HARVEY TOOL™

Your Specials Are Our Standards™

Precision at Your Fingertips

Fully stocked miniature and specialty cutting tools engineered for the toughest cuts.



Fall 2025 US Catalog

Think **Harvey Tool** First

Unique Selection

We offer a comprehensive selection of more than 31,000 miniature and specialty cutting tools that are all fully stocked. The breadth and depth of our products help solve the industry's toughest machining challenges.



Quality Products

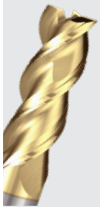
We are committed to designing unique geometries that optimize cutting performance for a variety of materials and applications. We introduce hundreds of new tools into the market every 6 months, offering our customers the solutions they need most.

Same-Day Shipping

Our fully stocked inventory is ready to ship day of purchase. We offer second day delivery at ground pricing, and any overnight orders ship until 7:00 p.m. EST. For additional shipping information and stock availability, please visit **HarveyTool.com.**

HARVEY PERFORMANCE COMPANY

Harvey Performance Company combines the leading Harvey Tool, Helical Solutions, Micro 100, Titan USA, CoreHog, Valor Holemaking, and ATA SGSPRO brands to provide world class tooling, unmatchred service, and innovative solutions that increase productivity for our customers.



Helical

Let Helical Impress You

Material-optimized high performance carbide end mills. Run faster, push harder, machine smarter.



MICRO 100

Make More with Micro 100

Exceptional quality turning tools designed for durability and performance in a range of difficult-to-machine materials.



TITAN USA

Trust in Titan USA

Broad assortment of quality, fully stocked cutting tools at exceptional value.



COREHOG

Innovative Tools for Innovative Materials

The industry's most innovative and advanced composite and honeycomb core cutting tools.



VALOR HOLEMAKING

Victory Starts with Valor Holemaking

High performance drills & complementary tooling solutions that revolutionize CNC holemaking.



ata sgspro

Superior Grinding and Finishing Solutions

More than 1,200 precision-engineered carbide burs with options tailored to every grinding application.

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What We Offer



Miniature End Mills pg 9

Select from over **10,000** miniature end mills down to .001” cutter diameter, available in a variety of styles and profiles.



Material Specific End Mills pg 111

Achieve the best results in high temp alloys, medium alloys, free machining steels, aluminum alloys, graphite, plastics, composites, wood, and more with over **6,700** high performance end mills.



Undercutting End Mills pg 304

Over **1,100** options, with 3 different wrap angles: 300°, 270°, and 220°.



Drill/End Mills pg 321

Over **600** options, with cutter diameters from 1/64" to 1".



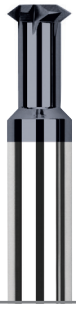
Chamfer Cutters pg 333

Over **1,300** options, with diameters from 1/32” to 1” and 21 different angles per side.



Engraving Cutters pg 363

Over **1,000** options, available with 17 included angles and a variety of styles.



Double Angle Shank Cutters pg 386

Over **700** options in multiple styles and reach lengths and 14 included angles.

Keyseat Cutters pg 397



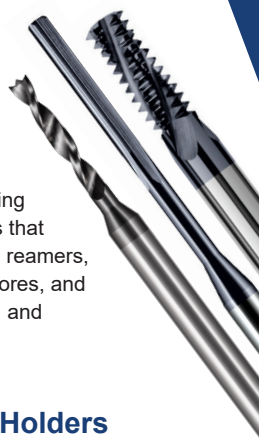
Over **2,200** options, with cutter diameters from 1/16” to 1-1/2”.

Slitting Saws pg 428



Over **250** coated and uncoated options, with thicknesses from .0100” to .2500”.

Holemaking & Threading pg 465



Solve a variety of holemaking challenges from spotting to threading with over **5,000** options that include miniature drills, reamers, countersinks, counterbores, and single-form, multi-form, and tri-form thread mills.



Corner Rounding End Mills pg 434

Over **900** options, with over 100 radii from .003” to 5/8”.



Dovetail Cutters pg 450

Over **600** options, with 17 included angles.



Tool Holders pg 567

Pair our exceptional tooling with different styles and reaches of tool holders. Choices range from Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, and ER Performance Collets.

30,000+ Tools

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Think **Harvey Tool** First

FEATURED SOLUTIONS

Mold Tool & Die

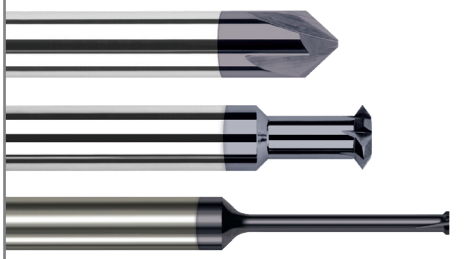
Building complex cavities requires **high performance tooling** that can mill **precise contours** while leaving **superior part finish.** Harvey Tool offers a selection of **tapered end mills** with unique geometries that are perfect for tackling the tough machining requirements of the **die and mold making** industries.



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Corner Conditioning

Whether prepping a corner for functional or aesthetic reasons, Harvey Tool has a variety of unique and **hard-to-find profiles** for machining **corner requirements** and features. With multiple **angle options, reaches, and styles,** we are confident that our tools can solve any corner conditioning challenge.



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Finishing

Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances and reduce witness marks.**



Finishers for Hardened Steels	127
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Double Ended

While all tools experience normal wear over time, Harvey Tool's double-ended tooling offering allows you to experience **twice your tool's longevity.** Simply flip your tool over to its second cutting side and continue your machining.



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Deburring

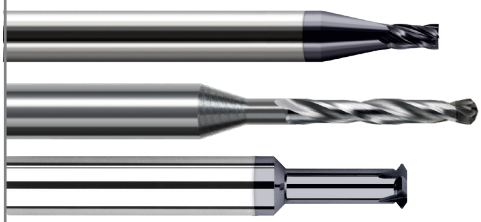
Deburring parts can be tiresome, expensive, and time-consuming, especially if done by hand. Harvey Tool's engineers have created a variety of **CNC-toleranced** deburring tools that allow you to deburr **in your CNC machine,** providing better finish, **reduced part and labor costs,** and increased capacity.



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Metric Tooling

Our metric product offering includes high performance end mills and drills each with specialized geometry that will enhance tool results in a **variety of materials**. Featuring **tight tolerances** for ultra-precision micromachining and larger shank diameters for **increased rigidity,** these products will improve performance, decrease cycle times, and save you money.



See Metic featured solutions online today at harveytool.com/products/featured-solutions/metric-tooling

Shop **Featured Solutions** Online Today

While ALL of our stocked products can be found in our full product catalog, our Featured Solutions series presents strategically grouped tools from across our catalog for easy reference.

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Machining Advisor Pro generates customized running parameters for your specific setup and material to take your Harvey Tool products further at the spindle.

Optimized for More Than 41,000 Products
Increase material removal rates and boost shop productivity with customized running parameters, specifically tailored for Harvey Tool, Helical Solutions and Valor Holemaking products.

Customizable Speeds & Feeds
Generate specialized machining parameters by pairing your tool with your exact path, material, and machine setup.

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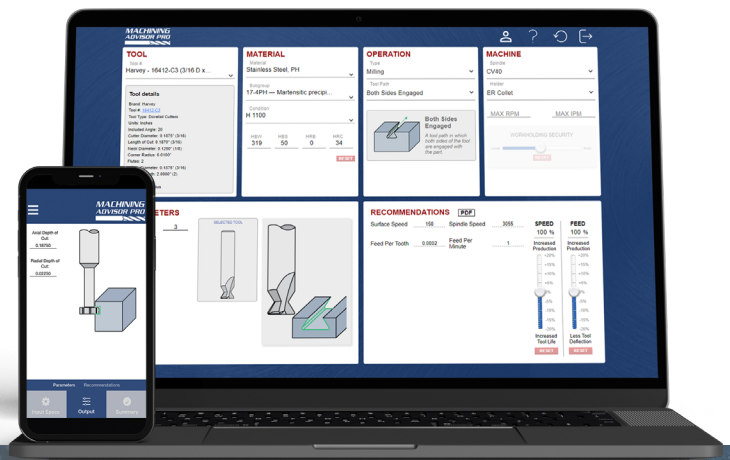
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A Machinist Favorite

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Ryan S.
Shop Owner, Avella, PA

MINIATURE END MILLS

SQUARE

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NEW SIZES!

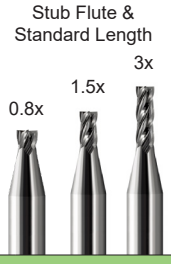
MINIATURE END MILLS

Square – Stub & Standard



- **Cutter diameter down to .001**
- Center cutting
- Solid carbide
- CNC ground in the USA





SQUARE

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
.001	**.001** (1.5x)	1/8	1-1/2	13901			64.70								
.001	**.003** (3x)	1/8	1-1/2	72001			64.70								
.002	**.003** (1.5x)	1/8	1-1/2	13902			56.30								
.002	**.006** (3x)	1/8	1-1/2	72002			56.30								
.003	**.004** (1.5x)	1/8	1-1/2	13903			48.50								
.003	**.009** (3x)	1/8	1-1/2	72003			48.50								
.004 (.1 mm)	**.006** (1.5x)	1/8	1-1/2	13904			41.60								
.004 (.1 mm)	**.012** (3x)	1/8	1-1/2	72004			41.60								
.005	**.007** (1.5x)	1/8	1-1/2	13905	823005	14005*	37.70	13905-C3	823005-C3	14005-C3*	43.60				
.005	**.015** (3x)	1/8	1-1/2	72005	836305	73005*	37.70	72005-C3	836305-C3	73005-C3*	43.60	72005-C4		73005-C4*	52.60
.006	**.009** (1.5x)	1/8	1-1/2	13906		14006*	38.50	13906-C3		14006-C3*	44.40				
.006	**.018** (3x)	1/8	1-1/2	72006	836306	73006*	38.50	72006-C3	836306-C3	73006-C3*	44.40	72006-C4		73006-C4*	53.50
.007	**.010** (1.5x)	1/8	1-1/2	13907		14007*	37.80	13907-C3		14007-C3*	43.70				
.007	**.021** (3x)	1/8	1-1/2	72007	836307	73007*	38.50	72007-C3	836307-C3	73007-C3*	44.40	72007-C4		73007-C4*	53.50
.008 (.2 mm)	**.012** (1.5x)	1/8	1-1/2	13908		14008*	37.80	13908-C3		14008-C3*	43.70				
.008 (.2 mm)	**.024** (3x)	1/8	1-1/2	72008	836308	73008*	38.50	72008-C3	836308-C3	73008-C3*	44.40	72008-C4		73008-C4*	53.50
.009	**.013** (1.5x)	1/8	1-1/2	13909		14009*	37.80	13909-C3		14009-C3*	43.70			14009-C4*	52.70
.009	**.027** (3x)	1/8	1-1/2	72009	836309	73009*	37.80	72009-C3	836309-C3	73009-C3*	43.70				
.010	**.008** (0.8x)	1/8	1-1/2			771310	31.10			771310-C3	37.10				
.010	**.015** (1.5x)	1/8	1-1/2	13910	823010	14010	29.80	13910-C3	823010-C3	14010-C3	35.70	13910-C4		14010-C4	44.70
.010	**.030** (3x)	1/8	1-1/2	72010	836310	73010	29.80	72010-C3	836310-C3	73010-C3	35.70	72010-C4		73010-C4	44.70
.011	**.016** (1.5x)	1/8	1-1/2	13911		14011	30.30	13911-C3		14011-C3	36.20				
.011	**.033** (3x)	1/8	1-1/2	72011	836311	73011	31.00	72011-C3	836311-C3	73011-C3	37.00			73011-C4	46.00
.012 (.3 mm)	**.018** (1.5x)	1/8	1-1/2	13912	823012	14012	30.30	13912-C3	823012-C3	14012-C3	36.20	13912-C4		14012-C4	45.30
.012 (.3 mm)	**.036** (3x)	1/8	1-1/2	72012	836312	73012	31.00	72012-C3	836312-C3	73012-C3	37.00	72012-C4		73012-C4	46.00
.013	**.019** (1.5x)	1/8	1-1/2	13913		14013	30.30	13913-C3		14013-C3	36.20				
.013	**.039** (3x)	1/8	1-1/2	72013	836313	73013	30.30	72013-C3	836313-C3	73013-C3	36.20			73013-C4	45.30
.014	**.021** (1.5x)	1/8	1-1/2	13914		14014	30.30	13914-C3		14014-C3	36.20				
.014	**.042** (3x)	1/8	1-1/2	72014	836314	73014	30.30	72014-C3	836314-C3	73014-C3	36.20			73014-C4	45.30
.015 (1/64)	**.012** (0.8x)	1/8	1-1/2			771315	26.50			771315-C3	32.40				
.015 (1/64)	**.022** (1.5x)	1/8	1-1/2	13915	823015	14015	24.80	13915-C3	823015-C3	14015-C3	30.70	13915-C4		14015-C4	39.80
.015 (1/64)	**.045** (3x)	1/8	1-1/2	72015	836315	73015	24.80	72015-C3	836315-C3	73015-C3	30.70	72015-C4	836315-C4	73015-C4	39.80
.016 (.4 mm)	**.024** (1.5x)	1/8	1-1/2	13916	823016	14016	27.30	13916-C3	823016-C3	14016-C3	33.20	13916-C4			42.20
.016 (.4 mm)	**.048** (3x)	1/8	1-1/2	72016	836316	73016	27.30	72016-C3	836316-C3	73016-C3	33.20			73016-C4	42.20
.017	**.026** (1.5x)	1/8	1-1/2	13917		14017	27.30	13917-C3		14017-C3	33.20				
.017	**.051** (3x)	1/8	1-1/2	72017	836317	73017	27.30	72017-C3	836317-C3	73017-C3	33.20			73017-C4	42.20
.018	**.027** (1.5x)	1/8	1-1/2	13918		14018	27.30	13918-C3		14018-C3	33.20				
.018	**.054** (3x)	1/8	1-1/2	72018	836318	73018	27.30	72018-C3	836318-C3	73018-C3	33.20	72018-C4		73018-C4	42.20
.019	**.029** (1.5x)	1/8	1-1/2	13919		14019	27.30	13919-C3		14019-C3	33.20				

Coated sizes down to .005"!

*End cutting (not center cutting)

continued on next page

MINIATURE END MILLS

Square – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED				AMORPHOUS DIAMOND			
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
	.019	**.057** (3x)	1/8	1-1/2	72019	836319	73019	27.30	72019-C3	836319-C3	73019-C3	33.20			73019-C4	42.20
	.020 (.5 mm)	**.016** (0.8x)	1/8	1-1/2	733420		771320	25.30	733420-C3		771320-C3	31.20				
	.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	13920	823020	14020	23.80	13920-C3	823020-C3	14020-C3	29.70	13920-C4		14020-C4	38.70
NEW	.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	72020	836320	73020	23.80	72020-C3	836320-C3	73020-C3	29.70	72020-C4	836320-C4	73020-C4	38.70
	.021	**.031** (1.5x)	1/8	1-1/2	13921		14021	26.00	13921-C3		14021-C3	31.90				
	.021	**.063** (3x)	1/8	1-1/2	72021	836321	73021	26.00	72021-C3	836321-C3	73021-C3	31.90			73021-C4	40.90
	.022	**.033** (1.5x)	1/8	1-1/2	13922		14022	26.00	13922-C3		14022-C3	31.90				
	.022	**.066** (3x)	1/8	1-1/2	72022	836322	73022	26.00	72022-C3	836322-C3	73022-C3	31.90			73022-C4	40.90
	.023	**.035** (1.5x)	1/8	1-1/2	13923	823023	14023	26.00	13923-C3	823023-C3	14023-C3	31.90	13923-C4			40.90
	.023	**.069** (3x)	1/8	1-1/2	72023	836323	73023	26.00	72023-C3	836323-C3	73023-C3	31.90			73023-C4	40.90
	.024 (.6 mm)	**.036** (1.5x)	1/8	1-1/2	13924		14024	26.00	13924-C3		14024-C3	31.90				
	.024 (.6 mm)	**.072** (3x)	1/8	1-1/2	72024	836324	73024	26.00	72024-C3	836324-C3	73024-C3	31.90	72024-C4		73024-C4	40.90
	.025	**.020** (0.8x)	1/8	1-1/2			771325	23.30			771325-C3	29.20				
	.025	**.037** (1.5x)	1/8	1-1/2	13925	823025	14025	21.90	13925-C3	823025-C3	14025-C3	27.80	13925-C4		14025-C4	36.80
	.025	**.075** (3x)	1/8	1-1/2	72025	836325	73025	21.90	72025-C3	836325-C3	73025-C3	27.80	72025-C4		73025-C4	36.80
	.026	**.039** (1.5x)	1/8	1-1/2	13926		14026	24.10	13926-C3		14026-C3	30.00				
	.026	**.078** (3x)	1/8	1-1/2	72026	836326	73026	24.10	72026-C3	836326-C3	73026-C3	30.00			73026-C4	39.00
	.027	**.041** (1.5x)	1/8	1-1/2	13927		14027	24.10	13927-C3		14027-C3	30.00				
	.027	**.081** (3x)	1/8	1-1/2	72027	836327	73027	24.10	72027-C3	836327-C3	73027-C3	30.00			73027-C4	39.00
	.028 (.7 mm)	**.042** (1.5x)	1/8	1-1/2	13928		14028	24.10	13928-C3		14028-C3	30.00				
	.028 (.7 mm)	**.084** (3x)	1/8	1-1/2	72028	836328	73028	24.10	72028-C3	836328-C3	73028-C3	30.00			73028-C4	39.00
	.029	**.043** (1.5x)	1/8	1-1/2	13929		14029	24.10	13929-C3		14029-C3	30.00				
	.029	**.087** (3x)	1/8	1-1/2	72029	836329	73029	24.10	72029-C3	836329-C3	73029-C3	30.00			73029-C4	39.00
	.030	**.045** (1.5x)	1/8	1-1/2	13930	823030	14030	21.90	13930-C3	823030-C3	14030-C3	27.80	13930-C4		14030-C4	36.80
	.030	**.090** (3x)	1/8	1-1/2	72030	836330	73030	21.90	72030-C3	836330-C3	73030-C3	27.80	72030-C4		73030-C4	36.80
	.031 (1/32)	**.025** (0.8x)	1/8	1-1/2	733431	736531	771331	23.50	733431-C3	736531-C3	771331-C3	29.40				
	.031 (1/32)	**.046** (1.5x)	1/8	1-1/2	13931	823031	14031	21.90	13931-C3	823031-C3	14031-C3	27.80	13931-C4		14031-C4	36.80
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	72031	836331	73031	21.90	72031-C3	836331-C3	73031-C3	27.80	72031-C4	836331-C4	73031-C4	36.80
	.032	**.048** (1.5x)	1/8	1-1/2	13932		14032	24.10	13932-C3		14032-C3	30.00				
	.032	**.096** (3x)	1/8	1-1/2	72032		73032	24.10	72032-C3		73032-C3	30.00				
	.033	**.049** (1.5x)	1/8	1-1/2	13933		14033	24.10	13933-C3		14033-C3	30.00				
	.033	**.099** (3x)	1/8	1-1/2	72033		73033	24.10	72033-C3		73033-C3	30.00				
	.034	**.051** (1.5x)	1/8	1-1/2	13934		14034	24.10	13934-C3		14034-C3	30.00				
	.034	**.102** (3x)	1/8	1-1/2	72034		73034	24.10	72034-C3		73034-C3	30.00				
	.035 (.9 mm)	**.028** (0.8x)	1/8	1-1/2			771335	20.40			771335-C3	26.40				
	.035 (.9 mm)	**.052** (1.5x)	1/8	1-1/2	13935	823035	14035	19.10	13935-C3	823035-C3	14035-C3	25.00			14035-C4	34.00
	.035 (.9 mm)	**.105** (3x)	1/8	1-1/2	72035	836335	73035	19.10	72035-C3	836335-C3	73035-C3	25.00	72035-C4		73035-C4	34.00
	.036	**.054** (1.5x)	1/8	1-1/2	13936		14036	20.80	13936-C3		14036-C3	26.70				
	.036	**.108** (3x)	1/8	1-1/2	72036		73036	20.80	72036-C3		73036-C3	26.70				
	.037	**.055** (1.5x)	1/8	1-1/2	13937		14037	20.80	13937-C3		14037-C3	26.70				
	.037	**.111** (3x)	1/8	1-1/2	72037		73037	20.80	72037-C3		73037-C3	26.70				
	.038	**.057** (1.5x)	1/8	1-1/2	13938		14038	20.80	13938-C3		14038-C3	26.70				
	.038	**.114** (3x)	1/8	1-1/2	72038	836338	73038	20.80	72038-C3	836338-C3	73038-C3	26.70			73038-C4	35.70
	.039 (1 mm)	**.031** (0.8x)	1/8	1-1/2			771339	21.90			771339-C3	27.80				
	.039 (1 mm)	**.058** (1.5x)	1/8	1-1/2	13939	823039	14039	20.60	13939-C3	823039-C3	14039-C3	26.50				
	.039 (1 mm)	**.117** (3x)	1/8	1-1/2	72039	836339	73039	20.60	72039-C3	836339-C3	73039-C3	26.50	72039-C4		73039-C4	35.50
	.040	**.032** (0.8x)	1/8	1-1/2			771340	20.80			771340-C3	26.70				

*End cutting (not center cutting)

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
.040	**.060**	(1.5x)	1/8	1-1/2	13940	823040	14040	19.10	13940-C3	823040-C3	14040-C3	25.00	13940-C4		14040-C4	34.00
.040	**.120**	(3x)	1/8	1-1/2	72040	836340	73040	19.10	72040-C3	836340-C3	73040-C3	25.00	72040-C4		73040-C4	34.00
.041	**.062**	(1.5x)	1/8	1-1/2	13941		14041	20.80	13941-C3		14041-C3	26.70				
.041	**.123**	(3x)	1/8	1-1/2	72041		73041	20.80	72041-C3		73041-C3	26.70				
.042	**.063**	(1.5x)	1/8	1-1/2	13942		14042	20.80	13942-C3		14042-C3	26.70				
.042	**.126**	(3x)	1/8	1-1/2	72042		73042	20.80	72042-C3		73042-C3	26.70				
.043 (1.1 mm)	**.065**	(1.5x)	1/8	1-1/2	13943		14043	20.80	13943-C3		14043-C3	26.70				
.043 (1.1 mm)	**.129**	(3x)	1/8	1-1/2	72043	836343	73043	20.80	72043-C3	836343-C3	73043-C3	26.70				
.044	**.066**	(1.5x)	1/8	1-1/2	13944		14044	20.80	13944-C3		14044-C3	26.70				
.044	**.132**	(3x)	1/8	1-1/2	72044	836344	73044	20.80	72044-C3	836344-C3	73044-C3	26.70			73044-C4	35.70
.045	**.067**	(1.5x)	1/8	1-1/2	13945	823045	14045	19.20	13945-C3	823045-C3	14045-C3	25.10			14045-C4	34.20
.045	**.135**	(3x)	1/8	1-1/2	72045	836345	73045	19.10	72045-C3	836345-C3	73045-C3	25.00	72045-C4		73045-C4	34.00
.046	**.069**	(1.5x)	1/8	1-1/2			14046	20.80			14046-C3	26.70				
.046	**.138**	(3x)	1/8	1-1/2	72046	836346	73046	20.80	72046-C3	836346-C3	73046-C3	26.70				
.047 (3/64)	**.038**	(0.8x)	1/8	1-1/2			771347	20.80			771347-C3	26.70				
.047 (3/64)	**.070**	(1.5x)	1/8	1-1/2	13947	823047	14047	19.10	13947-C3	823047-C3	14047-C3	25.00	13947-C4		14047-C4	34.00
.047 (3/64)	**.141**	(3x)	1/8	1-1/2	72047	836347	73047	19.10	72047-C3	836347-C3	73047-C3	25.00	72047-C4		73047-C4	34.00
.048	**.144**	(3x)	1/8	1-1/2	72048		73048	20.80	72048-C3		73048-C3	26.70				
.049	**.147**	(3x)	1/8	1-1/2	72049		73049	20.80	72049-C3		73049-C3	26.70				
.050	**.040**	(0.8x)	1/8	1-1/2			771350	20.80			771350-C3	26.70				
.050	**.075**	(1.5x)	1/8	1-1/2	13950	823050	14050	19.10	13950-C3	823050-C3	14050-C3	25.00	13950-C4		14050-C4	34.00
.050	**.150**	(3x)	1/8	1-1/2	72050	836350	73050	19.10	72050-C3	836350-C3	73050-C3	25.00	72050-C4		73050-C4	34.00
.051 (1.3 mm)	**.077**	(1.5x)	1/8	1-1/2			14051	21.10			14051-C3	27.00				
.051 (1.3 mm)	**.153**	(3x)	1/8	1-1/2	72051		73051	20.80	72051-C3		73051-C3	26.70				
.052	**.078**	(1.5x)	1/8	1-1/2	13952		14052	20.80	13952-C3		14052-C3	26.70				
.052	**.156**	(3x)	1/8	1-1/2	72052	836352	73052	20.80	72052-C3	836352-C3	73052-C3	26.70	72052-C4			35.70
.053	**.080**	(1.5x)	1/8	1-1/2			14053	20.80			14053-C3	26.70				
.053	**.159**	(3x)	1/8	1-1/2	72053	836353	73053	20.80	72053-C3	836353-C3	73053-C3	26.70			73053-C4	35.70
.054	**.162**	(3x)	1/8	1-1/2	72054		73054	20.80	72054-C3		73054-C3	26.70				
.055 (1.4 mm)	**.044**	(0.8x)	1/8	1-1/2			771355	20.80			771355-C3	26.70				
.055 (1.4 mm)	**.082**	(1.5x)	1/8	1-1/2	13955	823055	14055	19.10	13955-C3	823055-C3	14055-C3	25.00	13955-C4		14055-C4	34.00
.055 (1.4 mm)	**.165**	(3x)	1/8	1-1/2	72055	836355	73055	19.10	72055-C3	836355-C3	73055-C3	25.00	72055-C4		73055-C4	34.00
.056	**.168**	(3x)	1/8	1-1/2	72056		73056	20.80	72056-C3		73056-C3	26.70				
.057	**.086**	(1.5x)	1/8	1-1/2			14057	20.80			14057-C3	26.70				
.057	**.171**	(3x)	1/8	1-1/2	72057	836357	73057	20.80	72057-C3	836357-C3	73057-C3	26.70	72057-C4		73057-C4	35.70
.058	**.087**	(1.5x)	1/8	1-1/2			14058	20.80			14058-C3	26.70				
.058	**.174**	(3x)	1/8	1-1/2	72058		73058	20.80	72058-C3		73058-C3	26.70			73058-C4	35.70
.059 (1.5 mm)	**.089**	(1.5x)	1/8	1-1/2	13959	823059	14059	20.80	13959-C3	823059-C3	14059-C3	26.70				
.059 (1.5 mm)	**.177**	(3x)	1/8	1-1/2	72059	836359	73059	20.80	72059-C3	836359-C3	73059-C3	26.70			73059-C4	35.70
.060	**.048**	(0.8x)	1/8	1-1/2			771360	20.80			771360-C3	26.70				
.060	**.090**	(1.5x)	1/8	1-1/2	13960	823060	14060	19.10	13960-C3	823060-C3	14060-C3	25.00			14060-C4	34.00
.060	**.180**	(3x)	1/8	1-1/2	72060	836360	73060	19.10	72060-C3	836360-C3	73060-C3	25.00	72060-C4		73060-C4	34.00
.061	**.183**	(3x)	1/8	1-1/2			73061	20.90			73061-C3	26.80				
.062 (1/16)	**.050**	(0.8x)	1/8	1-1/2	733462	736562	771362	21.50	733462-C3	736562-C3	771362-C3	27.40				
.062 (1/16)	**.093**	(1.5x)	1/8	1-1/2	13962	823062	14062	17.10	13962-C3	823062-C3	14062-C3	23.00	13962-C4	823062-C4	14062-C4	32.10
.062 (1/16)	**.186**	(3x)	1/8	1-1/2	72062	836362	73062	17.10	72062-C3	836362-C3	73062-C3	23.00	72062-C4	836362-C4	73062-C4	32.10

*End cutting (not center cutting)

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MINIATURE END MILLS

Square – Stub & Standard (cont.)

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CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
.063 (1.6 mm)	**.095**	(1.5x)	1/8	1-1/2			14063	20.90			14063-C3	26.80				
.063 (1.6 mm)	**.189**	(3x)	1/8	1-1/2			73063	20.90			73063-C3	26.80				
.064	**.096**	(1.5x)	1/8	1-1/2			14064	17.90			14064-C3	23.80				
.064	**.192**	(3x)	1/8	1-1/2	72064		73064	20.90	72064-C3		73064-C3	26.80				
.065	**.097**	(1.5x)	1/8	1-1/2	13965	823065	14065	17.40	13965-C3	823065-C3	14065-C3	23.40			14065-C4	32.40
.065	**.195**	(3x)	1/8	1-1/2	72065	836365	73065	17.40	72065-C3	836365-C3	73065-C3	23.40	72065-C4		73065-C4	32.40
.066	**.198**	(3x)	1/8	1-1/2			73066	20.90			73066-C3	26.80				
.067 (1.7 mm)	**.201**	(3x)	1/8	1-1/2			73067	20.90			73067-C3	26.80				
.068	**.204**	(3x)	1/8	1-1/2			73068	20.90			73068-C3	26.80				
.069	**.207**	(3x)	1/8	1-1/2			73069	20.90			73069-C3	26.80				
.070	**.056**	(0.8x)	1/8	1-1/2			771370	18.90			771370-C3	24.80				
.070	**.105**	(1.5x)	1/8	1-1/2	13970	823070	14070	17.40	13970-C3	823070-C3	14070-C3	23.40			14070-C4	32.40
.070	**.210**	(3x)	1/8	1-1/2	72070	836370	73070	17.40	72070-C3	836370-C3	73070-C3	23.40	72070-C4		73070-C4	32.40
.071 (1.8 mm)	**.107**	(1.5x)	1/8	1-1/2			14071	20.90			14071-C3	26.80				
.071 (1.8 mm)	**.213**	(3x)	1/8	1-1/2	72071		73071	20.90	72071-C3		73071-C3	26.80				
.072	**.108**	(1.5x)	1/8	1-1/2			14072	20.90			14072-C3	26.80				
.072	**.216**	(3x)	1/8	1-1/2	72072		73072	20.90	72072-C3		73072-C3	26.80				
.073	**.219**	(3x)	1/8	1-1/2			73073	20.90			73073-C3	26.80				
.074	**.222**	(3x)	1/8	1-1/2			73074	20.90			73074-C3	26.80				
.075 (1.9 mm)	**.060**	(0.8x)	1/8	1-1/2			771375	18.90			771375-C3	24.80				
.075 (1.9 mm)	**.112**	(1.5x)	1/8	1-1/2	13975	823075	14075	17.40	13975-C3	823075-C3	14075-C3	23.40				
.075 (1.9 mm)	**.225**	(3x)	1/8	1-1/2	72075	836375	73075	17.40	72075-C3	836375-C3	73075-C3	23.40			73075-C4	32.40
.076	**.228**	(3x)	1/8	1-1/2			73076	20.90			73076-C3	26.80				
.077	**.231**	(3x)	1/8	1-1/2			73077	20.90			73077-C3	26.80				
.078 (5/64)	**.062**	(0.8x)	1/8	1-1/2			771378	18.80			771378-C3	24.70				
.078 (5/64)	**.117**	(1.5x)	1/8	1-1/2	13978	823078	14078	17.10	13978-C3	823078-C3	14078-C3	23.00	13978-C4		14078-C4	32.10
.078 (5/64)	**.234**	(3x)	1/8	1-1/2	72078	836378	73078	17.10	72078-C3	836378-C3	73078-C3	23.00	72078-C4	836378-C4	73078-C4	32.10
.079	**.237**	(3x)	1/8	1-1/2			73079	20.90			73079-C3	26.80				
.080	**.120**	(1.5x)	1/8	1-1/2	13980	823080	14080	17.40	13980-C3	823080-C3	14080-C3	23.40				
.080	**.240**	(3x)	1/8	1-1/2	72080	836380	73080	17.10	72080-C3	836380-C3	73080-C3	23.00	72080-C4		73080-C4	32.10
.081	**.243**	(3x)	1/8	1-1/2			73081	20.90			73081-C3	26.80				
.082	**.246**	(3x)	1/8	1-1/2			73082	20.90			73082-C3	26.80				
.083 (2.1 mm)	**.249**	(3x)	1/8	1-1/2			73083	20.90			73083-C3	26.80				
.084	**.252**	(3x)	1/8	1-1/2			73084	20.90			73084-C3	26.80				
.085	**.068**	(0.8x)	1/8	1-1/2			771385	18.90			771385-C3	24.80				
.085	**.127**	(1.5x)	1/8	1-1/2	13985	823085	14085	17.40	13985-C3	823085-C3	14085-C3	23.40				
.085	**.255**	(3x)	1/8	1-1/2	72085	836385	73085	17.40	72085-C3	836385-C3	73085-C3	23.40			73085-C4	32.40
.086	**.258**	(3x)	1/8	1-1/2			73086	20.90			73086-C3	26.80				
.087 (2.2 mm)	**.261**	(3x)	1/8	1-1/2			73087	20.90			73087-C3	26.80				
.088	**.132**	(1.5x)	1/8	1-1/2			14088	17.90			14088-C3	23.80				
.088	**.264**	(3x)	1/8	1-1/2			73088	20.90			73088-C3	26.80				
.089	**.267**	(3x)	1/8	1-1/2			73089	20.90			73089-C3	26.80				
.090	**.072**	(0.8x)	1/8	1-1/2			771390	18.60			771390-C3	24.50				
.090	**.135**	(1.5x)	1/8	1-1/2	13990	823090	14090	17.10	13990-C3	823090-C3	14090-C3	23.00			14090-C4	32.10
.090	**.270**	(3x)	1/8	1-1/2	72090	836390	73090	17.10	72090-C3	836390-C3	73090-C3	23.00	72090-C4		73090-C4	32.10
.091 (2.3 mm)	**.273**	(3x)	1/8	1-1/2			73091	20.90			73091-C3	26.80				
.092	**.276**	(3x)	1/8	1-1/2			73092	20.90			73092-C3	26.80			73092-C4	35.80

*End cutting (not center cutting)

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NEW SIZES!

MINIATURE END MILLS

Square – Stub & Standard (cont.)

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SQUARE

CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				ALTiN COATED				AMORPHOUS DIAMOND				
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	
.093 (3/32)	**.074**	(0.8x)	1/8	1-1/2	733493	736593	771393	18.90	733493-C3	736593-C3	771393-C3	24.80					
.093 (3/32)	**.139**	(1.5x)	1/8	1-1/2	13993	823093	14093	17.10	13993-C3	823093-C3	14093-C3	23.00	13993-C4		14093-C4	32.10	
.093 (3/32)	**.279**	(3x)	1/8	1-1/2	72093	836393	73093	17.10	72093-C3	836393-C3	73093-C3	23.00	72093-C4	836393-C4	73093-C4	32.10	
.094 (2.4 mm)	**.141**	(1.5x)	1/8	1-1/2			14094	21.20			14094-C3	27.10					
.094 (2.4 mm)	**.282**	(3x)	1/8	1-1/2	72094		73094	20.90	72094-C3		73094-C3	26.80					
.095	**.142**	(1.5x)	1/8	1-1/2	13995	823095	14095	17.40	13995-C3	823095-C3	14095-C3	23.40					
.095	**.285**	(3x)	1/8	1-1/2	72095	836395	73095	17.40	72095-C3	836395-C3	73095-C3	23.40			73095-C4	32.40	
.096	**.288**	(3x)	1/8	1-1/2			73096	20.90			73096-C3	26.80					
.097	**.291**	(3x)	1/8	1-1/2			73097	20.90			73097-C3	26.80					
.098 (2.5 mm)	**.147**	(1.5x)	1/8	1-1/2			14098	20.90			14098-C3	26.80					
.098 (2.5 mm)	**.294**	(3x)	1/8	1-1/2	72098		73098	20.90	72098-C3		73098-C3	26.80					
.099	**.297**	(3x)	1/8	1-1/2			73099	20.90			73099-C3	26.80					
.100	**.150**	(1.5x)	1/8	1-1/2	13999	823100	14099	17.40	13999-C3	823100-C3	14099-C3	23.40	13999-C4		14099-C4	32.40	
.100	**.300**	(3x)	1/8	1-1/2	72100	836400	73100	17.10	72100-C3	836400-C3	73100-C3	23.00	72100-C4		73100-C4	32.10	
.101	**.303**	(3x)	1/8	1-1/2			73101	20.90			73101-C3	26.80					
.102 (2.6 mm)	**.153**	(1.5x)	1/8	1-1/2			50306	20.90			50306-C3	26.80					NEW
.102 (2.6 mm)	**.306**	(3x)	1/8	1-1/2			73102	20.90			73102-C3	26.80					
.103	**.155**	(1.5x)	1/8	1-1/2			14103	20.90			14103-C3	26.80					
.103	**.309**	(3x)	1/8	1-1/2			73103	20.90			73103-C3	26.80					
.104	**.312**	(3x)	1/8	1-1/2			73104	20.90			73104-C3	26.80					
.105	**.158**	(1.5x)	1/8	1-1/2	50200		50300	17.40	50200-C3		50300-C3	23.40					
.105	**.315**	(3x)	1/8	1-1/2	72105		73105	17.10	72105-C3		73105-C3	23.00			73105-C4	32.10	
.106 (2.7 mm)	**.318**	(3x)	1/8	1-1/2			73106	20.90			73106-C3	26.80					
.107	**.321**	(3x)	1/8	1-1/2			73107	20.90			73107-C3	26.80					
.108	**.324**	(3x)	1/8	1-1/2			73108	20.90			73108-C3	26.80					
.109 (7/64)	**.087**	(0.8x)	1/8	1-1/2			771402	18.60			771402-C3	24.50					
.109 (7/64)	**.164**	(1.5x)	1/8	1-1/2	50201	823102	50301	17.10	50201-C3	823102-C3	50301-C3	23.00					
.109 (7/64)	**.327**	(3x)	1/8	1-1/2	72109	836402	73109	17.10	72109-C3	836402-C3	73109-C3	23.00			73109-C4	32.10	
.110	**.165**	(1.5x)	1/8	1-1/2	50202		50302	17.10	50202-C3		50302-C3	23.00					
.110	**.330**	(3x)	1/8	1-1/2	72110		73110	17.10	72110-C3		73110-C3	23.00			73110-C4	32.10	
.111 (2.8 mm)	**.333**	(3x)	1/8	1-1/2			73111	20.90			73111-C3	26.80					
.112	**.336**	(3x)	1/8	1-1/2			73112	20.90			73112-C3	26.80					
.113	**.339**	(3x)	1/8	1-1/2			73113	20.90			73113-C3	26.80					
.114 (2.9 mm)	**.341**	(3x)	1/8	1-1/2			73114	20.90			73114-C3	26.80					
.115	**.173**	(1.5x)	1/8	1-1/2	50203		50303	17.10	50203-C3		50303-C3	23.00					
.115	**.345**	(3x)	1/8	1-1/2	72115		73115	17.10	72115-C3		73115-C3	23.00			73115-C4	32.10	
.116	**.348**	(3x)	1/8	1-1/2			73116	20.90			73116-C3	26.80					
.117	**.351**	(3x)	1/8	1-1/2			73117	20.90			73117-C3	26.80					
.118 (3 mm)	**.177**	(1.5x)	1/8	1-1/2	50204	823105	50304	17.90	50204-C3	823105-C3	50304-C3	23.80			50304-C4	32.80	
.118 (3 mm)	**.354**	(3x)	1/8	1-1/2	72118	836405	73118	17.50	72118-C3	836405-C3	73118-C3	23.50	72118-C4		73118-C4	32.50	
.119	**.357**	(3x)	1/8	1-1/2			73119	20.90			73119-C3	26.80					
.120	**.180**	(1.5x)	1/8	1-1/2	50205		50305	17.10	50205-C3		50305-C3	23.00					
.120	**.360**	(3x)	1/8	1-1/2	72120	836406	73120	17.10	72120-C3	836406-C3	73120-C3	23.00			73120-C4	32.10	
.121	**.363**	(3x)	1/8	1-1/2			73121	20.90			73121-C3	26.80					
.122	**.366**	(3x)	1/8	1-1/2			73189	20.90			73189-C3	26.80					
.123	**.369**	(3x)	1/8	1-1/2			73123	20.90			73123-C3	26.80					
.124	**.372**	(3x)	1/8	1-1/2			73124	20.90			73124-C3	26.80					

*End cutting (not center cutting)

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MINIATURE END MILLS

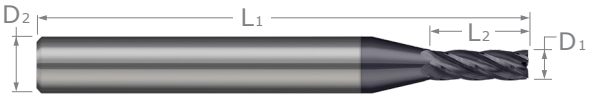
Square – Stub & Standard (cont.)

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	CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
	D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
	.125 (1/8)	**.100**	(0.8x)	1/8	1-1/2	733508	736608	771408	18.30	733508-C3	736608-C3	771408-C3	24.20				
NEW	.125 (1/8)	**.187**	(1.5x)	1/8	1-1/2	50208	823108	50308	16.60	50208-C3	823108-C3	50308-C3	22.50	50208-C4	823108-C4	50308-C4	31.60
	.125 (1/8)	**.375**	(3x)	1/8	1-1/2	72125	836408	73125	16.60	72125-C3	836408-C3	73125-C3	22.50	72125-C4	836408-C4	73125-C4	31.60
	.140 (9/64)	**.112**	(0.8x)	3/16	2			771409	19.50			771409-C3	25.70				
	.140 (9/64)	**.220**	(1.5x)	3/16	2	50209	823109	50309	18.20	50209-C3	823109-C3	50309-C3	24.50				
	.140 (9/64)	**.562**	(4x)	3/16	2	72140	836409	73140	18.20	72140-C3	836409-C3	73140-C3	24.50			73140-C4	36.80
	.156 (5/32)	**.125**	(0.8x)	3/16	2			771410	19.50			771410-C3	25.70				
NEW	.156 (5/32)	**.281**	(1.5x)	3/16	2	50210	823110	50310	18.20	50210-C3	823110-C3	50310-C3	24.50		823110-C4	50310-C4	36.80
	.156 (5/32)	**.562**	(3x)	3/16	2	72156	836410	73156	18.20	72156-C3	836410-C3	73156-C3	24.50	72156-C4	836410-C4	73156-C4	36.80
	.172 (11/64)	**.312**	(1.5x)	3/16	2	50211		50311	18.40	50211-C3		50311-C3	24.60				
	.172 (11/64)	**.625**	(3x)	3/16	2	72172	836411	73172	18.20	72172-C3	836411-C3	73172-C3	24.50				
	.187 (3/16)	**.150**	(0.8x)	3/16	2			771412	19.60			771412-C3	26.20				
NEW	.187 (3/16)	**.312**	(1.5x)	3/16	2	50212	823112	50312	18.20	50212-C3	823112-C3	50312-C3	24.50	50212-C4	823112-C4	50312-C4	36.80
	.187 (3/16)	**.625**	(3x)	3/16	2	72187	836412	73187	18.20	72187-C3	836412-C3	73187-C3	24.50	72187-C4	836412-C4	73187-C4	36.80
	.203 (13/64)	**.312**	(1.5x)	1/4	2-1/2			50313	19.90			50313-C3	28.00				
	.203 (13/64)	**.625**	(3x)	1/4	2-1/2	72190	836413	73190	19.90	72190-C3	836413-C3	73190-C3	28.00				
	.218 (7/32)	**.330**	(1.5x)	1/4	2-1/2	50214	823114	50314	19.90	50214-C3	823114-C3	50314-C3	28.50				
	.218 (7/32)	**.625**	(3x)	1/4	2-1/2	72193	836414	73193	19.90	72193-C3	836414-C3	73193-C3	28.00				
	.234 (15/64)	**.750**	(3x)	1/4	2-1/2	72195		73195	19.90	72195-C3		73195-C3	28.00				
	.250 (1/4)	**.200**	(0.8x)	1/4	2-1/2			771416	21.50			771416-C3	30.30				
	.250 (1/4)	**.375**	(1.5x)	1/4	2-1/2	50216	823116	50316	19.90	50216-C3	823116-C3	50316-C3	28.50	50216-C4		50316-C4	43.00
NEW	.250 (1/4)	**.750**	(3x)	1/4	2-1/2	72199	836416	73199	19.90	72199-C3	836416-C3	73199-C3	28.00	72199-C4	836416-C4	73199-C4	41.30
	.281 (9/32)	**.750**	(3x)	5/16	2-1/2			73122	27.10			73122-C3	37.20				
	.312 (5/16)	**.470**	(1.5x)	5/16	2-1/2	50220		50320	27.40	50220-C3		50320-C3	37.40				
	.312 (5/16)	**.812**	(3x)	5/16	2-1/2	15120		15220	27.10	15120-C3		15220-C3	37.20			15220-C4	52.60
	.343 (11/32)	**1.000**	(3x)	3/8	2-1/2			15222	38.80			15222-C3	50.20				
	.375 (3/8)	**.300**	(0.8x)	3/8	2-1/2			771424	38.00			771424-C3	49.40				
	.375 (3/8)	**.570**	(1.5x)	3/8	2-1/2	50224	823124	50324	36.50	50224-C3	823124-C3	50324-C3	48.00	50224-C4		50324-C4	65.80
	.375 (3/8)	**1.000**	(3x)	3/8	2-1/2	15124	836424	15224	36.20	15124-C3	836424-C3	15224-C3	47.60			15224-C4	65.30
	.437 (7/16)	**1.000**	(2x)	7/16	2-3/4			15228	57.80			15228-C3	71.30				
	.500 (1/2)	**.500**	(1x)	1/2	3			50332	59.60			50332-C3	76.60				
	.500 (1/2)	**1.000**	(2x)	1/2	3	15132	836432	15232	63.00	15132-C3	836432-C3	15232-C3	80.00	15132-C4		15232-C4	98.70

MINIATURE END MILLS

Square – Stub & Standard – 5 Flute



- Cutter diameter down to .015"
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_4 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.015 (1/64)	.023 (1.5x)	1/8	1-1/2	739415	27.40	739415-C3	33.30
.015 (1/64)	.045 (3x)	1/8	1-1/2	742015	29.20	742015-C3	35.10
.020 (.5 mm)	.030 (1.5x)	1/8	1-1/2	739420	27.40	739420-C3	33.30
.020 (.5 mm)	.060 (3x)	1/8	1-1/2	742020	29.20	742020-C3	35.10
.025	.038 (1.5x)	1/8	1-1/2	739425	27.40	739425-C3	33.30
.025	.075 (3x)	1/8	1-1/2	742025	29.20	742025-C3	35.10
.031 (1/32)	.047 (1.5x)	1/8	1-1/2	739431	25.50	739431-C3	31.50
.031 (1/32)	.093 (3x)	1/8	1-1/2	742031	27.80	742031-C3	33.70
.040	.060 (1.5x)	1/8	1-1/2	739440	25.50	739440-C3	31.50
.040	.120 (3x)	1/8	1-1/2	742040	26.90	742040-C3	32.80
.045	.068 (1.5x)	1/8	1-1/2	739445	25.50	739445-C3	31.50
.045	.135 (3x)	1/8	1-1/2	742045	26.90	742045-C3	32.80
.047 (3/64)	.071 (1.5x)	1/8	1-1/2	739447	25.50	739447-C3	31.50
.047 (3/64)	.141 (3x)	1/8	1-1/2	742047	26.90	742047-C3	32.80
.050	.075 (1.5x)	1/8	1-1/2	739450	25.50	739450-C3	31.50
.050	.150 (3x)	1/8	1-1/2	742050	26.90	742050-C3	32.80
.055	.083 (1.5x)	1/8	1-1/2	739455	25.50	739455-C3	31.50
.055	.165 (3x)	1/8	1-1/2	742055	26.90	742055-C3	32.80
.060	.090 (1.5x)	1/8	1-1/2	739460	25.50	739460-C3	31.50
.060	.180 (3x)	1/8	1-1/2	742060	26.90	742060-C3	32.80
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	739462	25.50	739462-C3	31.50
.062 (1/16)	.186 (3x)	1/8	1-1/2	742062	26.90	742062-C3	32.80
.070	.105 (1.5x)	1/8	1-1/2	739470	25.50	739470-C3	31.50
.070	.210 (3x)	1/8	1-1/2	742070	26.90	742070-C3	32.80
.075	.113 (1.5x)	1/8	1-1/2	739475	25.50	739475-C3	31.50
.075	.225 (3x)	1/8	1-1/2	742075	26.90	742075-C3	32.80
.078 (5/64)	.117 (1.5x)	1/8	1-1/2	739478	25.50	739478-C3	31.50
.078 (5/64)	.234 (3x)	1/8	1-1/2	742078	26.90	742078-C3	32.80
.080	.120 (1.5x)	1/8	1-1/2	739480	25.50	739480-C3	31.50
.080	.240 (3x)	1/8	1-1/2	742080	26.90	742080-C3	32.80
.085	.128 (1.5x)	1/8	1-1/2	739485	25.50	739485-C3	31.50
.085	.255 (3x)	1/8	1-1/2	742085	26.90	742085-C3	32.80
.090	.135 (1.5x)	1/8	1-1/2	739490	25.50	739490-C3	31.50
.090	.270 (3x)	1/8	1-1/2	742090	26.90	742090-C3	32.80
.093 (3/32)	.140 (1.5x)	1/8	1-1/2	739493	25.50	739493-C3	31.50
.093 (3/32)	.279 (3x)	1/8	1-1/2	742093	26.90	742093-C3	32.80
.109 (7/64)	.164 (1.5x)	1/8	1-1/2	739502	25.50	739502-C3	31.50
.109 (7/64)	.327 (3x)	1/8	1-1/2	742102	26.90	742102-C3	32.80
.118 (3 mm)	.177 (1.5x)	1/8	1-1/2	739505	25.50	739505-C3	31.50
.118 (3 mm)	.354 (3x)	1/8	1-1/2	742105	26.90	742105-C3	32.80

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MINIATURE END MILLS

Square – Stub & Standard – 5 Flute (cont.)

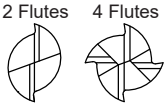
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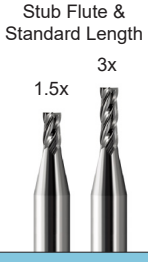
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_4 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.125 (1/8)	.187 (1.5x)	1/8	1-1/2	739508	23.80	739508-C3	29.70
.125 (1/8)	.375 (3x)	1/8	1-1/2	742108	25.10	742108-C3	31.00
.140 (9/64)	.220 (1.5x)	3/16	2	739509	27.50	739509-C3	33.70
.140 (9/64)	.562 (3x)	3/16	2	742109	29.00	742109-C3	35.20
.156 (5/32)	.281 (1.5x)	3/16	2	739510	27.50	739510-C3	33.70
.156 (5/32)	.562 (3x)	3/16	2	742110	29.00	742110-C3	35.20
.187 (3/16)	.312 (1.5x)	3/16	2	739512	27.50	739512-C3	34.00
.187 (3/16)	.625 (3x)	3/16	2	742112	29.00	742112-C3	35.40
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	739516	32.60	739516-C3	41.40
.250 (1/4)	.750 (3x)	1/4	2-1/2	742116	34.30	742116-C3	43.00
.375 (3/8)	.570 (1.5x)	3/8	2-1/2	739524	48.80	739524-C3	60.20
.375 (3/8)	1.000 (3x)	3/8	2-1/2	742124	52.00	742124-C3	63.40
.500 (1/2)	.750 (1.5x)	1/2	3	739532	73.50	739532-C3	89.10
.500 (1/2)	1.000 (2x)	1/2	3	742132	80.00	742132-C3	95.60

MINIATURE END MILLS

Square – Stub & Standard – Metric







SQUARE

- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
D_1 $^{+.00mm}_{-.02mm}$	L_2 $^{+.25mm}_{-.00mm}$	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
.500 mm	.75 (1.5x)	3 mm	38 mm	740811	740711	25.00	740811-C3	740711-C3	30.90
.500 mm	1.50 (3x)	3 mm	38 mm	741411	743411	25.00	741411-C3	743411-C3	30.90
1.00 mm	1.50 (1.5x)	3 mm	38 mm	740822	740722	21.00	740822-C3	740722-C3	26.90
1.00 mm	3.00 (3x)	3 mm	38 mm	741422	743422	21.00	741422-C3	743422-C3	26.90
1.20 mm	3.50 (3x)	3 mm	38 mm	741427	743427	21.20	741427-C3	743427-C3	27.10
1.40 mm	4.00 (3x)	3 mm	38 mm	741431	743431	21.20	741431-C3	743431-C3	27.10
1.50 mm	2.20 (1.5x)	3 mm	38 mm	740833	740733	21.20	740833-C3	740733-C3	27.10
1.50 mm	4.50 (3x)	3 mm	38 mm	741433	743433	21.20	741433-C3	743433-C3	27.10
1.60 mm	5.00 (3x)	3 mm	38 mm	741436	743436	21.20	741436-C3	743436-C3	27.10
1.80 mm	5.50 (3x)	3 mm	38 mm	741440	743440	21.20	741440-C3	743440-C3	27.10
2.00 mm	3.00 (1.5x)	3 mm	38 mm	740845	740745	21.00	740845-C3	740745-C3	26.90
2.00 mm	6.00 (3x)	3 mm	38 mm	741445	743445	21.00	741445-C3	743445-C3	26.90
2.50 mm	7.50 (3x)	3 mm	38 mm	741451	743451	21.20	741451-C3	743451-C3	27.10
3.00 mm	4.50 (1.5x)	3 mm	38 mm	740857	740757	19.70	740857-C3	740757-C3	25.60
3.00 mm	9.00 (3x)	3 mm	38 mm	741457	743457	19.70	741457-C3	743457-C3	25.60

D_1 $^{+.00mm}_{-.04mm}$	L_2 $^{+.75mm}_{-.00mm}$	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
3.50 mm	5.00 (1.5x)	4 mm	50 mm	740859	740759	21.90	740859-C3	740759-C3	28.10
3.50 mm	10.00 (3x)	4 mm	50 mm	741459	743459	21.90	741459-C3	743459-C3	28.10
4.00 mm	6.00 (1.5x)	4 mm	50 mm	740861	740761	21.90	740861-C3	740761-C3	28.10
4.00 mm	12.00 (3x)	4 mm	50 mm	741461	743461	21.90	741461-C3	743461-C3	28.10
4.50 mm	13.00 (3x)	5 mm	50 mm	741462	743462	26.90	741462-C3	743462-C3	34.40
5.00 mm	7.50 (1.5x)	5 mm	50 mm	740864	740764	26.90	740864-C3	740764-C3	34.40
5.00 mm	15.00 (3x)	5 mm	50 mm	741464	743464	26.90	741464-C3	743464-C3	34.40
6.00 mm	9.00 (1.5x)	6 mm	50 mm	740866	740766	28.10	740866-C3	740766-C3	35.60
6.00 mm	18.00 (3x)	6 mm	50 mm	741466	743466	28.10	741466-C3	743466-C3	35.60
7.00 mm	10.00 (1.5x)	8 mm	63 mm	740868	740768	34.50	740868-C3	740768-C3	45.90
7.00 mm	21.00 (3x)	8 mm	63 mm	741468	743468	34.50	741468-C3	743468-C3	45.90
8.00 mm	12.00 (1.5x)	8 mm	63 mm	740870	740770	34.50	740870-C3	740770-C3	45.90
8.00 mm	24.00 (3x)	8 mm	63 mm	741470	743470	34.50	741470-C3	743470-C3	45.90
9.00 mm	13.00 (1.5x)	10 mm	75 mm	740871	740771	56.80	740871-C3	740771-C3	70.10
9.00 mm	27.00 (3x)	10 mm	75 mm	741471	743471	56.80	741471-C3	743471-C3	70.10
10.00 mm	15.00 (1.5x)	10 mm	75 mm	740873	740773	59.00	740873-C3	740773-C3	72.20
10.00 mm	30.00 (3x)	10 mm	75 mm	741473	743473	59.00	741473-C3	743473-C3	72.20
11.00 mm	16.00 (1.5x)	12 mm	75 mm	740874	740774	65.30	740874-C3	740774-C3	80.90
11.00 mm	32.00 (3x)	12 mm	75 mm	741474	743474	65.30	741474-C3	743474-C3	80.90
12.00 mm	18.00 (1.5x)	12 mm	75 mm	740876	740776	67.40	740876-C3	740776-C3	82.90
12.00 mm	36.00 (3x)	12 mm	75 mm	741476	743476	67.40	741476-C3	743476-C3	82.90

MINIATURE END MILLS

Square – Long Flute



Stocked in 9 Lengths of Cut!

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.004	**.020** (5x)	3	1/8	2-1/2	31804	54.70				
.005	**.025** (5x)	3	1/8	2-1/2	31805	53.80				
.005	**.040** (8x)	3	1/8	2-1/2	33605	57.10				
.006	**.030** (5x)	3	1/8	2-1/2	31806	53.80				
.006	**.048** (8x)	3	1/8	2-1/2	33606	57.10				
.008	**.040** (5x)	3	1/8	2-1/2	31808	53.80				
.008	**.064** (8x)	3	1/8	2-1/2	33608	57.10				
.010	**.040** (4x)	3	1/8	2-1/2	888410	45.50	888410-C3	51.40		
.010	**.050** (5x)	3	1/8	2-1/2	12710	45.70	12710-C3	51.60	12710-C4	60.70
.010	**.050** (5x)	4	1/8	2-1/2	834110	47.70	834110-C3	53.70		
.010	**.060** (6x)	3	1/8	2-1/2	894210	54.80	894210-C3	60.70		
.010	**.070** (7x)	3	1/8	2-1/2	897910	63.90	897910-C3	69.90		
.010	**.080** (8x)	3	1/8	2-1/2	33610	81.60	33610-C3	87.50		
.010	**.100** (10x)	3	1/8	2-1/2	951310	86.20	951310-C3	92.10		
.012	**.060** (5x)	3	1/8	2-1/2	31812	46.40	31812-C3	52.30		
.012	**.096** (8x)	3	1/8	2-1/2	33612	81.60	33612-C3	87.50		
.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	888415	41.90	888415-C3	47.90		
.015 (1/64)	**.062** (4x)	4	1/8	2-1/2	836915	43.80	836915-C3	49.70		
.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	31815	41.90	31815-C3	47.90	31815-C4	57.00
.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	834115	43.80	834115-C3	49.70		
.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	894215	50.10	894215-C3	56.10		
.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	897915	58.40	897915-C3	64.40		
.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	33615	73.50	33615-C3	79.40	33615-C4	88.60
.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	826815	75.20	826815-C3	81.10		
.015 (1/64)	**.156** (10x)	3	1/8	2-1/2	951315	82.10	951315-C3	88.00		
.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	34915	90.60	34915-C3	96.50		
.017	**.085** (5x)	3	1/8	2-1/2	31817	46.40	31817-C3	52.30		
.017	**.136** (8x)	3	1/8	2-1/2	33617	80.80	33617-C3	86.70		
.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	888420	35.80	888420-C3	41.70		
.020 (.5 mm)	**.080** (4x)	4	1/8	2-1/2	836920	38.20	836920-C3	44.10		
.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12720	35.80	12720-C3	41.70	12720-C4	51.40
.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	834120	38.20	834120-C3	44.10		
.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	894220	43.10	894220-C3	49.00		
.020 (.5 mm)	**.120** (6x)	4	1/8	2-1/2	758020	46.40	758020-C3	52.30		
.020 (.5 mm)	**.140** (7x)	3	1/8	2-1/2	897920	50.10	897920-C3	56.10		
.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	33620	70.30	33620-C3	76.20	33620-C4	85.30
.020 (.5 mm)	**.160** (8x)	4	1/8	2-1/2	826820	74.20	826820-C3	80.10		
.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	951320	78.80	951320-C3	84.70		
NEW .020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	34920	87.20	34920-C3	93.10	34920-C4	103.00
.020 (.5 mm)	**.300** (15x)	3	1/8	2-1/2	35820	106.00	35820-C3	111.90		
.024	**.120** (5x)	3	1/8	2-1/2	31824	34.20	31824-C3	40.10		
.024	**.192** (8x)	3	1/8	2-1/2	33624	69.60	33624-C3	75.60		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.025	**.100** (4x)	3	1/8	2-1/2	888425	34.20	888425-C3	40.10			
.025	**.125** (5x)	3	1/8	2-1/2	12725	34.20	12725-C3	40.10	12725-C4	49.70	
.025	**.125** (5x)	4	1/8	2-1/2	834125	36.10	834125-C3	42.00			
.025	**.150** (6x)	3	1/8	2-1/2	894225	41.20	894225-C3	47.10			
.025	**.175** (7x)	3	1/8	2-1/2	897925	48.00	897925-C3	53.90			
.025	**.203** (8x)	3	1/8	2-1/2	33625	68.50	33625-C3	74.40	33625-C4	83.40	
.025	**.203** (8x)	4	1/8	2-1/2	826825	70.40	826825-C3	76.30			
.025	**.250** (10x)	3	1/8	2-1/2	951325	72.80	951325-C3	78.70			
.025	**.312** (12x)	3	1/8	2-1/2	34925	77.30	34925-C3	83.20			
.028	**.140** (5x)	4	1/8	2-1/2	834128	36.10	834128-C3	42.00			NEW
.028	**.224** (8x)	4	1/8	2-1/2	826828	70.40	826828-C3	76.30			NEW
.030	**.125** (4x)	3	1/8	2-1/2	888430	33.00	888430-C3	38.90			
.030	**.150** (5x)	3	1/8	2-1/2	12730	33.00	12730-C3	38.90	12730-C4	48.50	
.030	**.156** (5x)	4	1/8	2-1/2	834130	34.90	834130-C3	40.80			
.030	**.187** (6x)	3	1/8	2-1/2	894230	39.40	894230-C3	45.40			
.030	**.218** (7x)	3	1/8	2-1/2	897930	46.10	897930-C3	52.00			
.030	**.250** (8x)	3	1/8	2-1/2	33630	65.00	33630-C3	70.90	33630-C4	80.80	
.030	**.312** (10x)	3	1/8	2-1/2	951330	69.50	951330-C3	75.50			
.030	**.375** (12x)	3	1/8	2-1/2	34930	73.10	34930-C3	79.00			
.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	888431	33.00	888431-C3	38.90	888431-C4	48.50	
.031 (1/32)	**.125** (4x)	4	1/8	2-1/2	836931	34.90	836931-C3	40.80			
.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	31831	33.00	31831-C3	38.90	31831-C4	48.50	
.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	834131	34.60	834131-C3	40.50	834131-C4	50.30	
.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	894231	39.40	894231-C3	45.40	894231-C4	55.10	
.031 (1/32)	**.187** (6x)	4	1/8	2-1/2	12531	41.40	12531-C3	47.30			
.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	897931	46.10	897931-C3	52.00			
.031 (1/32)	**.218** (7x)	4	1/8	2-1/2	810331	48.00	810331-C3	53.90			
.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	33631	65.00	33631-C3	70.90	33631-C4	80.00	
.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	826831	66.80	826831-C3	72.80			
.031 (1/32)	**.281** (9x)	3	1/8	2-1/2	837831	68.20	837831-C3	74.10			
.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	951331	68.90	951331-C3	74.80	951331-C4	83.90	
.031 (1/32)	**.312** (10x)	4	1/8	2-1/2	802631	72.10	802631-C3	78.10			
.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	34931	73.10	34931-C3	79.00	34931-C4	88.20	
.031 (1/32)	**.375** (12x)	4	1/8	2-1/2	818031	75.50	818031-C3	81.40			
.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	35831	99.00	35831-C3	104.90			
.035 (.9 mm)	**.140** (4x)	3	1/8	2-1/2	888435	33.00	888435-C3	38.90			
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12735	33.00	12735-C3	38.90	12735-C4	48.50	
.035 (.9 mm)	**.187** (5x)	4	1/8	2-1/2	834135	35.40	834135-C3	41.30			
.035 (.9 mm)	**.218** (6x)	3	1/8	2-1/2	894235	39.40	894235-C3	45.40			
.035 (.9 mm)	**.250** (7x)	3	1/8	2-1/2	897935	46.10	897935-C3	52.00			
.035 (.9 mm)	**.280** (8x)	3	1/8	2-1/2	33635	65.00	33635-C3	70.90	33635-C4	80.00	
.035 (.9 mm)	**.350** (10x)	3	1/8	2-1/2	951335	68.90	951335-C3	74.80			
.035 (.9 mm)	**.425** (12x)	3	1/8	2-1/2	34935	74.30	34935-C3	80.20			
.039 (1 mm)	**.156** (4x)	3	1/8	2-1/2	888439	33.40	888439-C3	39.30			
.039 (1 mm)	**.156** (4x)	4	1/8	2-1/2	836939	35.80	836939-C3	41.70			
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	31839	33.40	31839-C3	39.30	31839-C4	49.00	
.039 (1 mm)	**.203** (5x)	4	1/8	2-1/2	834139	35.80	834139-C3	41.70			

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MINIATURE END MILLS

Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.039 (1 mm)	**.240** (6x)	3	1/8	2-1/2	894239	52.70	894239-C3	58.60		
.039 (1 mm)	**.281** (7x)	3	1/8	2-1/2	897939	59.50	897939-C3	65.40		
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	33639	65.50	33639-C3	71.40		
.039 (1 mm)	**.325** (8x)	4	1/8	2-1/2	826839	67.10	826839-C3	73.00		
.039 (1 mm)	**.400** (10x)	3	1/8	2-1/2	951339	69.50	951339-C3	75.50		
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	34939	74.60	34939-C3	80.50		
.040	**.160** (4x)	3	1/8	2-1/2	888440	33.00	888440-C3	38.90		
.040	**.160** (4x)	4	1/8	2-1/2	836940	36.00	836940-C3	41.90		
.040	**.200** (5x)	3	1/8	2-1/2	12740	33.00	12740-C3	38.90	12740-C4	48.50
.040	**.203** (5x)	4	1/8	2-1/2	834140	34.90	834140-C3	40.80		
.040	**.240** (6x)	3	1/8	2-1/2	894240	39.40	894240-C3	45.40		
.040	**.281** (7x)	3	1/8	2-1/2	897940	46.10	897940-C3	52.00		
.040	**.281** (7x)	4	1/8	2-1/2	810340	47.90	810340-C3	53.80		
.040	**.325** (8x)	3	1/8	2-1/2	33640	65.00	33640-C3	70.90	33640-C4	80.00
.040	**.325** (8x)	4	1/8	2-1/2	826840	66.80	826840-C3	72.80		
.040	**.400** (10x)	3	1/8	2-1/2	951340	68.90	951340-C3	74.80		
.040	**.480** (12x)	3	1/8	2-1/2	34940	74.30	34940-C3	80.20		
.045	**.187** (4x)	3	1/8	2-1/2	888445	33.00	888445-C3	38.90		
.045	**.225** (5x)	3	1/8	2-1/2	12745	33.00	12745-C3	38.90	12745-C4	48.50
.045	**.225** (5x)	4	1/8	2-1/2	834145	34.90	834145-C3	40.80		
.045	**.281** (6x)	3	1/8	2-1/2	894245	39.40	894245-C3	45.40		
.045	**.325** (7x)	3	1/8	2-1/2	897945	46.10	897945-C3	52.00		
.045	**.375** (8x)	3	1/8	2-1/2	33645	65.00	33645-C3	70.90		
.045	**.450** (10x)	3	1/8	2-1/2	951345	68.90	951345-C3	74.80		
.045	**.550** (12x)	3	1/8	2-1/2	34945	74.30	34945-C3	80.20		
.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	888447	33.00	888447-C3	38.90	888447-C4	48.50
.047 (3/64)	**.187** (4x)	4	1/8	2-1/2	836947	34.90	836947-C3	40.80		
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	31847	33.00	31847-C3	38.90	31847-C4	48.50
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	834147	34.60	834147-C3	40.50	834147-C4	50.10
.047 (3/64)	**.281** (6x)	3	1/8	2-1/2	894247	39.40	894247-C3	45.40		
NEW .047 (3/64)	**.281** (6x)	4	1/8	2-1/2	12547	41.30	12547-C3	47.20		
.047 (3/64)	**.328** (7x)	3	1/8	2-1/2	897947	46.10	897947-C3	52.00		
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	33647	63.60	33647-C3	69.50	33647-C4	78.70
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	826847	65.50	826847-C3	71.40		
.047 (3/64)	**.480** (10x)	3	1/8	2-1/2	951347	68.90	951347-C3	74.80		
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	34947	73.10	34947-C3	79.00	34947-C4	88.90
.047 (3/64)	**.710** (15x)	3	1/8	2-1/2	35847	93.20	35847-C3	99.10		
.050	**.203** (4x)	3	1/8	2-1/2	888450	33.00	888450-C3	38.90		
.050	**.203** (4x)	4	1/8	2-1/2	836950	35.40	836950-C3	41.30		
.050	**.250** (5x)	3	1/8	2-1/2	31850	33.00	31850-C3	38.90		
.050	**.250** (5x)	4	1/8	2-1/2	834150	34.90	834150-C3	40.80		
.050	**.300** (6x)	3	1/8	2-1/2	12750	33.00	12750-C3	38.90	12750-C4	48.50
.050	**.300** (6x)	4	1/8	2-1/2	12550	34.90	12550-C3	40.80		
.050	**.350** (7x)	3	1/8	2-1/2	897950	46.10	897950-C3	52.00		
.050	**.400** (8x)	3	1/8	2-1/2	33650	65.00	33650-C3	70.90	33650-C4	80.00
.050	**.500** (10x)	3	1/8	2-1/2	951350	69.50	951350-C3	75.50		
.050	**.600** (12x)	3	1/8	2-1/2	34950	73.10	34950-C3	79.00		

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.055 (1.4 mm)	**.220** (4x)	3	1/8	2-1/2	888455	29.40	888455-C3	35.30		
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	31855	29.40	31855-C3	35.30	31855-C4	45.20
.055 (1.4 mm)	**.275** (5x)	4	1/8	2-1/2	834155	31.70	834155-C3	37.60		
.055 (1.4 mm)	**.330** (6x)	3	1/8	2-1/2	894255	32.00	894255-C3	37.90		
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12755	33.00	12755-C3	38.90	12755-C4	48.50
.055 (1.4 mm)	**.385** (7x)	4	1/8	2-1/2	810355	34.90	810355-C3	40.80		
.055 (1.4 mm)	**.450** (8x)	3	1/8	2-1/2	33655	46.70	33655-C3	52.60		
.055 (1.4 mm)	**.560** (10x)	3	1/8	2-1/2	951355	51.30	951355-C3	57.20		
.055 (1.4 mm)	**.660** (12x)	3	1/8	2-1/2	34955	74.30	34955-C3	80.20		
.059 (1.5 mm)	**.295** (5x)	3	1/8	2-1/2	31859	30.70	31859-C3	36.60		
.059 (1.5 mm)	**.472** (8x)	3	1/8	2-1/2	12759	30.70	12759-C3	36.60		
.060	**.250** (4x)	3	1/8	2-1/2	888460	29.40	888460-C3	35.30		
.060	**.250** (4x)	4	1/8	2-1/2	836960	32.30	836960-C3	38.20		
.060	**.312** (5x)	3	1/8	2-1/2	31860	29.40	31860-C3	35.30		
.060	**.312** (5x)	4	1/8	2-1/2	834160	31.10	834160-C3	37.10		
.060	**.375** (6x)	3	1/8	2-1/2	894260	30.50	894260-C3	36.40		
.060	**.375** (6x)	4	1/8	2-1/2	12560	31.50	12560-C3	37.40		
.060	**.437** (7x)	3	1/8	2-1/2	897960	32.00	897960-C3	37.90		
.060	**.500** (8x)	3	1/8	2-1/2	12760	33.40	12760-C3	39.30	12760-C4	49.00
.060	**.500** (8x)	4	1/8	2-1/2	826860	35.80	826860-C3	41.70		
.060	**.625** (10x)	3	1/8	2-1/2	951360	58.10	951360-C3	64.00		
.060	**.720** (12x)	3	1/8	2-1/2	34960	74.30	34960-C3	80.20		
.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	888462	29.40	888462-C3	35.30	888462-C4	44.90
.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	836962	31.70	836962-C3	37.60	836962-C4	47.20
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	31862	29.40	31862-C3	35.30	31862-C4	44.90
.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	834162	31.70	834162-C3	37.60	834162-C4	47.20
.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	894262	30.50	894262-C3	36.40	894262-C4	46.10
.062 (1/16)	**.375** (6x)	4	1/8	2-1/2	12562	31.50	12562-C3	37.40	12562-C4	46.90
.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	897962	32.00	897962-C3	37.90	897962-C4	47.50
.062 (1/16)	**.437** (7x)	4	1/8	2-1/2	810362	33.10	810362-C3	39.00		
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	33662	33.40	33662-C3	39.30	33662-C4	49.00
.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	826862	35.30	826862-C3	41.20	826862-C4	50.90
.062 (1/16)	**.562** (9x)	3	1/8	2-1/2	837862	38.70	837862-C3	44.60		
.062 (1/16)	**.562** (9x)	4	1/8	2-1/2	770862	40.50	770862-C3	46.40		
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	951362	42.10	951362-C3	48.10	951362-C4	57.20
.062 (1/16)	**.625** (10x)	4	1/8	2-1/2	802662	45.40	802662-C3	51.30		
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	34962	57.20	34962-C3	63.10	34962-C4	72.30
.062 (1/16)	**.750** (12x)	4	1/8	2-1/2	818062	59.60	818062-C3	65.50		
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	35862	82.10	35862-C3	88.00	35862-C4	97.20
.062 (1/16)	**.950** (15x)	4	1/8	2-1/2	740362	84.50	740362-C3	90.40		
.065	**.325** (5x)	3	1/8	2-1/2	31865	29.40	31865-C3	35.30		
.065	**.500** (8x)	3	1/8	2-1/2	12765	33.00	12765-C3	38.90	12765-C4	48.80
.065	**.650** (10x)	3	1/8	2-1/2	951365	51.30	951365-C3	57.20		
.070	**.281** (4x)	3	1/8	2-1/2	888470	31.70	888470-C3	37.60		
.070	**.375** (5x)	3	1/8	2-1/2	31870	29.40	31870-C3	35.30	31870-C4	45.20
.070	**.375** (5x)	4	1/8	2-1/2	834170	32.30	834170-C3	38.20		

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Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.070	**.500** (7x)	3	1/8	2-1/2	12770	33.00	12770-C3	38.90	12770-C4	48.50
.070	**.700** (10x)	3	1/8	2-1/2	951370	51.30	951370-C3	57.20		
.070	**.850** (12x)	3	1/8	2-1/2	34970	57.90	34970-C3	63.80		
.075	**.300** (4x)	3	1/8	2-1/2	888475	32.30	888475-C3	38.20		
.075	**.375** (5x)	3	1/8	2-1/2	31875	29.40	31875-C3	35.30		
.075	**.450** (6x)	3	1/8	2-1/2	894275	32.00	894275-C3	37.90		
.075	**.500** (7x)	3	1/8	2-1/2	12775	33.00	12775-C3	38.90	12775-C4	48.50
.075	**.531** (7x)	4	1/8	2-1/2	810375	35.00	810375-C3	40.90		
.075	**.750** (10x)	3	1/8	2-1/2	951375	51.30	951375-C3	57.20		
.075	**.900** (12x)	3	1/8	2-1/2	34975	57.90	34975-C3	63.80		
.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	888478	29.40	888478-C3	35.30	888478-C4	45.20
.078 (5/64)	**.312** (4x)	4	1/8	2-1/2	836978	31.70	836978-C3	37.60		
.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	31878	29.40	31878-C3	35.30	31878-C4	44.90
.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	834178	31.70	834178-C3	37.60	834178-C4	47.20
.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	894278	30.50	894278-C3	36.40		
.078 (5/64)	**.475** (6x)	4	1/8	2-1/2	12578	33.00	12578-C3	38.90		
.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	897978	32.00	897978-C3	37.90	897978-C4	47.70
.078 (5/64)	**.550** (7x)	4	1/8	2-1/2	810378	33.90	810378-C3	39.90		
.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	33678	33.40	33678-C3	39.30	33678-C4	49.00
.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	826878	36.40	826878-C3	42.40		
.078 (5/64)	**.800** (10x)	3	1/8	2-1/2	951378	41.40	951378-C3	47.30		
.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	34978	57.20	34978-C3	63.10	34978-C4	72.30
.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	35878	82.10	35878-C3	88.00	35878-C4	97.90
.080	**.320** (4x)	3	1/8	2-1/2	888480	29.90	888480-C3	35.80		
.080	**.406** (5x)	3	1/8	2-1/2	31880	29.40	31880-C3	35.30		
.080	**.406** (5x)	4	1/8	2-1/2	834180	32.30	834180-C3	38.20		
.080	**.750** (9x)	3	1/8	2-1/2	12780	33.50	12780-C3	39.40	12780-C4	49.30
.080	**.960** (12x)	3	1/8	2-1/2	34980	57.90	34980-C3	63.80		
.085	**.425** (5x)	3	1/8	2-1/2	31885	29.40	31885-C3	35.30		
.085	**.750** (9x)	3	1/8	2-1/2	12785	33.50	12785-C3	39.40	12785-C4	49.30
.090	**.450** (5x)	3	1/8	2-1/2	31890	29.40	31890-C3	35.30		
.090	**.450** (5x)	4	1/8	2-1/2	834190	32.30	834190-C3	38.20		
.090	**.750** (8x)	3	1/8	2-1/2	12790	33.40	12790-C3	39.30	12790-C4	49.20
.090	**.900** (10x)	3	1/8	2-1/2	951390	51.30	951390-C3	57.20		
.090	**1.080** (12x)	3	1/8	2-1/2	34990	59.10	34990-C3	65.00		
.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	888493	29.40	888493-C3	35.30	888493-C4	44.90
.093 (3/32)	**.375** (4x)	4	1/8	2-1/2	836993	31.70	836993-C3	37.60		
.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	31893	29.40	31893-C3	35.30	31893-C4	44.90
.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	834193	31.70	834193-C3	37.60	834193-C4	47.20
.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	894293	30.50	894293-C3	36.40	894293-C4	46.30
.093 (3/32)	**.585** (6x)	4	1/8	2-1/2	12593	31.20	12593-C3	37.20		
.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	897993	32.00	897993-C3	37.90	897993-C4	47.50
.093 (3/32)	**.670** (7x)	4	1/8	2-1/2	810393	33.60	810393-C3	39.50		
.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	33693	33.40	33693-C3	39.30	33693-C4	49.00
.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	826893	36.40	826893-C3	42.40		
.093 (3/32)	**.850** (9x)	3	1/8	2-1/2	837893	39.10	837893-C3	45.00		
.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	951393	41.40	951393-C3	47.30		
.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	34993	57.20	34993-C3	63.10	34993-C4	72.30
.093 (3/32)	**1.400** (15x)	3	1/8	3	35893	85.30	35893-C3	91.20	35893-C4	100.40

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Square – Long Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.095	**.500** (5x)	3	1/8	2-1/2	31895	29.40	31895-C3	35.30			
.095	**.750** (8x)	3	1/8	2-1/2	12795	33.00	12795-C3	38.90	12795-C4	48.80	
.095	**.950** (10x)	3	1/8	2-1/2	951395	51.30	951395-C3	57.20			
.100	**.400** (4x)	3	1/8	2-1/2	888500	29.40	888500-C3	35.30			
.100	**.500** (5x)	3	1/8	2-1/2	31899	29.40	31899-C3	35.30	31899-C4	45.20	
.100	**.500** (5x)	4	1/8	2-1/2	834200	31.70	834200-C3	37.60			
.100	**.600** (6x)	3	1/8	2-1/2	894300	30.50	894300-C3	36.40			
.100	**.700** (7x)	4	1/8	2-1/2	810400	33.30	810400-C3	39.20			
.100	**.750** (7.5x)	3	1/8	2-1/2	12799	33.00	12799-C3	38.90	12799-C4	48.50	
.100	**.800** (8x)	4	1/8	2-1/2	826900	36.10	826900-C3	42.00			
.100	**1.000** (10x)	3	1/8	2-1/2	951600	51.30	951600-C3	57.20			
.100	**1.200** (12x)	3	1/8	2-1/2	34999	57.90	34999-C3	63.80			
.102	**.510** (5x)	4	1/8	2-1/2	834299	31.70	834299-C3	37.60			NEW
.102	**.816** (8x)	4	1/8	2-1/2	826999	36.10	826999-C3	42.00			NEW
.105	**.530** (5x)	3	1/8	2-1/2	31901	30.30	31901-C3	36.20			
.109 (7/64)	**.437** (4x)	3	1/8	2-1/2	888502	29.40	888502-C3	35.30			
.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	31902	29.40	31902-C3	35.30	31902-C4	45.20	
.109 (7/64)	**.570** (5x)	4	1/8	2-1/2	834202	31.70	834202-C3	37.60			
.109 (7/64)	**.680** (6x)	3	1/8	2-1/2	894302	30.50	894302-C3	36.40			
.109 (7/64)	**.790** (7x)	3	1/8	2-1/2	898002	33.30	898002-C3	39.20			
.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	33702	33.30	33702-C3	39.20			
.109 (7/64)	**.900** (8x)	4	1/8	2-1/2	826902	36.30	826902-C3	42.20			
.109 (7/64)	**1.125** (10x)	3	1/8	2-1/2	951602	58.10	951602-C3	64.00			
.110	**.570** (5x)	3	1/8	2-1/2	31903	30.30	31903-C3	36.20			
.115	**.600** (5x)	3	1/8	2-1/2	31904	30.30	31904-C3	36.20			
.118 (3 mm)	**.475** (4x)	3	1/8	2-1/2	888505	29.80	888505-C3	35.70			
.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	31905	29.80	31905-C3	35.70	31905-C4	45.30	
.118 (3 mm)	**.625** (5x)	4	1/8	2-1/2	834205	31.60	834205-C3	37.50			
.118 (3 mm)	**.735** (6x)	3	1/8	2-1/2	894305	30.50	894305-C3	36.40			
.118 (3 mm)	**.840** (7x)	3	1/8	2-1/2	898005	33.30	898005-C3	39.20			
.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	33705	33.60	33705-C3	39.50			
.118 (3 mm)	**.950** (8x)	4	1/8	2-1/2	826905	35.60	826905-C3	41.50			
.118 (3 mm)	**1.187** (10x)	3	1/8	2-1/2	951605	58.50	951605-C3	64.50			
.120	**.625** (5x)	3	1/8	2-1/2	31906	30.70	31906-C3	36.60			

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	888508	28.90	888508-C3	34.80	888508-C4	44.30	
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	888508	28.90	888508-C3	34.80	888508-C4	44.30	
.125 (1/8)	**.500** (4x)	4	1/8	2-1/2	837008	31.80	837008-C3	37.70			
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	31908	28.90	31908-C3	34.80	31908-C4	44.30	
.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	834208	31.80	834208-C3	37.70	834208-C4	47.30	
.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	894308	29.90	894308-C3	35.80	894308-C4	45.50	
.125 (1/8)	**.750** (6x)	4	1/8	2-1/2	12508	31.80	12508-C3	37.70			
.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	898008	30.40	898008-C3	36.30	898008-C4	46.20	NEW
.125 (1/8)	**.875** (7x)	4	1/8	2-1/2	810408	33.60	810408-C3	39.50			
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	33708	31.10	33708-C3	37.10	33708-C4	46.60	
.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	826908	34.30	826908-C3	40.20			

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MINIATURE END MILLS

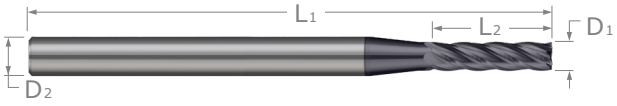
Square – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	**1.125** (9x)	3	1/8	2-1/2	837908	43.80	837908-C3	49.70		
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	951608	53.10	951608-C3	59.10	951608-C4	68.90
.125 (1/8)	**1.250** (10x)	4	1/8	2-1/2	802708	55.40	802708-C3	61.30		
.125 (1/8)	**1.500** (12x)	3	1/8	3	35008	60.80	35008-C3	66.70	35008-C4	75.90
.125 (1/8)	**1.500** (12x)	4	1/8	3	818108	63.20	818108-C3	69.10		
.125 (1/8)	**1.875** (15x)	3	1/8	3	35908	85.30	35908-C3	91.20	35908-C4	101.10
.140 (9/64)	**.562** (4x)	4	3/16	3	837009	31.80	837009-C3	38.30		
.140 (9/64)	**.750** (5x)	4	3/16	3	31909	31.80	31909-C3	38.30		
.140 (9/64)	**.875** (6x)	4	3/16	3	12509	34.30	12509-C3	40.90		
.140 (9/64)	**1.125** (8x)	4	3/16	3	33709	56.40	33709-C3	62.70		
.140 (9/64)	**1.450** (10x)	4	3/16	3	951609	66.60	951609-C3	73.30		
.156 (5/32)	**.625** (4x)	4	3/16	3	888510	29.60	888510-C3	36.10		
.156 (5/32)	**.750** (5x)	4	3/16	3	834210	29.60	834210-C3	36.10	834210-C4	47.40
.156 (5/32)	**.937** (6x)	3	3/16	3	894310	30.30	894310-C3	37.00		
.156 (5/32)	**1.000** (6x)	4	3/16	3	12510	32.10	12510-C3	38.70	12510-C4	49.90
.156 (5/32)	**1.093** (7x)	4	3/16	3	898010	38.00	898010-C3	44.50		
.156 (5/32)	**1.250** (8x)	4	3/16	3	33710	56.40	33710-C3	62.70		
.156 (5/32)	**1.570** (10x)	4	3/16	3	951610	66.60	951610-C3	73.30		
.156 (5/32)	**1.875** (12x)	4	3/16	4	35010	79.10	35010-C3	88.00	35010-C4	98.20
.172 (11/64)	**.875** (5x)	4	3/16	3	834211	32.40	834211-C3	39.00		
.172 (11/64)	**1.375** (8x)	4	3/16	3	33711	60.20	33711-C3	66.80		
.187 (3/16)	**.750** (4x)	4	3/16	3	888512	29.60	888512-C3	36.10	888512-C4	47.70
.187 (3/16)	**1.000** (5x)	4	3/16	3	834212	29.60	834212-C3	36.10	834212-C4	47.40
.187 (3/16)	**1.156** (6x)	3	3/16	3	894312	30.30	894312-C3	37.00		
.187 (3/16)	**1.125** (6x)	4	3/16	3	12512	32.10	12512-C3	38.70	77012	49.90
.187 (3/16)	**1.312** (7x)	4	3/16	3	898012	38.00	898012-C3	44.50		
.187 (3/16)	**1.500** (8x)	3	3/16	3	733612	54.00	733612-C3	60.60		
.187 (3/16)	**1.500** (8x)	4	3/16	3	33712	56.40	33712-C3	62.70	33712-C4	74.20
.187 (3/16)	**1.875** (10x)	4	3/16	4	951612	66.80	951612-C3	75.70		
.187 (3/16)	**2.250** (12x)	4	3/16	4	35012	79.10	35012-C3	88.00		
.218 (7/32)	**.875** (4x)	4	1/4	4	888514	34.50	888514-C3	43.10		
.218 (7/32)	**1.125** (5x)	4	1/4	4	834214	34.50	834214-C3	44.80		
.218 (7/32)	**1.750** (8x)	4	1/4	4	33714	43.40	33714-C3	52.00		
.218 (7/32)	**2.187** (10x)	4	1/4	4	951614	45.00	951614-C3	53.70		
.250 (1/4)	**1.000** (4x)	4	1/4	4	888516	33.80	888516-C3	42.50		
.250 (1/4)	**1.250** (5x)	4	1/4	4	834216	33.80	834216-C3	42.50	834216-C4	57.30
.250 (1/4)	**1.500** (6x)	3	1/4	4	894316	34.70	894316-C3	45.00		
.250 (1/4)	**1.500** (6x)	4	1/4	4	12516	36.30	12516-C3	46.70	77016	59.80
.250 (1/4)	**1.750** (7x)	4	1/4	4	898016	43.40	898016-C3	52.00		
.250 (1/4)	**2.000** (8x)	4	1/4	4	33716	60.30	33716-C3	70.50	33716-C4	83.80
.250 (1/4)	**2.500** (10x)	4	1/4	4	951616	72.50	951616-C3	82.70		
.250 (1/4)	**3.000** (12x)	4	1/4	6	35016	86.90	35016-C3	98.50		
.312 (5/16)	**1.625** (5x)	4	5/16	4	12520	52.40	12520-C3	62.80		
.375 (3/8)	**1.750** (5x)	4	3/8	4	12524	55.70	12524-C3	71.50	12524-C4	85.00
.375 (3/8)	**3.000** (8x)	4	3/8	6	33724	111.40	33724-C3	125.70		
.500 (1/2)	**2.000** (4x)	4	1/2	4	12532	78.50	12532-C3	95.70	12532-C4	113.60
.500 (1/2)	**3.000** (6x)	4	1/2	6	888532	152.20	888532-C3	171.60		

MINIATURE END MILLS

Square – Long Flute – 5 Flute

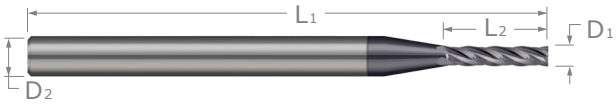


- **Long flute and long length design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.020 (.5 mm)	**.100** (5x)	1/8	2-1/2	707120	44.00	707120-C3	49.90
.020 (.5 mm)	**.160** (8x)	1/8	2-1/2	706920	45.30	706920-C3	51.20
.031 (1/32)	**.156** (5x)	1/8	2-1/2	707131	41.00	707131-C3	46.90
.031 (1/32)	**.250** (8x)	1/8	2-1/2	706931	42.10	706931-C3	48.10
.062 (1/16)	**.312** (5x)	1/8	2-1/2	707162	38.50	707162-C3	44.40
.062 (1/16)	**.500** (8x)	1/8	2-1/2	706962	39.00	706962-C3	44.90
.078 (5/64)	**.406** (5x)	1/8	2-1/2	707178	27.20	707178-C3	33.10
.078 (5/64)	**.625** (8x)	1/8	2-1/2	706978	39.00	706978-C3	44.90
.093 (3/32)	**.500** (5x)	1/8	2-1/2	707193	38.50	707193-C3	44.40
.093 (3/32)	**.750** (8x)	1/8	2-1/2	706993	39.00	706993-C3	44.90
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.125 (1/8)	**.625** (5x)	1/8	2-1/2	707208	38.50	707208-C3	44.40
.125 (1/8)	**1.000** (8x)	1/8	2-1/2	707008	38.50	707008-C3	44.40
.187 (3/16)	**1.000** (5x)	3/16	3	707212	40.60	707212-C3	47.20
.187 (3/16)	**1.500** (8x)	3/16	3	707012	41.20	707012-C3	47.90
.250 (1/4)	**1.250** (5x)	1/4	4	707216	49.50	707216-C3	58.10
.250 (1/4)	**2.000** (8x)	1/4	4	707016	50.40	707016-C3	59.10

MINIATURE END MILLS

Square – Long Flute – Metric



- **Long flute and long length design for deep cavities**
- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm • Mills deep pockets • Center cutting
- Solid carbide • CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.00mm −.02mm	L_2 +.25mm −.00mm	D_2	L_1	4 FL	USD$	4 FL	USD$
NEW	.50 mm	2.50 mm (5x)	3 mm	50 mm	731711	32.10	731711-C3	38.00
NEW	.50 mm	4.00 mm (8x)	3 mm	50 mm	744211	35.70	744211-C3	41.60
NEW	1.00 mm	5.00 mm (5x)	3 mm	50 mm	731722	30.40	731722-C3	36.30
NEW	1.00 mm	8.00 mm (8x)	3 mm	50 mm	744222	34.00	744222-C3	39.90
NEW	1.50 mm	7.50 mm (5x)	3 mm	50 mm	731733	29.30	731733-C3	35.20
NEW	1.50 mm	12.00 mm (8x)	3 mm	50 mm	744233	32.90	744233-C3	38.80
NEW	2.00 mm	10.00 mm (5x)	3 mm	50 mm	731745	29.30	731745-C3	35.20
NEW	2.00 mm	16.00 mm (8x)	3 mm	50 mm	744245	32.90	744245-C3	38.80
NEW	3.00 mm	15.00 mm (5x)	3 mm	50 mm	731757	29.30	731757-C3	35.20
NEW	3.00 mm	24.00 mm (8x)	3 mm	50 mm	744257*	32.90	744257-C3*	38.80
	D_1 +.00mm −.04mm	L_2 +.75mm −.00mm	D_2	L_1	4 FL	USD$	4 FL	USD$
NEW	4.00 mm	20.00 mm (5x)	4 mm	63 mm	731761	26.50	731761-C3	32.40
NEW	4.00 mm	32.00 mm (8x)	4 mm	63 mm	744261	30.10	744261-C3	36.00
NEW	5.00 mm	25.00 mm (5x)	5 mm	63 mm	731764	28.00	731764-C3	33.90
NEW	5.00 mm	40.00 mm (8x)	5 mm	75 mm	744264	31.70	744264-C3	37.60
NEW	6.00 mm	30.00 mm (5x)	6 mm	63 mm	731766	35.70	731766-C3	41.70
NEW	6.00 mm	48.00 mm (8x)	6 mm	100 mm	744266	39.30	744266-C3	45.30
NEW	8.00 mm	40.00 mm (5x)	8 mm	75 mm	731770	45.00	731770-C3	51.00
NEW	8.00 mm	64.00 mm (8x)	8 mm	100 mm	744270	48.70	744270-C3	54.70
NEW	10.00 mm	50.00 mm (5x)	10 mm	100 mm	731773	73.30	731773-C3	79.30
NEW	10.00 mm	80.00 mm (8x)	10 mm	125 mm	744273	76.90	744273-C3	82.90
NEW	12.00 mm	60.00 mm (5x)	12 mm	100 mm	731776	104.80	731776-C3	110.80
NEW	12.00 mm	96.00 mm (8x)	12 mm	150 mm	744276	108.50	744276-C3	114.50

*D1 +.000 mm / -.040 mm

MINIATURE END MILLS

Square – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

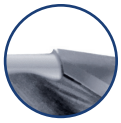
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
.015 (1/64)	**.045** (3x)	6	3	1/8	2-1/2	60715	40.20	60715-C3	46.10
.031 (1/32)	**.093** (3x)	6	3	1/8	2-1/2	60731	30.70	60731-C3	36.60
.047 (3/64)	**.141** (3x)	8	4	1/8	2-1/2	60747	29.70	60747-C3	35.60
.062 (1/16)	**.186** (3x)	8	4	1/8	2-1/2	60762	29.70	60762-C3	35.60
.078 (5/64)	**.234** (3x)	10	5	1/8	2-1/2	60778	30.20	60778-C3	36.10
.093 (3/32)	**.279** (3x)	12	6	1/8	2-1/2	60793	30.20	60793-C3	36.10
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	**.375** (3x)	14	7	1/8	2-1/2	60808	28.00	60808-C3	33.90
.187 (3/16)	**.562** (3x)	16	8	3/16	2-1/2	60812	51.10	60812-C3	57.70
.250 (1/4)	**.750** (3x)	18	9	1/4	2-1/2	60816	59.60	60816-C3	67.70

MINIATURE END MILLS

Square – Long Reach, Standard Flute





Reduced Neck Diameter to Avoid Heeling

• Length of cut = 3x diameter • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4FL	USD$	2FL	4FL	USD$	4 FL	USD$
.005	.015	**.025** (5x)	1/8	1-1/2		944505	956805	59.00					
.005	.015	**.040** (8x)	1/8	1-1/2		76205	76405	59.00					
.008	.024	**.040** (5x)	1/8	1-1/2		944508	956808	59.00					
.008	.024	**.065** (8x)	1/8	1-1/2		76208	76408	59.00					
.010	.030	**.050** (5x)	1/8	1-1/2		944510	956810	56.40	944510-C3	956810-C3	62.30		
.010	.030	**.080** (8x)	1/8	1-1/2		76210	76410	56.40	76210-C3	76410-C3	62.30		
.010	.030	**.100** (10x)	1/8	1-1/2			846110	59.60		846110-C3	65.50		
.010	.030	**.125** (12x)	1/8	1-1/2		952010	992510	59.60	952010-C3	992510-C3	65.50		
.015 (1/64)	.045	**.078** (5x)	1/8	1-1/2		944515	956815	45.50	944515-C3	956815-C3	51.40		
.015 (1/64)	.045	**.093** (6x)	1/8	1-1/2			802415	45.50		802415-C3	51.40		
.015 (1/64)	.045	**.109** (7x)	1/8	1-1/2			896815	45.50		896815-C3	51.40		
.015 (1/64)	.045	**.128** (8x)	1/8	1-1/2		76215	76415	45.50	76215-C3	76415-C3	51.40		
.015 (1/64)	.045	**.156** (10x)	1/8	1-1/2		849615	846115	47.40		846115-C3	53.40		
.015 (1/64)	.045	**.187** (12x)	1/8	1-1/2		952015	992515	47.40	952015-C3	992515-C3	53.40		
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2		944520	956820	43.50	944520-C3	956820-C3	49.40	956820-C4	58.40
.020 (.5 mm)	.060	**.100** (5x)	1/8	2-1/2	**LONG!**		736120	48.50		736120-C3	54.40		
.020 (.5 mm)	.060	**.120** (6x)	1/8	1-1/2			802420	43.50		802420-C3	49.40		
.020 (.5 mm)	.060	**.140** (7x)	1/8	1-1/2			896820	43.50		896820-C3	49.40		
.020 (.5 mm)	.060	**.170** (8x)	1/8	1-1/2		76220	76420	43.50	76220-C3	76420-C3	49.40	76420-C4	58.40
.020 (.5 mm)	.060	**.160** (8x)	1/8	2-1/2	**LONG!**		735520	48.50		735520-C3	54.40		
.020 (.5 mm)	.060	**.200** (10x)	1/8	1-1/2		849620	846120	45.70		846120-C3	51.60		
.020 (.5 mm)	.060	**.250** (12x)	1/8	1-1/2		952020	992520	45.70	952020-C3	992520-C3	51.60		
.025	.075	**.125** (5x)	1/8	1-1/2		944525	956825	41.90	944525-C3	956825-C3	47.90		
.025	.075	**.150** (6x)	1/8	1-1/2			802425	41.90		802425-C3	47.90		
.025	.075	**.213** (8x)	1/8	1-1/2		76225	76425	41.90	76225-C3	76425-C3	47.90		
.025	.075	**.312** (12x)	1/8	1-1/2		952025	992525	43.40	952025-C3	992525-C3	49.30		
.030	.090	**.156** (5x)	1/8	1-1/2		944530	956830	41.90	944530-C3	956830-C3	47.90		
.030	.090	**.270** (9x)	1/8	1-1/2		76230	76430	41.90	76230-C3	76430-C3	47.90		
.030	.090	**.375** (12x)	1/8	1-1/2		952030	992530	43.40	952030-C3	992530-C3	49.30		
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2		944531	956831	41.90	944531-C3	956831-C3	47.90	956831-C4	56.90
.031 (1/32)	.093	**.156** (5x)	1/8	2-1/2	**LONG!**		736131	47.00		736131-C3	52.90		
.031 (1/32)	.093	**.187** (6x)	1/8	1-1/2		757931	802431	41.90		802431-C3	47.90		
.031 (1/32)	.093	**.218** (7x)	1/8	1-1/2			896831	41.90		896831-C3	47.90		
.031 (1/32)	.093	**.250** (8x)	1/8	1-1/2		960831	972231	41.90		972231-C3	47.90		
.031 (1/32)	.093	**.279** (9x)	1/8	1-1/2		76231	76431	41.90	76231-C3	76431-C3	47.90	76431-C4	56.90
.031 (1/32)	.093	**.281** (9x)	1/8	2-1/2	**LONG!**		735331	47.00		735331-C3	52.90		
.031 (1/32)	.093	**.312** (10x)	1/8	1-1/2			846131	43.40		846131-C3	49.30		
.031 (1/32)	.093	**.375** (12x)	1/8	1-1/2		952031	992531	43.40	952031-C3	992531-C3	49.30		
.031 (1/32)	.093	**.470** (15x)	1/8	1-1/2		829131	838631	45.80	829131-C3	838631-C3	51.70		
.035 (.9 mm)	.105	**.187** (5x)	1/8	1-1/2		944535	956835	41.90	944535-C3	956835-C3	47.90		
.035 (.9 mm)	.105	**.218** (6x)	1/8	1-1/2			802435	41.90		802435-C3	47.90		
.035 (.9 mm)	.105	**.315** (9x)	1/8	1-1/2		76235	76435	41.90	76235-C3	76435-C3	47.90	76435-C4	56.90
.035 (.9 mm)	.105	**.425** (12x)	1/8	1-1/2		952035	992535	43.40	952035-C3	992535-C3	49.30		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1		2 FL	4FL	USD$	2FL	4FL	USD$	4 FL	USD$
.039 (1 mm)	.117	**.203** (5x)	1/8	1-1/2		944539	956839	41.90	944539-C3	956839-C3	47.90		
.039 (1 mm)	.117	**.240** (6x)	1/8	1-1/2			802439	41.90		802439-C3	47.90		
.039 (1 mm)	.117	**.325** (8x)	1/8	1-1/2		960839	972239	41.90	960839-C3	972239-C3	47.90		
.039 (1 mm)	.117	**.400** (10x)	1/8	1-1/2			846139	43.40		846139-C3	49.30		
.039 (1 mm)	.117	**.480** (12x)	1/8	1-1/2		952039	992539	43.40		992539-C3	49.30		
.040	.120	**.203** (5x)	1/8	1-1/2		944540	956840	41.90	944540-C3	956840-C3	47.90		
.040	.120	**.281** (7x)	1/8	1-1/2			896840	41.90		896840-C3	47.90		
.040	.120	**.360** (9x)	1/8	1-1/2		76240	76440	41.90	76240-C3	76440-C3	47.90	76440-C4	56.90
.040	.120	**.400** (10x)	1/8	1-1/2			846140	43.40		846140-C3	49.30		
.040	.120	**.480** (12x)	1/8	1-1/2		952040	992540	43.40	952040-C3	992540-C3	49.30		
.045	.135	**.225** (5x)	1/8	1-1/2		944545	956845	41.20	944545-C3	956845-C3	47.10		
.045	.135	**.405** (9x)	1/8	1-1/2		76245	76445	41.20	76245-C3	76445-C3	47.10		
.047 (3/64)	.141	**.250** (5x)	1/8	1-1/2		944547	956847	41.20	944547-C3	956847-C3	47.10		
.047 (3/64)	.141	**.281** (6x)	1/8	1-1/2			802447	41.90		802447-C3	47.90		
.047 (3/64)	.141	**.328** (7x)	1/8	1-1/2		898747	896847	41.20		896847-C3	47.10		
.047 (3/64)	.141	**.375** (8x)	1/8	1-1/2			972247	41.20		972247-C3	47.10		
.047 (3/64)	.141	**.423** (9x)	1/8	1-1/2		76247	76447	41.20	76247-C3	76447-C3	47.10		
.047 (3/64)	.141	**.480** (10x)	1/8	1-1/2			846147	42.40		846147-C3	48.30		
.047 (3/64)	.141	**.570** (12x)	1/8	1-1/2		952047	992547	42.40	952047-C3	992547-C3	48.30		
.047 (3/64)	.141	**.710** (15x)	1/8	2-1/2			838647	46.10		838647-C3	52.00		
.050	.150	**.250** (5x)	1/8	1-1/2		944550	956850	41.20	944550-C3	956850-C3	47.10		
.050	.150	**.400** (8x)	1/8	1-1/2		960850	972250	41.20	960850-C3	972250-C3	47.10		
.050	.150	**.500** (10x)	1/8	1-1/2		76250	76450	42.40	76250-C3	76450-C3	48.30	76450-C4	57.30
.050	.150	**.600** (12x)	1/8	2		952050	992550	45.00	952050-C3	992550-C3	51.00		
.055 (1.4 mm)	.165	**.275** (5x)	1/8	1-1/2		944555	956855	42.10	944555-C3	956855-C3	48.10		
.055 (1.4 mm)	.165	**.500** (9x)	1/8	1-1/2		76255	76455	42.10	76255-C3	76455-C3	48.10		
.055 (1.4 mm)	.165	**.660** (12x)	1/8	2		952055	992555	44.80		992555-C3	50.80		
.060	.180	**.312** (5x)	1/8	1-1/2		944560	956860	41.20	944560-C3	956860-C3	47.10		
.060	.180	**.375** (6x)	1/8	1-1/2			802460	41.20		802460-C3	47.10		
.060	.180	**.500** (8x)	1/8	1-1/2		76260	76460	41.20	76260-C3	76460-C3	47.10		
.060	.180	**.625** (10x)	1/8	2			846160	42.40		846160-C3	48.30		
.060	.180	**.720** (12x)	1/8	2		952060	992560	42.40	952060-C3	992560-C3	48.30		
.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2		944562	956862	41.20	944562-C3	956862-C3	47.10	956862-C4	56.20
.062 (1/16)	.186	**.312** (5x)	1/8	2-1/2	**LONG!**		736162	46.30		736162-C3	52.20		
.062 (1/16)	.186	**.375** (6x)	1/8	1-1/2		736662	802462	41.20		802462-C3	47.10		
.062 (1/16)	.186	**.437** (7x)	1/8	1-1/2			896862	41.20		896862-C3	47.10		
.062 (1/16)	.186	**.500** (8x)	1/8	1-1/2		76262	76462	41.20	76262-C3	76462-C3	47.10	76462-C4	56.20
.062 (1/16)	.186	**.500** (8x)	1/8	2-1/2	**LONG!**		735562	46.30		735562-C3	52.20		
.062 (1/16)	.186	**.562** (9x)	1/8	2			758162	42.40		758162-C3	48.30		
.062 (1/16)	.186	**.625** (10x)	1/8	2		849662	846162	42.40	849662-C3	846162-C3	48.30		
.062 (1/16)	.186	**.750** (12x)	1/8	2		952062	992562	42.40	952062-C3	992562-C3	48.30		
.062 (1/16)	.186	**.950** (15x)	1/8	2		829162	838662	45.00	829162-C3	838662-C3	51.00		
.065	.195	**.500** (8x)	1/8	1-1/2		76265	76465	41.20	76265-C3	76465-C3	47.10		
.070	.210	**.375** (5x)	1/8	1-1/2			956770	41.20		956770-C3	47.10		
.070	.210	**.500** (7x)	1/8	1-1/2		76270	76470	41.20	76270-C3	76470-C3	47.10		
.070	.210	**.850** (12x)	1/8	2		952070	992570	42.40	952070-C3	992570-C3	48.30		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4FL	USD$	2FL	4FL	USD$	4 FL	USD$
.075	.225	**.500** (7x)	1/8	1-1/2		76275	76475	41.20	76275-C3	76475-C3	47.10		
.075	.225	**.750** (10x)	1/8	2			846175	43.30		846175-C3	49.20		
.078 (5/64)	.234	**.406** (5x)	1/8	1-1/2			956878	41.20		956878-C3	47.10		
.078 (5/64)	.234	**.475** (6x)	1/8	2-1/2	**LONG!**		735978	46.30		735978-C3	52.20		
.078 (5/64)	.234	**.500** (6x)	1/8	1-1/2		76278	76478	41.20	76278-C3	76478-C3	47.10	76478-C4	56.20
.078 (5/64)	.234	**.550** (7x)	1/8	1-1/2			896878	41.20		896878-C3	47.10		
.078 (5/64)	.234	**.625** (8x)	1/8	2		960878	972278	41.30		972278-C3	47.20		
.078 (5/64)	.234	**.800** (10x)	1/8	2		849678	846178	42.40		846178-C3	48.30		
.078 (5/64)	.234	**.940** (12x)	1/8	2		952078	992578	42.40	952078-C3	992578-C3	48.30		
.078 (5/64)	.234	**1.187** (15x)	1/8	2-1/2			838678	46.10		838678-C3	52.00		
.080	.240	**.500** (6x)	1/8	1-1/2		76280	76480	41.20	76280-C3	76480-C3	47.10		
.080	.240	**.960** (12x)	1/8	2		952080	992580	42.40	952080-C3	992580-C3	48.30		
.085	.255	**.500** (6x)	1/8	1-1/2		76285	76485	41.20	76285-C3	76485-C3	47.10		
.085	.255	**.875** (10x)	1/8	2			846185	42.40		846185-C3	48.30		
.090	.270	**.625** (7x)	1/8	1-1/2		76290	76490	41.20	76290-C3	76490-C3	47.10		
.090	.270	**1.080** (12x)	1/8	2		952090	992590	42.40	952090-C3	992590-C3	48.30		
.093 (3/32)	.279	**.500** (5x)	1/8	1-1/2		944593	956893	41.20	944593-C3	956893-C3	47.10	956893-C4	56.20
.093 (3/32)	.279	**.500** (5x)	1/8	2-1/2	**LONG!**		736193	46.30		736193-C3	52.20		
.093 (3/32)	.279	**.585** (6x)	1/8	1-1/2		757993	802493	41.20		802493-C3	47.10		
.093 (3/32)	.279	**.625** (7x)	1/8	1-1/2		76293	76493	41.20	76293-C3	76493-C3	47.10	76493-C4	56.20
.093 (3/32)	.279	**.670** (7x)	1/8	3	**LONG!**		735793	46.30		735793-C3	52.20		
.093 (3/32)	.279	**.750** (8x)	1/8	2		972293	960893	42.40		960893-C3	48.30		
.093 (3/32)	.279	**.950** (10x)	1/8	2		849693	846193	42.40	849693-C3	846193-C3	48.30		
.093 (3/32)	.279	**1.125** (12x)	1/8	2		952093	992593	42.40	952093-C3	992593-C3	48.30		
.093 (3/32)	.279	**1.400** (15x)	1/8	2-1/2		829193	838693	45.00	829193-C3	838693-C3	51.00		
.095	.285	**.625** (6x)	1/8	1-1/2		76295	76495	41.20	76295-C3	76495-C3	47.10		
.100	.300	**.625** (6x)	1/8	1-1/2		76300	76500	41.20	76300-C3	76500-C3	47.10		
.100	.300	**.800** (8x)	1/8	2			972300	42.40		972300-C3	48.30		
.100	.300	**1.200** (12x)	1/8	2-1/2		952100	992600	42.40	952100-C3	992600-C3	48.30		
.109 (7/64)	.327	**.570** (5x)	1/8	1-1/2		944602	956902	41.20		956902-C3	47.10		
.109 (7/64)	.327	**.900** (8x)	1/8	2		960902	972302	41.20		972302-C3	47.10		
.109 (7/64)	.327	**1.125** (10x)	1/8	2			846202	42.40		846202-C3	48.30		
.118 (3 mm)	.354	**.625** (5x)	1/8	1-1/2		944605	956905	41.20	944605-C3	956905-C3	47.10		
.118 (3 mm)	.354	**.735** (6x)	1/8	2			802505	41.20		802505-C3	47.10		
.118 (3 mm)	.354	**.950** (8x)	1/8	2		960905	972305	41.20	960905-C3	972305-C3	47.10		
.118 (3 mm)	.354	**1.187** (10x)	1/8	2-1/2			846205	43.30		846205-C3	49.20		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	4FL	USD$	2FL	4FL	USD$	4 FL	USD$
.125 (1/8)	.375	**.625** (5x)	1/8	1-1/2	944608	956908	41.20	944608-C3	956908-C3	47.10	956908-C4	56.20
.125 (1/8)	.375	**.750** (6x)	1/8	2	76308	802508	41.20		802508-C3	47.10		
.125 (1/8)	.375	**.875** (7x)	1/8	2-1/2		802308	44.60		802308-C3	50.60		
.125 (1/8)	.375	**1.000** (8x)	1/8	2	960908	972308	41.20	960908-C3	972308-C3	47.10	972308-C4	59.80
.125 (1/8)	.375	**1.250** (10x)	1/8	2-1/2	849708	846208	44.60	849708-C3	846208-C3	50.60		
.125 (1/8)	.375	**1.500** (12x)	1/8	2-1/2	952108	992608	44.60	952108-C3	992608-C3	50.60		
.125 (1/8)	.375	**1.875** (15x)	1/8	3	829208	838708	47.60	829208-C3	838708-C3	53.60		
.140 (9/64)	.422	**.750** (5x)	3/16	2	944609	956909	48.60		956909-C3	55.20		
.140 (9/64)	.425	**.875** (6x)	3/16	2		802509	48.60		802509-C3	54.80		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL	UNCOATED			AlTiN COATED			AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4FL	USD$	2FL	4FL	USD$	4 FL	USD$
.140 (9/64)	.425	**1.000** (7x)	3/16	2-1/2		802309	48.60		802309-C3	55.20		
.140 (9/64)	.422	**1.125** (8x)	3/16	2-1/2	960909	972309	48.60		972309-C3	55.20		
.140 (9/64)	.425	**1.450** (10x)	3/16	3		846209	50.90		846209-C3	57.50		
.156 (5/32)	.469	**.750** (5x)	3/16	2	944610	956910	48.60		956910-C3	55.20		
.156 (5/32)	.470	**.937** (6x)	3/16	2		802510	48.60		802510-C3	54.80		
.156 (5/32)	.470	**1.093** (7x)	3/16	2-1/2		802310	48.60		802310-C3	55.20		
.156 (5/32)	.469	**1.250** (8x)	3/16	2-1/2	960910	972310	48.60		972310-C3	55.20		
.156 (5/32)	.470	**1.570** (10x)	3/16	3		846210	50.90		846210-C3	57.50		
.187 (3/16)	.562	**1.000** (5x)	3/16	2	944612	956912	48.60	944612-C3	956912-C3	55.20		
.187 (3/16)	.562	**1.500** (8x)	3/16	2-1/2	960912	972312	48.60	960912-C3	972312-C3	55.20		
.187 (3/16)	.562	**1.875** (10x)	3/16	3	849712	846212	50.90	849712-C3	846212-C3	57.50		
.250 (1/4)	.750	**1.250** (5x)	1/4	2-1/2	944616	956916	54.40	944616-C3	956916-C3	63.30		
.250 (1/4)	.750	**2.000** (8x)	1/4	4	960916	972316	54.40	960916-C3	972316-C3	64.60		
.250 (1/4)	.750	**3.000** (12x)	1/4	6	952116	992616	63.00		992616-C3	74.60		
.375 (3/8)	1.125	**2.000** (5x)	3/8	4		956924	57.00		956924-C3	69.20		
.375 (3/8)	1.125	**3.000** (8x)	3/8	4		972324	57.00		972324-C3	72.80		

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MINIATURE END MILLS

Square – Long Reach, Standard Flute – 5 Flute



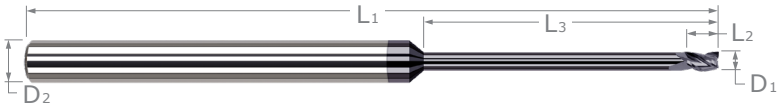
• Length of cut = 3x diameter • Center cutting • Solid carbide • CNC ground in the USA

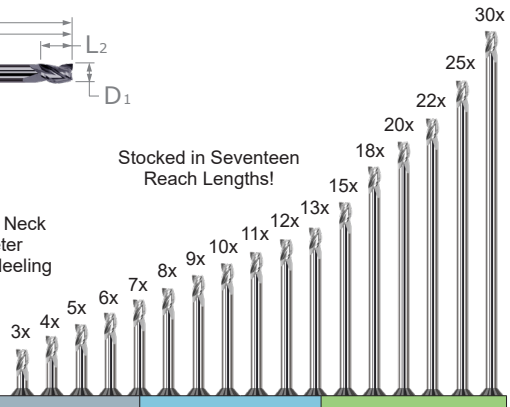
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.020 (.5 mm)	.060	**.100** (5x)	1/8	1-1/2	702420	57.40	702420-C3	63.30
.020 (.5 mm)	.060	**.160** (8x)	1/8	1-1/2	702220	62.10	702220-C3	68.00
.031 (1/32)	.093	**.156** (5x)	1/8	1-1/2	702431	57.40	702431-C3	63.30
.031 (1/32)	.093	**.250** (8x)	1/8	1-1/2	702231	62.10	702231-C3	68.00
.062 (1/16)	.186	**.312** (5x)	1/8	1-1/2	702462	57.40	702462-C3	63.30
.062 (1/16)	.186	**.500** (8x)	1/8	2	702262	62.10	702262-C3	68.00
.078 (5/64)	.234	**.406** (5x)	1/8	2	702478	57.40	702478-C3	63.30
.078 (5/64)	.234	**.625** (8x)	1/8	2	702278	62.60	702278-C3	68.50
.093 (3/32)	.279	**.500** (5x)	1/8	2	702493	60.50	702493-C3	66.40
.093 (3/32)	.279	**.750** (8x)	1/8	2	702293	65.20	702293-C3	71.10
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.125 (1/8)	.375	**.625** (5x)	1/8	2	702508	61.10	702508-C3	67.10
.125 (1/8)	.375	**1.000** (8x)	1/8	2-1/2	702308	65.80	702308-C3	71.70
.187 (3/16)	.570	**1.000** (5x)	3/16	2-1/2	702512	64.60	702512-C3	71.20
.187 (3/16)	.570	**1.500** (8x)	3/16	3	702312	68.90	702312-C3	75.60
.250 (1/4)	.750	**1.250** (5x)	1/4	4	702516	67.60	702516-C3	76.20
.250 (1/4)	.750	**2.000** (8x)	1/4	4	702316	72.20	702316-C3	80.90

NEW SIZES!

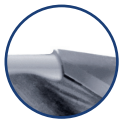
MINIATURE END MILLS

Square – Long Reach, Stub Flute





- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.005	.007	**.025** (5x)	3	1/8	2-1/2	33205	57.30				
.005	.007	**.040** (8x)	3	1/8	2-1/2	34605	57.30				
.008	.012	**.040** (5x)	3	1/8	2-1/2	33208	57.30				
.008	.012	**.065** (8x)	3	1/8	2-1/2	34608	57.30				
.010	.015	**.030** (3x)	3	1/8	2-1/2	47810	55.00	47810-C3	60.90		
.010	.015	**.050** (5x)	3	1/8	2-1/2	33210	55.00	33210-C3	60.90	33210-C4	70.10
.010	.015	**.050** (5x)	4	1/8	2-1/2	861610	55.00	861610-C3	60.90		
.010	.015	**.060** (6x)	3	1/8	2-1/2	937010	56.30	937010-C3	62.20		
.010	.015	**.070** (7x)	3	1/8	2-1/2	934810	56.30	934810-C3	62.20		
.010	.015	**.080** (8x)	3	1/8	2-1/2	34610	58.10	34610-C3	64.00	34610-C4	73.30
.010	.015	**.080** (8x)	4	1/8	2-1/2	874110	58.10	874110-C3	64.00		
.010	.015	**.100** (10x)	3	1/8	2-1/2	982110	61.10	982110-C3	67.10		
.010	.015	**.125** (12x)	3	1/8	2-1/2	35410	61.80	35410-C3	67.70	35410-C4	76.80
.010	.015	**.150** (15x)	3	1/8	2-1/2	48910	71.10	48910-C3	77.00		
.010	.015	**.180** (18x)	3	1/8	2-1/2	977310	79.10	977310-C3	85.00		
.011	.016	**.055** (5x)	3	1/8	2-1/2	33211	55.00	33211-C3	60.90		
.011	.016	**.088** (8x)	3	1/8	2-1/2	34611	58.10	34611-C3	64.00		
.012 (.3 mm)	.018	**.060** (5x)	3	1/8	2-1/2	33212	55.00	33212-C3	60.90		
.012 (.3 mm)	.018	**.096** (8x)	3	1/8	2-1/2	34612	58.10	34612-C3	64.00		
.013	.019	**.065** (5x)	3	1/8	2-1/2	33213	55.00	33213-C3	60.90	33213-C4	70.80
.013	.019	**.104** (8x)	3	1/8	2-1/2	34613	58.10	34613-C3	64.00		
.014	.021	**.070** (5x)	3	1/8	2-1/2	33214	55.00	33214-C3	60.90		
.014	.021	**.112** (8x)	3	1/8	2-1/2	34614	58.10	34614-C3	64.00		
.015 (1/64)	.022	**.045** (3x)	3	1/8	2-1/2	47815	45.50	47815-C3	51.40	47815-C4	61.20
.015 (1/64)	.022	**.062** (4x)	3	1/8	2-1/2	945515	45.50	945515-C3	51.40		
.015 (1/64)	.022	**.078** (5x)	3	1/8	2-1/2	33215	45.50	33215-C3	51.40	33215-C4	60.50
.015 (1/64)	.022	**.078** (5x)	4	1/8	2-1/2	861615	45.50	861615-C3	51.40		
.015 (1/64)	.022	**.093** (6x)	3	1/8	2-1/2	937015	45.70	937015-C3	51.60		
.015 (1/64)	.022	**.109** (7x)	3	1/8	2-1/2	934815	45.70	934815-C3	51.60		
.015 (1/64)	.022	**.125** (8x)	3	1/8	2-1/2	34615	45.70	34615-C3	51.60	34615-C4	60.70
.015 (1/64)	.022	**.125** (8x)	4	1/8	2-1/2	874115	45.70	874115-C3	51.60		
.015 (1/64)	.022	**.156** (10x)	3	1/8	2-1/2	982115	47.40	982115-C3	53.40	982115-C4	62.30
.015 (1/64)	.022	**.187** (12x)	3	1/8	2-1/2	35415	47.40	35415-C3	53.40	35415-C4	62.30
.015 (1/64)	.022	**.225** (15x)	3	1/8	2-1/2	48915	53.70	48915-C3	59.60	48915-C4	68.60
.015 (1/64)	.022	**.270** (18x)	3	1/8	2-1/2	977315	63.80	977315-C3	69.80		
.015 (1/64)	.022	**.300** (20x)	3	1/8	2-1/2	58315	67.90	58315-C3	73.80		
.015 (1/64)	.022	**.375** (25x)	3	1/8	2-1/2	38015	86.80	38015-C3	92.70	38015-C4	102.60

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.016 (.4 mm)	.024	**.080** (5x)	3	1/8	2-1/2	33216	46.80	33216-C3	52.70		
.016 (.4 mm)	.024	**.128** (8x)	3	1/8	2-1/2	34616	47.10	34616-C3	53.00		
.017	.026	**.085** (5x)	3	1/8	2-1/2	33217	46.80	33217-C3	52.70		
.017	.026	**.136** (8x)	3	1/8	2-1/2	34617	47.10	34617-C3	53.00		
.018	.027	**.090** (5x)	3	1/8	2-1/2	33218	46.80	33218-C3	52.70		
.018	.027	**.144** (8x)	3	1/8	2-1/2	34618	47.10	34618-C3	53.00		
.019	.029	**.095** (5x)	3	1/8	2-1/2	33219	46.80	33219-C3	52.70		
.019	.029	**.152** (8x)	3	1/8	2-1/2	34619	47.10	34619-C3	53.00		
.020 (.5 mm)	.030	**.060** (3x)	3	1/8	2-1/2	47820	43.50	47820-C3	49.40		
.020 (.5 mm)	.030	**.080** (4x)	3	1/8	2-1/2	945520	43.50	945520-C3	49.40	945520-C4	59.30
.020 (.5 mm)	.030	**.080** (4x)	4	1/8	2-1/2	752020	43.50	752020-C3	49.90		
.020 (.5 mm)	.030	**.100** (5x)	3	1/8	2-1/2	33220	43.50	33220-C3	49.40	33220-C4	58.40
.020 (.5 mm)	.030	**.100** (5x)	4	1/8	2-1/2	861620	45.80	861620-C3	51.70		
.020 (.5 mm)	.030	**.120** (6x)	3	1/8	2-1/2	937020	43.50	937020-C3	49.40	937020-C4	59.30
.020 (.5 mm)	.030	**.140** (7x)	3	1/8	2-1/2	934820	43.70	934820-C3	49.60		
.020 (.5 mm)	.030	**.160** (8x)	3	1/8	2-1/2	34620	43.70	34620-C3	49.60	34620-C4	58.60
.020 (.5 mm)	.030	**.160** (8x)	4	1/8	2-1/2	874120	44.50	874120-C3	50.40		
.020 (.5 mm)	.030	**.180** (9x)	3	1/8	2-1/2	846820	45.70	846820-C3	51.60		
.020 (.5 mm)	.030	**.200** (10x)	3	1/8	2-1/2	982120	45.70	982120-C3	51.60	982120-C4	61.40
.020 (.5 mm)	.030	**.200** (10x)	4	1/8	2-1/2	789120	45.70	789120-C3	51.60		
.020 (.5 mm)	.030	**.250** (12x)	3	1/8	2-1/2	35420	45.70	35420-C3	51.60	35420-C4	60.70
.020 (.5 mm)	.030	**.250** (12x)	4	1/8	2-1/2	801720	45.70	801720-C3	51.60		
.020 (.5 mm)	.030	**.300** (15x)	3	1/8	2-1/2	48920	51.60	48920-C3	57.50	48920-C4	66.60
.020 (.5 mm)	.030	**.360** (18x)	3	1/8	2-1/2	977320	59.70	977320-C3	65.60		
.020 (.5 mm)	.030	**.400** (20x)	3	1/8	2-1/2	58320	64.90	58320-C3	70.80	58320-C4	80.70
.020 (.5 mm)	.030	**.440** (22x)	3	1/8	2-1/2	969620	71.70	969620-C3	77.60		
.020 (.5 mm)	.030	**.500** (25x)	3	1/8	2-1/2	38020	83.80	38020-C3	89.70	**25x Diameter!**	
.020 (.5 mm)	.030	**.600** (30x)	3	1/8	2-1/2	972020	89.60	972020-C3	95.50	**30x Diameter!**	
.021	.031	**.105** (5x)	3	1/8	2-1/2	33221	46.40	33221-C3	52.30		
.021	.031	**.168** (8x)	3	1/8	2-1/2	34621	46.60	34621-C3	52.50		
.022	.033	**.110** (5x)	3	1/8	2-1/2	33222	45.50	33222-C3	51.40		
.022	.033	**.176** (8x)	3	1/8	2-1/2	34622	45.70	34622-C3	51.60		
.023	.035	**.115** (5x)	3	1/8	2-1/2	33223	45.50	33223-C3	51.40		
.023	.035	**.187** (8x)	3	1/8	2-1/2	34623	45.70	34623-C3	51.60		
.024 (.6 mm)	.036	**.120** (5x)	3	1/8	2-1/2	33224	45.50	33224-C3	51.40		
.024 (.6 mm)	.036	**.192** (8x)	3	1/8	2-1/2	34624	45.70	34624-C3	51.60		
.025	.037	**.075** (3x)	3	1/8	2-1/2	47825	41.90	47825-C3	47.90		
.025	.037	**.100** (4x)	3	1/8	2-1/2	945525	41.90	945525-C3	47.90		
.025	.037	**.125** (5x)	3	1/8	2-1/2	33225	41.90	33225-C3	47.90	33225-C4	57.00
.025	.037	**.125** (5x)	4	1/8	2-1/2	861625	41.90	861625-C3	47.90		
.025	.037	**.150** (6x)	3	1/8	2-1/2	937025	41.90	937025-C3	47.90		
.025	.037	**.175** (7x)	3	1/8	2-1/2	934825	41.90	934825-C3	47.90		
.025	.037	**.203** (8x)	3	1/8	2-1/2	34625	42.10	34625-C3	48.10	34625-C4	57.20
.025	.037	**.203** (8x)	4	1/8	2-1/2	874125	42.10	874125-C3	48.10		
.025	.037	**.250** (10x)	3	1/8	2-1/2	982125	43.40	982125-C3	49.30		
.025	.037	**.312** (12x)	3	1/8	2-1/2	35425	43.40	35425-C3	49.30	35425-C4	59.20
.025	.037	**.375** (15x)	3	1/8	2-1/2	48925	50.70	48925-C3	56.60	48925-C4	65.70
.025	.037	**.450** (18x)	3	1/8	2-1/2	977325	59.50	977325-C3	65.40		
.025	.037	**.500** (20x)	3	1/8	2-1/2	58325	63.80	58325-C3	69.80		
.025	.037	**.625** (25x)	3	1/8	2-1/2	38025	82.90	38025-C3	88.90	**25x Diameter!**	

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.026	.039	**.130** (5x)	3	1/8	2-1/2	33226	42.80	33226-C3	48.70			
.026	.039	**.208** (8x)	3	1/8	2-1/2	34626	43.10	34626-C3	49.00			
.027	.041	**.135** (5x)	3	1/8	2-1/2	33227	42.80	33227-C3	48.70			
.027	.041	**.216** (8x)	3	1/8	2-1/2	34627	43.10	34627-C3	49.00			
.028 (.7 mm)	.042	**.140** (5x)	3	1/8	2-1/2	33228	42.80	33228-C3	48.70			
.028 (.7 mm)	.042	**.224** (8x)	3	1/8	2-1/2	34628	43.10	34628-C3	49.00			
.029	.043	**.145** (5x)	3	1/8	2-1/2	33229	42.80	33229-C3	48.70			
.029	.043	**.232** (8x)	3	1/8	2-1/2	34629	43.10	34629-C3	49.00			
.030	.045	**.090** (3x)	3	1/8	2-1/2	47830	41.90	47830-C3	47.90			
.030	.045	**.125** (4x)	3	1/8	2-1/2	945530	41.90	945530-C3	47.90			
.030	.045	**.156** (5x)	3	1/8	2-1/2	33230	41.90	33230-C3	47.90	33230-C4	57.70	
.030	.045	**.156** (5x)	4	1/8	2-1/2	861630	44.40	861630-C3	50.30			
.030	.045	**.187** (6x)	3	1/8	2-1/2	937030	42.10	937030-C3	48.10			
.030	.045	**.218** (7x)	3	1/8	2-1/2	934830	42.10	934830-C3	48.10			
.030	.045	**.250** (8x)	3	1/8	2-1/2	34630	42.10	34630-C3	48.10	34630-C4	57.20	
.030	.045	**.250** (8x)	4	1/8	2-1/2	874130	42.10	874130-C3	48.10			
.030	.045	**.270** (9x)	3	1/8	2-1/2	846830	43.40	846830-C3	49.30			
.030	.045	**.312** (10x)	3	1/8	2-1/2	982130	43.40	982130-C3	49.30			
.030	.045	**.375** (12x)	3	1/8	2-1/2	35430	43.40	35430-C3	49.30	35430-C4	58.30	
.030	.045	**.450** (15x)	3	1/8	2-1/2	48930	50.70	48930-C3	56.60			
.030	.045	**.540** (18x)	3	1/8	2-1/2	977330	59.00	977330-C3	64.90			
.030	.045	**.600** (20x)	3	1/8	2-1/2	58330	63.80	58330-C3	69.80			
.031 (1/32)	.046	**.093** (3x)	3	1/8	2-1/2	47831	41.90	47831-C3	47.90	47831-C4	57.70	
.031 (1/32)	.046	**.093** (3x)	4	1/8	2-1/2	739931	41.90	739931-C3	47.90			
.031 (1/32)	.046	**.125** (4x)	3	1/8	2-1/2	945531	41.90	945531-C3	47.90	945531-C4	57.70	
.031 (1/32)	.046	**.125** (4x)	4	1/8	2-1/2	752031	41.90	752031-C3	47.90			
.031 (1/32)	.046	**.156** (5x)	3	1/8	2-1/2	33231	41.90	33231-C3	47.90	33231-C4	57.00	
.031 (1/32)	.046	**.156** (5x)	4	1/8	2-1/2	861631	44.40	861631-C3	50.30			
.031 (1/32)	.046	**.187** (6x)	3	1/8	2-1/2	937031	41.90	937031-C3	47.90	937031-C4	57.00	
.031 (1/32)	.046	**.187** (6x)	4	1/8	2-1/2	753631	44.40	753631-C3	50.30			NEW
.031 (1/32)	.046	**.218** (7x)	3	1/8	2-1/2	934831	42.10	934831-C3	48.10			
.031 (1/32)	.046	**.250** (8x)	3	1/8	2-1/2	34631	42.10	34631-C3	48.10	34631-C4	57.20	
.031 (1/32)	.046	**.250** (8x)	4	1/8	2-1/2	874131	44.50	874131-C3	50.40			
.031 (1/32)	.046	**.281** (9x)	3	1/8	2-1/2	846831	43.40	846831-C3	49.30			
.031 (1/32)	.046	**.312** (10x)	3	1/8	2-1/2	982131	43.40	982131-C3	49.30	982131-C4	58.30	
.031 (1/32)	.046	**.312** (10x)	4	1/8	2-1/2	789131	43.40	789131-C3	49.30			
.031 (1/32)	.046	**.343** (11x)	3	1/8	2-1/2	850231	44.20	850231-C3	50.10			
.031 (1/32)	.046	**.375** (12x)	3	1/8	2-1/2	35431	43.40	35431-C3	49.30	35431-C4	58.30	
.031 (1/32)	.046	**.375** (12x)	4	1/8	2-1/2	801731	43.40	801731-C3	49.30			
.031 (1/32)	.046	**.470** (15x)	3	1/8	2-1/2	48931	50.70	48931-C3	56.60	48931-C4	65.70	
.031 (1/32)	.046	**.565** (18x)	3	1/8	2-1/2	977331	63.80	977331-C3	69.80	977331-C4	79.60	
.031 (1/32)	.046	**.625** (20x)	3	1/8	2-1/2	58331	63.80	58331-C3	69.80			
.031 (1/32)	.046	**.687** (22x)	3	1/8	2-1/2	969631	70.70	969631-C3	76.60			
.031 (1/32)	.046	**.775** (25x)	3	1/8	2-1/2	38031	82.90	38031-C3	88.90	**25x Diameter!**		
.031 (1/32)	.046	**.937** (30x)	3	1/8	2-1/2	972031	98.80	972031-C3	104.70	**30x Diameter!**		

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005" −.0005"	L_2 +.010" −.000"	L_3 +.010" −.000"		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.035 (.9 mm)	.052	**.105** (3x)	3	1/8	2-1/2	47835	41.90	47835-C3	47.90		
.035 (.9 mm)	.052	**.187** (5x)	3	1/8	2-1/2	33235	41.90	33235-C3	47.90	33235-C4	57.00
.035 (.9 mm)	.052	**.187** (5x)	4	1/8	2-1/2	861635	42.70	861635-C3	48.60		
.035 (.9 mm)	.052	**.218** (6x)	3	1/8	2-1/2	937035	42.10	937035-C3	48.10		
.035 (.9 mm)	.052	**.250** (7x)	3	1/8	2-1/2	934835	42.10	934835-C3	48.10		
.035 (.9 mm)	.052	**.281** (8x)	3	1/8	2-1/2	34635	42.10	34635-C3	48.10	34635-C4	57.20
.035 (.9 mm)	.052	**.350** (10x)	3	1/8	2-1/2	982135	43.40	982135-C3	49.30		
.035 (.9 mm)	.052	**.425** (12x)	3	1/8	2-1/2	35435	43.40	35435-C3	49.30	35435-C4	58.30
.035 (.9 mm)	.052	**.525** (15x)	3	1/8	2-1/2	48935	50.70	48935-C3	56.60		
.035 (.9 mm)	.052	**.700** (20x)	3	1/8	2-1/2	58335	63.80	58335-C3	69.80		
.039 (1 mm)	.059	**.117** (3x)	3	1/8	2-1/2	47839	41.90	47839-C3	47.90		
.039 (1 mm)	.059	**.203** (5x)	3	1/8	2-1/2	33239	41.90	33239-C3	47.90	33239-C4	57.70
.039 (1 mm)	.059	**.203** (5x)	4	1/8	2-1/2	861639	41.90	861639-C3	47.90		
.039 (1 mm)	.059	**.240** (6x)	3	1/8	2-1/2	937039	42.10	937039-C3	48.10		
.039 (1 mm)	.059	**.281** (7x)	3	1/8	2-1/2	934839	42.10	934839-C3	48.10		
.039 (1 mm)	.059	**.325** (8x)	3	1/8	2-1/2	34639	42.10	34639-C3	48.10	34639-C4	57.90
.039 (1 mm)	.059	**.325** (8x)	4	1/8	2-1/2	874139	42.10	874139-C3	48.10		
.039 (1 mm)	.059	**.400** (10x)	3	1/8	2-1/2	982139	43.40	982139-C3	49.30		
.039 (1 mm)	.059	**.480** (12x)	3	1/8	2-1/2	35439	43.40	35439-C3	49.30		
.039 (1 mm)	.059	**.600** (15x)	3	1/8	2-1/2	48939	50.70	48939-C3	56.60		
.039 (1 mm)	.059	**.700** (18x)	3	1/8	2-1/2	977339	55.10	977339-C3	61.00		
.040	.060	**.120** (3x)	3	1/8	2-1/2	47840	41.90	47840-C3	47.90		
.040	.060	**.160** (4x)	3	1/8	2-1/2	945540	41.90	945540-C3	47.90	945540-C4	57.70
.040	.060	**.203** (5x)	3	1/8	2-1/2	33240	41.90	33240-C3	47.90	33240-C4	57.00
.040	.060	**.203** (5x)	4	1/8	2-1/2	861640	44.40	861640-C3	50.30		
.040	.060	**.240** (6x)	3	1/8	2-1/2	937040	42.10	937040-C3	48.10		
.040	.060	**.281** (7x)	3	1/8	2-1/2	934840	42.10	934840-C3	48.10		
.040	.060	**.325** (8x)	3	1/8	2-1/2	34640	42.10	34640-C3	48.10	34640-C4	57.20
.040	.060	**.325** (8x)	4	1/8	2-1/2	874140	42.10	874140-C3	48.10		
.040	.060	**.400** (10x)	3	1/8	2-1/2	982140	43.40	982140-C3	49.30	982140-C4	59.20
.040	.060	**.400** (10x)	4	1/8	2-1/2	789140	44.20	789140-C3	50.10		
.040	.060	**.480** (12x)	3	1/8	2-1/2	35440	43.40	35440-C3	49.30	35440-C4	58.30
.040	.060	**.600** (15x)	3	1/8	2-1/2	48940	50.70	48940-C3	56.60	48940-C4	65.70
.040	.060	**.720** (18x)	3	1/8	2-1/2	977340	63.80	977340-C3	69.80		
.040	.060	**.800** (20x)	3	1/8	2-1/2	58340	63.80	58340-C3	69.80		
.040	.060	**1.000** (25x)	3	1/8	2-1/2	38040	82.90	38040-C3	88.90	**25x Diameter!**	
.045	.067	**.135** (3x)	3	1/8	2-1/2	47845	41.20	47845-C3	47.10		
.045	.067	**.225** (5x)	3	1/8	2-1/2	33245	41.20	33245-C3	47.10	33245-C4	57.00
.045	.067	**.375** (8x)	3	1/8	2-1/2	34645	41.30	34645-C3	47.20	34645-C4	56.90
.045	.067	**.450** (10x)	3	1/8	2-1/2	982145	42.70	982145-C3	48.60		
.045	.067	**.550** (12x)	3	1/8	2-1/2	35445	42.70	35445-C3	48.60	35445-C4	57.80
.045	.067	**.680** (15x)	3	1/8	2-1/2	48945	48.20	48945-C3	54.10		
.045	.067	**.900** (20x)	3	1/8	2-1/2	58345	60.20	58345-C3	66.10		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.047 (3/64)	.070	**.141** (3x)	3	1/8	2-1/2	47847	41.20	47847-C3	47.10		
.047 (3/64)	.070	**.187** (4x)	3	1/8	2-1/2	945547	41.20	945547-C3	47.10		
.047 (3/64)	.070	**.250** (5x)	3	1/8	2-1/2	33247	41.20	33247-C3	47.10	33247-C4	56.70
.047 (3/64)	.070	**.250** (5x)	4	1/8	2-1/2	861647	43.70	861647-C3	49.60		
.047 (3/64)	.070	**.281** (6x)	3	1/8	2-1/2	937047	41.20	937047-C3	47.10		
.047 (3/64)	.070	**.328** (7x)	3	1/8	2-1/2	934847	41.30	934847-C3	47.20		
.047 (3/64)	.070	**.375** (8x)	3	1/8	2-1/2	34647	41.30	34647-C3	47.20	34647-C4	56.90
.047 (3/64)	.070	**.375** (8x)	4	1/8	2-1/2	874147	43.80	874147-C3	49.70		
.047 (3/64)	.070	**.425** (9x)	3	1/8	2-1/2	846847	42.70	846847-C3	48.60		
.047 (3/64)	.070	**.480** (10x)	3	1/8	2-1/2	982147	42.70	982147-C3	48.60	982147-C4	57.80
.047 (3/64)	.070	**.570** (12x)	3	1/8	2-1/2	35447	42.70	35447-C3	48.60	35447-C4	57.80
.047 (3/64)	.070	**.570** (12x)	4	1/8	2-1/2	801747	45.40	801747-C3	51.30		
.047 (3/64)	.070	**.710** (15x)	3	1/8	2-1/2	48947	48.20	48947-C3	54.10	48947-C4	63.30
.047 (3/64)	.070	**.850** (18x)	3	1/8	2-1/2	977347	60.20	977347-C3	66.10		
.047 (3/64)	.070	**.950** (20x)	3	1/8	2-1/2	58347	60.20	58347-C3	66.10		
.047 (3/64)	.070	**1.187** (25x)	3	1/8	2-1/2	38047	73.10	38047-C3	79.00	**25x Diameter!**	
.047 (3/64)	.070	**1.406** (30x)	3	1/8	2-1/2	972047	96.80	972047-C3	102.80	**30x Diameter!**	
.050	.075	**.150** (3x)	3	1/8	2-1/2	47850	41.20	47850-C3	47.10		
.050	.075	**.203** (4x)	3	1/8	2-1/2	945550	41.20	945550-C3	47.10		
.050	.075	**.250** (5x)	3	1/8	2-1/2	33250	41.20	33250-C3	47.10	33250-C4	56.70
.050	.075	**.250** (5x)	4	1/8	2-1/2	861650	43.80	861650-C3	49.70		
.050	.075	**.300** (6x)	3	1/8	2-1/2	937050	41.30	937050-C3	47.20		
.050	.075	**.350** (7x)	3	1/8	2-1/2	934850	41.30	934850-C3	47.20		
.050	.075	**.400** (8x)	3	1/8	2-1/2	34650	41.30	34650-C3	47.20	34650-C4	56.90
.050	.075	**.450** (9x)	3	1/8	2-1/2	846850	42.70	846850-C3	48.60		
.050	.075	**.500** (10x)	3	1/8	2-1/2	982150	42.70	982150-C3	48.60		
.050	.075	**.600** (12x)	3	1/8	2-1/2	35450	42.70	35450-C3	48.60	35450-C4	57.80
.050	.075	**.750** (15x)	3	1/8	2-1/2	48950	48.20	48950-C3	54.10		
.050	.075	**.900** (18x)	3	1/8	2-1/2	977350	60.20	977350-C3	66.10		
.055 (1.4 mm)	.082	**.165** (3x)	3	1/8	2-1/2	47855	41.20	47855-C3	47.10		
.055 (1.4 mm)	.082	**.275** (5x)	3	1/8	2-1/2	33255	41.20	33255-C3	47.10	33255-C4	57.00
.055 (1.4 mm)	.082	**.275** (5x)	4	1/8	2-1/2	861655	41.90	861655-C3	47.90		
.055 (1.4 mm)	.082	**.330** (6x)	3	1/8	2-1/2	937055	41.30	937055-C3	47.20		
.055 (1.4 mm)	.082	**.385** (7x)	3	1/8	2-1/2	934855	41.30	934855-C3	47.20		
.055 (1.4 mm)	.082	**.450** (8x)	3	1/8	2-1/2	34655	41.30	34655-C3	47.20	34655-C4	57.10
.055 (1.4 mm)	.082	**.560** (10x)	3	1/8	2-1/2	982155	42.70	982155-C3	48.60		
.055 (1.4 mm)	.082	**.660** (12x)	3	1/8	2-1/2	35455	43.60	35455-C3	49.50	35455-C4	58.50
.055 (1.4 mm)	.082	**.825** (15x)	3	1/8	2-1/2	48955	48.20	48955-C3	54.10		
.055 (1.4 mm)	.082	**1.000** (18x)	3	1/8	2-1/2	977355	60.20	977355-C3	66.10		
.060	.090	**.180** (3x)	3	1/8	2-1/2	47860	41.20	47860-C3	47.10		
.060	.090	**.250** (4x)	3	1/8	2-1/2	945560	41.20	945560-C3	47.10		
.060	.090	**.312** (5x)	3	1/8	2-1/2	33260	41.20	33260-C3	47.10	33260-C4	57.00
.060	.090	**.312** (5x)	4	1/8	2-1/2	861660	43.60	861660-C3	49.50		
.060	.090	**.375** (6x)	3	1/8	2-1/2	937060	41.30	937060-C3	47.20		
.060	.090	**.437** (7x)	3	1/8	2-1/2	934860	41.30	934860-C3	47.20		
.060	.090	**.500** (8x)	3	1/8	2-1/2	34660	41.30	34660-C3	47.20	34660-C4	57.10
.060	.090	**.500** (8x)	4	1/8	2-1/2	874160	42.00	874160-C3	48.00		
.060	.090	**.562** (9x)	3	1/8	2-1/2	846860	42.70	846860-C3	48.60		

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MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.060	.090	**.625** (10x)	3	1/8	2-1/2	982160	42.70	982160-C3	48.60		
.060	.090	**.720** (12x)	3	1/8	2-1/2	35460	42.70	35460-C3	48.60	35460-C4	57.80
.060	.090	**.900** (15x)	3	1/8	2-1/2	48960	48.20	48960-C3	54.10		
.060	.090	**1.062** (18x)	3	1/8	2-1/2	977360	60.20	977360-C3	66.10		
.060	.090	**1.200** (20x)	3	1/8	2-1/2	58360	60.20	58360-C3	66.10		
.062 (1/16)	.093	**.186** (3x)	3	1/8	2-1/2	47862	41.20	47862-C3	47.10	47862-C4	57.00
.062 (1/16)	.093	**.186** (3x)	4	1/8	2-1/2	739962	41.20	739962-C3	47.10		
.062 (1/16)	.093	**.250** (4x)	3	1/8	2-1/2	945562	41.20	945562-C3	47.10	945562-C4	56.70
.062 (1/16)	.093	**.250** (4x)	4	1/8	2-1/2	752062	41.20	752062-C3	47.10		
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	33262	41.20	33262-C3	47.10	33262-C4	56.70
.062 (1/16)	.093	**.312** (5x)	4	1/8	2-1/2	861662	43.70	861662-C3	49.60		
.062 (1/16)	.093	**.375** (6x)	3	1/8	2-1/2	937062	41.20	937062-C3	47.10	937062-C4	56.70
.062 (1/16)	.093	**.375** (6x)	4	1/8	2-1/2	753662	41.20	753662-C3	47.10		
.062 (1/16)	.093	**.437** (7x)	3	1/8	2-1/2	934862	41.30	934862-C3	47.20	934862-C4	56.90
.062 (1/16)	.093	**.437** (7x)	4	1/8	2-1/2	753262	41.30	753262-C3	47.20		
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	34662	41.30	34662-C3	47.20	34662-C4	56.90
.062 (1/16)	.093	**.500** (8x)	4	1/8	2-1/2	874162	44.60	874162-C3	50.60	874162-C4	59.60
.062 (1/16)	.093	**.562** (9x)	3	1/8	2-1/2	846862	42.70	846862-C3	48.60		
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	982162	42.70	982162-C3	48.60	982162-C4	57.80
.062 (1/16)	.093	**.625** (10x)	4	1/8	2-1/2	789162	43.60	789162-C3	49.50		
.062 (1/16)	.093	**.687** (11x)	3	1/8	2-1/2	850262	42.70	850262-C3	48.60		
.062 (1/16)	.093	**.750** (12x)	3	1/8	2-1/2	35462	42.70	35462-C3	48.60	35462-C4	57.80
.062 (1/16)	.093	**.750** (12x)	4	1/8	2-1/2	801762	45.30	801762-C3	51.20		
.062 (1/16)	.093	**.800** (13x)	3	1/8	2-1/2	839362	45.50	839362-C3	51.40		
.062 (1/16)	.093	**.950** (15x)	3	1/8	2-1/2	48962	48.20	48962-C3	54.10	48962-C4	63.30
.062 (1/16)	.093	**.950** (15x)	4	1/8	2-1/2	735162	48.20	735162-C3	54.10		
.062 (1/16)	.093	**1.125** (18x)	3	1/8	2-1/2	977362	60.20	977362-C3	66.10	977362-C4	76.00
.062 (1/16)	.093	**1.250** (20x)	3	1/8	2-1/2	58362	60.20	58362-C3	66.10	58362-C4	76.00
.062 (1/16)	.093	**1.375** (22x)	3	1/8	3	969662	67.90	969662-C3	73.80		
.062 (1/16)	.093	**1.550** (25x)	3	1/8	3	38062	73.10	38062-C3	79.00	**25x Diameter!**	
.062 (1/16)	.093	**1.875** (30x)	3	1/8	3	972062	96.80	972062-C3	102.80	**30x Diameter!**	
.065	.097	**.195** (3x)	3	1/8	2-1/2	47865	41.20	47865-C3	47.10		
.065	.097	**.325** (5x)	3	1/8	2-1/2	33265	41.20	33265-C3	47.10		
.065	.097	**.530** (8x)	3	1/8	2-1/2	34665	41.30	34665-C3	47.20	34665-C4	57.10
.065	.097	**.650** (10x)	3	1/8	2-1/2	982165	42.70	982165-C3	48.60		
.065	.097	**.800** (12x)	3	1/8	2-1/2	35465	42.70	35465-C3	48.60		
.070	.105	**.210** (3x)	3	1/8	2-1/2	47870	41.20	47870-C3	47.10		
.070	.105	**.375** (5x)	3	1/8	2-1/2	33270	41.20	33270-C3	47.10	33270-C4	57.00
.070	.105	**.375** (5x)	4	1/8	2-1/2	861670	43.60	861670-C3	49.50		
.070	.105	**.570** (8x)	3	1/8	2-1/2	34670	41.30	34670-C3	47.20	34670-C4	57.10
.070	.105	**.700** (10x)	3	1/8	2-1/2	982170	42.70	982170-C3	48.60		
.070	.105	**.850** (12x)	3	1/8	2-1/2	35470	42.70	35470-C3	48.60		
.070	.105	**1.062** (15x)	3	1/8	2-1/2	48970	48.20	48970-C3	54.10		
.075	.112	**.225** (3x)	3	1/8	2-1/2	47875	41.20	47875-C3	47.10		
.075	.112	**.375** (5x)	3	1/8	2-1/2	33275	41.20	33275-C3	47.10		
.075	.112	**.625** (8x)	3	1/8	2-1/2	34675	41.30	34675-C3	47.20	34675-C4	56.90
.075	.112	**.750** (10x)	3	1/8	2-1/2	982175	42.70	982175-C3	48.60		
.075	.112	**.900** (12x)	3	1/8	2-1/2	35475	42.70	35475-C3	48.60		

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NEW SIZES!

MINIATURE END MILLS

Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.078 (5/64)	.117	**.234** (3x)	3	1/8	2-1/2	47878	41.20	47878-C3	47.10			
.078 (5/64)	.117	**.312** (4x)	3	1/8	2-1/2	945578	41.20	945578-C3	47.10			
.078 (5/64)	.117	**.406** (5x)	3	1/8	2-1/2	33278	41.20	33278-C3	47.10	33278-C4	56.70	
.078 (5/64)	.117	**.406** (5x)	4	1/8	2-1/2	861678	43.70	861678-C3	49.60			
.078 (5/64)	.117	**.475** (6x)	3	1/8	2-1/2	937078	41.20	937078-C3	47.10			
.078 (5/64)	.117	**.550** (7x)	3	1/8	2-1/2	934878	41.30	934878-C3	47.20			
.078 (5/64)	.117	**.625** (8x)	3	1/8	2-1/2	34678	41.30	34678-C3	47.20	34678-C4	56.90	
.078 (5/64)	.117	**.625** (8x)	4	1/8	2-1/2	874178	43.80	874178-C3	49.70			
.078 (5/64)	.117	**.700** (9x)	3	1/8	2-1/2	846878	42.70	846878-C3	48.60			
.078 (5/64)	.117	**.800** (10x)	3	1/8	2-1/2	982178	42.70	982178-C3	48.60			
.078 (5/64)	.117	**.800** w(10x)	4	1/8	2-1/2	789178	45.20	789178-C3	51.10			NEW
.078 (5/64)	.117	**.940** (12x)	3	1/8	2-1/2	35478	42.70	35478-C3	48.60	35478-C4	57.80	
.078 (5/64)	.117	**1.187** (15x)	3	1/8	2-1/2	48978	48.20	48978-C3	54.10			
.078 (5/64)	.117	**1.400** (18x)	3	1/8	3	977378	60.20	977378-C3	66.10			
.078 (5/64)	.117	**1.562** (20x)	3	1/8	3	58378	60.20	58378-C3	66.10			
.078 (5/64)	.117	**1.950** (25x)	3	1/8	3	38078	73.10	38078-C3	79.00	**25x Diameter!**		
.078 (5/64)	.117	**2.343** (30x)	3	1/8	4	972078	96.80	972078-C3	103.20	**30x Diameter!**		
.080	.120	**.240** (3x)	3	1/8	2-1/2	47880	41.20	47880-C3	47.10			
.080	.120	**.406** (5x)	3	1/8	2-1/2	33280	41.20	33280-C3	47.10			
.080	.120	**.650** (8x)	3	1/8	2-1/2	34680	41.30	34680-C3	47.20	34680-C4	57.10	
.080	.120	**.960** (12x)	3	1/8	2-1/2	35480	42.70	35480-C3	48.60			
.085	.127	**.425** (5x)	3	1/8	2-1/2	33285	41.20	33285-C3	47.10			
.085	.127	**.700** (8x)	3	1/8	2-1/2	34685	41.30	34685-C3	47.20	34685-C4	57.10	
.085	.127	**1.020** (12x)	3	1/8	2-1/2	35485	42.70	35485-C3	48.60			
.090	.135	**.270** (3x)	3	1/8	2-1/2	47890	41.20	47890-C3	47.10			
.090	.135	**.450** (5x)	3	1/8	2-1/2	33290	41.20	33290-C3	47.10			
.090	.135	**.750** (8x)	3	1/8	2-1/2	34690	41.30	34690-C3	47.20	34690-C4	56.90	
.090	.135	**1.080** (12x)	3	1/8	2-1/2	35490	42.70	35490-C3	48.60			
.093 (3/32)	.139	**.279** (3x)	3	1/8	2-1/2	47893	41.20	47893-C3	47.10	47893-C4	57.00	
.093 (3/32)	.139	**.279** (3x)	4	1/8	2-1/2	739993	43.70	739993-C3	49.60			
.093 (3/32)	.139	**.375** (4x)	3	1/8	2-1/2	945593	41.20	945593-C3	47.10	945593-C4	57.00	
.093 (3/32)	.139	**.375** (4x)	4	1/8	2-1/2	752093	41.20	752093-C3	47.10			
.093 (3/32)	.139	**.500** (5x)	3	1/8	2-1/2	33293	41.20	33293-C3	47.10	33293-C4	56.70	
.093 (3/32)	.139	**.500** (5x)	4	1/8	2-1/2	861693	43.70	861693-C3	49.60			
.093 (3/32)	.139	**.585** (6x)	3	1/8	2-1/2	937093	41.20	937093-C3	47.10	937093-C4	57.00	
.093 (3/32)	.139	**.585** (6x)	4	1/8	2-1/2	753693	41.20	753693-C3	47.10			
.093 (3/32)	.139	**.670** (7x)	3	1/8	2-1/2	934893	41.30	934893-C3	47.20	934893-C4	57.10	
.093 (3/32)	.139	**.670** (7x)	4	1/8	2-1/2	753293	41.30	753293-C3	47.20			
.093 (3/32)	.139	**.750** (8x)	3	1/8	2-1/2	34693	41.30	34693-C3	47.20	34693-C4	56.90	
.093 (3/32)	.139	**.750** (8x)	4	1/8	2-1/2	874193	43.80	874193-C3	49.70			
.093 (3/32)	.139	**.850** (9x)	3	1/8	2-1/2	846893	42.70	846893-C3	48.60			
.093 (3/32)	.139	**.950** (10x)	3	1/8	2-1/2	982193	42.70	982193-C3	48.60	982193-C4	58.40	
.093 (3/32)	.139	**.950** (10x)	4	1/8	2-1/2	789193	42.70	789193-C3	48.60			
.093 (3/32)	.139	**1.030** (11x)	3	1/8	2-1/2	850293	42.70	850293-C3	48.60			
.093 (3/32)	.139	**1.125** (12x)	3	1/8	2-1/2	35493	42.70	35493-C3	48.60	35493-C4	57.80	
.093 (3/32)	.139	**1.125** (12x)	4	1/8	2-1/2	801793	42.70	801793-C3	48.60			
.093 (3/32)	.139	**1.250** (13x)	3	1/8	2-1/2	839393	45.90	839393-C3	51.80			

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Square – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.093 (3/32)	.139	**1.400** (15x)	3	1/8	3	48993	50.10	48993-C3	56.10	48993-C4	65.10
.093 (3/32)	.139	**1.675** (18x)	3	1/8	3	977393	60.90	977393-C3	66.40		
.093 (3/32)	.139	**1.875** (20x)	3	1/8	4	58393	66.40	58393-C3	72.80		
.093 (3/32)	.139	**2.062** (22x)	3	1/8	4	969693	69.80	969693-C3	76.10		
.093 (3/32)	.139	**2.312** (25x)	3	1/8	4	38093	76.10	38093-C3	82.40	**25x Diameter!**	
.093 (3/32)	.139	**2.812** (30x)	3	1/8	4	972093	107.40	972093-C3	113.80	**30x Diameter!**	
.095	.142	**.500** (5x)	3	1/8	2-1/2	33295	41.20	33295-C3	47.10		
.095	.142	**.750** (8x)	3	1/8	2-1/2	34695	41.30	34695-C3	47.20	34695-C4	57.10
.095	.142	**1.150** (12x)	3	1/8	2-1/2	35495	42.70	35495-C3	48.60		
.100	.150	**.300** (3x)	3	1/8	2-1/2	978400	41.20	978400-C3	47.10		
.100	.150	**.400** (4x)	3	1/8	2-1/2	945600	41.20	945600-C3	47.10		
.100	.150	**.500** (5x)	3	1/8	2-1/2	33300	41.20	33300-C3	47.10		
.100	.150	**.600** (6x)	3	1/8	2-1/2	937100	41.20	937100-C3	47.10		
.100	.150	**.700** (7x)	3	1/8	2-1/2	934900	41.20	934900-C3	47.10		
.100	.150	**.800** (8x)	3	1/8	2-1/2	34700	41.30	34700-C3	47.20	34700-C4	56.90
.100	.150	**1.000** (10x)	3	1/8	2-1/2	982200	42.70	982200-C3	48.60		
.100	.150	**1.200** (12x)	3	1/8	2-1/2	35499	42.70	35499-C3	48.60		
.100	.150	**1.500** (15x)	3	1/8	3	49000	51.00	49000-C3	56.90		
.100	.150	**1.812** (18x)	3	1/8	4	977400	63.80	977400-C3	70.20		
.105	.158	**.530** (5x)	3	1/8	2-1/2	33301	41.20	33301-C3	47.10		
.105	.158	**.850** (8x)	3	1/8	2-1/2	34701	41.30	34701-C3	47.20		
.109 (7/64)	.163	**.570** (5x)	3	1/8	2-1/2	33302	41.20	33302-C3	47.10	33302-C4	57.00
.109 (7/64)	.163	**.570** (5x)	4	1/8	2-1/2	861702	41.90	861702-C3	47.90		
.109 (7/64)	.163	**.680** (6x)	3	1/8	2-1/2	937102	41.30	937102-C3	47.20		
.109 (7/64)	.163	**.790** (7x)	3	1/8	2-1/2	934902	41.30	934902-C3	47.20		
.109 (7/64)	.163	**.900** (8x)	3	1/8	2-1/2	34702	41.30	34702-C3	47.20		
.109 (7/64)	.163	**1.125** (10x)	3	1/8	2-1/2	982202	42.70	982202-C3	48.60		
.109 (7/64)	.163	**1.312** (12x)	3	1/8	3	35502	43.40	35502-C3	49.30		
.110	.165	**.570** (5x)	3	1/8	2-1/2	33303	41.20	33303-C3	47.10		
.110	.165	**.900** (8x)	3	1/8	2-1/2	34703	42.00	34703-C3	48.00		
.115	.173	**.600** (5x)	3	1/8	2-1/2	33304	41.20	33304-C3	47.10		
.115	.173	**.950** (8x)	3	1/8	2-1/2	34704	41.30	34704-C3	47.20		
.118 (3 mm)	.177	**.475** (4x)	3	1/8	2-1/2	945605	41.20	945605-C3	47.10		
.118 (3 mm)	.177	**.625** (5x)	3	1/8	2-1/2	33305	41.20	33305-C3	47.10		
.118 (3 mm)	.177	**.625** (5x)	4	1/8	2-1/2	861705	41.20	861705-C3	47.10		
.118 (3 mm)	.177	**.735** (6x)	3	1/8	2-1/2	937105	41.30	937105-C3	47.20		
.118 (3 mm)	.177	**.840** (7x)	3	1/8	2-1/2	934905	41.30	934905-C3	47.20		
.118 (3 mm)	.177	**.950** (8x)	3	1/8	2-1/2	34705	41.30	34705-C3	47.20		
.118 (3 mm)	.177	**.950** (8x)	4	1/8	2-1/2	874205	42.00	874205-C3	48.00		
.118 (3 mm)	.177	**1.187** (10x)	3	1/8	2-1/2	982205	42.70	982205-C3	48.60		
.118 (3 mm)	.177	**1.420** (12x)	3	1/8	3	35505	43.40	35505-C3	49.30		
.118 (3 mm)	.177	**1.770** (15x)	3	1/8	3	49005	52.00	49005-C3	57.90		
.118 (3 mm)	.177	**2.125** (18x)	3	1/8	4	977405	64.80	977405-C3	71.10		
.120	.180	**.625** (5x)	3	1/8	2-1/2	33306	41.20	33306-C3	47.10		
.120	.180	**1.000** (8x)	3	1/8	2-1/2	34706	41.30	34706-C3	47.20		

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NEW SIZES!

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Square – Long Reach, Stub Flute (cont.)

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SQUARE

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.187	.375 (3x)	3	1/8	2-1/2	978408	41.20	978408-C3	47.10		
.125 (1/8)	.187	.500 (4x)	3	1/8	2-1/2	945608	41.20	945608-C3	47.10	945608-C4	56.70
.125 (1/8)	.187	.625 (5x)	3	1/8	2-1/2	33308	41.20	33308-C3	47.10	33308-C4	56.70
.125 (1/8)	.187	.625 (5x)	4	1/8	2-1/2	861708	43.70	861708-C3	49.60		
.125 (1/8)	.187	.750 (6x)	3	1/8	2-1/2	937108	41.20	937108-C3	47.10	937108-C4	56.70
.125 (1/8)	.187	.750 (6x)	4	1/8	2-1/2	753708	41.90	753708-C3	47.90		
.125 (1/8)	.187	.875 (7x)	3	1/8	2-1/2	934908	41.20	934908-C3	47.10	934908-C4	57.00
.125 (1/8)	.187	.875 (7x)	4	1/8	2-1/2	753308	41.90	753308-C3	47.90		
.125 (1/8)	.187	1.000 (8x)	3	1/8	2-1/2	34708	41.20	34708-C3	47.10	34708-C4	56.70
.125 (1/8)	.187	1.000 (8x)	4	1/8	2-1/2	874208	43.70	874208-C3	49.60		
.125 (1/8)	.187	1.125 (9x)	3	1/8	2-1/2	846908	44.50	846908-C3	50.40		
.125 (1/8)	.187	1.250 (10x)	3	1/8	2-1/2	982208	44.50	982208-C3	50.40	982208-C4	59.50
.125 (1/8)	.187	1.250 (10x)	4	1/8	2-1/2	789208	44.50	789208-C3	50.40		
.125 (1/8)	.187	1.375 (11x)	3	1/8	2-1/2	850308	44.60	850308-C3	50.60		
.125 (1/8)	.187	1.500 (12x)	3	1/8	3	35508	44.60	35508-C3	50.60	35508-C4	59.60
.125 (1/8)	.187	1.500 (12x)	4	1/8	3	801808	44.60	801808-C3	50.60		
.125 (1/8)	.187	1.625 (13x)	3	1/8	3	839408	47.90	839408-C3	53.80		
.125 (1/8)	.187	1.875 (15x)	3	1/8	3	49008	51.00	49008-C3	56.90	49008-C4	66.00
.125 (1/8)	.187	2.250 (18x)	3	1/8	4	977408	61.10	977408-C3	67.50		
.125 (1/8)	.187	2.500 (20x)	3	1/8	4	58408	63.30	58408-C3	69.60		
.125 (1/8)	.187	2.750 (22x)	3	1/8	4	969708	66.80	969708-C3	73.20		
.125 (1/8)	.187	3.125 (25x)	3	1/8	4	38108	73.50	38108-C3	79.80	**25x Diameter!**	
.125 (1/8)	.187	3.750 (30x)	3	1/8	6	973608	89.50	973608-C3	97.50	**30x Diameter!**	
.140 (9/64)	.220	.425 (3x)	3	3/16	3	978409	48.60	978409-C3	55.20		
.140 (9/64)	.220	.750 (5x)	3	3/16	3	33309	48.60	33309-C3	55.20	33309-C4	66.40
.140 (9/64)	.220	.750 (5x)	4	3/16	3	861709	48.60	861709-C3	55.20		
.140 (9/64)	.220	1.125 (8x)	3	3/16	3	34709	48.60	34709-C3	55.20		
.140 (9/64)	.220	1.450 (10x)	3	3/16	3	982209	52.20	982209-C3	58.60		
.140 (9/64)	.220	1.680 (12x)	3	3/16	4	35509	56.10	35509-C3	63.20		
.156 (5/32)	.234	.470 (3x)	3	3/16	3	978410	48.60	978410-C3	55.20		
.156 (5/32)	.234	.625 (4x)	3	3/16	3	945610	48.60	945610-C3	55.20		
.156 (5/32)	.234	.750 (5x)	3	3/16	3	33310	48.60	33310-C3	55.20	33310-C4	66.40
.156 (5/32)	.234	.750 (5x)	4	3/16	3	861710	48.60	861710-C3	55.20		
.156 (5/32)	.234	.937 (6x)	3	3/16	3	937110	48.60	937110-C3	55.20		
.156 (5/32)	.234	1.093 (7x)	3	3/16	3	934910	48.60	934910-C3	55.20		
.156 (5/32)	.234	1.250 (8x)	3	3/16	3	34710	48.60	34710-C3	55.20	34710-C4	69.40
.156 (5/32)	.234	1.250 (8x)	4	3/16	3	874210	48.60	874210-C3	55.20		
.156 (5/32)	.234	1.375 (9x)	3	3/16	3	846910	52.20	846910-C3	58.60		
.156 (5/32)	.234	1.570 (10x)	3	3/16	3	982210	52.20	982210-C3	58.60		
.156 (5/32)	.234	1.875 (12x)	3	3/16	4	35510	52.40	35510-C3	61.20		
.156 (5/32)	.234	2.375 (15x)	3	3/16	4	49010	56.10	49010-C3	64.70		
.156 (5/32)	.234	2.812 (18x)	3	3/16	6	977410	77.30	977410-C3	88.90		
.172 (11/64)	.258	.875 (5x)	3	3/16	3	33311	48.60	33311-C3	55.20		
.172 (11/64)	.258	1.375 (8x)	3	3/16	3	34711	48.60	34711-C3	55.20		

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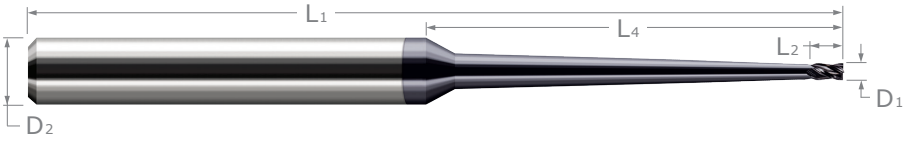
Square – Long Reach, Stub Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	.187 (3/16)	.281	.570 (3x)	3	3/16	3	978412	48.60	978412-C3	55.20		
	.187 (3/16)	.281	.750 (4x)	3	3/16	3	945612	48.60	945612-C3	55.20		
	.187 (3/16)	.281	1.000 (5x)	3	3/16	3	33312	48.60	33312-C3	55.20	33312-C4	69.40
	.187 (3/16)	.281	1.000 (5x)	4	3/16	3	861712	48.60	861712-C3	55.20		
	.187 (3/16)	.281	1.156 (6x)	3	3/16	3	937112	48.60	937112-C3	55.20		
	.187 (3/16)	.281	1.312 (7x)	3	3/16	3	934912	48.60	934912-C3	55.20		
	.187 (3/16)	.281	1.500 (8x)	3	3/16	3	34712	48.60	34712-C3	55.20	34712-C4	69.40
	.187 (3/16)	.281	1.500 (8x)	4	3/16	3	874212	50.90	874212-C3	57.50		
	.187 (3/16)	.281	1.680 (9x)	3	3/16	3	846912	52.20	846912-C3	58.60		
	.187 (3/16)	.281	1.875 (10x)	3	3/16	4	982212	52.20	982212-C3	61.00		
NEW	.187 (3/16)	.281	1.875 (10x)	4	3/16	4	789212	54.50	789212-C3	61.70		
	.187 (3/16)	.281	2.250 (12x)	3	3/16	4	35512	52.40	35512-C3	61.20	35512-C4	74.40
	.187 (3/16)	.281	2.812 (15x)	3	3/16	4	49012	56.10	49012-C3	64.70		
	.187 (3/16)	.281	3.375 (18x)	3	3/16	6	977412	79.80	977412-C3	88.20		
	.187 (3/16)	.281	3.750 (20x)	3	3/16	6	58412	79.80	58412-C3	88.20		
	.187 (3/16)	.281	4.125 (22x)	3	3/16	6	969712	78.80	969712-C3	90.40		
	.203 (13/64)	.312	1.015 (5x)	3	1/4	4	33313	61.10	33313-C3	69.80		
	.203 (13/64)	.312	1.625 (8x)	3	1/4	4	34713	61.10	34713-C3	71.50		
	.218 (7/32)	.330	1.125 (5x)	3	1/4	4	33314	60.80	33314-C3	71.10		
	.218 (7/32)	.330	1.750 (8x)	3	1/4	4	34714	60.80	34714-C3	71.10		
	.218 (7/32)	.330	2.187 (10x)	3	1/4	4	982214	62.70	982214-C3	72.90		
	.250 (1/4)	.375	.750 (3x)	3	1/4	4	978416	54.40	978416-C3	64.60		
	.250 (1/4)	.375	1.000 (4x)	3	1/4	4	945616	54.40	945616-C3	64.60		
	.250 (1/4)	.375	1.250 (5x)	3	1/4	4	33316	54.40	33316-C3	64.60	33316-C4	77.90
	.250 (1/4)	.375	1.250 (5x)	4	1/4	4	861716	54.40	861716-C3	64.60		
	.250 (1/4)	.375	1.500 (6x)	3	1/4	4	937116	54.40	937116-C3	64.60		
	.250 (1/4)	.375	1.750 (7x)	3	1/4	4	934916	54.40	934916-C3	64.60		
	.250 (1/4)	.375	2.000 (8x)	3	1/4	4	34716	54.40	34716-C3	64.60	34716-C4	77.90
	.250 (1/4)	.375	2.000 (8x)	4	1/4	4	874216	56.80	874216-C3	67.10		
	.250 (1/4)	.375	2.250 (9x)	3	1/4	4	846916	61.40	846916-C3	71.70		
	.250 (1/4)	.375	2.500 (10x)	3	1/4	4	982216	61.40	982216-C3	71.70		
	.250 (1/4)	.375	3.000 (12x)	3	1/4	6	35516	67.30	35516-C3	78.90	35516-C4	96.00
	.250 (1/4)	.375	3.750 (15x)	3	1/4	6	49016	68.60	49016-C3	80.20		
	.250 (1/4)	.375	5.000 (20x)	3	1/4	8	58416	142.90	58416-C3	160.20		
	.312 (5/16)	.470	1.625 (5x)	3	5/16	4	33320	90.60	33320-C3	102.80		
	.312 (5/16)	.470	2.500 (8x)	3	5/16	4	34720	90.60	34720-C3	102.80		
	.375 (3/8)	.570	2.000 (5x)	3	3/8	4	33324	90.60	33324-C3	102.90		
	.375 (3/8)	.570	3.000 (8x)	3	3/8	6	34724	124.70	34724-C3	142.50		
	.375 (3/8)	.570	3.750 (10x)	3	3/8	6	982224	124.70	982224-C3	139.00		
	.500 (1/2)	.750	2.625 (5x)	3	1/2	4	33332	107.10	33332-C3	123.70		

MINIATURE END MILLS

Square – Tapered Reach (Clearance Cutters)



Maximum Reach & Maximum Rigidity!

SQUARE

- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½x diameter
- Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

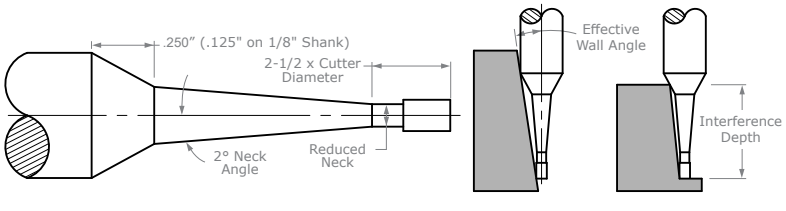
CUTTER DIA.	LOC	OVERALL REACH	EFF. WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*						UNCOATED			AlTiN NANO COATED		
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2°	3°	4°	2 FL	4 FL	USD$	2 FL	4 FL	USD$
.015	.023	**1/2**	6.4°	1/8	2-1/2	.060	.080	.125	.375	.395	.420		990215	87.50		990215-C6	94.80
.031	.047	**1/2**	5.4°	1/8	2-1/2	.115	.155	.235	.385	.410	.440		990231	67.40		990231-C6	74.60
.031	.047	**1**	6.3°	1/4	4	.115	.155	.235	.755	.800	.850	26631	30831	81.20	26631-C6	30831-C6	91.70
.031	.047	**1-1/2**	4.2°	1/4	4	.115	.155	.235	1.260	1.355	1.470	28331	31231	87.70	28331-C6	31231-C6	98.20
.031	.047	**2**	3.1°	1/4	4	.115	.155	.235	1.765	1.965	-	17431	913131	94.00	17431-C6	913131-C6	104.50
.047	.071	**1/2**	4.5°	1/8	2-1/2	.180	.245	.370	.395	.430	.470		990247	68.00		990247-C6	75.30
.047	.071	**1**	5.9°	1/4	4	.180	.245	.370	.765	.815	.870	26647	30847	81.20	26647-C6	30847-C6	91.70
.047	.071	**1-1/2**	3.9°	1/4	4	.180	.245	.370	1.275	1.380	-	28347	31247	87.70	28347-C6	31247-C6	98.20
.062	.093	**1/2**	3.7°	1/8	2-1/2	.220	.295	.375	.410	.460	-		990262	65.50		990262-C6	72.80
.062	.093	**1**	5.4°	1/4	4	.220	.295	.445	.775	.825	.890	26662	30862	78.90	26662-C6	30862-C6	89.40
.062	.093	**1-1/2**	3.7°	1/4	4	.220	.295	.445	1.285	1.410	-	28362	31262	85.30	28362-C6	31262-C6	95.80
.062	.093	**2**	2.6°	1/4	4	.220	.295	.445	1.805	-	-	17462	913162	91.80	17462-C6	913162-C6	102.20
.078	.118	**1**	5.0°	1/4	4	.305	.405	.610	.785	.845	.915	26678	30878	78.90	26678-C6	30878-C6	89.40
.078	.118	**1-1/2**	3.4°	1/4	4	.305	.405	.610	1.305	1.445	-	28378	31278	85.30	28378-C6	31278-C6	95.80
.093	.140	**1**	4.6°	1/4	4	.340	.455	.685	.795	.865	.945	26693	30893	79.90	26693-C6	30893-C6	90.40
.093	.140	**1-1/2**	3.1°	1/4	4	.340	.455	.685	1.320	-	-	28393	31293	84.60	28393-C6	31293-C6	95.10
.093	.140	**2**	2.2°	1/4	4	.340	.455	.685	1.890	-	-	17493	913193	89.50	17493-C6	913193-C6	100.00
.125	.188	**1**	3.7°	1/4	4	.450	.600	.760	.835	.930	-	26708	30908	79.90	26708-C6	30908-C6	90.40
.125	.188	**1-1/2**	2.5°	1/4	4	.450	.600	.905	1.395	-	-	28408	31308	84.60	28408-C6	31308-C6	95.10
.125	.188	**2**	1.7°	1/4	4	.450	.600	.905	-	-	-	17508	913208	89.50	17508-C6	913208-C6	100.00
.156	.234	**1**	2.8°	1/4	4	.525	.705	.780	.895	-	-	26710	30910	79.90	26710-C6	30910-C6	90.40
.156	.234	**1-1/2**	1.9°	1/4	4	.525	.705	1.060	-	-	-	28410	31310	84.60	28410-C6	31310-C6	95.10
.187	.281	**1-1/2**	1.3°	1/4	4	.605	.805	1.215	-	-	-	28412	31312	84.60	28412-C6	31312-C6	95.10
.250	.375	**1-1/2**	2.5°	3/8	4	.760	1.015	1.275	1.425	-	-	28416	31316	109.20	28416-C6	31316-C6	124.20

*Values are approximate and may vary due to tolerancing.

For detailed interference charts with more angles, scan the QR code or visit **harveytool.com/resources**

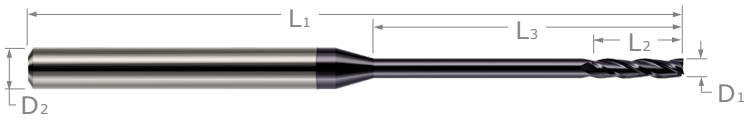
Effective Wall Angle:
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

Interference Depth:
At a given angle, the depth at which the cutter interferes with the workpiece.

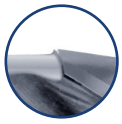


MINIATURE END MILLS

Square – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut is > 5x diameter
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.010	.050	.080 (8x)	3	1/8	2-1/2	876610	58.30	876610-C3	64.30		
.010	.050	.100 (10x)	3	1/8	2-1/2	13610	59.90	13610-C3	65.80	10010	74.90
.010	.050	.150 (15x)	3	1/8	2-1/2	948210	76.00	948210-C3	81.90		
.012	.060	.120 (10x)	3	1/8	2-1/2	13612	59.90	13612-C3	65.80		
.015 (1/64)	.075	.125 (8x)	3	1/8	2-1/2	876615	46.30	876615-C3	52.20		
.015 (1/64)	.075	.150 (10x)	3	1/8	2-1/2	13615	47.60	13615-C3	53.60	10015	62.50
.015 (1/64)	.075	.225 (15x)	3	1/8	2-1/2	948215	65.30	948215-C3	71.20		
.020 (.5 mm)	.100	.160 (8x)	3	1/8	2-1/2	876620	44.30	876620-C3	50.20		
.020 (.5 mm)	.100	.200 (10x)	3	1/8	2-1/2	13620	45.70	13620-C3	51.60	10020	60.70
.020 (.5 mm)	.100	.300 (15x)	3	1/8	2-1/2	948220	63.00	948220-C3	68.90		
.025	.125	.250 (10x)	3	1/8	2-1/2	13625	43.90	13625-C3	49.80	10025	58.90
.025	.125	.312 (12x)	3	1/8	2-1/2	867025	57.50	867025-C3	63.40		
.030	.150	.300 (10x)	3	1/8	2-1/2	13630	43.90	13630-C3	49.80	10030	58.90
.030	.150	.450 (15x)	3	1/8	2-1/2	948230	60.90	948230-C3	66.80		
.031 (1/32)	.155	.250 (8x)	3	1/8	2-1/2	876631	42.60	876631-C3	48.50		
.031 (1/32)	.155	.310 (10x)	3	1/8	2-1/2	13631	43.90	13631-C3	49.80	10031	58.90
.031 (1/32)	.155	.312 (10x)	4	1/8	2-1/2	776031	43.90	776031-C3	49.80		
.031 (1/32)	.155	.375 (12x)	3	1/8	2-1/2	867031	57.00	867031-C3	62.90		
.031 (1/32)	.155	.470 (15x)	3	1/8	2-1/2	948231	60.90	948231-C3	66.80		
.035 (.9 mm)	.175	.350 (10x)	3	1/8	2-1/2	13635	43.90	13635-C3	49.80	10035	59.70
.040	.200	.325 (8x)	3	1/8	2-1/2	876640	42.50	876640-C3	48.40		
.040	.200	.400 (10x)	3	1/8	2-1/2	13640	43.90	13640-C3	49.80	10040	58.90
.040	.200	.600 (15x)	3	1/8	2-1/2	948240	60.90	948240-C3	66.80		
.045	.225	.450 (10x)	3	1/8	2-1/2	13645	43.10	13645-C3	49.00	10045	58.90
.047 (3/64)	.250	.375 (8x)	3	1/8	2-1/2	876647	41.70	876647-C3	47.60		
.047 (3/64)	.250	.500 (10x)	3	1/8	2-1/2	13647	43.10	13647-C3	49.00	10047	58.10
.047 (3/64)	.250	.500 (10x)	4	1/8	2-1/2	776047	43.10	776047-C3	49.00		
.047 (3/64)	.250	.570 (12x)	3	1/8	2-1/2	867047	53.90	867047-C3	59.80		
.047 (3/64)	.250	.710 (15x)	3	1/8	2-1/2	948247	57.80	948247-C3	63.70		
.050	.300	.500 (10x)	3	1/8	2-1/2	956350	43.10	956350-C3	49.00		
.050	.300	.600 (12x)	3	1/8	2-1/2	13650	43.10	13650-C3	49.00	10050	58.90
.050	.300	.750 (15x)	3	1/8	2-1/2	948250	57.80	948250-C3	63.70		
.055 (1.4 mm)	.385	.770 (14x)	3	1/8	2-1/2	13655	45.70	13655-C3	51.60	10055	61.40
.060	.312	.625 (10x)	3	1/8	2-1/2	956360	43.10	956360-C3	49.00		
.060	.312	.720 (12x)	3	1/8	2-1/2	867060	43.10	867060-C3	49.00		
.060	.500	1.000 (16x)	3	1/8	2-1/2	13660	45.90	13660-C3	51.80	10060	61.20

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MINIATURE END MILLS

Square – Long Reach, Long Flute (cont.)

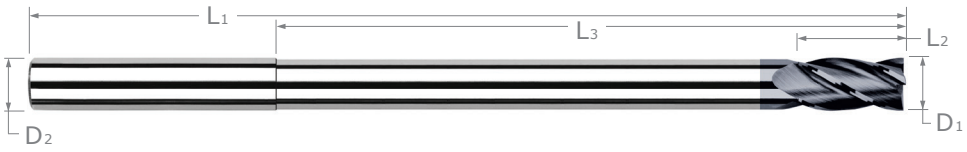
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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.062 (1/16)	.312	.500 (8x)	3	1/8	2-1/2	876662	41.60	876662-C3	47.50		
.062 (1/16)	.312	.625 (10x)	3	1/8	2-1/2	956362	43.10	956362-C3	49.00		
.062 (1/16)	.312	.750 (12x)	3	1/8	2-1/2	867062	42.20	867062-C3	48.20		
.062 (1/16)	.500	1.000 (16x)	3	1/8	2-1/2	13662	45.90	13662-C3	51.80	10062	61.20
.062 (1/16)	.312	1.000 (16x)	4	1/8	2-1/2	776062	45.90	776062-C3	51.80		
.062 (1/16)	.312	1.125 (18x)	3	1/8	2-1/2	720762	46.60	720762-C3	52.50		
.065	.500	1.000 (15x)	3	1/8	2-1/2	13665	45.70	13665-C3	51.60	10065	61.00
.070	.375	.700 (10x)	3	1/8	2-1/2	956370	43.10	956370-C3	49.00		
.070	.500	1.000 (14x)	3	1/8	2-1/2	13670	45.70	13670-C3	51.60	10070	61.40
.075	.500	1.000 (13x)	3	1/8	2-1/2	13675	43.10	13675-C3	49.00	10075	58.90
.078 (5/64)	.406	.800 (10x)	3	1/8	2-1/2	956378	43.10	956378-C3	49.00		
.078 (5/64)	.500	1.000 (12x)	3	1/8	2-1/2	13678	43.10	13678-C3	49.00	10078	58.10
.078 (5/64)	.406	1.000 (12x)	4	1/8	2-1/2	776078	43.10	776078-C3	49.00		
.078 (5/64)	.406	1.187 (15x)	3	1/8	2-1/2	948278	57.80	948278-C3	63.70		
.080	.750	1.250 (15x)	3	1/8	2-1/2	13680	45.90	13680-C3	51.80	10080	61.20
.085	.750	1.250 (14x)	3	1/8	2-1/2	13685	45.90	13685-C3	51.80	10085	61.70
.090	.750	1.250 (13x)	3	1/8	2-1/2	13690	43.40	13690-C3	49.30	10090	59.20
.093 (3/32)	.500	.750 (8x)	3	1/8	2-1/2	876693	41.60	876693-C3	47.50		
.093 (3/32)	.500	.950 (10x)	3	1/8	2-1/2	956393	43.10	956393-C3	49.00		
.093 (3/32)	.750	.950 (10x)	3	1/8	2-1/2	755693	44.20	755693-C3	50.10		
.093 (3/32)	.750	1.250 (13x)	3	1/8	2-1/2	13693	43.40	13693-C3	49.30	10093	58.30
.093 (3/32)	.500	1.250 (13x)	4	1/8	2-1/2	776093	43.40	776093-C3	49.30		
.093 (3/32)	.500	1.400 (15x)	3	1/8	3	948293	57.80	948293-C3	63.70		
.093 (3/32)	.750	1.400 (15x)	3	1/8	3	720593	59.10	720593-C3	65.00		
.093 (3/32)	.500	1.675 (18x)	3	1/8	3	720793	59.70	720793-C3	65.60		
.095	.750	1.250 (13x)	3	1/8	2-1/2	13695	43.10	13695-C3	49.00	10095	58.10
.100	.750	1.250 (12x)	3	1/8	2-1/2	13700	43.10	13700-C3	49.00	10100	58.90

D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.625	1.000 (8x)	3	1/8	2-1/2	876708	41.60	876708-C3	47.50		
.125 (1/8)	.625	1.250 (10x)	3	1/8	2-1/2	956408	44.40	956408-C3	50.30		
.125 (1/8)	1.000	1.250 (10x)	3	1/8	2-1/2	755708	45.00	755708-C3	51.00		
.125 (1/8)	1.000	1.500 (12x)	3	1/8	2-1/2	13708	44.60	13708-C3	50.60	10108	59.80
.125 (1/8)	.625	1.500 (12x)	4	1/8	2-1/2	776108	44.60	776108-C3	50.60		
.125 (1/8)	.625	1.875 (15x)	3	1/8	3	948308	61.40	948308-C3	67.40		
.125 (1/8)	1.000	1.875 (15x)	3	1/8	3	720608	62.60	720608-C3	68.50		
.140 (9/64)	.750	1.125 (8x)	3	3/16	3	876709	54.10	876709-C3	60.70		
.140 (9/64)	.750	1.450 (10x)	3	3/16	3	956409	56.70	956409-C3	63.30		
.156 (5/32)	.750	1.250 (8x)	3	3/16	3	876710	54.10	876710-C3	60.70		
.156 (5/32)	.750	1.570 (10x)	3	3/16	3	956410	56.70	956410-C3	63.30		
.187 (3/16)	1.125	1.625 (8x)	3	3/16	3	13712	51.00	13712-C3	57.60	10112	71.70
.187 (3/16)	1.000	1.875 (10x)	3	3/16	4	956412	54.00	956412-C3	61.10		
.250 (1/4)	1.500	2.000 (8x)	3	1/4	4	13716	56.90	13716-C3	64.00	10116	80.40
.250 (1/4)	1.250	2.500 (10x)	3	1/4	4	956416	62.20	956416-C3	72.50		
.375 (3/8)	2.000	3.000 (8x)	3	3/8	6	876724	149.30	876724-C3	163.60		

MINIATURE END MILLS

Square – Extra Long Length

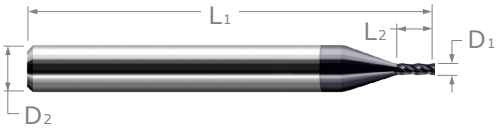


- **Up to 10" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach • 4 flutes • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.030"}_{-.000"}$	L_3 $^{+.030"}_{-.000"}$	D_2	L_1	4 FL	USD$	4 FL	USD$
.250 (1/4)	.375	4.375 (17.5x)	1/4	6	991916	102.50	991916-C3	114.00
.250 (1/4)	.375	4.375 (17.5x)	1/4	8	960516	141.60	960516-C3	159.00
.312 (5/16)	.470	4.343 (14x)	5/16	6	991920	122.30	991920-C3	139.60
.375 (3/8)	.562	4.312 (11.5x)	3/8	6	991924	137.80	991924-C3	155.90
.375 (3/8)	.562	4.312 (11.5x)	3/8	8	960524	169.70	960524-C3	193.80
.437 (7/16)	.656	5.875 (13.5x)	7/16	8	991928	240.40	991928-C3	261.40
.500 (1/2)	.750	5.750 (11.5x)	1/2	8	991932	252.50	991932-C3	288.10
.500 (1/2)	.750	5.750 (11.5x)	1/2	10	960532	367.00	960532-C3	402.60
.625 (5/8)	.937	5.687 (9x)	5/8	8	991940	424.90	991940-C3	451.30
.750 (3/4)	1.125	5.625 (7.5x)	3/4	8	991948	527.80	991948-C3	559.50

MINIATURE END MILLS

Square – Router Style



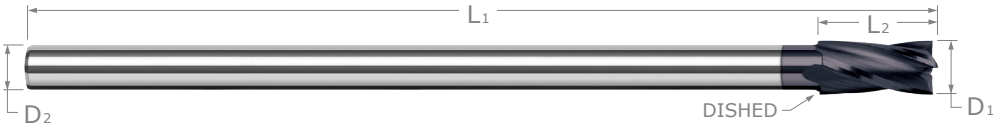
- Router style shank and tight overall length for quick and consistent tool changes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED		
D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.010"}_{-.000"}$	D_2	L_1 $^{+.010"}_{-.000"}$	2 FL	4 FL	USD$	2 FL	4 FL	USD$
.015 (1/64)	**.045** (3x)	1/4	2	760615	761715	39.90	760615-C3	761715-C3	47.50
.031 (1/32)	**.093** (3x)	1/4	2	760631	761731	39.90	760631-C3	761731-C3	47.50
.047 (3/64)	**.141** (3x)	1/4	2	760647	761747	39.90	760647-C3	761747-C3	47.50
.062 (1/16)	**.186** (3x)	1/4	2	760662	761762	39.90	760662-C3	761762-C3	47.50
.078 (5/64)	**.234** (3x)	1/4	2	760678	761778	39.90	760678-C3	761778-C3	47.50
.093 (3/32)	**.279** (3x)	1/4	2	760693	761793	39.90	760693-C3	761793-C3	47.50

	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.030"}_{-.000"}$	D_2	L_1 $^{+.010"}_{-.000"}$	2 FL	4 FL	USD$	2 FL	4 FL	USD$
NEW	.125 (1/8)	**.187** (1.5x)	1/4	2		698108	38.60		698108-C3	46.10
	.125 (1/8)	**.375** (3x)	1/4	2	760708	761808	39.90	760708-C3	761808-C3	47.50
NEW	.187 (3/16)	**.312** (1.5x)	1/4	2		698112	38.50		698112-C3	46.00
	.187 (3/16)	**.625** (3x)	1/4	2	760712	761812	39.90	760712-C3	761812-C3	47.50

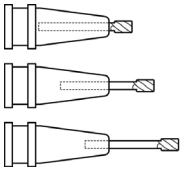
END MILLS

Square – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!

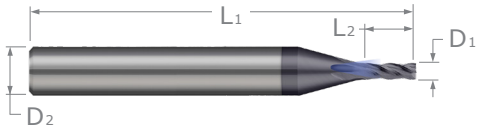


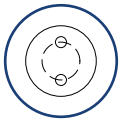
CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/8	3/16 (1.5x)	2	**3 mm**	2-1/2	907808	101.70	907808-C3	107.60	907808-C4	116.70
1/8	3/16 (1.5x)	4	**3 mm**	2-1/2	943208	104.60	943208-C3	110.50	943208-C4	120.40
1/8	3/8 (3x)	4	**3 mm**	2-1/2	789308	107.20	789308-C3	113.10		
5/32	15/64 (1.5x)	2	**1/8**	2-1/2	907810	101.70	907810-C3	108.40		
5/32	15/64 (1.5x)	4	**1/8**	2-1/2	943210	104.60	943210-C3	111.30		
5/32	15/64 (1.5x)	4	**1/8**	4	920610	114.50	920610-C3	123.30		
3/16	9/32 (1.5x)	2	**1/8**	2-1/2	907812	101.70	907812-C3	108.40		
3/16	9/32 (1.5x)	4	**1/8**	2-1/2	943212	104.60	943212-C3	111.30		
3/16	9/32 (1.5x)	4	**5/32**	4	920613	114.50	920613-C3	123.30	920613-C4	136.50
3/16	.570 (3x)	4	**1/8**	2-1/2	789312	107.20	789312-C3	113.90		
1/4	3/8 (1.5x)	2	**3/16**	3	907816	112.40	907816-C3	120.50		
1/4	3/8 (1.5x)	4	**3/16**	3	943216	113.30	943216-C3	122.10	943216-C4	134.70
1/4	3/8 (1.5x)	4	**3/16**	4	920616	153.90	920616-C3	164.10		
1/4	3/4 (3x)	4	**3/16**	3	789316	118.50	789316-C3	127.30		
5/16	15/32 (1.5x)	4	**1/4**	4	943220	139.20	943220-C3	151.40		
5/16	15/32 (1.5x)	4	**1/4**	6	920620	184.00	920620-C3	196.00		
3/8	9/16 (1.5x)	4	**5/16**	4	943224	164.30	943224-C3	180.10	943224-C4	197.00
3/8	9/16 (1.5x)	4	**5/16**	6	920624	200.40	920624-C3	218.30		
7/16	21/32 (1.5x)	4	**3/8**	6	943228	227.70	943228-C3	244.20		
1/2	3/4 (1.5x)	4	**7/16**	6	943232	257.60	943232-C3	274.90		
5/8	15/16 (1.5x)	4	**1/2**	6	943240	334.80	943240-C3	360.30		
3/4	1-1/8 (1.5x)	4	**5/8**	6	943248	413.10	943248-C3	439.90		

For Ball Reduced Shank, please see page 76.
For Corner Radius Reduced Shank, please see page 102.

MINIATURE END MILLS

Square – Coolant Through





Cross sectional view of dual coolant channels

- Coolant-through design for improved chip removal and heat reduction
- Dual coolant channels through shank transition
- AlTiN coating for improved lubricity and heat resistance
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
.031	**.093** (3x)	1/4	2	741531	742931	47.10	741531-C3	742931-C3	54.60
.047	**.141** (3x)	1/4	2	741547	742947	47.70	741547-C3	742947-C3	55.20
.062	**.186** (3x)	1/4	2	741562	742962	48.20	741562-C3	742962-C3	55.60
.078	**.234** (3x)	1/4	2	741578	742978	49.30	741578-C3	742978-C3	56.80
.093	**.279** (3x)	3/8	2	741593	742993	71.70	741593-C3	742993-C3	82.50
.125	**.375** (3x)	3/8	2	741608	743008	72.20	741608-C3	743008-C3	83.00

In The Loupe TV

Check Out Our New CNC Show!

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

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NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard



- **Cutter diameter down to .002"**
- Center cutting • Solid carbide
- CNC ground in the USA





BALL

CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	
.002	.003	(1.5x)	1/8	1-1/2	24502			78.90									
.002	.006	(3x)	1/8	1-1/2	74002			78.90									
.003	.004	(1.5x)	1/8	1-1/2	24503			69.80									
.003	.009	(3x)	1/8	1-1/2	74003			70.50									
.004 (.1 mm)	.006	(1.5x)	1/8	1-1/2	24504			62.80									
.004 (.1 mm)	.012	(3x)	1/8	1-1/2	74004			62.80									
.005	.007	(1.5x)	1/8	1-1/2	24505		24605	56.60	24505-C3		24605-C3	62.50			24605-C4	71.50	
.005	.015	(3x)	1/8	1-1/2	74005		74305	56.60	74005-C3		74305-C3	62.50	74005-C4		74305-C4	71.50	
.006	.009	(1.5x)	1/8	1-1/2	24506		24606	58.10			24606-C3	64.00					
.006	.018	(3x)	1/8	1-1/2	74006		74306	58.10	74006-C3		74306-C3	64.00					
.007	.010	(1.5x)	1/8	1-1/2	24507		24607	58.10			24607-C3	64.00					
.007	.021	(3x)	1/8	1-1/2	74007		74307	58.10	74007-C3		74307-C3	64.00					
.008 (.2 mm)	.012	(1.5x)	1/8	1-1/2	24508		24608	58.10	24508-C3		24608-C3	64.00					
.008 (.2 mm)	.024	(3x)	1/8	1-1/2	74008	835908	74308	58.10	74008-C3	835908-C3	74308-C3	64.00	74008-C4			73.10	
.009	.013	(1.5x)	1/8	1-1/2	24509		24609	58.10			24609-C3	64.00					
.009	.027	(3x)	1/8	1-1/2	74009		74309	58.10			74309-C3	64.00					
.010	.008	(0.8x)	1/8	1-1/2			758210	46.50			758210-C3	52.40					
.010	.015	(1.5x)	1/8	1-1/2	24510	823410	24610	45.00	24510-C3	823410-C3	24610-C3	51.00			24610-C4	60.00	
.010	.030	(3x)	1/8	1-1/2	74010	835910	74310	45.00	74010-C3	835910-C3	74310-C3	51.00	74010-C4		74310-C4	60.00	
.011	.016	(1.5x)	1/8	1-1/2	24511		24611	47.10			24611-C3	53.00					
.011	.033	(3x)	1/8	1-1/2	74011		74311	47.10			74311-C3	53.00					
.012 (.3 mm)	.018	(1.5x)	1/8	1-1/2	24512		24612	47.10	24512-C3		24612-C3	53.00					
.012 (.3 mm)	.036	(3x)	1/8	1-1/2	74012	835912	74312	47.10	74012-C3	835912-C3	74312-C3	53.00	74012-C4			62.10	
.013	.019	(1.5x)	1/8	1-1/2	24513		24613	47.10			24613-C3	53.00					
.013	.039	(3x)	1/8	1-1/2	74013		74313	47.10			74313-C3	53.00					
.014	.021	(1.5x)	1/8	1-1/2	24514		24614	47.10			24614-C3	53.00					
.014	.042	(3x)	1/8	1-1/2	74014		74314	47.10			74314-C3	53.00					
.015 (1/64)	.012	(0.8x)	1/8	1-1/2			758215	36.30			758215-C3	42.20					NEW
.015 (1/64)	.022	(1.5x)	1/8	1-1/2	24515	823415	24615	34.90	24515-C3	823415-C3	24615-C3	40.80	24515-C4		24615-C4	49.80	
.015 (1/64)	.045	(3x)	1/8	1-1/2	74015	835915	74315	34.90	74015-C3	835915-C3	74315-C3	40.80	74015-C4		74315-C4	49.80	
.016 (.4 mm)	.024	(1.5x)	1/8	1-1/2	24516		24616	36.50			24616-C3	42.50					
.016 (.4 mm)	.048	(3x)	1/8	1-1/2	74016		74316	36.50			74316-C3	42.50					
.017	.026	(1.5x)	1/8	1-1/2	24517		24617	36.50			24617-C3	42.50					
.017	.051	(3x)	1/8	1-1/2	74017		74317	36.50			74317-C3	42.50					
.018	.027	(1.5x)	1/8	1-1/2	24518		24618	36.50			24618-C3	42.50					
.018	.054	(3x)	1/8	1-1/2	74018		74318	36.50	74018-C3		74318-C3	42.50					
.019	.029	(1.5x)	1/8	1-1/2	24519		24619	36.50			24619-C3	42.50					
.019	.057	(3x)	1/8	1-1/2	74019		74319	36.50			74319-C3	42.50	74019-C4			51.50	

Down to .002"!

continued on next page

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
	.020 (.5 mm)	.016 (0.8x)	1/8	1-1/2			758220	35.10			758220-C3	41.00				
	.020 (.5 mm)	.030 (1.5x)	1/8	1-1/2	24520	823420	24620	33.60	24520-C3	823420-C3	24620-C3	39.50	24520-C4		24620-C4	48.60
	.020 (.5 mm)	.060 (3x)	1/8	1-1/2	74020	835920	74320	33.60	74020-C3	835920-C3	74320-C3	39.50	74020-C4		74320-C4	48.60
	.021	.031 (1.5x)	1/8	1-1/2	24521		24621	35.30			24621-C3	41.20				
	.021	.063 (3x)	1/8	1-1/2	74021		74321	35.30	74021-C3		74321-C3	41.20				
	.022	.033 (1.5x)	1/8	1-1/2	24522		24622	35.30			24622-C3	41.20				
	.022	.066 (3x)	1/8	1-1/2	74022		74322	35.30			74322-C3	41.20				
	.023	.035 (1.5x)	1/8	1-1/2	24523		24623	35.30			24623-C3	41.20				
	.023	.069 (3x)	1/8	1-1/2	74023		74323	35.30	74023-C3		74323-C3	41.20				
	.024 (.6 mm)	.036 (1.5x)	1/8	1-1/2	24524		24624	35.30			24624-C3	41.20				
	.024 (.6 mm)	.072 (3x)	1/8	1-1/2	74024		74324	35.30			74324-C3	41.20				
NEW	.025	.020 (0.8x)	1/8	1-1/2			758225	31.80			758225-C3	37.70				
	.025	.037 (1.5x)	1/8	1-1/2	24525	823425	24625	30.30	24525-C3	823425-C3	24625-C3	36.20			24625-C4	45.30
	.025	.075 (3x)	1/8	1-1/2	74025	835925	74325	30.30	74025-C3	835925-C3	74325-C3	36.20	74025-C4		74325-C4	45.30
	.026	.039 (1.5x)	1/8	1-1/2	24526		24626	31.70			24626-C3	37.60				
	.026	.078 (3x)	1/8	1-1/2	74026		74326	31.70			74326-C3	37.60				
	.027	.041 (1.5x)	1/8	1-1/2	24527		24627	31.70			24627-C3	37.60				
	.027	.081 (3x)	1/8	1-1/2	74027		74327	31.70			74327-C3	37.60				
	.028 (.7 mm)	.042 (1.5x)	1/8	1-1/2	24528		24628	31.70			24628-C3	37.60				
	.028 (.7 mm)	.084 (3x)	1/8	1-1/2	74028		74328	31.70			74328-C3	37.60				
	.029	.043 (1.5x)	1/8	1-1/2	24529		24629	31.70			24629-C3	37.60				
	.029	.087 (3x)	1/8	1-1/2	74029		74329	31.70			74329-C3	37.60				
	.030	.024 (0.8x)	1/8	1-1/2			758230	29.10			758230-C3	35.00				
	.030	.045 (1.5x)	1/8	1-1/2	24530	823430	24630	27.70	24530-C3	823430-C3	24630-C3	33.60			24630-C4	42.70
	.030	.090 (3x)	1/8	1-1/2	74030	835930	74330	27.70	74030-C3	835930-C3	74330-C3	33.60	74030-C4		74330-C4	42.70
	.031 (1/32)	.025 (0.8x)	1/8	1-1/2			758231	27.70			758231-C3	33.60				
	.031 (1/32)	.046 (1.5x)	1/8	1-1/2	24531	823431	24631	27.70	24531-C3	823431-C3	24631-C3	33.60	24531-C4		24631-C4	42.70
	.031 (1/32)	.093 (3x)	1/8	1-1/2	74031	835931	74331	27.70	74031-C3	835931-C3	74331-C3	33.60	74031-C4	835931-C4	74331-C4	42.70
NEW	.032	.026 (0.8x)	1/8	1-1/2			758232	30.50			758232-C3	36.40				
NEW	.032	.048 (1.5x)	1/8	1-1/2	24532		24632	29.10			24632-C3	35.00	24532-C4			44.00
	.032	.096 (3x)	1/8	1-1/2	74032		74332	29.10	74032-C3		74332-C3	35.00				
	.033	.049 (1.5x)	1/8	1-1/2	24533		24633	29.10			24633-C3	35.00				
	.033	.099 (3x)	1/8	1-1/2	74033		74333	29.10	74033-C3		74333-C3	35.00				
	.034	.051 (1.5x)	1/8	1-1/2	24534		24634	29.10			24634-C3	35.00				
	.034	.102 (3x)	1/8	1-1/2	74034		74334	29.10			74334-C3	35.00				
	.035 (.9 mm)	.052 (1.5x)	1/8	1-1/2	24535	823435	24635	26.20	24535-C3	823435-C3	24635-C3	32.10			24635-C4	41.10
	.035 (.9 mm)	.105 (3x)	1/8	1-1/2	74035	835935	74335	26.20	74035-C3	835935-C3	74335-C3	32.10	74035-C4		74335-C4	41.10
	.036	.054 (1.5x)	1/8	1-1/2	24536		24636	27.40			24636-C3	33.30				
	.036	.108 (3x)	1/8	1-1/2	74036		74336	27.40			74336-C3	33.30				
	.037	.055 (1.5x)	1/8	1-1/2	24537		24637	27.40			24637-C3	33.30				
	.037	.111 (3x)	1/8	1-1/2	74037		74337	27.40			74337-C3	33.30				
	.038	.057 (1.5x)	1/8	1-1/2	24538		24638	27.40			24638-C3	33.30				
	.038	.114 (3x)	1/8	1-1/2	74038		74338	27.40			74338-C3	33.30				
NEW	.039 (1 mm)	.031 (0.8x)	1/8	1-1/2			758239	28.30			758239-C3	34.30				
	.039 (1 mm)	.058 (1.5x)	1/8	1-1/2	24539	823439	24639	26.90	24539-C3	823439-C3	24639-C3	32.80				
	.039 (1 mm)	.117 (3x)	1/8	1-1/2	74039	835939	74339	26.90	74039-C3	835939-C3	74339-C3	32.80	74039-C4		74339-C4	41.80

continued on next page

NEW SIZES!

MINIATURE END MILLS

Ball – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	
.040	.032 (0.8x)	1/8	1-1/2			758240	27.50			758240-C3	33.40					
.040	.060 (1.5x)	1/8	1-1/2	24540	823440	24640	26.20	24540-C3	823440-C3	24640-C3	32.10	24540-C4		24640-C4	41.10	
.040	.120 (3x)	1/8	1-1/2	74040	835940	74340	26.20	74040-C3	835940-C3	74340-C3	32.10	74040-C4		74340-C4	41.10	
.041	.123 (3x)	1/8	1-1/2	74041		74341	27.40			74341-C3	33.30					
.042	.126 (3x)	1/8	1-1/2	74042		74342	27.40			74342-C3	33.30					
.043 (1.1 mm)	.129 (3x)	1/8	1-1/2	74043		74343	27.40			74343-C3	33.30					
.044	.132 (3x)	1/8	1-1/2	74044		74344	27.40			74344-C3	33.30					
.045	.067 (1.5x)	1/8	1-1/2	24545	823445	24645	26.20		823445-C3	24645-C3	32.10			24645-C4	41.10	
.045	.135 (3x)	1/8	1-1/2	74045	835945	74345	26.20	74045-C3	835945-C3	74345-C3	32.10	74045-C4		74345-C4	41.10	
.046	.138 (3x)	1/8	1-1/2	74046		74346	27.40			74346-C3	33.30					
.047 (3/64)	.038 (0.8x)	1/8	1-1/2			758247	27.50			758247-C3	33.40					
.047 (3/64)	.070 (1.5x)	1/8	1-1/2	24547	823447	24647	26.20	24547-C3	823447-C3	24647-C3	32.10	24547-C4		24647-C4	41.10	
.047 (3/64)	.141 (3x)	1/8	1-1/2	74047	835947	74347	26.20	74047-C3	835947-C3	74347-C3	32.10	74047-C4		74347-C4	41.10	
.048	.144 (3x)	1/8	1-1/2	74048		74348	27.40			74348-C3	33.30					
.049	.147 (3x)	1/8	1-1/2	74049		74349	27.40			74349-C3	33.30					
.050	.040 (0.8x)	1/8	1-1/2			758250	27.50			758250-C3	33.40					
.050	.075 (1.5x)	1/8	1-1/2	24550	823450	24650	26.20	24550-C3	823450-C3	24650-C3	32.10			24650-C4	41.10	
.050	.150 (3x)	1/8	1-1/2	74050	835950	74350	26.20	74050-C3	835950-C3	74350-C3	32.10	74050-C4		74350-C4	41.10	
.051 (1.3 mm)	.153 (3x)	1/8	1-1/2	74051		74351	27.40			74351-C3	33.30					
.052	.156 (3x)	1/8	1-1/2	74052		74352	27.40			74352-C3	33.30					
.053	.159 (3x)	1/8	1-1/2	74053		74353	27.40			74353-C3	33.30					
.054	.162 (3x)	1/8	1-1/2	74054		74354	27.40			74354-C3	33.30					
.055 (1.4 mm)	.044 (0.8x)	1/8	1-1/2			758255	27.60			758255-C3	33.50					NEW
.055 (1.4 mm)	.082 (1.5x)	1/8	1-1/2	24555	823455	24655	26.20	24555-C3	823455-C3	24655-C3	32.10			24655-C4	41.10	
.055 (1.4 mm)	.165 (3x)	1/8	1-1/2	74055	835955	74355	26.20	74055-C3	835955-C3	74355-C3	32.10	74055-C4		74355-C4	41.10	
.056	.168 (3x)	1/8	1-1/2	74056		74356	27.40			74356-C3	33.30					
.057	.171 (3x)	1/8	1-1/2	74057		74357	27.40			74357-C3	33.30					
.058	.174 (3x)	1/8	1-1/2	74058		74358	27.40			74358-C3	33.30					
.059 (1.5 mm)	.089 (1.5x)	1/8	1-1/2	24559		24659	27.40			24659-C3	33.30					
.059 (1.5 mm)	.177 (3x)	1/8	1-1/2	74059		74359	27.40			74359-C3	33.30					
.060	.049 (0.8x)	1/8	1-1/2			758260	27.50			758260-C3	33.40					
.060	.090 (1.5x)	1/8	1-1/2	24560	823460	24660	26.20	24560-C3	823460-C3	24660-C3	32.10			24660-C4	41.10	
.060	.180 (3x)	1/8	1-1/2	74060	835960	74360	26.20	74060-C3	835960-C3	74360-C3	32.10	74060-C4		74360-C4	41.10	
.061	.183 (3x)	1/8	1-1/2			74361	26.20			74361-C3	32.10					
.062 (1/16)	.050 (0.8x)	1/8	1-1/2			758262	25.70			758262-C3	31.70					
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	24562	823462	24662	25.70	24562-C3	823462-C3	24662-C3	31.70	24562-C4		24662-C4	40.70	
.062 (1/16)	.186 (3x)	1/8	1-1/2	74062	835962	74362	25.70	74062-C3	835962-C3	74362-C3	31.70	74062-C4	835962-C4	74362-C4	40.70	
.063	.189 (3x)	1/8	1-1/2			74363	26.20			74363-C3	32.10					
.064	.192 (3x)	1/8	1-1/2			74364	26.20			74364-C3	32.10					
.065	.097 (1.5x)	1/8	1-1/2	24565	823465	24665	25.70		823465-C3	24665-C3	31.70					
.065	.195 (3x)	1/8	1-1/2	74065	835965	74365	25.70	74065-C3	835965-C3	74365-C3	31.70	74065-C4		74365-C4	40.70	
.066	.198 (3x)	1/8	1-1/2			74366	26.20			74366-C3	32.10					
.067	.201 (3x)	1/8	1-1/2			74367	26.20			74367-C3	32.10					
.068	.204 (3x)	1/8	1-1/2			74368	26.20			74368-C3	32.10					
.069	.207 (3x)	1/8	1-1/2			74369	26.20			74369-C3	32.10					

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MINIATURE END MILLS

Ball – Stub & Standard (cont.)

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	CUTTER DIA.	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND			
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$
NEW	.070	.056 (0.8x)	1/8	1-1/2			758270	27.20			758270-C3	33.10				
	.070	.105 (1.5x)	1/8	1-1/2	24570	823470	24670	25.70	24570-C3	823470-C3	24670-C3	31.70				
	.070	.210 (3x)	1/8	1-1/2	74070	835970	74370	25.70	74070-C3	835970-C3	74370-C3	31.70	74070-C4		74370-C4	40.70
	.071	.213 (3x)	1/8	1-1/2			74371	25.70			74371-C3	31.70				
	.075	.112 (1.5x)	1/8	1-1/2	24575		24675	25.70			24675-C3	31.70				
	.075	.225 (3x)	1/8	1-1/2	74075	835975	74375	25.70	74075-C3	835975-C3	74375-C3	31.70	74075-C4			40.70
	.078 (5/64)	.062 (0.8x)	1/8	1-1/2			758278	27.10			758278-C3	33.00				
	.078 (5/64)	.117 (1.5x)	1/8	1-1/2	24578	823478	24678	25.70	24578-C3	823478-C3	24678-C3	31.70			24678-C4	40.70
	.078 (5/64)	.234 (3x)	1/8	1-1/2	74078	835978	74378	25.70	74078-C3	835978-C3	74378-C3	31.70	74078-C4		74378-C4	40.70
	.080	.120 (1.5x)	1/8	1-1/2	24580	823480	24680	25.70		823480-C3	24680-C3	31.70				
	.080	.240 (3x)	1/8	1-1/2	74080	835980	74380	25.70	74080-C3	835980-C3	74380-C3	31.70	74080-C4		74380-C4	40.70
NEW	.085	.068 (0.8x)	1/8	1-1/2			758285	27.20			758285-C3	33.10				
	.085	.127 (1.5x)	1/8	1-1/2	24585		24685	25.70			24685-C3	31.70				
	.085	.255 (3x)	1/8	1-1/2	74085		74385	25.70			74385-C3	31.70				
	.090	.135 (1.5x)	1/8	1-1/2	24590	823490	24690	25.70		823490-C3	24690-C3	31.70				
	.090	.270 (3x)	1/8	1-1/2	74090	835990	74390	25.70	74090-C3	835990-C3	74390-C3	31.70	74090-C4		74390-C4	40.70
	.093 (3/32)	.074 (0.8x)	1/8	1-1/2			758293	25.70			758293-C3	31.70				
	.093 (3/32)	.139 (1.5x)	1/8	1-1/2	24593	823493	24693	25.70	24593-C3	823493-C3	24693-C3	31.70	24593-C4		24693-C4	40.70
	.093 (3/32)	.279 (3x)	1/8	1-1/2	74093	835993	74393	25.70	74093-C3	835993-C3	74393-C3	31.70	74093-C4		74393-C4	40.70
	.095	.142 (1.5x)	1/8	1-1/2	24595		24695	25.70			24695-C3	31.70				
	.095	.285 (3x)	1/8	1-1/2	74095		74395	25.70			74395-C3	31.70				
	.098	.294 (3x)	1/8	1-1/2			74398	28.90			74398-C3	34.80				
	.100	.150 (1.5x)	1/8	1-1/2	24599	823500	24699	25.70	24599-C3	823500-C3	24699-C3	31.70				
	.100	.300 (3x)	1/8	1-1/2	74100	836000	74400	25.70	74100-C3	836000-C3	74400-C3	31.70	74100-C4		74400-C4	40.70
	.103	.309 (3x)	1/8	1-1/2			74403	25.70			74403-C3	31.70				
	.105	.158 (1.5x)	1/8	1-1/2	50900		51000	25.70			51000-C3	31.70				
	.105	.315 (3x)	1/8	1-1/2	74105		74405	25.70			74405-C3	31.70				
NEW	.109 (7/64)	.087 (0.8x)	1/8	1-1/2			758302	27.20			758302-C3	33.10				
	.109 (7/64)	.164 (1.5x)	1/8	1-1/2	50901	823502	51001	25.70	50901-C3	823502-C3	51001-C3	31.70				
	.109 (7/64)	.375 (3x)	1/8	1-1/2	74109	836002	74409	25.70	74109-C3	836002-C3	74409-C3	31.70				
	.110	.165 (1.5x)	1/8	1-1/2	50902		51002	25.70			51002-C3	31.70				
	.110	.330 (3x)	1/8	1-1/2	74110		74410	25.70			74410-C3	31.70				
	.115	.173 (1.5x)	1/8	1-1/2	50903		51003	25.70			51003-C3	31.70				
	.115	.345 (3x)	1/8	1-1/2	74115		74415	25.70			74415-C3	31.70				
NEW	.118 (3 mm)	.094 (0.8x)	1/8	1-1/2			758305	27.80			758305-C3	33.70				
	.118 (3 mm)	.177 (1.5x)	1/8	1-1/2	50904	823505	51004	26.40		823505-C3	51004-C3	32.30				
	.118 (3 mm)	.354 (3x)	1/8	1-1/2	74118	836005	74418	26.40	74118-C3	836005-C3	74418-C3	32.30				
	.120	.180 (1.5x)	1/8	1-1/2	50905		51005	25.70			51005-C3	31.70				
	.120	.360 (3x)	1/8	1-1/2	74120		74420	25.70			74420-C3	31.70				

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NEW SIZES!

MINIATURE END MILLS

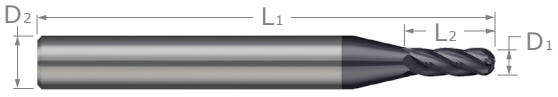
Ball – Stub & Standard (cont.)

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CUTTER DIA.	LOC		SHANK DIA.	OAL	UNCOATED				AlTiN COATED				AMORPHOUS DIAMOND				
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	2 FL	3 FL	4 FL	USD$	
.125 (1/8)	.100	(0.8x)	1/8	1-1/2			758308	23.80			758308-C3	29.70					
.125 (1/8)	.187	(1.5x)	1/8	1-1/2	50908	823508	51008	23.80	50908-C3	823508-C3	51008-C3	29.70	50908-C4		51008-C4	38.70	
.125 (1/8)	.375	(3x)	1/8	1-1/2	74125	836008	74425	23.80	74125-C3	836008-C3	74425-C3	29.70	74125-C4	836008-C4	74425-C4	38.70	
.140 (9/64)	.112	(0.8x)	3/16	2			758309	24.90			758309-C3	31.10					NEW
.140 (9/64)	.220	(1.5x)	3/16	2	50909		51009	24.30	50909-C3		51009-C3	30.80					
.140 (9/64)	.562	(3x)	3/16	2	74140	836009	74440	24.30	74140-C3	836009-C3	74440-C3	30.50					
.156 (5/32)	.125	(0.8x)	3/16	2			758310	26.80			758310-C3	33.00					NEW
.156 (5/32)	.281	(1.5x)	3/16	2	50910	823510	51010	25.30		823510-C3	51010-C3	31.70			51010-C4	43.60	
.156 (5/32)	.562	(3x)	3/16	2	74156	836010	74456	25.30	74156-C3	836010-C3	74456-C3	31.60			74456-C4	42.00	
.172 (11/64)	.312	(1.5x)	3/16	2			51011	28.20			51011-C3	34.70					
.172 (11/64)	.625	(3x)	3/16	2			74472	28.20			74472-C3	34.70					
.187 (3/16)	.150	(0.8x)	3/16	2			758312	26.80			758312-C3	33.00					
.187 (3/16)	.312	(1.5x)	3/16	2	50912	823512	51012	25.30	50912-C3	823512-C3	51012-C3	31.70			51012-C4	43.60	
.187 (3/16)	.625	(3x)	3/16	2	74187	836012	74487	25.30	74187-C3	836012-C3	74487-C3	31.70	74187-C4		74487-C4	43.60	
.203 (13/64)	.312	(1.5x)	1/4	2-1/2			51013	31.00			51013-C3	39.70					
.203 (13/64)	.625	(3x)	1/4	2-1/2			74490	31.00			74490-C3	39.70					
.218 (7/32)	.330	(1.5x)	1/4	2-1/2	50914	823514	51014	27.90		823514-C3	51014-C3	36.60					
.218 (7/32)	.625	(3x)	1/4	2-1/2	74193	836014	74493	27.90	74193-C3	836014-C3	74493-C3	36.00					
.234 (15/64)	.750	(3x)	1/4	2-1/2			74495	31.00			74495-C3	39.10					
.250 (1/4)	.200	(0.8x)	1/4	2-1/2			758316	29.50			758316-C3	37.60					
.250 (1/4)	.375	(1.5x)	1/4	2-1/2	50916	823516	51016	27.90	50916-C3	823516-C3	51016-C3	36.60	50916-C4		51016-C4	51.10	
.250 (1/4)	.750	(3x)	1/4	2-1/2	74199	836016	74499	27.90	74199-C3	836016-C3	74499-C3	36.00	74199-C4		74499-C4	49.30	
.312 (5/16)	.470	(1.5x)	5/16	2-1/2			51020	36.20			51020-C3	46.30					
.312 (5/16)	.812	(3x)	5/16	2-1/2			74620	36.20			74620-C3	46.30					
.375 (3/8)	.570	(1.5x)	3/8	2-1/2			51024	45.20			51024-C3	56.60					
.375 (3/8)	1.000	(3x)	3/8	2-1/2	74124		74624	45.20			74624-C3	56.60			74624-C4	74.60	
.500 (1/2)	1.000	(2x)	1/2	3	74132		74632	71.60			74632-C3	88.70			74632-C4	107.90	

MINIATURE END MILLS

Ball – Stub & Standard – 5 Flute



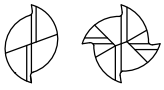
- **Cutter diameter down to .020"**
- Center cutting • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2	L_1	5 FL	USD$	5 FL	USD$
.020 (.5 mm)	**.030** (1.5x)	1/8	1-1/2	714820	37.30	714820-C3	43.20
.020 (.5 mm)	**.060** (3x)	1/8	1-1/2	715020	38.90	715020-C3	44.80
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	714831	31.20	714831-C3	37.20
.031 (1/32)	**.093** (3x)	1/8	1-1/2	715031	33.40	715031-C3	39.30
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	714847	32.50	714847-C3	38.40
.047 (3/64)	**.141** (3x)	1/8	1-1/2	715047	33.90	715047-C3	39.90
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	714862	34.00	714862-C3	40.00
.062 (1/16)	**.186** (3x)	1/8	1-1/2	715062	35.40	715062-C3	41.30
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	714878	34.00	714878-C3	40.00
.078 (5/64)	**.234** (3x)	1/8	1-1/2	715078	35.40	715078-C3	41.30
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	714893	34.00	714893-C3	40.00
.093 (3/32)	**.279** (3x)	1/8	1-1/2	715093	35.40	715093-C3	41.30
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	5 FL	USD$	5 FL	USD$
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	714908	31.00	714908-C3	37.00
.125 (1/8)	**.375** (3x)	1/8	1-1/2	715108	32.30	715108-C3	38.20
.187 (3/16)	**.312** (1.5x)	3/16	2	714912	34.80	714912-C3	41.00
.187 (3/16)	**.625** (3x)	3/16	2	715112	36.10	715112-C3	42.40
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	714916	40.70	714916-C3	48.80
.250 (1/4)	**.750** (3x)	1/4	2-1/2	715116	42.20	715116-C3	50.30

MINIATURE END MILLS

Ball – Stub & Standard – Metric







- All dimensions and tolerances in metric values
- Cutter diameter down to 0.5mm
- Center cutting
- Solid carbide
- CNC ground in the USA

BALL

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			ALTiN COATED		
D_1 +.00mm −.02mm	L_2 +.25mm −.00mm	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
.500 mm	.75 (1.5x)	3 mm	38 mm	741311	741211	28.60	741311-C3	741211-C3	34.60
.500 mm	1.50 (3x)	3 mm	38 mm	739611	741011	28.60	739611-C3	741011-C3	34.60
1.00 mm	1.50 (1.5x)	3 mm	38 mm	741322	741222	24.00	741322-C3	741222-C3	29.90
1.00 mm	3.00 (3x)	3 mm	38 mm	739622	741022	24.00	739622-C3	741022-C3	29.90
1.20 mm	3.50 (3x)	3 mm	38 mm	739627	741027	24.30	739627-C3	741027-C3	30.20
1.40 mm	4.00 (3x)	3 mm	38 mm	739631	741031	24.30	739631-C3	741031-C3	30.20
1.50 mm	2.20 (1.5x)	3 mm	38 mm	741333	741233	24.30	741333-C3	741233-C3	30.20
1.50 mm	4.50 (3x)	3 mm	38 mm	739633	741033	24.30	739633-C3	741033-C3	30.20
1.60 mm	5.00 (3x)	3 mm	38 mm	739636	741036	24.30	739636-C3	741036-C3	30.20
1.80 mm	5.50 (3x)	3 mm	38 mm	739640	741040	24.30	739640-C3	741040-C3	30.20
2.00 mm	3.00 (1.5x)	3 mm	38 mm	741345	741245	24.00	741345-C3	741245-C3	29.90
2.00 mm	6.00 (3x)	3 mm	38 mm	739645	741045	24.00	739645-C3	741045-C3	29.90
2.50 mm	3.70 (1.5x)	3 mm	38 mm	741351	741251	24.30	741351-C3	741251-C3	30.20
2.50 mm	7.50 (3x)	3 mm	38 mm	739651	741051	24.30	739651-C3	741051-C3	30.20
3.00 mm	4.50 (1.5x)	3 mm	38 mm	741357	741257	22.70	741357-C3	741257-C3	28.60
3.00 mm	9.00 (3x)	3 mm	38 mm	739657	741057	22.70	739657-C3	741057-C3	28.60
D_1 +.00mm −.04mm	L_2 +.75mm −.00mm	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
4.00 mm	6.00 (1.5x)	4 mm	50 mm	741361	741261	26.80	741361-C3	741261-C3	33.00
4.00 mm	12.00 (3x)	4 mm	50 mm	739661	741061	26.80	739661-C3	741061-C3	33.00
5.00 mm	7.50 (1.5x)	5 mm	50 mm	741364	741264	32.70	741364-C3	741264-C3	40.00
5.00 mm	15.00 (3x)	5 mm	50 mm	739664	741064	32.70	739664-C3	741064-C3	40.20
6.00 mm	9.00 (1.5x)	6 mm	50 mm	741366	741266	39.40	741366-C3	741266-C3	46.90
6.00 mm	18.00 (3x)	6 mm	50 mm	739666	741066	39.40	739666-C3	741066-C3	46.90
7.00 mm	10.00 (1.5x)	8 mm	63 mm	741368	741268	43.90	741368-C3	741268-C3	55.30
7.00 mm	21.00 (3x)	8 mm	63 mm	739668	741068	43.90	739668-C3	741068-C3	55.30
8.00 mm	12.00 (1.5x)	8 mm	63 mm	741370	741270	48.40	741370-C3	741270-C3	59.80
8.00 mm	24.00 (3x)	8 mm	63 mm	739670	741070	50.10	739670-C3	741070-C3	61.60
9.00 mm	13.00 (1.5x)	10 mm	75 mm	741371	741271	66.30	741371-C3	741271-C3	79.60
9.00 mm	27.00 (3x)	10 mm	75 mm	739671	741071	66.30	739671-C3	741071-C3	79.60
10.00 mm	15.00 (1.5x)	10 mm	75 mm	741373	741273	82.50	741373-C3	741273-C3	95.80
10.00 mm	30.00 (3x)	10 mm	75 mm	739673	741073	82.50	739673-C3	741073-C3	95.80
11.00 mm	16.00 (1.5x)	12 mm	75 mm	741374	741274	95.00	741374-C3	741274-C3	110.50
11.00 mm	32.00 (3x)	12 mm	75 mm	739674	741074	95.00	739674-C3	741074-C3	110.50
12.00 mm	18.00 (1.5x)	12 mm	75 mm	741376	741276	101.40	741376-C3	741276-C3	117.00
12.00 mm	36.00 (3x)	12 mm	75 mm	739676	741076	101.40	739676-C3	741076-C3	117.00

NEW SIZES!

MINIATURE END MILLS

Ball – Long Flute



Stocked in 10 Lengths of Cut!

- **Long flute and long shank design for deep cavities**
- Mills deep pockets • Center cutting • Solid carbide • CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	.005	**.025** (5x)	3	1/8	2-1/2	32205	57.20				
	.008	**.040** (5x)	3	1/8	2-1/2	32208	55.90				
	.010	**.050** (5x)	3	1/8	2-1/2	12810	52.70	12810-C3	58.60	12810-C4	67.70
	.010	**.050** (5x)	4	1/8	2-1/2	841010	54.80	841010-C3	60.70		
	.010	**.080** (8x)	3	1/8	2-1/2	34010	88.70	34010-C3	94.70		
NEW	.012 (.3 mm)	**.060** (5x)	4	1/8	2-1/2	841012	54.80	841012-C3	60.70		
NEW	.012 (.3 mm)	**.096** (8x)	4	1/8	2-1/2	845512	88.70	845512-C3	94.70		
	.015 (1/64)	**.062** (4x)	3	1/8	2-1/2	895715	48.60	895715-C3	54.50		
	.015 (1/64)	**.078** (5x)	3	1/8	2-1/2	32215	48.60	32215-C3	54.50	32215-C4	63.70
	.015 (1/64)	**.078** (5x)	4	1/8	2-1/2	841015	50.80	841015-C3	56.70		
	.015 (1/64)	**.093** (6x)	3	1/8	2-1/2	877115	56.40	877115-C3	62.30		
	.015 (1/64)	**.109** (7x)	3	1/8	2-1/2	861415	65.00	861415-C3	70.90		
	.015 (1/64)	**.125** (8x)	3	1/8	2-1/2	34015	85.00	34015-C3	90.90	34015-C4	100.10
	.015 (1/64)	**.125** (8x)	4	1/8	2-1/2	845515	87.20	845515-C3	93.10		
	.015 (1/64)	**.187** (12x)	3	1/8	2-1/2	35115	109.20	35115-C3	115.10		
	.020 (.5 mm)	**.080** (4x)	3	1/8	2-1/2	895720	41.90	895720-C3	47.90		
	.020 (.5 mm)	**.100** (5x)	3	1/8	2-1/2	12820	41.90	12820-C3	47.90	12820-C4	57.00
	.020 (.5 mm)	**.100** (5x)	4	1/8	2-1/2	841020	46.50	841020-C3	52.40		
	.020 (.5 mm)	**.120** (6x)	3	1/8	2-1/2	877120	48.70	877120-C3	54.60		
	.020 (.5 mm)	**.160** (8x)	3	1/8	2-1/2	34020	79.00	34020-C3	84.90	34020-C4	94.80
	.020 (.5 mm)	**.200** (10x)	3	1/8	2-1/2	957220	94.90	957220-C3	100.80		
	.020 (.5 mm)	**.250** (12x)	3	1/8	2-1/2	35120	103.00	35120-C3	108.90		
	.025	**.125** (5x)	3	1/8	2-1/2	12825	39.50	12825-C3	45.50	12825-C4	55.20
	.025	**.203** (8x)	3	1/8	2-1/2	34025	77.30	34025-C3	83.20		
	.030	**.125** (4x)	3	1/8	2-1/2	895730	38.50	895730-C3	44.40		
	.030	**.150** (5x)	3	1/8	2-1/2	12830	38.50	12830-C3	44.40	12830-C4	53.50
	.030	**.156** (5x)	4	1/8	2-1/2	841030	42.60	841030-C3	48.50		
	.030	**.250** (8x)	3	1/8	2-1/2	34030	75.00	34030-C3	81.00		
	.031 (1/32)	**.125** (4x)	3	1/8	2-1/2	895731	38.50	895731-C3	44.40	895731-C4	54.30
	.031 (1/32)	**.125** (4x)	4	1/8	2-1/2	801531	42.60	801531-C3	48.50		
	.031 (1/32)	**.156** (5x)	3	1/8	2-1/2	32231	38.50	32231-C3	44.40	32231-C4	53.50
	.031 (1/32)	**.156** (5x)	4	1/8	2-1/2	841031	42.40	841031-C3	48.30		
	.031 (1/32)	**.187** (6x)	3	1/8	2-1/2	877131	43.40	877131-C3	49.30	877131-C4	58.30
	.031 (1/32)	**.187** (6x)	4	1/8	2-1/2	754131	45.40	754131-C3	51.30		
	.031 (1/32)	**.218** (7x)	3	1/8	2-1/2	861431	48.60	861431-C3	54.50		
	.031 (1/32)	**.250** (8x)	3	1/8	2-1/2	34031	75.00	34031-C3	81.00	34031-C4	90.00
	.031 (1/32)	**.250** (8x)	4	1/8	2-1/2	845531	77.10	845531-C3	83.00		
	.031 (1/32)	**.312** (10x)	3	1/8	2-1/2	957231	80.20	957231-C3	86.20		
	.031 (1/32)	**.375** (12x)	3	1/8	2-1/2	35131	87.70	35131-C3	93.60	35131-C4	102.70
	.031 (1/32)	**.470** (15x)	3	1/8	2-1/2	36031	109.50	36031-C3	115.40		

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.035 (.9 mm)	**.175** (5x)	3	1/8	2-1/2	12835	38.50	12835-C3	44.40	12835-C4	53.50	
.035 (.9 mm)	**.281** (8x)	3	1/8	2-1/2	34035	75.00	34035-C3	81.00			
.039 (1 mm)	**.156** (4x)	3	1/8	2-1/2	895739	38.50	895739-C3	44.40			
.039 (1 mm)	**.203** (5x)	3	1/8	2-1/2	32239	38.50	32239-C3	44.40			
.039 (1 mm)	**.203** (5x)	4	1/8	2-1/2	841039	40.60	841039-C3	46.50			
.039 (1 mm)	**.325** (8x)	3	1/8	2-1/2	34039	75.00	34039-C3	81.00	34039-C4	90.80	NEW
.039 (1 mm)	**.480** (12x)	3	1/8	2-1/2	35139	88.50	35139-C3	94.50			
.040	**.160** (4x)	3	1/8	2-1/2	895740	38.50	895740-C3	44.40			
.040	**.200** (5x)	3	1/8	2-1/2	12840	38.50	12840-C3	44.40	12840-C4	53.50	
.040	**.200** (5x)	4	1/8	2-1/2	841040	42.60	841040-C3	48.50			
.040	**.240** (6x)	3	1/8	2-1/2	877140	43.40	877140-C3	49.30			
.040	**.281** (7x)	3	1/8	2-1/2	861440	48.60	861440-C3	54.50			
.040	**.325** (8x)	3	1/8	2-1/2	34040	75.00	34040-C3	81.00	34040-C4	90.00	
.040	**.325** (8x)	4	1/8	2-1/2	845540	77.20	845540-C3	83.10			
.040	**.480** (12x)	3	1/8	2-1/2	35140	87.70	35140-C3	93.60			
.045	**.225** (5x)	3	1/8	2-1/2	12845	38.50	12845-C3	44.40	12845-C4	54.30	
.045	**.375** (8x)	3	1/8	2-1/2	34045	75.00	34045-C3	81.00			
.047 (3/64)	**.187** (4x)	3	1/8	2-1/2	895747	38.50	895747-C3	44.40			
.047 (3/64)	**.250** (5x)	3	1/8	2-1/2	32247	38.50	32247-C3	44.40	32247-C4	53.50	
.047 (3/64)	**.250** (5x)	4	1/8	2-1/2	841047	42.40	841047-C3	48.30			
.047 (3/64)	**.375** (8x)	3	1/8	2-1/2	34047	70.90	34047-C3	76.80	34047-C4	85.90	
.047 (3/64)	**.375** (8x)	4	1/8	2-1/2	845547	74.40	845547-C3	80.30			
.047 (3/64)	**.570** (12x)	3	1/8	2-1/2	35147	87.70	35147-C3	93.60	35147-C4	102.70	
.050	**.203** (4x)	3	1/8	2-1/2	895750	38.50	895750-C3	44.40			
.050	**.300** (6x)	3	1/8	2-1/2	12850	38.50	12850-C3	44.40	12850-C4	53.50	
.050	**.400** (8x)	3	1/8	2-1/2	34050	75.00	34050-C3	81.00			
.055 (1.4 mm)	**.275** (5x)	3	1/8	2-1/2	32255	34.20	32255-C3	40.10			
.055 (1.4 mm)	**.385** (7x)	3	1/8	2-1/2	12855	38.50	12855-C3	44.40	12855-C4	54.30	
.060	**.250** (4x)	3	1/8	2-1/2	895760	34.20	895760-C3	40.10			
.060	**.312** (5x)	3	1/8	2-1/2	32260	34.20	32260-C3	40.10	32260-C4	49.90	
.060	**.312** (5x)	4	1/8	2-1/2	841060	37.70	841060-C3	43.60			
.060	**.375** (6x)	3	1/8	2-1/2	877160	35.60	877160-C3	41.50			
.060	**.500** (8x)	3	1/8	2-1/2	12860	39.10	12860-C3	45.00	12860-C4	54.90	
.060	**.720** (12x)	3	1/8	2-1/2	35160	68.30	35160-C3	74.20			
.062 (1/16)	**.250** (4x)	3	1/8	2-1/2	895762	34.20	895762-C3	40.10	895762-C4	49.90	
.062 (1/16)	**.250** (4x)	4	1/8	2-1/2	801562	36.40	801562-C3	42.40			
.062 (1/16)	**.312** (5x)	3	1/8	2-1/2	32262	34.20	32262-C3	40.10	32262-C4	49.70	
.062 (1/16)	**.312** (5x)	4	1/8	2-1/2	841062	37.70	841062-C3	43.60	841062-C4	53.20	
.062 (1/16)	**.375** (6x)	3	1/8	2-1/2	877162	35.60	877162-C3	41.50	877162-C4	51.20	
.062 (1/16)	**.375** (6x)	4	1/8	2-1/2	754162	39.10	754162-C3	45.00			
.062 (1/16)	**.437** (7x)	3	1/8	2-1/2	861462	37.20	861462-C3	43.10			
.062 (1/16)	**.500** (8x)	3	1/8	2-1/2	34062	38.50	34062-C3	44.40	34062-C4	53.50	
.062 (1/16)	**.500** (8x)	4	1/8	2-1/2	845562	41.90	845562-C3	47.90	845562-C4	57.00	
.062 (1/16)	**.558** (9x)	3	1/8	2-1/2	757662	47.20	757662-C3	53.10			
.062 (1/16)	**.625** (10x)	3	1/8	2-1/2	957262	52.60	957262-C3	58.50	957262-C4	68.40	
.062 (1/16)	**.625** (10x)	4	1/8	2-1/2	751262	57.20	751262-C3	63.10			
.062 (1/16)	**.750** (12x)	3	1/8	2-1/2	35162	68.80	35162-C3	74.70	35162-C4	83.80	
.062 (1/16)	**.950** (15x)	3	1/8	2-1/2	36062	93.80	36062-C3	99.80	36062-C4	109.60	

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MINIATURE END MILLS

Ball – Long Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	.065	**.500** (8x)	3	1/8	2-1/2	12865	38.40	12865-C3	44.30	12865-C4	54.20
	.070	**.375** (5x)	4	1/8	2-1/2	841070	37.90	841070-C3	43.80		
	.070	**.500** (7x)	3	1/8	2-1/2	12870	38.40	12870-C3	44.30	12870-C4	54.20
	.075	**.375** (5x)	4	1/8	2-1/2	841075	37.90	841075-C3	43.80		
	.075	**.500** (7x)	3	1/8	2-1/2	12875	38.40	12875-C3	44.30	12875-C4	54.20
	.078 (5/64)	**.312** (4x)	3	1/8	2-1/2	895778	34.20	895778-C3	40.10		
NEW	.078 (5/64)	**.312** (4x)	4	1/8	2-1/2	801578	37.70	801578-C3	43.60		
	.078 (5/64)	**.406** (5x)	3	1/8	2-1/2	32278	34.20	32278-C3	40.10	32278-C4	49.70
	.078 (5/64)	**.406** (5x)	4	1/8	2-1/2	841078	37.70	841078-C3	43.60		
	.078 (5/64)	**.475** (6x)	3	1/8	2-1/2	877178	35.60	877178-C3	41.50		
	.078 (5/64)	**.550** (7x)	3	1/8	2-1/2	861478	37.20	861478-C3	43.10		
	.078 (5/64)	**.625** (8x)	3	1/8	2-1/2	34078	38.50	34078-C3	44.40	34078-C4	53.50
	.078 (5/64)	**.625** (8x)	4	1/8	2-1/2	845578	41.90	845578-C3	47.90		
	.078 (5/64)	**.940** (12x)	3	1/8	2-1/2	35178	68.80	35178-C3	74.70	35178-C4	84.60
	.078 (5/64)	**1.187** (15x)	3	1/8	2-1/2	36078	93.80	36078-C3	99.80	36078-C4	109.60
	.080	**.750** (9x)	3	1/8	2-1/2	12880	38.70	12880-C3	44.60	12880-C4	53.80
	.085	**.750** (9x)	3	1/8	2-1/2	12885	38.70	12885-C3	44.60	12885-C4	54.50
	.090	**.750** (8x)	3	1/8	2-1/2	12890	38.70	12890-C3	44.60	12890-C4	53.80
	.093 (3/32)	**.375** (4x)	3	1/8	2-1/2	895793	34.20	895793-C3	40.10	895793-C4	49.90
	.093 (3/32)	**.375** (4x)	4	1/8	2-1/2	801593	34.20	801593-C3	40.10		
	.093 (3/32)	**.500** (5x)	3	1/8	2-1/2	32293	34.20	32293-C3	40.10	32293-C4	49.70
	.093 (3/32)	**.500** (5x)	4	1/8	2-1/2	841093	37.70	841093-C3	43.60		
	.093 (3/32)	**.585** (6x)	3	1/8	2-1/2	877193	35.60	877193-C3	41.50		
	.093 (3/32)	**.670** (7x)	3	1/8	2-1/2	861493	37.20	861493-C3	43.10		
	.093 (3/32)	**.750** (8x)	3	1/8	2-1/2	34093	38.50	34093-C3	44.40	34093-C4	53.50
	.093 (3/32)	**.750** (8x)	4	1/8	2-1/2	845593	41.90	845593-C3	47.90		
	.093 (3/32)	**.950** (10x)	3	1/8	2-1/2	957293	52.60	957293-C3	58.50		
	.093 (3/32)	**1.125** (12x)	3	1/8	2-1/2	35193	68.80	35193-C3	74.70	35193-C4	84.60
	.093 (3/32)	**1.400** (15x)	3	1/8	3	36093	96.20	36093-C3	102.10	36093-C4	112.00
	.095	**.750** (8x)	3	1/8	2-1/2	12895	39.10	12895-C3	45.00	12895-C4	54.90
	.100	**.500** (5x)	3	1/8	2-1/2	32299	34.30	32299-C3	40.20		
	.100	**.750** (7.5x)	3	1/8	2-1/2	12899	38.70	12899-C3	44.60	12899-C4	53.80
	.109 (7/64)	**.570** (5x)	3	1/8	2-1/2	32302	34.20	32302-C3	40.10		
	.109 (7/64)	**.900** (8x)	3	1/8	2-1/2	34102	38.50	34102-C3	44.40		
	.118 (3 mm)	**.475** (4x)	3	1/8	2-1/2	895705	34.20	895705-C3	40.10		
	.118 (3 mm)	**.625** (5x)	3	1/8	2-1/2	32305	34.20	32305-C3	40.10	32305-C4	49.90
	.118 (3 mm)	**.950** (8x)	3	1/8	2-1/2	34105	38.50	34105-C3	44.40	34105-C4	54.30
	.118 (3 mm)	**.950** (8x)	4	1/8	2-1/2	845605	42.80	845605-C3	48.70		
	.118 (3 mm)	**1.420** (12x)	3	1/8	3	35205	96.20	35205-C3	102.10		

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Flute (cont.)

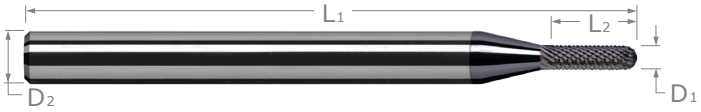
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CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.125 (1/8)	**.500** (4x)	3	1/8	2-1/2	895808	31.60	895808-C3	37.50	895808-C4	47.00	
.125 (1/8)	**.500** (4x)	4	1/8	2-1/2	801608	34.80	801608-C3	40.70			
.125 (1/8)	**.625** (5x)	3	1/8	2-1/2	32308	31.60	32308-C3	37.50	32308-C4	47.00	
.125 (1/8)	**.625** (5x)	4	1/8	2-1/2	12608	34.80	12608-C3	40.70			
.125 (1/8)	**.750** (6x)	3	1/8	2-1/2	877208	33.40	877208-C3	39.30	877208-C4	49.00	
.125 (1/8)	**.750** (6x)	4	1/8	2-1/2	750308	37.70	750308-C3	43.60			
.125 (1/8)	**.875** (7x)	3	1/8	2-1/2	861508	34.90	861508-C3	40.80			
.125 (1/8)	**1.000** (8x)	3	1/8	2-1/2	34108	34.90	34108-C3	40.80	34108-C4	49.90	
.125 (1/8)	**1.000** (8x)	4	1/8	2-1/2	845608	38.50	845608-C3	44.40			
.125 (1/8)	**1.250** (10x)	3	1/8	2-1/2	957308	52.00	957308-C3	57.90			
.125 (1/8)	**1.500** (12x)	3	1/8	3	35208	72.30	35208-C3	78.30	35208-C4	87.30	
.125 (1/8)	**1.875** (15x)	3	1/8	3	36108	96.20	36108-C3	102.10	36108-C4	111.30	
.140 (9/64)	**.562** (4x)	4	3/16	3	801609	37.40	801609-C3	44.00			NEW
.140 (9/64)	**.750** (5x)	4	3/16	3	12609	37.40	12609-C3	43.80			
.140 (9/64)	**1.125** (8x)	4	3/16	3	34109	41.60	34109-C3	48.30			
.156 (5/32)	**.625** (4x)	4	3/16	3	801610	34.00	801610-C3	40.70			
.156 (5/32)	**.750** (5x)	4	3/16	3	841110	34.00	841110-C3	40.50	841110-C4	51.90	
.156 (5/32)	**1.000** (6x)	4	3/16	3	12610	37.40	12610-C3	43.80	12610-C4	58.00	
.156 (5/32)	**1.093** (7x)	4	3/16	3	856310	44.10	856310-C3	50.80			
.156 (5/32)	**1.250** (8x)	4	3/16	3	34110	41.60	34110-C3	48.10			
.187 (3/16)	**.750** (4x)	4	3/16	3	837012	34.00	837012-C3	40.50			
.187 (3/16)	**1.000** (5x)	4	3/16	3	841112	34.00	841112-C3	40.50			
.187 (3/16)	**1.125** (6x)	4	3/16	3	12612	37.40	12612-C3	43.80	77112	58.00	
.187 (3/16)	**1.312** (7x)	4	3/16	3	856312	39.40	856312-C3	46.10			
.187 (3/16)	**1.500** (8x)	4	3/16	3	34112	41.60	34112-C3	48.10			
.187 (3/16)	**1.875** (10x)	4	3/16	3	957312	58.50	957312-C3	65.20			
.218 (7/32)	**1.125** (5x)	4	1/4	4	841114	39.70	841114-C3	48.30			NEW
.218 (7/32)	**1.750** (8x)	4	1/4	4	845614	46.40	845614-C3	55.00			NEW
.250 (1/4)	**1.000** (4x)	4	1/4	4	837016	39.70	837016-C3	48.30			
.250 (1/4)	**1.250** (5x)	4	1/4	4	841116	39.70	841116-C3	48.30			
.250 (1/4)	**1.500** (6x)	4	1/4	4	12616	41.90	12616-C3	50.60	77116	65.40	
.250 (1/4)	**1.750** (7x)	4	1/4	4	856316	44.10	856316-C3	52.70			
.250 (1/4)	**2.000** (8x)	4	1/4	4	34116	46.40	34116-C3	56.50	34116-C4	69.20	
.250 (1/4)	**2.500** (10x)	4	1/4	4	957316	61.70	957316-C3	71.90			
.312 (5/16)	**1.625** (5x)	4	5/16	4	12620	57.30	12620-C3	67.70			
.375 (3/8)	**1.750** (5x)	4	3/8	4	12624	72.10	12624-C3	88.00			
.375 (3/8)	**3.000** (8x)	4	3/8	6	845624	81.00	845624-C3	98.80			
.500 (1/2)	**2.000** (4x)	4	1/2	4	12632	87.70	12632-C3	104.30			

NEW SIZES!

MINIATURE END MILLS

Ball – Deburring End Mill



End Mill Tolerances with Bur-Style Geometry!

- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Bur geometry is optimized for removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern • Center cutting (2 flutes to center)
- Solid carbide • CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.015 (1/64)	**.045** (3x)	12	10	1/8	2-1/2	892115	35.30	892115-C3	41.20
	.020	**.060** (3x)	12	10	1/8	2-1/2	892120	35.30	892120-C3	41.20
NEW	.031 (1/32)	**.047** (1.5x)	6	5	1/8	2-1/2	697831	35.00	697831-C3	40.90
	.031 (1/32)	**.093** (3x)	12	10	1/8	2-1/2	892131	35.00	892131-C3	40.90
	.047 (3/64)	**.141** (3x)	12	10	1/8	2-1/2	892147	35.30	892147-C3	41.20
NEW	.062 (1/16)	**.093** (1.5x)	8	6	1/8	2-1/2	697862	33.60	697862-C3	39.50
	.062 (1/16)	**.186** (3x)	14	12	1/8	2-1/2	892162	33.60	892162-C3	39.50
	.078 (5/64)	**.234** (3x)	14	12	1/8	2-1/2	892178	35.30	892178-C3	41.20
NEW	.093 (3/32)	**.140** (1.5x)	8	6	1/8	2-1/2	697893	33.60	697893-C3	39.50
	.093 (3/32)	**.279** (3x)	14	12	1/8	2-1/2	892193	33.60	892193-C3	39.50

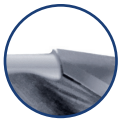
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	**.375** (3x)	16	13	1/8	2-1/2	892208	32.30	892208-C3	38.20
.187 (3/16)	**.561** (3x)	16	13	3/16	2-1/2	892212	44.80	892212-C3	51.50
.250 (1/4)	**.750** (3x)	16	13	1/4	2-1/2	892216	57.00	892216-C3	65.80

NEW SIZES!

MINIATURE END MILLS

Ball – Long Reach, Standard Flute





Reduced Neck Diameter to Avoid Heeling

- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

BALL

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4 FL	USD$	4 FL	USD$	4 FL	USD$	
.010	.030	.050 (5x)	1/8	1-1/2		948610	982810	77.00	982810-C3	82.90	982810-C4	92.00	NEW
.010	.030	.080 (8x)	1/8	1-1/2		76610	76810	77.30	76810-C3	83.20			
.010	.030	.125 (12x)	1/8	1-1/2		950210	991110	78.50	991110-C3	84.40			
.012 (.3 mm)	.036	.060 (5x)	1/8	1-1/2			982812	59.80	982812-C3	65.70			NEW
.012 (.3 mm)	.036	.096 (8x)	1/8	1-1/2			76812	60.90	76812-C3	66.80			NEW
.015 (1/64)	.045	.078 (5x)	1/8	1-1/2		948615	982815	59.80	982815-C3	65.70			
.015 (1/64)	.045	.128 (8x)	1/8	1-1/2		76615	76815	60.90	76815-C3	66.80			
.015 (1/64)	.045	.156 (10x)	1/8	1-1/2			851015	63.10	851015-C3	69.00			
.015 (1/64)	.045	.187 (12x)	1/8	1-1/2		950215	991115	64.50	991115-C3	70.40			
.015 (1/64)	.045	.225 (15x)	1/8	1-1/2			861215	67.40	861215-C3	73.30			
.020 (.5 mm)	.060	.100 (5x)	1/8	1-1/2		948620	982820	58.40	982820-C3	64.40	982820-C4	73.40	
.020 (.5 mm)	.060	.120 (6x)	1/8	1-1/2			805720	59.80	805720-C3	65.70			
.020 (.5 mm)	.060	.140 (7x)	1/8	1-1/2			805520	59.80	805520-C3	65.70			
.020 (.5 mm)	.060	.170 (8x)	1/8	1-1/2		76620	76820	58.60	76820-C3	64.60	76820-C4	73.60	
.020 (.5 mm)	.060	.200 (10x)	1/8	1-1/2			851020	60.50	851020-C3	66.40			
.020 (.5 mm)	.060	.250 (12x)	1/8	1-1/2		950220	991120	60.50	991120-C3	66.40			
.020 (.5 mm)	.060	.300 (15x)	1/8	1-1/2			861220	64.90	861220-C3	70.80			
.025	.075	.125 (5x)	1/8	1-1/2		948625	982825	53.40	982825-C3	59.30			
.025	.075	.213 (8x)	1/8	1-1/2		76625	76825	53.70	76825-C3	59.60			
.025	.075	.312 (12x)	1/8	1-1/2		950225	991125	55.60	991125-C3	61.60			
.030	.090	.156 (5x)	1/8	1-1/2		948630	982830	53.40	982830-C3	59.30			
.030	.090	.270 (9x)	1/8	1-1/2		76630	76830	53.70	76830-C3	59.60			
.030	.090	.375 (12x)	1/8	1-1/2		950230	991130	55.60	991130-C3	61.60			
.031 (1/32)	.093	.156 (5x)	1/8	1-1/2		948631	982831	52.40	982831-C3	58.30	982831-C4	67.40	
.031 (1/32)	.093	.187 (6x)	1/8	1-1/2			805731	54.60	805731-C3	60.50			
.031 (1/32)	.093	.218 (7x)	1/8	1-1/2			805531	54.60	805531-C3	60.50			
.031 (1/32)	.093	.250 (8x)	1/8	1-1/2		903831	904431	53.70	904431-C3	59.60			
.031 (1/32)	.093	.250 (8x)	1/8	2-1/2	LONG		734931	58.80	734931-C3	64.70			
.031 (1/32)	.093	.279 (9x)	1/8	1-1/2		76631	76831	53.70	76831-C3	59.60	76831-C4	68.60	
.031 (1/32)	.093	.312 (10x)	1/8	1-1/2		811031	851031	55.60	851031-C3	61.60			
.031 (1/32)	.093	.375 (12x)	1/8	1-1/2		950231	991131	55.60	991131-C3	61.60			
.031 (1/32)	.093	.470 (15x)	1/8	1-1/2		753431	861231	59.70	861231-C3	65.60			NEW
.035 (.9 mm)	.105	.187 (5x)	1/8	1-1/2		948635	982835	52.40	982835-C3	58.30			
.035 (.9 mm)	.105	.315 (9x)	1/8	1-1/2		76635	76835	53.70	76835-C3	59.60			
.039 (1 mm)	.117	.203 (5x)	1/8	1-1/2		948639	982839	52.40	982839-C3	58.30			
.039 (1 mm)	.117	.325 (8x)	1/8	1-1/2		903839	904439	53.70	904439-C3	59.60			
.040	.120	.203 (5x)	1/8	1-1/2		948640	982840	52.40	982840-C3	58.30			
.040	.120	.325 (8x)	1/8	1-1/2			904440	53.70	904440-C3	59.60			
.040	.120	.360 (9x)	1/8	1-1/2		76640	76840	53.70	76840-C3	59.60			
.040	.120	.480 (12x)	1/8	1-1/2		950240	991140	55.60	991140-C3	61.60			

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MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

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	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL		UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1		2 FL	4 FL	USD$	4 FL	USD$	4 FL	USD$
	.045	.135	.405 (9x)	1/8	1-1/2		76645	76845	52.00	76845-C3	57.90		
	.047 (3/64)	.141	.250 (5x)	1/8	1-1/2		948647	982847	50.80	982847-C3	56.70		
	.047 (3/64)	.141	.375 (8x)	1/8	1-1/2			904447	52.00	904447-C3	57.90		
	.047 (3/64)	.141	.423 (9x)	1/8	1-1/2		76647	76847	52.00	76847-C3	57.90		
	.047 (3/64)	.141	.480 (10x)	1/8	1-1/2			851047	53.70	851047-C3	59.60		
	.047 (3/64)	.141	.570 (12x)	1/8	1-1/2		950247	991147	53.70	991147-C3	59.60		
	.047 (3/64)	.141	.710 (15x)	1/8	2			861247	57.80	861247-C3	63.70		
	.050	.150	.250 (5x)	1/8	1-1/2		948650	982850	50.80	982850-C3	56.70		
	.050	.150	.500 (10x)	1/8	1-1/2		76650	76850	52.00	76850-C3	57.90		
	.055 (1.4 mm)	.165	.500 (9x)	1/8	1-1/2		76655	76855	52.00	76855-C3	57.90		
	.060	.180	.312 (5x)	1/8	1-1/2			982860	50.80	982860-C3	56.70		
	.060	.180	.500 (8x)	1/8	1-1/2		76660	76860	52.00	76860-C3	57.90		
	.060	.180	.720 (12x)	1/8	2		950260	991160	53.70	991160-C3	59.60		
	.062 (1/16)	.186	.312 (5x)	1/8	1-1/2		948662	982862	50.80	982862-C3	56.70	982862-C4	65.70
	.062 (1/16)	.186	.375 (6x)	1/8	1-1/2		755062	805762	52.00	805762-C3	57.90		
	.062 (1/16)	.186	.437 (7x)	1/8	1-1/2		753862	805562	52.00	805562-C3	57.90		
	.062 (1/16)	.186	.500 (8x)	1/8	1-1/2		76662	76862	52.00	76862-C3	57.90	76862-C4	67.00
	.062 (1/16)	.186	.500 (8x)	1/8	2-1/2	LONG		734962	57.10	734962-C3	63.00		
	.062 (1/16)	.186	.625 (10x)	1/8	2		811062	851062	53.70	851062-C3	59.60		
	.062 (1/16)	.186	.750 (12x)	1/8	2		950262	991162	53.70	991162-C3	59.60		
	.062 (1/16)	.186	.950 (15x)	1/8	2		753462	861262	57.80	861262-C3	63.70		
	.065	.195	.500 (8x)	1/8	1-1/2		76665	76865	52.00	76865-C3	57.90		
	.070	.210	.500 (7x)	1/8	1-1/2		76670	76870	52.00	76870-C3	57.90		
	.075	.225	.500 (7x)	1/8	1-1/2		76675	76875	52.00	76875-C3	57.90		
	.078 (5/64)	.234	.406 (5x)	1/8	1-1/2			982878	51.70	982878-C3	57.60		
NEW	.078 (5/64)	.234	.500 (6x)	1/8	1-1/2		76678	76878	52.00	76878-C3	57.90	76878-C4	67.00
	.078 (5/64)	.234	.475 (6x)	1/8	2-1/2	LONG		734778	57.10	734778-C3	63.00		
	.078 (5/64)	.234	.625 (8x)	1/8	2			904478	52.00	904478-C3	57.90		
	.078 (5/64)	.234	.800 (10x)	1/8	2			851078	53.70	851078-C3	59.60		
	.078 (5/64)	.234	.940 (12x)	1/8	2		950278	991178	53.70	991178-C3	59.60		
	.078 (5/64)	.234	1.187 (15x)	1/8	2-1/2			861278	57.80	861278-C3	63.70		
	.080	.240	.500 (6x)	1/8	1-1/2		76680	76880	52.00	76880-C3	57.90		
	.085	.255	.500 (6x)	1/8	1-1/2		76685	76885	51.00	76885-C3	56.90		
	.090	.270	.625 (7x)	1/8	1-1/2		76690	76890	52.00	76890-C3	57.90		
	.093 (3/32)	.279	.500 (5x)	1/8	1-1/2		948693	982893	51.80	982893-C3	57.70	982893-C4	66.70
	.093 (3/32)	.279	.585 (6x)	1/8	1-1/2			805793	53.00	805793-C3	59.00		
	.093 (3/32)	.279	.625 (7x)	1/8	1-1/2		76693	76893	52.00	76893-C3	57.90	76893-C4	67.00
	.093 (3/32)	.279	.670 (7x)	1/8	3	LONG		734593	57.10	734593-C3	63.00		
	.093 (3/32)	.279	.750 (8x)	1/8	2			904493	53.00	904493-C3	59.00		
	.093 (3/32)	.279	.950 (10x)	1/8	2			851093	53.70	851093-C3	59.60		
	.093 (3/32)	.279	1.125 (12x)	1/8	2		950293	991193	53.70	991193-C3	59.60		
	.093 (3/32)	.279	1.400 (15x)	1/8	2-1/2			861293	57.80	861293-C3	63.70		
	.095	.285	.625 (6x)	1/8	1-1/2		76695	76895	53.00	76895-C3	59.00		
	.100	.300	.625 (6x)	1/8	1-1/2		76700	76900	52.00	76900-C3	57.90		
	.109 (7/64)	.327	.570 (5x)	1/8	1-1/2		948602	982902	51.80	982902-C3	57.70		
	.109 (7/64)	.327	.900 (8x)	1/8	2		903802	904402	53.70	904402-C3	59.60		
	.118 (3 mm)	.354	.625 (5x)	1/8	1-1/2		948705	982905	51.80	982905-C3	57.70		
	.118 (3 mm)	.354	.950 (8x)	1/8	2		903805	904405	53.70	904405-C3	59.60		

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NEW SIZES!

MINIATURE END MILLS

Ball – Long Reach, Standard Flute (cont.)

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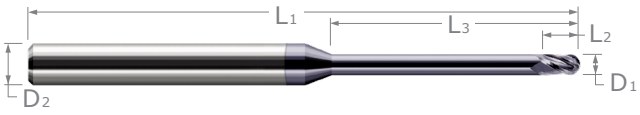
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIA.	OAL	UNCOATED			AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	USD$	4 FL	USD$	4 FL	USD$
.125 (1/8)	.375	.625 (5x)	1/8	1-1/2	948708	982908	51.80	982908-C3	57.70	982908-C4	66.70
.125 (1/8)	.375	.750 (6x)	1/8	2		805808	52.00	805808-C3	57.90		
.125 (1/8)	.375	.875 (7x)	1/8	2		805608	52.00	805608-C3	57.90		
.125 (1/8)	.375	1.000 (8x)	1/8	2	76708	76908	52.00	76908-C3	57.90	76908-C4	67.00
.125 (1/8)	.375	1.250 (10x)	1/8	2-1/2		851108	55.30	851108-C3	61.20		
.125 (1/8)	.375	1.500 (12x)	1/8	2-1/2	950308	991208	55.30	991208-C3	61.20		
.125 (1/8)	.375	1.875 (15x)	1/8	3		861308	60.90	861308-C3	66.80		
.140 (9/64)	.425	.750 (5x)	3/16	2		982909	62.20	982909-C3	68.40		
.140 (9/64)	.425	1.125 (8x)	3/16	2-1/2		76909	62.70	76909-C3	69.30		
.156 (5/32)	.470	.750 (5x)	3/16	2		982910	59.80	982910-C3	66.30		
.156 (5/32)	.470	1.250 (8x)	3/16	2-1/2		76910	60.00	76910-C3	66.60		
.187 (3/16)	.570	1.000 (5x)	3/16	2	948712	982912	59.80	982912-C3	66.30		
.187 (3/16)	.570	1.500 (8x)	3/16	2-1/2	76712	76912	60.00	76912-C3	66.60		
.250 (1/4)	.750	1.250 (5x)	1/4	2-1/2	948716	982916	65.30	982916-C3	74.10		
.250 (1/4)	.750	2.000 (8x)	1/4	4	76716	76916	65.60	76916-C3	75.90		

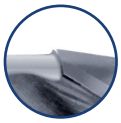
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MINIATURE END MILLS

Ball – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- **Long length design for deep cavities**
- Stub flutes for maximum rigidity
- Length of cut = 1½x diameter
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.005	.007	.025 (5x)	3	1/8	2-1/2	33405	72.10				
.005	.007	.040 (8x)	3	1/8	2-1/2	34205	72.80				
.008	.012	.040 (5x)	3	1/8	2-1/2	33408	70.80				
.008	.012	.064 (8x)	3	1/8	2-1/2	34208	71.40				
.010	.015	.030 (3x)	3	1/8	2-1/2	47910	70.80	47910-C3	76.70		
.010	.015	.050 (5x)	3	1/8	2-1/2	33410	70.80	33410-C3	76.70	33410-C4	85.80
.010	.015	.050 (5x)	4	1/8	2-1/2	803110	70.80	803110-C3	76.70		
.010	.015	.080 (8x)	3	1/8	2-1/2	34210	71.40	34210-C3	77.30	34210-C4	86.40
.010	.015	.080 (8x)	4	1/8	2-1/2	801310	71.40	801310-C3	77.30		
.010	.015	.100 (10x)	3	1/8	2-1/2	966010	74.60	966010-C3	80.50	966010-C4	89.50
.010	.015	.125 (12x)	3	1/8	2-1/2	35610	74.60	35610-C3	80.50	35610-C4	89.50
.010	.015	.150 (15x)	3	1/8	2-1/2	49210	84.00	49210-C3	89.90	49210-C4	99.00
.010	.015	.180 (18x)	3	1/8	2-1/2	970710	96.50	970710-C3	102.50		
.011	.016	.055 (5x)	3	1/8	2-1/2	33411	72.10	33411-C3	78.10		
.011	.016	.088 (8x)	3	1/8	2-1/2	34211	72.80	34211-C3	78.70		
.012 (.3 mm)	.018	.060 (5x)	3	1/8	2-1/2	33412	70.80	33412-C3	76.70		
.012 (.3 mm)	.018	.096 (8x)	3	1/8	2-1/2	34212	71.40	34212-C3	77.30		
.013	.019	.065 (5x)	3	1/8	2-1/2	33413	72.10	33413-C3	78.10		
.013	.019	.104 (8x)	3	1/8	2-1/2	34213	72.80	34213-C3	78.70		
.014	.021	.070 (5x)	3	1/8	2-1/2	33414	70.80	33414-C3	76.70		
.014	.021	.112 (8x)	3	1/8	2-1/2	34214	71.40	34214-C3	77.30		
.015 (1/64)	.022	.045 (3x)	3	1/8	2-1/2	47915	59.00	47915-C3	64.90		
.015 (1/64)	.022	.062 (4x)	3	1/8	2-1/2	844415	59.00	844415-C3	64.90		
.015 (1/64)	.022	.078 (5x)	3	1/8	2-1/2	33415	59.00	33415-C3	64.90	33415-C4	74.00
.015 (1/64)	.022	.078 (5x)	4	1/8	2-1/2	803115	60.10	803115-C3	66.00		
.015 (1/64)	.022	.093 (6x)	3	1/8	2-1/2	860615	59.00	860615-C3	64.90		
.015 (1/64)	.022	.109 (7x)	3	1/8	2-1/2	868215	59.00	868215-C3	64.90		
.015 (1/64)	.022	.125 (8x)	3	1/8	2-1/2	34215	60.30	34215-C3	66.20	34215-C4	75.40
.015 (1/64)	.022	.125 (8x)	4	1/8	2-1/2	801315	61.40	801315-C3	67.40		
.015 (1/64)	.022	.156 (10x)	3	1/8	2-1/2	966015	62.10	966015-C3	68.00	966015-C4	77.00
.015 (1/64)	.022	.187 (12x)	3	1/8	2-1/2	35615	62.10	35615-C3	68.00	35615-C4	77.00
.015 (1/64)	.022	.225 (15x)	3	1/8	2-1/2	49215	68.60	49215-C3	74.50	49215-C4	83.60
.015 (1/64)	.022	.270 (18x)	3	1/8	2-1/2	970715	80.80	970715-C3	86.70		
.015 (1/64)	.022	.300 (20x)	3	1/8	2-1/2	59415	80.80	59415-C3	86.70	59415-C4	95.80
.015 (1/64)	.022	.375 (25x)	3	1/8	2-1/2	40115	102.20	40115-C3	108.20		
.016 (.4 mm)	.024	.080 (5x)	3	1/8	2-1/2	33416	63.10	33416-C3	69.00		
.016 (.4 mm)	.024	.128 (8x)	3	1/8	2-1/2	34216	63.10	34216-C3	69.00		

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.017	.026	.085 (5x)	3	1/8	2-1/2	33417	63.10	33417-C3	69.00		
.017	.026	.136 (8x)	3	1/8	2-1/2	34217	64.50	34217-C3	70.40		
.018	.027	.090 (5x)	3	1/8	2-1/2	33418	62.10	33418-C3	68.00		
.018	.027	.144 (8x)	3	1/8	2-1/2	34218	64.50	34218-C3	70.40		
.019	.029	.095 (5x)	3	1/8	2-1/2	33419	62.10	33419-C3	68.00		
.019	.029	.152 (8x)	3	1/8	2-1/2	34219	63.10	34219-C3	69.00		
.020 (.5 mm)	.030	.060 (3x)	3	1/8	2-1/2	47920	57.00	47920-C3	62.90	47920-C4	72.00
.020 (.5 mm)	.030	.080 (4x)	3	1/8	2-1/2	844420	57.00	844420-C3	62.90		
.020 (.5 mm)	.030	.100 (5x)	3	1/8	2-1/2	33420	57.00	33420-C3	62.90	33420-C4	72.00
.020 (.5 mm)	.030	.100 (5x)	4	1/8	2-1/2	803120	57.00	803120-C3	62.90		
.020 (.5 mm)	.030	.120 (6x)	3	1/8	2-1/2	860620	57.00	860620-C3	62.90	860620-C4	72.80
.020 (.5 mm)	.030	.120 (6x)	4	1/8	2-1/2	753020	57.00	753020-C3	62.90		
.020 (.5 mm)	.030	.140 (7x)	3	1/8	2-1/2	868220	57.00	868220-C3	62.90		
.020 (.5 mm)	.030	.160 (8x)	3	1/8	2-1/2	34220	58.50	34220-C3	64.50	34220-C4	73.50
.020 (.5 mm)	.030	.160 (8x)	4	1/8	2-1/2	801320	58.50	801320-C3	64.50		
.020 (.5 mm)	.030	.200 (10x)	3	1/8	2-1/2	966020	60.10	966020-C3	66.00	966020-C4	75.00
.020 (.5 mm)	.030	.250 (12x)	3	1/8	2-1/2	35620	60.10	35620-C3	66.00	35620-C4	75.00
.020 (.5 mm)	.030	.300 (15x)	3	1/8	2-1/2	49220	66.40	49220-C3	72.30	49220-C4	81.30
.020 (.5 mm)	.030	.360 (18x)	3	1/8	2-1/2	970720	80.20	970720-C3	86.20		
.020 (.5 mm)	.030	.400 (20x)	3	1/8	2-1/2	59420	80.20	59420-C3	86.20	59420-C4	95.20
.020 (.5 mm)	.030	.500 (25x)	3	1/8	2-1/2	40120	99.90	40120-C3	105.80	40120-C4	115.00
.020 (.5 mm)	.030	.600 (30x)	3	1/8	2-1/2	922720	112.70	922720-C3	118.60	**30x Diameter!**	
.021	.031	.105 (5x)	3	1/8	2-1/2	33421	63.10	33421-C3	69.00		
.021	.031	.168 (8x)	3	1/8	2-1/2	34221	64.50	34221-C3	70.40		
.022	.033	.110 (5x)	3	1/8	2-1/2	33422	63.10	33422-C3	69.00		
.022	.033	.176 (8x)	3	1/8	2-1/2	34222	63.10	34222-C3	69.00		
.023	.035	.115 (5x)	3	1/8	2-1/2	33423	63.10	33423-C3	69.00		
.023	.035	.187 (8x)	3	1/8	2-1/2	34223	63.10	34223-C3	69.00		
.024 (.6 mm)	.036	.120 (5x)	3	1/8	2-1/2	33424	62.10	33424-C3	68.00		
.024 (.6 mm)	.036	.192 (8x)	3	1/8	2-1/2	34224	63.10	34224-C3	69.00		
.025	.037	.075 (3x)	3	1/8	2-1/2	47925	49.50	47925-C3	55.40		
.025	.037	.125 (5x)	3	1/8	2-1/2	33425	49.50	33425-C3	55.40	33425-C4	64.40
.025	.037	.125 (5x)	4	1/8	2-1/2	803125	49.50	803125-C3	55.40		
.025	.037	.150 (6x)	3	1/8	2-1/2	860625	50.30	860625-C3	56.30		
.025	.037	.175 (7x)	3	1/8	2-1/2	868225	51.20	868225-C3	57.10		
.025	.037	.203 (8x)	3	1/8	2-1/2	34225	50.30	34225-C3	56.30	34225-C4	65.30
.025	.037	.250 (10x)	3	1/8	2-1/2	966025	52.00	966025-C3	57.90		
.025	.037	.312 (12x)	3	1/8	2-1/2	35625	52.00	35625-C3	57.90	35625-C4	67.10
.025	.037	.312 (12x)	4	1/8	2-1/2	768025	52.00	768025-C3	57.90		
.025	.037	.375 (15x)	3	1/8	2-1/2	49225	59.60	49225-C3	65.50	49225-C4	74.60
.026	.039	.130 (5x)	3	1/8	2-1/2	33426	63.10	33426-C3	69.00		
.026	.039	.208 (8x)	3	1/8	2-1/2	34226	64.50	34226-C3	70.40		
.027	.041	.135 (5x)	3	1/8	2-1/2	33427	63.10	33427-C3	69.00		
.027	.041	.216 (8x)	3	1/8	2-1/2	34227	64.50	34227-C3	70.40		
.028 (.7 mm)	.042	.140 (5x)	3	1/8	2-1/2	33428	62.10	33428-C3	68.00		
.028 (.7 mm)	.042	.224 (8x)	3	1/8	2-1/2	34228	63.10	34228-C3	69.00		

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MINIATURE END MILLS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.029	.043	.145 (5x)	3	1/8	2-1/2	33429	63.10	33429-C3	69.00		
.029	.043	.232 (8x)	3	1/8	2-1/2	34229	64.50	34229-C3	70.40		
.030	.045	.090 (3x)	3	1/8	2-1/2	47930	49.50	47930-C3	55.40		
.030	.045	.156 (5x)	3	1/8	2-1/2	33430	49.50	33430-C3	55.40	33430-C4	64.40
.030	.045	.250 (8x)	3	1/8	2-1/2	34230	50.30	34230-C3	56.30	34230-C4	65.30
.030	.045	.312 (10x)	3	1/8	2-1/2	966030	52.00	966030-C3	57.90	966030-C4	67.80
.030	.045	.375 (12x)	3	1/8	2-1/2	35630	52.00	35630-C3	57.90	35630-C4	67.10
.030	.045	.450 (15x)	3	1/8	2-1/2	49230	59.60	49230-C3	65.50	49230-C4	74.60
.030	.045	.540 (18x)	3	1/8	2-1/2	970730	72.80	970730-C3	78.70		
.031 (1/32)	.046	.093 (3x)	3	1/8	2-1/2	47931	49.50	47931-C3	55.40	47931-C4	64.40
.031 (1/32)	.046	.125 (4x)	3	1/8	2-1/2	844431	49.50	844431-C3	55.40	844431-C4	65.30
.031 (1/32)	.046	.156 (5x)	3	1/8	2-1/2	33431	49.50	33431-C3	55.40	33431-C4	64.40
.031 (1/32)	.046	.156 (5x)	4	1/8	2-1/2	803131	49.50	803131-C3	55.40		
.031 (1/32)	.046	.187 (6x)	3	1/8	2-1/2	860631	49.50	860631-C3	55.40	860631-C4	64.40
.031 (1/32)	.046	.218 (7x)	3	1/8	2-1/2	868231	49.50	868231-C3	55.40		
.031 (1/32)	.046	.250 (8x)	3	1/8	2-1/2	34231	50.30	34231-C3	56.30	34231-C4	65.30
.031 (1/32)	.046	.250 (8x)	4	1/8	2-1/2	801331	50.30	801331-C3	56.30		
.031 (1/32)	.046	.312 (10x)	3	1/8	2-1/2	966031	52.00	966031-C3	57.90	966031-C4	67.10
.031 (1/32)	.046	.312 (10x)	4	1/8	2-1/2	769231	52.00	769231-C3	57.90		
.031 (1/32)	.046	.375 (12x)	3	1/8	2-1/2	35631	52.00	35631-C3	57.90	35631-C4	67.10
.031 (1/32)	.046	.375 (12x)	4	1/8	2-1/2	768031	53.00	768031-C3	59.00		
.031 (1/32)	.046	.470 (15x)	3	1/8	2-1/2	49231	59.60	49231-C3	65.50	49231-C4	74.60
.031 (1/32)	.046	.565 (18x)	3	1/8	2-1/2	970731	72.80	970731-C3	78.70	970731-C4	87.90
.031 (1/32)	.046	.625 (20x)	3	1/8	2-1/2	59431	72.80	59431-C3	78.70	59431-C4	87.90
.031 (1/32)	.046	.775 (25x)	3	1/8	2-1/2	40131	87.00	40131-C3	92.90	40131-C4	102.10
.031 (1/32)	.046	.937 (30x)	3	1/8	2-1/2	922731	104.50	922731-C3	110.40	**30x Diameter!**	
.035 (.9 mm)	.052	.187 (5x)	3	1/8	2-1/2	33435	49.50	33435-C3	55.40	33435-C4	65.30
.035 (.9 mm)	.052	.281 (8x)	3	1/8	2-1/2	34235	50.30	34235-C3	56.30	34235-C4	66.10
.035 (.9 mm)	.052	.425 (12x)	3	1/8	2-1/2	35635	52.60	35635-C3	58.50	35635-C4	68.40
.035 (.9 mm)	.052	.525 (15x)	3	1/8	2-1/2	49235	59.60	49235-C3	65.50		
.039 (1 mm)	.059	.203 (5x)	3	1/8	2-1/2	33439	49.70	33439-C3	55.60		
.039 (1 mm)	.059	.203 (5x)	4	1/8	2-1/2	803139	49.70	803139-C3	55.60		
.039 (1 mm)	.059	.240 (6x)	3	1/8	2-1/2	860639	49.70	860639-C3	55.60		
.039 (1 mm)	.059	.281 (7x)	3	1/8	2-1/2	868239	50.70	868239-C3	56.60		
.039 (1 mm)	.059	.325 (8x)	3	1/8	2-1/2	34239	50.30	34239-C3	56.30		
.039 (1 mm)	.059	.400 (10x)	3	1/8	2-1/2	966039	52.60	966039-C3	58.50		
.040	.060	.120 (3x)	3	1/8	2-1/2	47940	49.50	47940-C3	55.40	47940-C4	65.30
.040	.060	.160 (4x)	3	1/8	2-1/2	844440	50.40	844440-C3	56.40		
.040	.060	.203 (5x)	3	1/8	2-1/2	33440	49.50	33440-C3	55.40	33440-C4	64.40
.040	.060	.203 (5x)	4	1/8	2-1/2	803140	49.50	803140-C3	55.40		
.040	.060	.240 (6x)	3	1/8	2-1/2	860640	49.50	860640-C3	55.40		
.040	.060	.281 (7x)	3	1/8	2-1/2	868240	49.50	868240-C3	55.40		
.040	.060	.325 (8x)	3	1/8	2-1/2	34240	50.30	34240-C3	56.30	34240-C4	65.30
.040	.060	.325 (8x)	4	1/8	2-1/2	801340	50.30	801340-C3	56.30		
.040	.060	.400 (10x)	3	1/8	2-1/2	966040	52.60	966040-C3	58.50	966040-C4	67.60
.040	.060	.480 (12x)	3	1/8	2-1/2	35640	52.60	35640-C3	58.50	35640-C4	67.60

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.040	.060	.600 (15x)	3	1/8	2-1/2	49240	59.60	49240-C3	65.50	49240-C4	74.60
.040	.060	.720 (18x)	3	1/8	2-1/2	970740	72.80	970740-C3	78.70		
.040	.060	.800 (20x)	3	1/8	2-1/2	59440	72.80	59440-C3	78.70	59440-C4	87.90
.040	.060	1.000 (25x)	3	1/8	2-1/2	40140	87.00	40140-C3	92.90	**25x Diameter!**	
.045	.067	.225 (5x)	3	1/8	2-1/2	33445	48.20	33445-C3	54.10	33445-C4	63.90
.045	.067	.375 (8x)	3	1/8	2-1/2	34245	49.30	34245-C3	55.20	34245-C4	65.10
.045	.067	.550 (12x)	3	1/8	2-1/2	35645	50.70	35645-C3	56.60	35645-C4	66.40
.045	.067	.680 (15x)	3	1/8	2-1/2	49245	57.30	49245-C3	63.20		
.047 (3/64)	.070	.141 (3x)	3	1/8	2-1/2	47947	48.20	47947-C3	54.10		
.047 (3/64)	.070	.187 (4x)	3	1/8	2-1/2	844447	48.20	844447-C3	54.10		
.047 (3/64)	.070	.250 (5x)	3	1/8	2-1/2	33447	48.20	33447-C3	54.10	33447-C4	63.30
.047 (3/64)	.070	.250 (5x)	4	1/8	2-1/2	803147	48.20	803147-C3	54.10		
.047 (3/64)	.070	.281 (6x)	3	1/8	2-1/2	860647	48.20	860647-C3	54.10		
.047 (3/64)	.070	.328 (7x)	3	1/8	2-1/2	868247	48.20	868247-C3	54.10		
.047 (3/64)	.070	.375 (8x)	3	1/8	2-1/2	34247	49.30	34247-C3	55.20	34247-C4	64.30
.047 (3/64)	.070	.375 (8x)	4	1/8	2-1/2	801347	49.30	801347-C3	55.20		
.047 (3/64)	.070	.480 (10x)	3	1/8	2-1/2	966047	50.70	966047-C3	56.60	966047-C4	65.70
.047 (3/64)	.070	.480 (10x)	4	1/8	2-1/2	769247	50.70	769247-C3	56.60		
.047 (3/64)	.070	.570 (12x)	3	1/8	2-1/2	35647	50.70	35647-C3	56.60	35647-C4	65.70
.047 (3/64)	.070	.710 (15x)	3	1/8	2-1/2	49247	56.40	49247-C3	62.30	49247-C4	71.40
.047 (3/64)	.070	.850 (18x)	3	1/8	2-1/2	970747	68.50	970747-C3	74.40		
.047 (3/64)	.070	.950 (20x)	3	1/8	2-1/2	59447	68.50	59447-C3	74.40	59447-C4	83.50
.047 (3/64)	.070	1.187 (25x)	3	1/8	2-1/2	40147	84.00	40147-C3	89.90	**25x Diameter!**	
.050	.075	.150 (3x)	3	1/8	2-1/2	47950	48.20	47950-C3	54.10		
.050	.075	.250 (5x)	3	1/8	2-1/2	33450	48.20	33450-C3	54.10	33450-C4	63.30
.050	.075	.400 (8x)	3	1/8	2-1/2	34250	49.30	34250-C3	55.20	34250-C4	65.10
.050	.075	.500 (10x)	3	1/8	2-1/2	966050	50.70	966050-C3	56.60		
.050	.075	.600 (12x)	3	1/8	2-1/2	35650	50.70	35650-C3	56.60	35650-C4	65.70
.050	.075	.750 (15x)	3	1/8	2-1/2	49250	56.40	49250-C3	62.30		
.055 (1.4 mm)	.082	.165 (3x)	3	1/8	2-1/2	47955	48.20	47955-C3	54.10		
.055 (1.4 mm)	.082	.275 (5x)	3	1/8	2-1/2	33455	48.20	33455-C3	54.10	33455-C4	63.90
.055 (1.4 mm)	.082	.330 (6x)	3	1/8	2-1/2	860655	48.20	860655-C3	54.10		
.055 (1.4 mm)	.082	.450 (8x)	3	1/8	2-1/2	34255	49.30	34255-C3	55.20	34255-C4	64.30
.055 (1.4 mm)	.082	.560 (10x)	3	1/8	2-1/2	966055	51.60	966055-C3	57.50		
.055 (1.4 mm)	.082	.660 (12x)	3	1/8	2-1/2	35655	50.70	35655-C3	56.60	35655-C4	65.70
.060	.090	.180 (3x)	3	1/8	2-1/2	47960	48.20	47960-C3	54.10		
.060	.090	.312 (5x)	3	1/8	2-1/2	33460	48.20	33460-C3	54.10	33460-C4	63.30
.060	.090	.375 (6x)	3	1/8	2-1/2	860660	49.30	860660-C3	55.20		
.060	.090	.437 (7x)	3	1/8	2-1/2	868260	49.30	868260-C3	55.20		
.060	.090	.500 (8x)	3	1/8	2-1/2	34260	49.30	34260-C3	55.20	34260-C4	64.30
.060	.090	.625 (10x)	3	1/8	2-1/2	966060	50.70	966060-C3	56.60		
.060	.090	.720 (12x)	3	1/8	2-1/2	35660	50.70	35660-C3	56.60	35660-C4	65.70
.060	.090	.900 (15x)	3	1/8	2-1/2	49260	56.40	49260-C3	62.30		
.060	.090	1.062 (18x)	3	1/8	2-1/2	970760	68.50	970760-C3	74.40		
.060	.090	1.200 (20x)	3	1/8	2-1/2	59460	68.50	59460-C3	74.40		

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.062 (1/16)	.093	.186 (3x)	3	1/8	2-1/2	47962	48.20	47962-C3	54.10	47962-C4	63.90
.062 (1/16)	.093	.250 (4x)	3	1/8	2-1/2	844462	48.20	844462-C3	54.10	844462-C4	63.90
.062 (1/16)	.093	.250 (4x)	4	1/8	2-1/2	754362	48.20	754362-C3	54.10		
.062 (1/16)	.093	.312 (5x)	3	1/8	2-1/2	33462	48.20	33462-C3	54.10	33462-C4	63.30
.062 (1/16)	.093	.312 (5x)	4	1/8	2-1/2	803162	48.20	803162-C3	54.10		
.062 (1/16)	.093	.375 (6x)	3	1/8	2-1/2	860662	48.20	860662-C3	54.10	860662-C4	63.30
.062 (1/16)	.093	.375 (6x)	4	1/8	2-1/2	753062	48.20	753062-C3	54.10		
.062 (1/16)	.093	.437 (7x)	3	1/8	2-1/2	868262	48.20	868262-C3	54.10	868262-C4	63.30
.062 (1/16)	.093	.500 (8x)	3	1/8	2-1/2	34262	49.30	34262-C3	55.20	34262-C4	64.30
.062 (1/16)	.093	.500 (8x)	4	1/8	2-1/2	801362	49.30	801362-C3	55.20		
.062 (1/16)	.093	.558 (9x)	3	1/8	2-1/2	805362	50.70	805362-C3	56.60		
.062 (1/16)	.093	.625 (10x)	3	1/8	2-1/2	966062	50.70	966062-C3	56.60	966062-C4	65.70
.062 (1/16)	.093	.625 (10x)	4	1/8	2-1/2	769262	50.70	769262-C3	56.60		
.062 (1/16)	.093	.750 (12x)	3	1/8	2-1/2	35662	50.70	35662-C3	56.60	35662-C4	65.70
.062 (1/16)	.093	.750 (12x)	4	1/8	2-1/2	768062	50.70	768062-C3	56.60		
.062 (1/16)	.093	.950 (15x)	3	1/8	2-1/2	49262	56.40	49262-C3	62.30	49262-C4	71.40
.062 (1/16)	.093	.950 (15x)	4	1/8	2-1/2	752262	57.30	752262-C3	63.20		
.062 (1/16)	.093	1.125 (18x)	3	1/8	2-1/2	970762	68.50	970762-C3	74.40	970762-C4	83.50
.062 (1/16)	.093	1.250 (20x)	3	1/8	2-1/2	59462	68.50	59462-C3	74.40	59462-C4	83.50
.062 (1/16)	.093	1.550 (25x)	3	1/8	3	40162	84.00	40162-C3	89.90	40162-C4	99.00
.062 (1/16)	.093	1.875 (30x)	3	1/8	3	922762	109.60	922762-C3	115.50	**30x Diameter!**	
.065	.097	.325 (5x)	3	1/8	2-1/2	33465	48.20	33465-C3	54.10		
.065	.097	.530 (8x)	3	1/8	2-1/2	34265	49.30	34265-C3	55.20	34265-C4	65.10
.070	.105	.375 (5x)	3	1/8	2-1/2	33470	48.20	33470-C3	54.10		
.070	.105	.570 (8x)	3	1/8	2-1/2	34270	49.30	34270-C3	55.20	34270-C4	64.30
.075	.112	.375 (5x)	3	1/8	2-1/2	33475	48.20	33475-C3	54.10		
.075	.112	.625 (8x)	3	1/8	2-1/2	34275	49.30	34275-C3	55.20	34275-C4	65.10
.078 (5/64)	.117	.234 (3x)	3	1/8	2-1/2	47978	48.20	47978-C3	54.10		
.078 (5/64)	.117	.312 (4x)	3	1/8	2-1/2	844478	48.20	844478-C3	54.10		
.078 (5/64)	.117	.406 (5x)	3	1/8	2-1/2	33478	48.20	33478-C3	54.10	33478-C4	63.30
.078 (5/64)	.117	.406 (5x)	4	1/8	2-1/2	803178	48.20	803178-C3	54.10		
.078 (5/64)	.117	.475 (6x)	3	1/8	2-1/2	860678	48.20	860678-C3	54.10		
.078 (5/64)	.117	.550 (7x)	3	1/8	2-1/2	868278	48.20	868278-C3	54.10		
.078 (5/64)	.117	.625 (8x)	3	1/8	2-1/2	34278	49.30	34278-C3	55.20	34278-C4	65.10
.078 (5/64)	.117	.625 (8x)	4	1/8	2-1/2	801378	49.30	801378-C3	55.20		
.078 (5/64)	.117	.800 (10x)	3	1/8	2-1/2	966078	50.70	966078-C3	56.60		
.078 (5/64)	.117	.940 (12x)	3	1/8	2-1/2	35678	50.70	35678-C3	56.60	35678-C4	65.70
.078 (5/64)	.117	1.187 (15x)	3	1/8	2-1/2	49278	56.40	49278-C3	62.30	49278-C4	71.40
.078 (5/64)	.117	1.400 (18x)	3	1/8	3	970778	68.50	970778-C3	74.40		
.078 (5/64)	.117	1.562 (20x)	3	1/8	3	59478	68.50	59478-C3	74.40		
.078 (5/64)	.117	1.950 (25x)	3	1/8	3	40178	84.00	40178-C3	89.90	**25x Diameter!**	
.080	.120	.406 (5x)	3	1/8	2-1/2	33480	48.20	33480-C3	54.10		
.080	.120	.650 (8x)	3	1/8	2-1/2	34280	49.30	34280-C3	55.20	34280-C4	65.10
.085	.127	.425 (5x)	3	1/8	2-1/2	33485	48.20	33485-C3	54.10		
.085	.127	.700 (8x)	3	1/8	2-1/2	34285	49.30	34285-C3	55.20	34285-C4	65.10
.090	.135	.450 (5x)	3	1/8	2-1/2	33490	49.00	33490-C3	54.90		
.090	.135	.750 (8x)	3	1/8	2-1/2	34290	49.30	34290-C3	55.20	34290-C4	65.10

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.093 (3/32)	.139	.279 (3x)	3	1/8	2-1/2	47993	48.20	47993-C3	54.10		
.093 (3/32)	.139	.375 (4x)	3	1/8	2-1/2	844493	48.20	844493-C3	54.10		
.093 (3/32)	.139	.500 (5x)	3	1/8	2-1/2	33493	48.20	33493-C3	54.10	33493-C4	63.30
.093 (3/32)	.139	.500 (5x)	4	1/8	2-1/2	803193	48.20	803193-C3	54.10		
.093 (3/32)	.139	.585 (6x)	3	1/8	2-1/2	860693	48.20	860693-C3	54.10		
.093 (3/32)	.139	.670 (7x)	3	1/8	2-1/2	868293	48.20	868293-C3	54.10		
.093 (3/32)	.139	.750 (8x)	3	1/8	2-1/2	34293	49.30	34293-C3	55.20	34293-C4	64.30
.093 (3/32)	.139	.750 (8x)	4	1/8	2-1/2	801393	49.30	801393-C3	55.20		
.093 (3/32)	.139	.950 (10x)	3	1/8	2-1/2	966093	50.70	966093-C3	56.60	966093-C4	65.70
.093 (3/32)	.139	1.125 (12x)	3	1/8	2-1/2	35693	50.70	35693-C3	56.60	35693-C4	65.70
.093 (3/32)	.139	1.400 (15x)	3	1/8	3	49293	59.30	49293-C3	65.20	49293-C4	74.30
.093 (3/32)	.139	1.675 (18x)	3	1/8	3	970793	72.70	970793-C3	78.60		
.093 (3/32)	.139	1.875 (20x)	3	1/8	4	59493	75.70	59493-C3	82.00		
.093 (3/32)	.139	2.312 (25x)	3	1/8	4	40193	86.80	40193-C3	93.10	**25x Diameter!**	
.093 (3/32)	.139	2.812 (30x)	3	1/8	4	922793	119.40	922793-C3	125.70	**30x Diameter!**	
.095	.142	.500 (5x)	3	1/8	2-1/2	33495	48.20	33495-C3	54.10		
.095	.142	.750 (8x)	3	1/8	2-1/2	34295	49.30	34295-C3	55.20	34295-C4	65.10
.100	.150	.300 (3x)	3	1/8	2-1/2	978500	48.20	978500-C3	54.10		
.100	.150	.500 (5x)	3	1/8	2-1/2	33500	48.20	33500-C3	54.10		
.100	.150	.800 (8x)	3	1/8	2-1/2	34300	49.30	34300-C3	55.20	34300-C4	64.30
.100	.150	1.000 (10x)	3	1/8	2-1/2	966100	50.70	966100-C3	56.60		
.100	.150	1.200 (12x)	3	1/8	2-1/2	35700	50.70	35700-C3	56.60		
.109 (7/64)	.163	.570 (5x)	3	1/8	2-1/2	33502	48.20	33502-C3	54.10		
.109 (7/64)	.163	.900 (8x)	3	1/8	2-1/2	34302	49.30	34302-C3	55.20		
.118 (3 mm)	.177	.475 (4x)	3	1/8	2-1/2	844505	48.20	844505-C3	54.10		
.118 (3 mm)	.177	.625 (5x)	3	1/8	2-1/2	33505	48.20	33505-C3	54.10		
.118 (3 mm)	.177	.625 (5x)	4	1/8	2-1/2	803105	48.20	803105-C3	54.10		
.118 (3 mm)	.177	.950 (8x)	3	1/8	2-1/2	34305	49.30	34305-C3	55.20		
.118 (3 mm)	.177	1.187 (10x)	3	1/8	2-1/2	966105	50.70	966105-C3	56.60		
.118 (3 mm)	.177	1.420 (12x)	3	1/8	3	35605	51.90	35605-C3	57.80		

D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.187	.375 (3x)	3	1/8	2-1/2	978508	48.20	978508-C3	54.10	978508-C4	63.90
.125 (1/8)	.187	.375 (3x)	4	1/8	2-1/2	751908	49.00	751908-C3	54.90		
.125 (1/8)	.187	.500 (4x)	3	1/8	2-1/2	844508	48.20	844508-C3	54.10		
.125 (1/8)	.187	.625 (5x)	3	1/8	2-1/2	33508	48.20	33508-C3	54.10	33508-C4	63.30
.125 (1/8)	.187	.625 (5x)	4	1/8	2-1/2	803208	48.20	803208-C3	54.10		
.125 (1/8)	.187	.750 (6x)	3	1/8	2-1/2	860708	48.20	860708-C3	54.10	860708-C4	63.30
.125 (1/8)	.187	.875 (7x)	3	1/8	2-1/2	868308	48.20	868308-C3	54.10		
.125 (1/8)	.187	1.000 (8x)	3	1/8	2-1/2	34308	49.30	34308-C3	55.20	34308-C4	64.30
.125 (1/8)	.187	1.000 (8x)	4	1/8	2-1/2	801408	49.30	801408-C3	55.20		
.125 (1/8)	.187	1.125 (9x)	3	1/8	2-1/2	805408	52.90	805408-C3	58.90		
.125 (1/8)	.187	1.250 (10x)	3	1/8	2-1/2	966108	52.90	966108-C3	58.90	966108-C4	67.90
.125 (1/8)	.187	1.250 (10x)	4	1/8	2-1/2	769308	52.90	769308-C3	58.90		

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MINIATURE END MILLS

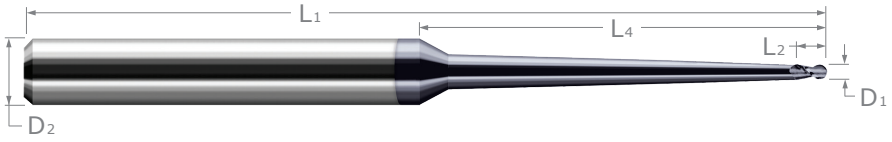
Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.187	1.500 (12x)	3	1/8	3	35708	52.90	35708-C3	58.90	35708-C4	67.90
.125 (1/8)	.187	1.500 (12x)	4	1/8	3	768108	52.90	768108-C3	58.90		
.125 (1/8)	.187	1.875 (15x)	3	1/8	3	49308	59.30	49308-C3	65.20	49308-C4	74.30
.125 (1/8)	.187	2.250 (18x)	3	1/8	4	970808	72.70	970808-C3	79.00	970808-C4	89.50
.125 (1/8)	.187	2.500 (20x)	3	1/8	4	59508	72.70	59508-C3	79.00	59508-C4	89.50
.125 (1/8)	.187	3.125 (25x)	3	1/8	4	959108	92.90	959108-C3	99.20	**25x Diameter!**	
.125 (1/8)	.187	3.750 (30x)	3	1/8	6	922808	111.40	922808-C3	119.40	**30x Diameter!**	
.140 (9/64)	.220	.750 (5x)	3	3/16	3	33509	53.10	33509-C3	59.80		
.140 (9/64)	.220	1.125 (8x)	3	3/16	3	34309	54.30	34309-C3	60.90		
.140 (9/64)	.220	1.450 (10x)	3	3/16	3	966109	57.90	966109-C3	64.60		
.156 (5/32)	.234	.470 (3x)	3	3/16	3	978510	53.10	978510-C3	59.80		
.156 (5/32)	.234	.750 (5x)	3	3/16	3	33510	53.10	33510-C3	59.80		
.156 (5/32)	.234	1.250 (8x)	3	3/16	3	34310	54.30	34310-C3	60.90	34310-C4	72.10
.156 (5/32)	.234	1.570 (10x)	3	3/16	3	966110	57.90	966110-C3	64.60		
.156 (5/32)	.234	1.875 (12x)	3	3/16	4	35710	57.90	35710-C3	66.70		
.156 (5/32)	.234	2.375 (15x)	3	3/16	4	49310	62.50	49310-C3	71.30		
.187 (3/16)	.281	.570 (3x)	3	3/16	3	978512	53.10	978512-C3	59.80		
.187 (3/16)	.281	1.000 (5x)	3	3/16	3	33512	53.10	33512-C3	59.80	33512-C4	73.90
.187 (3/16)	.281	1.000 (5x)	4	3/16	3	803212	53.10	803212-C3	59.80		
.187 (3/16)	.281	1.156 (6x)	3	3/16	3	860712	54.30	860712-C3	60.90		
.187 (3/16)	.281	1.312 (7x)	3	3/16	3	868312	54.30	868312-C3	60.90		
.187 (3/16)	.281	1.500 (8x)	3	3/16	3	34312	54.30	34312-C3	60.90	34312-C4	74.90
.187 (3/16)	.281	1.500 (8x)	4	3/16	3	801412	54.30	801412-C3	60.90		
.187 (3/16)	.281	1.875 (10x)	3	3/16	4	966112	57.90	966112-C3	66.70	966112-C4	80.00
.187 (3/16)	.281	2.250 (12x)	3	3/16	4	35712	57.90	35712-C3	66.70	35712-C4	77.00
.187 (3/16)	.281	2.812 (15x)	3	3/16	4	49312	61.10	49312-C3	70.00	49312-C4	80.20
.187 (3/16)	.281	3.375 (18x)	3	3/16	6	970812	84.80	970812-C3	93.20		
.187 (3/16)	.281	3.750 (20x)	3	3/16	6	59512	88.10	59512-C3	96.50		
.218 (7/32)	.330	1.125 (5x)	3	1/4	4	33514	61.90	33514-C3	72.00		
.218 (7/32)	.330	1.750 (8x)	3	1/4	4	34314	62.50	34314-C3	72.70		
.250 (1/4)	.375	.750 (3x)	3	1/4	4	978516	58.60	978516-C3	68.80		
.250 (1/4)	.375	1.250 (5x)	3	1/4	4	33516	58.60	33516-C3	68.80	33516-C4	82.20
.250 (1/4)	.375	1.250 (5x)	4	1/4	4	803216	59.80	803216-C3	70.00		
.250 (1/4)	.375	2.000 (8x)	3	1/4	4	34316	60.10	34316-C3	70.30	34316-C4	83.60
.250 (1/4)	.375	2.000 (8x)	4	1/4	4	801416	60.10	801416-C3	70.30		
.250 (1/4)	.375	2.500 (10x)	3	1/4	4	966116	67.10	966116-C3	77.40	966116-C4	89.90
.250 (1/4)	.375	3.000 (12x)	3	1/4	6	35716	72.10	35716-C3	83.70	35716-C4	98.80
.250 (1/4)	.375	3.750 (15x)	3	1/4	6	49316	73.90	49316-C3	85.50		
.250 (1/4)	.375	5.000 (20x)	3	1/4	8	59516	149.40	59516-C3	166.80		
.312 (5/16)	.470	1.625 (5x)	3	5/16	4	33520	77.50	33520-C3	87.90		
.312 (5/16)	.470	2.500 (8x)	3	5/16	4	34320	95.70	34320-C3	106.10		
.375 (3/8)	.570	2.000 (5x)	3	3/8	4	33524	102.50	33524-C3	114.70		
.375 (3/8)	.570	3.000 (8x)	3	3/8	6	34324	138.20	34324-C3	156.00		

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters)



Maximum Reach & Maximum Rigidity!

- Designed for deep cavity profiling
- 2° tapered neck design minimizes deflection and maximizes wall clearance
- Length of cut = 1½ x diameter • Neck behind length of cut is reduced for 1x diameter
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LOC	EFFECTIVE OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*			UNCOATED			AlTiN NANO COATED			AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2 FL	4 FL	USD$	2 FL	4 FL	USD$	2 FL	USD$
.010	.015	1/2	6.6°	1/8	2-1/2	.054	.070	.102	29810		84.30	29810-C6		93.10		
.015	.023	1/2	6.4°	1/8	2-1/2	.060	.080	.120	29815	778115	83.10	29815-C6	778115-C6	91.90	29815-C4	98.10
.015	.023	1	6.7°	1/4	4	.060	.080	.120	17715		99.00	17715-C6		111.80		
.020	.030	1/2	6.1°	1/8	2-1/2	.070	.095	.140	29820		84.30	29820-C6		93.10		
.020	.030	1	6.6°	1/4	4	.070	.095	.140	17720		99.00	17720-C6		109.50		
.031	.047	1/2	5.5°	1/8	2-1/2	.115	.150	.220	29831	778131	65.00	29831-C6	778131-C6	73.70	29831-C4	80.00
.031	.047	1	6.3°	1/4	4	.115	.150	.220	17731	777231	81.40	17731-C6	777231-C6	94.40	17731-C4	104.20
.031	.047	1-1/2	4.2°	1/4	4	.115	.150	.220	24831	776231	87.70	24831-C6	776231-C6	100.60	24831-C4	110.50
.031	.047	2	3.2°	1/4	4	.115	.150	.220	18831	775231	100.20	18831-C6	775231-C6	110.70	18831-C4	123.90
.039	.059	1/2	5.1°	1/8	2-1/2	.150	.195	.285	29839		65.80	29839-C6		74.60		
.039	.059	1	6.1°	1/4	4	.150	.195	.285	17739		81.40	17739-C6		91.90		
.047	.071	1/2	4.7°	1/8	2-1/2	.180	.235	.350	29847	778147	65.00	29847-C6	778147-C6	73.70	29847-C4	80.80
.047	.071	1	5.9°	1/4	4	.180	.235	.350	17747	777247	81.40	17747-C6	777247-C6	94.40	17747-C4	104.20
.047	.071	1-1/2	3.9°	1/4	4	.180	.235	.350	24847		87.70	24847-C6		100.60	24847-C4	110.50
.047	.071	2	2.9°	1/4	4	.180	.235	.350	18847		100.20	18847-C6		113.20	18847-C4	123.00
.062	.093	1/2	3.8°	1/8	2-1/2	.220	.285	.370	29862	778162	62.90	29862-C6	778162-C6	71.70	29862-C4	77.90
.062	.093	1	5.5°	1/4	4	.220	.285	.415	17762	777262	78.90	17762-C6	777262-C6	91.80	17762-C4	102.50
.062	.093	1-1/2	3.7°	1/4	4	.220	.285	.415	24862	776262	84.60	24862-C6	776262-C6	97.50	24862-C4	108.20
.062	.093	2	2.7°	1/4	4	.220	.285	.415	18862	775262	97.70	18862-C6	775262-C6	110.70	18862-C4	121.50
.062	.093	2-1/2	2.2°	1/4	4	.220	.285	.415	21362		100.10	21362-C6		110.50		
.078	.118	1	5.1°	1/4	4	.305	.395	.575	17778	777278	78.90	17778-C6	777278-C6	89.40	17778-C4	101.70
.078	.118	1-1/2	3.4°	1/4	4	.305	.395	.575	24878		84.60	24878-C6		97.50	24878-C4	107.40
.078	.118	2	2.5°	1/4	4	.305	.395	.575	18878		97.70	18878-C6		110.70	18878-C4	120.50
.093	.140	1	4.7°	1/4	4	.340	.440	.640	17793	777293	79.90	17793-C6	777293-C6	92.70	17793-C4	102.80
.093	.140	1-1/2	3.1°	1/4	4	.340	.440	.640	24893	776293	84.60	24893-C6	776293-C6	97.50	24893-C4	108.20
.093	.140	2	2.3°	1/4	4	.340	.440	.640	18893	775293	95.20	18893-C6	775293-C6	105.70	18893-C4	118.00
.118	.177	1	4.0°	1/4	4	.438	.565	.756	17805		80.70	17805-C6		91.10		
.118	.177	1-1/2	2.6°	1/4	4	.438	.565	.818	24905		85.40	24905-C6		95.90		
.125	.188	1	3.8°	1/4	4	.450	.580	.750	17808	777308	79.90	17808-C6	777308-C6	92.70	17808-C4	103.40
.125	.188	1-1/2	2.5°	1/4	4	.450	.580	.840	24908	776308	84.60	24908-C6	776308-C6	97.50	24908-C4	108.20
.125	.188	2	1.8°	1/4	4	.450	.580	.840	18908	775308	95.20	18908-C6	775308-C6	108.10	18908-C4	118.90
.125	.188	2-1/2	2.2°	5/16	4	.450	.580	.840	21408	734408	99.90	21408-C6	734408-C6	114.40		

*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

continued on next page

For detailed interference charts with more angles, scan the QR code or visit www.harveytool.com/resources

MINIATURE END MILLS

Ball – Tapered Reach (Clearance Cutters) (cont.)

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CUTTER DIA.	LOC	EFFECTIVE OVERALL REACH	WALL ANGLE	SHANK DIA.	OAL	INTERFERENCE DEPTH AT WALL ANGLE*			UNCOATED			AlTiN NANO COATED			AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.020″ −.000″	L_4 +.020″ −.000″		D_2 (h6)	L_1	0°	.5°	1°	2 FL	4 FL	USD$	2 FL	4 FL	USD$	2 FL	USD$
.140	.211	1-1/2	2.2°	1/4	4	.495	.636	.919	24909		85.10	24909-C6		95.60		
.140	.211	2	1.6°	1/4	4	.495	.636	.919	18909		95.20	18909-C6		105.70		
.156	.234	1	2.9°	1/4	4	.525	.680	.775	17810		79.90	17810-C6		92.70	17810-C4	102.80
.156	.234	1-1/2	1.9°	1/4	4	.525	.680	.980	24910		84.60	24910-C6		97.50	24910-C4	107.40
.156	.234	2	1.4°	1/4	4	.540	.710	1.085	18910†	775310†	95.20	18910-C6†	775310-C6†	105.70	18910-C4†	118.00
.187	.281	1-1/2	1.3°	1/4	4	.605	.775	1.120	24912	776312	86.80	24912-C6	776312-C6	99.70	24912-C4	109.60
.187	.281	2	2.7°	3/8	4	.605	.775	1.120	18912	775312	127.80	18912-C6	775312-C6	142.40	18912-C4	156.40
.187	.281	2-1/2	2.2°	3/8	4	.605	.775	1.120	21412	734512	132.00	21412-C6	734512-C6	147.10		
.250	.375	1-1/2	2.6°	3/8	4	.760	.975	1.260	24916	776316	111.40	24916-C6	776316-C6	125.90	24916-C4	140.70
.250	.375	2	1.8°	3/8	4	.760	.975	1.405	18916	775316	127.80	18916-C6	775316-C6	142.40	18916-C4	156.40
.250	.375	2-1/2	1.5°	3/8	4	.760	.975	1.405	21416		132.00	21416-C6		146.60		
.312	.468	2	2.7°	1/2	4	.915	1.170	1.685	18920		173.20	18920-C6		193.60	18920-C4	217.70
.375	.563	2	1.8°	1/2	4	1.075	1.370	1.770	18924		173.20	18924-C6		193.60	18924-C4	207.50

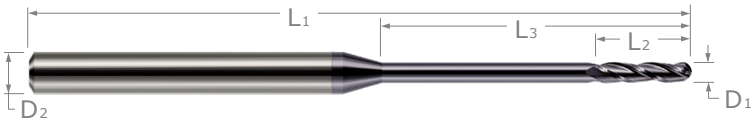
*Values are approximate and may vary due to tolerancing. †Tapered neck angle is 1.85°.

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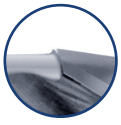
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MINIATURE END MILLS

Ball – Long Reach, Long Flute



- **Long length design for deep cavities**
- Long flutes for deep pocket milling
- Length of cut > 5x diameter
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA



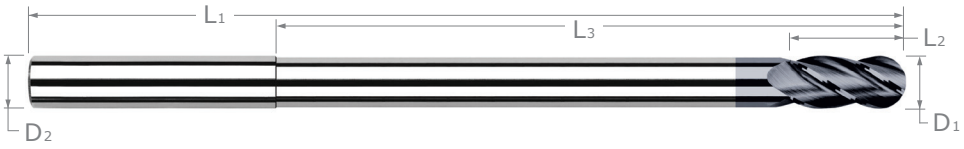
Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.010	.050	.100 (10x)	1/8	2-1/2	13810	74.90	13810-C3	80.90	10210	89.90
.012	.060	.120 (10x)	1/8	2-1/2	13812	72.30	13812-C3	78.30		
.015 (1/64)	.075	.150 (10x)	1/8	2-1/2	13815	63.80	13815-C3	69.80	10215	79.00
.020 (.5 mm)	.100	.200 (10x)	1/8	2-1/2	13820	62.10	13820-C3	68.00	10220	77.20
.025	.125	.250 (10x)	1/8	2-1/2	13825	53.60	13825-C3	59.50	10225	69.30
.030	.150	.300 (10x)	1/8	2-1/2	13830	53.60	13830-C3	59.50	10230	69.30
.031 (1/32)	.155	.250 (8x)	1/8	2-1/2	750431	52.30	750431-C3	58.20		
.031 (1/32)	.155	.310 (10x)	1/8	2-1/2	13831	53.60	13831-C3	59.50	10231	69.00
.031 (1/32)	.155	.470 (15x)	1/8	2-1/2	724031	53.60	724031-C3	59.50		
.035 (.9 mm)	.175	.350 (10x)	1/8	2-1/2	13835	54.00	13835-C3	59.90	10235	69.80
.040	.200	.400 (10x)	1/8	2-1/2	13840	53.60	13840-C3	59.50	10240	69.00
.045	.225	.450 (10x)	1/8	2-1/2	13845	52.30	13845-C3	58.20	10245	67.80
.047 (3/64)	.250	.500 (10x)	1/8	2-1/2	13847	52.30	13847-C3	58.20	10247	67.80
.050	.300	.600 (12x)	1/8	2-1/2	13850	52.30	13850-C3	58.20	10250	68.10
.055 (1.4 mm)	.385	.770 (14x)	1/8	2-1/2	13855	52.30	13855-C3	58.20	10255	68.10
.060	.500	1.000 (16x)	1/8	2-1/2	13860	53.50	13860-C3	59.40	10260	69.20
.062 (1/16)	.312	.500 (8x)	1/8	2-1/2	750462	51.00	750462-C3	56.90		
.062 (1/16)	.500	.625 (10x)	1/8	2-1/2	803562	52.30	803562-C3	58.20	803362	67.80
.062 (1/16)	.500	1.000 (16x)	1/8	2-1/2	13862	53.50	13862-C3	59.40	10262	68.90
.065	.500	1.000 (15x)	1/8	2-1/2	13865	52.80	13865-C3	58.80	10265	68.60
.070	.500	1.000 (14x)	1/8	2-1/2	13870	52.30	13870-C3	58.20	10270	68.10
.075	.500	1.000 (13x)	1/8	2-1/2	13875	52.30	13875-C3	58.20	10275	68.10
.078 (5/64)	.500	1.000 (12x)	1/8	2-1/2	13878	52.30	13878-C3	58.20	10278	68.10
.080	.750	1.250 (15x)	1/8	2-1/2	13880	52.30	13880-C3	58.20	10280	68.10
.085	.750	1.250 (14x)	1/8	2-1/2	13885	52.30	13885-C3	58.20	10285	68.10
.090	.750	1.250 (13x)	1/8	2-1/2	13890	52.80	13890-C3	58.80	10290	68.60
.093 (3/32)	.500	.750 (8x)	1/8	2-1/2	750493	51.00	750493-C3	56.90		
.093 (3/32)	.750	1.250 (13x)	1/8	2-1/2	13893	52.30	13893-C3	58.20	10293	68.10
.095	.750	1.250 (13x)	1/8	2-1/2	13895	52.30	13895-C3	58.20	10295	68.10
.100	.750	1.250 (12x)	1/8	2-1/2	14800	52.30	14800-C3	58.20	10300	67.80

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	1.000	1.500 (12x)	1/8	2-1/2	14808	52.30	14808-C3	58.20	10308	67.80
.187 (3/16)	1.125	1.625 (8x)	3/16	3	14812	56.60	14812-C3	63.20	10312	77.40
.250 (1/4)	1.500	2.000 (8x)	1/4	4	14816	63.40	14816-C3	70.40	10316	86.30

MINIATURE END MILLS

Ball – Extra Long Length

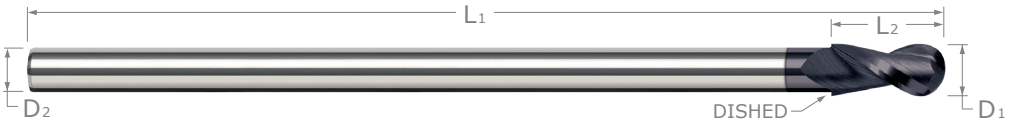


- **Up to 8" overall length**
- Longest overall length carbide end mill available in stock
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 +.000" −.002"	L_2 +.030" −.000"	L_3 +.030" −.000"	D_2	L_1	4 FL	USD$	4 FL	USD$
.250 (1/4)	.375	**4.375** (17.5x)	1/4	6	14916	114.50	14916-C3	126.10
.312 (5/16)	.470	**4.343** (14x)	5/16	6	14920	138.40	14920-C3	155.80
.375 (3/8)	.562	**4.312** (11.5x)	3/8	6	14924	156.90	14924-C3	174.90
.500 (1/2)	.750	**5.750** (11.5x)	1/2	8	14932	273.30	14932-C3	308.90
.625 (5/8)	.937	**5.687** (9x)	5/8	8	14940	461.90		
.750 (3/4)	1.125	**5.625** (7.5x)	3/4	8	14948	555.20		

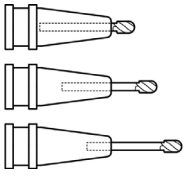
MINIATURE END MILLS

Ball – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Length of cut = 1½x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



BALL

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
1/8	3/16	2	**3 mm**	2-1/2	24708	114.50	24708-C3	120.40
1/8	3/16	4	**3 mm**	2-1/2	804208	118.50	804208-C3	124.50
5/32	15/64	2	**1/8**	2-1/2	24710	114.50	24710-C3	121.10
3/16	9/32	2	**1/8**	2-1/2	24712	115.50	24712-C3	122.20
3/16	9/32	2	**5/32**	2-1/2	24713	118.20	24713-C3	124.90
3/16	9/32	4	**5/32**	2-1/2	804212	123.50	804212-C3	130.20
1/4	3/8	2	**3/16**	3	24716	124.00	24716-C3	132.80
1/4	3/8	4	**3/16**	3	804216	128.40	804216-C3	136.50
5/16	15/32	2	**1/4**	4	24720	152.40	24720-C3	162.80
3/8	9/16	2	**5/16**	4	24724	180.00	24724-C3	195.90
7/16	21/32	2	**3/8**	6	24728	267.90	24728-C3	284.40
1/2	3/4	2	**7/16**	6	24732	279.90	24732-C3	299.40
5/8	15/16	2	**1/2**	6	24740	363.00	24740-C3	385.40
3/4	1-1/8	2	**5/8**	6	24748	448.60	24748-C3	475.40

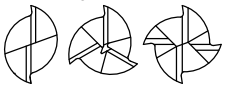
For Square Reduced Shank, please see page 48.
For Corner Radius Reduced Shank, please see page 102.

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard







- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
	.008	.002	.012 (1.5x)	1/8	1-1/2			856008	59.30		856008-C3	65.20			
	.008	.002	.024 (3x)	1/8	1-1/2			854208	59.30		854208-C3	65.20			
	.010	.003	.015 (1.5x)	1/8	1-1/2			987510	53.40		987510-C3	59.30			
	.010	.003	.030 (3x)	1/8	1-1/2			47210	53.40		47210-C3	59.30			
	.012	.003	.018 (1.5x)	1/8	1-1/2			987512	54.40		987512-C3	60.30			
	.012	.003	.036 (3x)	1/8	1-1/2			47212	54.40		47212-C3	60.30			
	.015 (1/64)	.003	.023 (1.5x)	1/8	1-1/2			987515	53.40		987515-C3	59.30			
	.015 (1/64)	.003	.045 (3x)	1/8	1-1/2	45415		47215	53.40		47215-C3	59.30		47215-C4	68.30
	.015 (1/64)	.005	.023 (1.5x)	1/8	1-1/2			993815	53.40		993815-C3	59.30			
	.015 (1/64)	.005	.045 (3x)	1/8	1-1/2	44715		26315	53.40		26315-C3	59.30			
	.018	.005	.027 (1.5x)	1/8	1-1/2			993818	53.40		993818-C3	59.30			
	.018	.005	.054 (3x)	1/8	1-1/2			26318	53.40		26318-C3	59.30			
	.020 (.5 mm)	.003	.030 (1.5x)	1/8	1-1/2			987520	51.10		987520-C3	57.00			
	.020 (.5 mm)	.003	.060 (3x)	1/8	1-1/2			47220	51.10		47220-C3	57.00			
NEW	.020 (.5 mm)	.005	.016 (0.8x)	1/8	1-1/2			720420	52.00		720420-C3	57.90			
	.020 (.5 mm)	.005	.030 (1.5x)	1/8	1-1/2			993820	51.10		993820-C3	57.00			
	.020 (.5 mm)	.005	.060 (3x)	1/8	1-1/2	44720	848320	26320	51.10	848320-C3	26320-C3	57.00		26320-C4	66.00
	.022	.005	.066 (3x)	1/8	1-1/2			26322	46.50		26322-C3	52.40			
	.024 (.6 mm)	.005	.072 (3x)	1/8	1-1/2			26324	46.50		26324-C3	52.40			
	.025	.003	.038 (1.5x)	1/8	1-1/2			987525	46.50		987525-C3	52.40			
	.025	.003	.075 (3x)	1/8	1-1/2			47225	46.50		47225-C3	52.40			
NEW	.025	.005	.020 (0.8x)	1/8	1-1/2			720425	48.10		720425-C3	54.00			
	.025	.005	.038 (1.5x)	1/8	1-1/2			993825	46.50		993825-C3	52.40			
	.025	.005	.075 (3x)	1/8	1-1/2	44725		26325	46.50		26325-C3	52.40		26325-C4	61.40
	.025	.008	.038 (1.5x)	1/8	1-1/2			994525	46.50		994525-C3	52.40			
	.025	.008	.075 (3x)	1/8	1-1/2			953025	46.50		953025-C3	52.40			
	.028 (.7mm)	.005	.084 (3x)	1/8	1-1/2			26328	43.10		26328-C3	49.00			
	.030	.003	.090 (3x)	1/8	1-1/2			47230	43.10		47230-C3	49.00			
	.030	.005	.045 (1.5x)	1/8	1-1/2			993830	43.10		993830-C3	49.00			
	.030	.005	.090 (3x)	1/8	1-1/2	44730		26330	43.10		26330-C3	49.00		26330-C4	58.00
	.030	.008	.090 (3x)	1/8	1-1/2			953030	43.10		953030-C3	49.00			
	.030	.010	.045 (1.5x)	1/8	1-1/2			994530	43.10		994530-C3	49.00			
	.030	.010	.090 (3x)	1/8	1-1/2	45230		27230	43.10		27230-C3	49.00		27230-C4	58.00
	.031 (1/32)	.003	.047 (1.5x)	1/8	1-1/2			987531	43.10		987531-C3	49.00			
	.031 (1/32)	.003	.093 (3x)	1/8	1-1/2			47231	43.10		47231-C3	49.00		47231-C4	58.00
	.031 (1/32)	.005	.025 (0.8x)	1/8	1-1/2			720431	44.60		720431-C3	50.60			
	.031 (1/32)	.005	.047 (1.5x)	1/8	1-1/2			993831	43.10		993831-C3	49.00			
	.031 (1/32)	.005	.093 (3x)	1/8	1-1/2	44731	848331	26331	43.10	848331-C3	26331-C3	49.00	44731-C4	26331-C4	58.00
	.031 (1/32)	.008	.047 (1.5x)	1/8	1-1/2			913731	43.10		913731-C3	49.00			
	.031 (1/32)	.008	.093 (3x)	1/8	1-1/2			953031	43.10		953031-C3	49.00			
	.031 (1/32)	.010	.025 (0.8x)	1/8	1-1/2			720331	44.60		720331-C3	50.60			
	.031 (1/32)	.010	.047 (1.5x)	1/8	1-1/2			994531	43.10		994531-C3	49.00			
	.031 (1/32)	.010	.093 (3x)	1/8	1-1/2	45231	854131	27231	43.10	854131-C3	27231-C3	49.00		27231-C4	58.00

continued on next page

NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND			
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$	
.034	.005	.102 (3x)	1/8	1-1/2			26334	36.10		26334-C3	42.00				
.035 (.9 mm)	.005	.053 (1.5x)	1/8	1-1/2			993835	36.10		993835-C3	42.00				
.035 (.9 mm)	.005	.105 (3x)	1/8	1-1/2	44735		26335	36.10		26335-C3	42.00		26335-C4	51.10	
.035 (.9 mm)	.010	.053 (1.5x)	1/8	1-1/2			994535	36.10		994535-C3	42.00				
.035 (.9 mm)	.010	.105 (3x)	1/8	1-1/2	45235		27235	36.10		27235-C3	42.00		27235-C4	51.10	
.037	.005	.111 (3x)	1/8	1-1/2			26337	36.10		26337-C3	42.00				
.039 (1 mm)	.003	.059 (1.5x)	1/8	1-1/2			987539	28.00		987539-C3	33.90				
.039 (1 mm)	.003	.117 (3x)	1/8	1-1/2			47239	28.00		47239-C3	33.90				
.039 (1 mm)	.005	.031 (0.8x)	1/8	1-1/2			720439	29.60		720439-C3	35.50				NEW
.039 (1 mm)	.005	.059 (1.5x)	1/8	1-1/2	804539		993839	28.00		993839-C3	33.90				
.039 (1 mm)	.005	.117 (3x)	1/8	1-1/2	44739		26339	28.00		26339-C3	33.90				
.039 (1 mm)	.008	.059 (1.5x)	1/8	1-1/2			913739	28.00		913739-C3	33.90				
.039 (1 mm)	.008	.117 (3x)	1/8	1-1/2			953039	28.00		953039-C3	33.90				
.039 (1 mm)	.010	.059 (1.5x)	1/8	1-1/2			994539	28.00		994539-C3	33.90				
.039 (1 mm)	.010	.117 (3x)	1/8	1-1/2			27239	28.00		27239-C3	33.90				
.040	.003	.120 (3x)	1/8	1-1/2			47240	27.50		47240-C3	33.40				
.040	.005	.032 (0.8x)	1/8	1-1/2			720440	29.10		720440-C3	35.00				NEW
.040	.005	.060 (1.5x)	1/8	1-1/2	804540	865140	993840	27.50	865140-C3	993840-C3	33.40				
.040	.005	.120 (3x)	1/8	1-1/2	44740	848340	26340	27.50	848340-C3	26340-C3	33.40		26340-C4	42.50	
.040	.008	.120 (3x)	1/8	1-1/2			953040	27.50		953040-C3	33.40				
.040	.010	.060 (1.5x)	1/8	1-1/2			994540	27.50		994540-C3	33.40				
.040	.010	.120 (3x)	1/8	1-1/2	45240		27240	27.50		27240-C3	33.40		27240-C4	42.50	
.045	.005	.068 (1.5x)	1/8	1-1/2			993845	27.50		993845-C3	33.40				
.045	.005	.135 (3x)	1/8	1-1/2	44745		26345	27.50		26345-C3	33.40		26345-C4	42.50	
.045	.010	.068 (1.5x)	1/8	1-1/2			994545	27.50		994545-C3	33.40				
.045	.010	.135 (3x)	1/8	1-1/2	45245		27245	27.50		27245-C3	33.40		27245-C4	42.50	
.045	.015	.068 (1.5x)	1/8	1-1/2			997945	27.50		997945-C3	33.40				
.045	.015	.135 (3x)	1/8	1-1/2	45545		28145	27.50		28145-C3	33.40		28145-C4	42.50	
.046	.005	.138 (3x)	1/8	1-1/2			26346	27.50		26346-C3	33.40				
.047 (3/64)	.003	.071 (1.5x)	1/8	1-1/2			987547	27.50		987547-C3	33.40				
.047 (3/64)	.003	.141 (3x)	1/8	1-1/2			47247	27.50		47247-C3	33.40				
.047 (3/64)	.005	.038 (0.8x)	1/8	1-1/2			720447	29.10		720447-C3	35.00				NEW
.047 (3/64)	.005	.071 (1.5x)	1/8	1-1/2	804547	865147	993847	27.50	865147-C3	993847-C3	33.40				
.047 (3/64)	.005	.141 (3x)	1/8	1-1/2	44747	848347	26347	27.50	848347-C3	26347-C3	33.40		26347-C4	42.50	
.047 (3/64)	.008	.071 (1.5x)	1/8	1-1/2			913747	27.50		913747-C3	33.40				
.047 (3/64)	.008	.141 (3x)	1/8	1-1/2			953047	27.50		953047-C3	33.40				
.047 (3/64)	.010	.071 (1.5x)	1/8	1-1/2			994547	27.50		994547-C3	33.40				
.047 (3/64)	.010	.141 (3x)	1/8	1-1/2	45247	854147	27247	27.50	854147-C3	27247-C3	33.40		27247-C4	42.50	NEW
.047 (3/64)	.012	.141 (3x)	1/8	1-1/2			966947	27.50		966947-C3	33.40				
.047 (3/64)	.015	.071 (1.5x)	1/8	1-1/2	830147	860847	997947	27.50	860847-C3	997947-C3	33.40				
.047 (3/64)	.015	.141 (3x)	1/8	1-1/2	45547	867247	28147	27.50	867247-C3	28147-C3	33.40		28147-C4	42.50	

continued on next page

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

continued from previous page

	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
	.050	.003	.150 (3x)	1/8	1-1/2			47250	27.50		47250-C3	33.40			
	.050	.005	.075 (1.5x)	1/8	1-1/2			993850	27.50		993850-C3	33.40			
	.050	.005	.150 (3x)	1/8	1-1/2	44750	848350	26350	27.50	848350-C3	26350-C3	33.40		26350-C4	42.50
	.050	.008	.075 (1.5x)	1/8	1-1/2			913750	28.10		913750-C3	34.00			
	.050	.008	.150 (3x)	1/8	1-1/2			953050	27.50		953050-C3	33.40			
NEW	.050	.010	.040 (0.8x)	1/8	1-1/2			720350	29.10		720350-C3	35.00			
	.050	.010	.075 (1.5x)	1/8	1-1/2			994550	27.50		994550-C3	33.40			
	.050	.010	.150 (3x)	1/8	1-1/2	45250		27250	27.50		27250-C3	33.40		27250-C4	42.50
	.050	.012	.150 (3x)	1/8	1-1/2			966950	28.10		966950-C3	34.00			
	.050	.015	.075 (1.5x)	1/8	1-1/2			997950	27.50		997950-C3	33.40			
	.050	.015	.150 (3x)	1/8	1-1/2	45550		28150	27.50		28150-C3	33.40		28150-C4	42.50
	.055 (1.4 mm)	.003	.165 (3x)	1/8	1-1/2			47255	27.50		47255-C3	33.40			
NEW	.055 (1.4 mm)	.005	.044 (0.8x)	1/8	1-1/2			720455	29.10		720455-C3	35.00			
NEW	.055 (1.4 mm)	.005	.083 (1.5x)	1/8	1-1/2	804555		993855	27.50		993855-C3	33.40			
	.055 (1.4 mm)	.005	.165 (3x)	1/8	1-1/2	44755		26355	27.50		26355-C3	33.40		26355-C4	42.50
	.055 (1.4 mm)	.008	.165 (3x)	1/8	1-1/2			953055	27.50		953055-C3	33.40			
	.055 (1.4 mm)	.010	.083 (1.5x)	1/8	1-1/2			994555	27.50		994555-C3	33.40			
	.055 (1.4 mm)	.010	.165 (3x)	1/8	1-1/2	45255		27255	27.50		27255-C3	33.40		27255-C4	42.50
	.055 (1.4 mm)	.015	.083 (1.5x)	1/8	1-1/2			997955	27.50		997955-C3	33.40			
	.055 (1.4 mm)	.015	.165 (3x)	1/8	1-1/2	45555		28155	27.50		28155-C3	33.40		28155-C4	42.50
	.059	.005	.177 (3x)	1/8	1-1/2			26359	27.50		26359-C3	33.40			
	.060	.003	.180 (3x)	1/8	1-1/2			47260	27.50		47260-C3	33.40			
	.060	.005	.090 (1.5x)	1/8	1-1/2			993860	27.50		993860-C3	33.40			
	.060	.005	.180 (3x)	1/8	1-1/2	44760	848360	26360	27.50	848360-C3	26360-C3	33.40		26360-C4	42.50
	.060	.008	.180 (3x)	1/8	1-1/2			953060	27.50		953060-C3	33.40			
	.060	.010	.090 (1.5x)	1/8	1-1/2			994560	27.50		994560-C3	33.40			
	.060	.010	.180 (3x)	1/8	1-1/2	45260		27260	27.50		27260-C3	33.40		27260-C4	42.50
	.060	.015	.090 (1.5x)	1/8	1-1/2			997960	27.50		997960-C3	33.40			
	.060	.015	.180 (3x)	1/8	1-1/2	45560		28160	27.50		28160-C3	33.40		28160-C4	42.50
	.060	.020	.090 (1.5x)	1/8	1-1/2			966460	27.50		966460-C3	33.40			
	.060	.020	.180 (3x)	1/8	1-1/2			51660	27.50		51660-C3	33.40			
	.062 (1/16)	.003	.093 (1.5x)	1/8	1-1/2			987562	27.50		987562-C3	33.40			
	.062 (1/16)	.003	.186 (3x)	1/8	1-1/2	45462		47262	27.50		47262-C3	33.40			
	.062 (1/16)	.005	.050 (0.8x)	1/8	1-1/2			720462	29.20		720462-C3	35.10			
	.062 (1/16)	.005	.093 (1.5x)	1/8	1-1/2	804562	865162	993862	27.50	865162-C3	993862-C3	33.40		993862-C4	42.50
	.062 (1/16)	.005	.186 (3x)	1/8	1-1/2	44762	848362	26362	27.50	848362-C3	26362-C3	33.40	44762-C4	26362-C4	42.50
	.062 (1/16)	.008	.093 (1.5x)	1/8	1-1/2			913762	27.50		913762-C3	33.40			
	.062 (1/16)	.008	.186 (3x)	1/8	1-1/2	843962		953062	27.50		953062-C3	33.40			
	.062 (1/16)	.010	.050 (0.8x)	1/8	1-1/2			720362	29.20		720362-C3	35.10			
	.062 (1/16)	.010	.093 (1.5x)	1/8	1-1/2	830362	864662	994562	27.50	864662-C3	994562-C3	33.40		994562-C4	42.50
	.062 (1/16)	.010	.186 (3x)	1/8	1-1/2	45262	854162	27262	27.50	854162-C3	27262-C3	33.40	45262-C4	27262-C4	42.50
	.062 (1/16)	.012	.093 (1.5x)	1/8	1-1/2			904862	27.50		904862-C3	33.40			
	.062 (1/16)	.012	.186 (3x)	1/8	1-1/2			966962	27.50		966962-C3	33.40			
	.062 (1/16)	.015	.093 (1.5x)	1/8	1-1/2	830162	860862	997962	27.50	860862-C3	997962-C3	33.40			
	.062 (1/16)	.015	.186 (3x)	1/8	1-1/2	45562	867262	28162	27.50	867262-C3	28162-C3	33.40	45562-C4	28162-C4	42.50
NEW	.062 (1/16)	.020	.050 (0.8x)	1/8	1-1/2			697762	29.20		697762-C3	35.10			
	.062 (1/16)	.020	.093 (1.5x)	1/8	1-1/2	810662	858762	966462	27.50	858762-C3	966462-C3	33.40			
	.062 (1/16)	.020	.186 (3x)	1/8	1-1/2	51362	857762	51662	27.50	857762-C3	51662-C3	33.40	51362-C4	51662-C4	42.50

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
.065	.005	.098 (1.5x)	1/8	1-1/2			993865	27.50		993865-C3	33.40			
.065	.005	.195 (3x)	1/8	1-1/2	44765		26365	27.50		26365-C3	33.40		26365-C4	42.50
.065	.010	.098 (1.5x)	1/8	1-1/2			994565	27.50		994565-C3	33.40			
.065	.010	.195 (3x)	1/8	1-1/2	45265		27265	27.50		27265-C3	33.40		27265-C4	42.50
.065	.015	.195 (3x)	1/8	1-1/2	45565		28165	27.50		28165-C3	33.40		28165-C4	42.50
.065	.020	.195 (3x)	1/8	1-1/2			51665	28.10		51665-C3	34.00			
.070	.003	.210 (3x)	1/8	1-1/2			47270	27.50		47270-C3	33.40			
.070	.005	.105 (1.5x)	1/8	1-1/2			993870	27.50		993870-C3	33.40			
.070	.005	.210 (3x)	1/8	1-1/2	44770		26370	27.50		26370-C3	33.40		26370-C4	42.50
.070	.008	.210 (3x)	1/8	1-1/2			953070	27.50		953070-C3	33.40			
.070	.010	.105 (1.5x)	1/8	1-1/2			994570	27.50		994570-C3	33.40			
.070	.010	.210 (3x)	1/8	1-1/2	45270		27270	27.50		27270-C3	33.40		27270-C4	42.50
.070	.015	.210 (3x)	1/8	1-1/2	45570		28170	27.50		28170-C3	33.40		28170-C4	42.50
.070	.020	.105 (1.5x)	1/8	1-1/2			966470	28.10		966470-C3	34.00			
.070	.020	.210 (3x)	1/8	1-1/2			51670	27.50		51670-C3	33.40			
.075	.005	.113 (1.5x)	1/8	1-1/2			993875	27.50		993875-C3	33.40			
.075	.005	.225 (3x)	1/8	1-1/2	44775		26375	27.50		26375-C3	33.40		26375-C4	42.50
.075	.010	.113 (1.5x)	1/8	1-1/2			994575	27.50		994575-C3	33.40			
.075	.010	.225 (3x)	1/8	1-1/2	45275		27275	27.50		27275-C3	33.40		27275-C4	42.50
.075	.015	.225 (3x)	1/8	1-1/2	45575		28175	27.50		28175-C3	33.40		28175-C4	42.50
.078 (5/64)	.003	.117 (1.5x)	1/8	1-1/2			987578	27.50		987578-C3	33.40			
.078 (5/64)	.003	.234 (3x)	1/8	1-1/2			47278	27.50		47278-C3	33.40			
.078 (5/64)	.005	.117 (1.5x)	1/8	1-1/2	804578		993878	27.50		993878-C3	33.40			
.078 (5/64)	.005	.234 (3x)	1/8	1-1/2	44778	848378	26378	27.50	848378-C3	26378-C3	33.40		26378-C4	42.50
.078 (5/64)	.008	.117 (1.5x)	1/8	1-1/2			913778	27.50		913778-C3	33.40			
.078 (5/64)	.008	.234 (3x)	1/8	1-1/2			953078	27.50		953078-C3	33.40			
.078 (5/64)	.010	.062 (0.8x)	1/8	1-1/2			720378	29.20		720378-C3	35.10			NEW
.078 (5/64)	.010	.117 (1.5x)	1/8	1-1/2	830378	864678	994578	27.50	864678-C3	994578-C3	33.40		994578-C4	42.50
.078 (5/64)	.010	.234 (3x)	1/8	1-1/2	45278	854178	27278	27.50	854178-C3	27278-C3	33.40	45278-C4	27278-C4	42.50
.078 (5/64)	.012	.234 (3x)	1/8	1-1/2			966978	27.50		966978-C3	33.40			
.078 (5/64)	.015	.117 (1.5x)	1/8	1-1/2	830178	860878	997978	27.50	860878-C3	997978-C3	33.40			
.078 (5/64)	.015	.234 (3x)	1/8	1-1/2	45578	867278	28178	27.50	867278-C3	28178-C3	33.40		28178-C4	42.50
.078 (5/64)	.020	.117 (1.5x)	1/8	1-1/2	810678		966478	27.50		966478-C3	33.40			
.078 (5/64)	.020	.234 (3x)	1/8	1-1/2	51378	857778	51678	27.50	857778-C3	51678-C3	33.40	51378-C4	51678-C4	42.50
.078 (5/64)	.025	.117 (1.5x)	1/8	1-1/2			964078	27.50		964078-C3	33.40			
.078 (5/64)	.025	.234 (3x)	1/8	1-1/2	706778	842678	957178	27.50	842678-C3	957178-C3	33.40			
.080	.003	.240 (3x)	1/8	1-1/2			47280	27.50		47280-C3	33.40			
.080	.005	.120 (1.5x)	1/8	1-1/2			993880	27.50		993880-C3	33.40			
.080	.005	.240 (3x)	1/8	1-1/2	44780		26380	27.50		26380-C3	33.40		26380-C4	42.50
.080	.008	.240 (3x)	1/8	1-1/2			953080	28.10		953080-C3	34.00			
.080	.010	.120 (1.5x)	1/8	1-1/2			994580	27.50		994580-C3	33.40			
.080	.010	.240 (3x)	1/8	1-1/2	45280		27280	27.50		27280-C3	33.40		27280-C4	42.50
.080	.015	.240 (3x)	1/8	1-1/2	45580		28180	27.50		28180-C3	33.40		28180-C4	42.50
.080	.020	.240 (3x)	1/8	1-1/2			51680	27.50		51680-C3	33.40			
.080	.025	.240 (3x)	1/8	1-1/2			957180	27.50		957180-C3	33.40			

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND		
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
	.085	.005	.128 (1.5x)	1/8	1-1/2			993885	27.50		993885-C3	33.40			
	.085	.005	.255 (3x)	1/8	1-1/2	44785		26385	27.50		26385-C3	33.40		26385-C4	42.50
	.085	.010	.128 (1.5x)	1/8	1-1/2			994585	27.50		994585-C3	33.40			
	.085	.010	.255 (3x)	1/8	1-1/2	45285		27285	27.50		27285-C3	33.40		27285-C4	42.50
	.085	.015	.128 (1.5x)	1/8	1-1/2			997985	27.50		997985-C3	33.40			
	.085	.015	.255 (3x)	1/8	1-1/2	45585		28185	27.50		28185-C3	33.40		28185-C4	42.50
	.085	.020	.255 (3x)	1/8	1-1/2			51685	27.50		51685-C3	33.40			
	.090	.003	.270 (3x)	1/8	1-1/2			47290	28.10		47290-C3	34.00			
	.090	.005	.135 (1.5x)	1/8	1-1/2			993890	27.50		993890-C3	33.40			
	.090	.005	.270 (3x)	1/8	1-1/2	44790		26390	27.50		26390-C3	33.40		26390-C4	42.50
	.090	.008	.135 (1.5x)	1/8	1-1/2			913790	27.50		913790-C3	33.40			
	.090	.008	.270 (3x)	1/8	1-1/2			953090	27.50		953090-C3	33.40			
	.090	.010	.135 (1.5x)	1/8	1-1/2			994590	27.50		994590-C3	33.40			
	.090	.010	.270 (3x)	1/8	1-1/2	45290		27290	27.50		27290-C3	33.40		27290-C4	42.50
	.090	.015	.135 (1.5x)	1/8	1-1/2			997990	27.50		997990-C3	33.40			
	.090	.015	.270 (3x)	1/8	1-1/2	45590		28190	27.50		28190-C3	33.40		28190-C4	42.50
	.090	.020	.135 (1.5x)	1/8	1-1/2			966490	27.50		966490-C3	33.40			
	.090	.020	.270 (3x)	1/8	1-1/2			51690	27.50		51690-C3	33.40			
	.090	.025	.270 (3x)	1/8	1-1/2			957190	27.50		957190-C3	33.40			
	.090	.030	.135 (1.5x)	1/8	1-1/2			958890	27.50		958890-C3	33.40			
	.090	.030	.270 (3x)	1/8	1-1/2			28690	27.50		28690-C3	33.40			
	.093 (3/32)	.003	.140 (1.5x)	1/8	1-1/2			987593	27.50		987593-C3	33.40			
	.093 (3/32)	.003	.279 (3x)	1/8	1-1/2	45493		47293	27.50		47293-C3	33.40			
	.093 (3/32)	.005	.074 (0.8x)	1/8	1-1/2			720493	29.20		720493-C3	35.10			
	.093 (3/32)	.005	.140 (1.5x)	1/8	1-1/2	804593	865193	993893	27.50	865193-C3	993893-C3	33.40			
	.093 (3/32)	.005	.279 (3x)	1/8	1-1/2	44793	848393	26393	27.50	848393-C3	26393-C3	33.40		26393-C4	42.50
	.093 (3/32)	.008	.140 (1.5x)	1/8	1-1/2			913793	27.50		913793-C3	33.40			
	.093 (3/32)	.008	.279 (3x)	1/8	1-1/2	843993		953093	27.50		953093-C3	33.40			
	.093 (3/32)	.010	.074 (0.8x)	1/8	1-1/2			720393	29.20		720393-C3	35.10			
	.093 (3/32)	.010	.140 (1.5x)	1/8	1-1/2	830393	864693	994593	27.50	864693-C3	994593-C3	33.40		994593-C4	42.50
	.093 (3/32)	.010	.279 (3x)	1/8	1-1/2	45293	854193	27293	27.50	854193-C3	27293-C3	33.40	45293-C4	27293-C4	42.50
	.093 (3/32)	.012	.140 (1.5x)	1/8	1-1/2			904893	27.50		904893-C3	33.40			
	.093 (3/32)	.012	.279 (3x)	1/8	1-1/2			966993	27.50		966993-C3	33.40			
	.093 (3/32)	.015	.140 (1.5x)	1/8	1-1/2	830193	860893	997993	27.50	860893-C3	997993-C3	33.40		997993-C4	42.50
	.093 (3/32)	.015	.279 (3x)	1/8	1-1/2	45593	867293	28193	27.50	867293-C3	28193-C3	33.40	45593-C4	28193-C4	42.50
NEW	.093 (3/32)	.020	.074 (0.8x)	1/8	1-1/2			697793	29.20		697793-C3	35.10			
	.093 (3/32)	.020	.140 (1.5x)	1/8	1-1/2	810693	858793	966493	27.50	858793-C3	966493-C3	33.40			
	.093 (3/32)	.020	.279 (3x)	1/8	1-1/2	51393	857793	51693	27.50	857793-C3	51693-C3	33.40	51393-C4	51693-C4	42.50
	.093 (3/32)	.025	.140 (1.5x)	1/8	1-1/2			964093	27.50		964093-C3	33.40			
	.093 (3/32)	.025	.279 (3x)	1/8	1-1/2			957193	27.50		957193-C3	33.40			
	.093 (3/32)	.030	.140 (1.5x)	1/8	1-1/2	759093	758693	958893	27.50	758693-C3	958893-C3	33.40			
	.093 (3/32)	.030	.279 (3x)	1/8	1-1/2	73993	853493	28693	27.50	853493-C3	28693-C3	33.40	73993-C4	28693-C4	42.50
	.095	.005	.143 (1.5x)	1/8	1-1/2			993895	27.50		993895-C3	33.40			
	.095	.005	.285 (3x)	1/8	1-1/2	44795		26395	27.50		26395-C3	33.40		26395-C4	42.50
	.095	.010	.143 (1.5x)	1/8	1-1/2			994595	27.50		994595-C3	33.40			
	.095	.010	.285 (3x)	1/8	1-1/2	45295		27295	27.50		27295-C3	33.40		27295-C4	42.50
	.095	.015	.285 (3x)	1/8	1-1/2	45595		28195	27.50		28195-C3	33.40		28195-C4	42.50
	.095	.020	.285 (3x)	1/8	1-1/2			51695	27.50		51695-C3	33.40			
	.095	.030	.285 (3x)	1/8	1-1/2			28695	27.50		28695-C3	33.40			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND			
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$	
.100	.003	.300 (3x)	1/8	1-1/2			47300	27.50		47300-C3	33.40				
.100	.005	.150 (1.5x)	1/8	1-1/2			993899	27.50		993899-C3	33.40				
.100	.005	.300 (3x)	1/8	1-1/2	44799		26399	27.50		26399-C3	33.40		26399-C4	42.50	
.100	.008	.300 (3x)	1/8	1-1/2			953099	27.50		953099-C3	33.40				
.100	.010	.150 (1.5x)	1/8	1-1/2			994599	27.50		994599-C3	33.40				
.100	.010	.300 (3x)	1/8	1-1/2	45299		27299	27.50		27299-C3	33.40		27299-C4	42.50	
.100	.015	.150 (1.5x)	1/8	1-1/2			997999	27.50		997999-C3	33.40				
.100	.015	.300 (3x)	1/8	1-1/2	45599		28199	27.50		28199-C3	33.40		28199-C4	42.50	
.100	.020	.150 (1.5x)	1/8	1-1/2			966499	27.50		966499-C3	33.40				
.100	.020	.300 (3x)	1/8	1-1/2			51699	27.50		51699-C3	33.40				
.100	.030	.150 (1.5x)	1/8	1-1/2			958899	27.50		958899-C3	33.40				
.100	.030	.300 (3x)	1/8	1-1/2			28699	27.50		28699-C3	33.40				
.109 (7/64)	.003	.327 (3x)	1/8	1-1/2			10802	27.50		10802-C3	33.40				
.109 (7/64)	.005	.164 (1.5x)	1/8	1-1/2			941402	27.50		941402-C3	33.40				
.109 (7/64)	.005	.327 (3x)	1/8	1-1/2	44802		72902	27.50		72902-C3	33.40				
.109 (7/64)	.008	.164 (1.5x)	1/8	1-1/2			913802	27.50		913802-C3	33.40				
.109 (7/64)	.008	.327 (3x)	1/8	1-1/2			75502	27.50		75502-C3	33.40				
.109 (7/64)	.010	.164 (1.5x)	1/8	1-1/2			936902	27.50		936902-C3	33.40				
.109 (7/64)	.010	.327 (3x)	1/8	1-1/2			75802	27.50		75802-C3	33.40		75802-C4	42.50	
.109 (7/64)	.015	.164 (1.5x)	1/8	1-1/2			935002	27.50		935002-C3	33.40				
.109 (7/64)	.015	.327 (3x)	1/8	1-1/2			74202	27.50		74202-C3	33.40				
.109 (7/64)	.020	.087 (0.8x)	1/8	1-1/2			697802	29.20		697802-C3	35.10				NEW
.109 (7/64)	.020	.164 (1.5x)	1/8	1-1/2			872002	27.50		872002-C3	33.40				
.109 (7/64)	.020	.327 (3x)	1/8	1-1/2			986302	27.50		986302-C3	33.40				
.109 (7/64)	.025	.164 (1.5x)	1/8	1-1/2			964102	27.50		964102-C3	33.40				NEW
.109 (7/64)	.025	.327 (3x)	1/8	1-1/2			957109	27.50		957109-C3	33.40				
.109 (7/64)	.030	.164 (1.5x)	1/8	1-1/2			892402	27.50		892402-C3	33.40				
.109 (7/64)	.030	.327 (3x)	1/8	1-1/2			937602	27.50		937602-C3	33.40		937602-C4	42.50	
.118 (3 mm)	.003	.354 (3x)	1/8	1-1/2			47305	28.00		47305-C3	33.90				
.118 (3 mm)	.005	.177 (1.5x)	1/8	1-1/2			941405	28.00		941405-C3	33.90				
.118 (3 mm)	.005	.354 (3x)	1/8	1-1/2			72905	28.00		72905-C3	33.90				
.118 (3 mm)	.008	.177 (1.5x)	1/8	1-1/2			913805	28.00		913805-C3	33.90				
.118 (3 mm)	.008	.354 (3x)	1/8	1-1/2			916705	28.00		916705-C3	33.90				
.118 (3 mm)	.010	.177 (1.5x)	1/8	1-1/2			936905	28.00		936905-C3	33.90				
.118 (3 mm)	.010	.354 (3x)	1/8	1-1/2			75805	28.00		75805-C3	33.90				
.118 (3 mm)	.015	.177 (1.5x)	1/8	1-1/2			935005	28.00		935005-C3	33.90				
.118 (3 mm)	.015	.354 (3x)	1/8	1-1/2	45605		74205	28.00		74205-C3	33.90				
.118 (3 mm)	.020	.177 (1.5x)	1/8	1-1/2			872005	28.00		872005-C3	33.90				
.118 (3 mm)	.020	.354 (3x)	1/8	1-1/2			986305	28.00		986305-C3	33.90				
.118 (3 mm)	.025	.354 (3x)	1/8	1-1/2			957205	28.00		957205-C3	33.90				
.118 (3 mm)	.030	.177 (1.5x)	1/8	1-1/2			892405	28.00		892405-C3	33.90				
.118 (3 mm)	.030	.354 (3x)	1/8	1-1/2			937605	28.00		937605-C3	33.90		937605-C4	43.00	
.118 (3 mm)	.040	.177 (1.5x)	1/8	1-1/2			734105	28.00		734105-C3	33.90				
.118 (3 mm)	.040	.354 (3x)	1/8	1-1/2			874005	28.00		874005-C3	33.90				

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MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
	.125 (1/8)	.003	.187 (1.5x)	1/8	1-1/2			980203	25.50		980203-C3	31.50			
	.125 (1/8)	.003	.500 (4x)	1/8	1-1/2	46403		32403	25.50		32403-C3	31.50			
	.125 (1/8)	.005	.100 (0.8x)	1/8	1-1/2			720205	27.20		720205-C3	33.10			
	.125 (1/8)	.005	.187 (1.5x)	1/8	1-1/2	832905	833405	980205	27.50	833405-C3	980205-C3	33.40			
	.125 (1/8)	.005	.500 (4x)	1/8	1-1/2	46405	870905	32405	27.50	870905-C3	32405-C3	33.40		32405-C4	42.50
	.125 (1/8)	.008	.187 (1.5x)	1/8	1-1/2			980208	27.50		980208-C3	33.40		980208-C4	42.50
	.125 (1/8)	.008	.500 (4x)	1/8	1-1/2	46408		32408	27.50		32408-C3	33.40			
	.125 (1/8)	.010	.100 (0.8x)	1/8	1-1/2			720210	29.20		720210-C3	35.10			
	.125 (1/8)	.010	.187 (1.5x)	1/8	1-1/2	832910	833410	980210	25.50	833410-C3	980210-C3	31.50		980210-C4	40.50
	.125 (1/8)	.010	.500 (4x)	1/8	1-1/2	46410	870910	32410	25.50	870910-C3	32410-C3	31.50	46410-C4	32410-C4	40.50
	.125 (1/8)	.012	.187 (1.5x)	1/8	1-1/2			980212	27.50		980212-C3	33.40			
	.125 (1/8)	.012	.500 (4x)	1/8	1-1/2			32412	27.50		32412-C3	33.40			
	.125 (1/8)	.015	.187 (1.5x)	1/8	1-1/2	832915	833415	980215	25.50	833415-C3	980215-C3	31.50		980215-C4	40.50
	.125 (1/8)	.015	.500 (4x)	1/8	1-1/2	46415	870915	32415	25.50	870915-C3	32415-C3	31.50		32415-C4	40.50
	.125 (1/8)	.020	.187 (1.5x)	1/8	1-1/2	832920	833420	980220	25.50	833420-C3	980220-C3	31.50		980220-C4	40.50
	.125 (1/8)	.020	.500 (4x)	1/8	1-1/2	46420	870920	32420	25.50	870920-C3	32420-C3	31.50	46420-C4	32420-C4	40.50
	.125 (1/8)	.025	.187 (1.5x)	1/8	1-1/2			980225	27.50		980225-C3	33.40			
	.125 (1/8)	.025	.500 (4x)	1/8	1-1/2	46425		32425	27.50		32425-C3	33.40		32425-C4	42.50
	.125 (1/8)	.030	.187 (1.5x)	1/8	1-1/2	832930	833430	980230	25.50	833430-C3	980230-C3	31.50		980230-C4	40.50
	.125 (1/8)	.030	.500 (4x)	1/8	1-1/2	46430	870930	32430	25.50	870930-C3	32430-C3	31.50	46430-C4	32430-C4	40.50
	.125 (1/8)	.035	.500 (4x)	1/8	1-1/2			32435	27.50		32435-C3	33.40			
	.125 (1/8)	.040	.187 (1.5x)	1/8	1-1/2	832940	833440	980240	27.50	833440-C3	980240-C3	33.40			
	.125 (1/8)	.040	.500 (4x)	1/8	1-1/2	46440	870940	32440	27.50	870940-C3	32440-C3	33.40			
	.125 (1/8)	.045	.187 (1.5x)	1/8	1-1/2			980245	25.50		980245-C3	31.50			
	.125 (1/8)	.045	.500 (4x)	1/8	1-1/2			32445	25.50		32445-C3	31.50			
	.140 (9/64)	.005	.220 (1.5x)	3/16	2			857105	33.40		857105-C3	39.90			
	.140 (9/64)	.005	.425 (3x)	3/16	2			966705	33.40		966705-C3	39.90			
	.140 (9/64)	.008	.425 (3x)	3/16	2			966708	33.40		966708-C3	39.70			
NEW	.140 (9/64)	.010	.112 (0.8x)	3/16	2			697610	33.00		697610-C3	39.20			
	.140 (9/64)	.010	.220 (1.5x)	3/16	2			857110	30.90		857110-C3	37.30			
	.140 (9/64)	.010	.425 (3x)	3/16	2	810910		966710	30.90		966710-C3	37.30			
	.140 (9/64)	.012	.425 (3x)	3/16	2			966712	31.80		966712-C3	38.30			
	.140 (9/64)	.015	.220 (1.5x)	3/16	2		833315	857115	30.90	833315-C3	857115-C3	37.30			
	.140 (9/64)	.015	.425 (3x)	3/16	2	810915	832115	966715	30.90	832115-C3	966715-C3	37.30			
	.140 (9/64)	.020	.220 (1.5x)	3/16	2			857120	30.90		857120-C3	37.30			
	.140 (9/64)	.020	.425 (3x)	3/16	2			966720	30.90		966720-C3	37.30			
	.140 (9/64)	.025	.425 (3x)	3/16	2			966725	30.90		966725-C3	37.20			
	.140 (9/64)	.030	.220 (1.5x)	3/16	2			857130	30.90		857130-C3	37.30			
	.140 (9/64)	.030	.425 (3x)	3/16	2			966730	30.90		966730-C3	37.30			
	.140 (9/64)	.040	.220 (1.5x)	3/16	2			857140	33.40		857140-C3	39.90			
	.140 (9/64)	.040	.425 (3x)	3/16	2			966740	33.40		966740-C3	39.90			
	.140 (9/64)	.045	.220 (1.5x)	3/16	2			857145	30.90		857145-C3	37.30			
	.140 (9/64)	.045	.425 (3x)	3/16	2			966745	30.90		966745-C3	37.30			

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Stub & Standard (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				ALTiN COATED			AMORPHOUS DIAMOND			
D_1 +.000" −.002"	R +.001" −.001"	L_2 +.030" −.000"	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$	
.156 (5/32)	.005	.235 (1.5x)	3/16	2			954805	30.50		954805-C3	37.10				
.156 (5/32)	.005	.562 (3x)	3/16	2			75205	30.50		75205-C3	37.10				
.156 (5/32)	.008	.562 (3x)	3/16	2			75208	30.50		75208-C3	37.10				
.156 (5/32)	.010	.235 (1.5x)	3/16	2			954810	28.20		954810-C3	34.70				
.156 (5/32)	.010	.562 (3x)	3/16	2	71910		75210	28.20		75210-C3	34.70				
.156 (5/32)	.015	.235 (1.5x)	3/16	2			954815	28.20		954815-C3	34.70				
.156 (5/32)	.015	.562 (3x)	3/16	2	71915		75215	28.20		75215-C3	34.70				
.156 (5/32)	.020	.125 (0.8x)	3/16	2			697520	30.30		697520-C3	36.50				NEW
.156 (5/32)	.020	.235 (1.5x)	3/16	2			954820	28.20		954820-C3	34.70				
.156 (5/32)	.020	.562 (3x)	3/16	2	71920		75220	28.20		75220-C3	34.70		75220-C4	46.60	
.156 (5/32)	.025	.235 (1.5x)	3/16	2			954825	28.20		954825-C3	34.50				
.156 (5/32)	.025	.562 (3x)	3/16	2			75225	28.20		75225-C3	34.70				
.156 (5/32)	.030	.235 (1.5x)	3/16	2	734030		954830	28.20		954830-C3	34.70				
.156 (5/32)	.030	.562 (3x)	3/16	2	71930	832030	75230	28.20	832030-C3	75230-C3	34.70		75230-C4	46.60	
.156 (5/32)	.040	.235 (1.5x)	3/16	2			954840	30.50		954840-C3	37.10				
.156 (5/32)	.040	.562 (3x)	3/16	2			75240	30.50		75240-C3	37.10				
.156 (5/32)	.045	.235 (1.5x)	3/16	2			954845	28.20		954845-C3	34.70				
.156 (5/32)	.045	.562 (3x)	3/16	2			75245	28.20		75245-C3	34.70				
.172 (11/64)	.005	.515 (3x)	3/16	2			855305	30.50		855305-C3	37.10				
.172 (11/64)	.010	.260 (1.5x)	3/16	2			758710	30.50		758710-C3	37.10				
.172 (11/64)	.010	.515 (3x)	3/16	2			855310	28.20		855310-C3	34.70				
.172 (11/64)	.020	.515 (3x)	3/16	2			855320	30.50		855320-C3	37.10				
.172 (11/64)	.030	.260 (1.5x)	3/16	2			758730	30.50		758730-C3	36.70				
.172 (11/64)	.030	.515 (3x)	3/16	2			855330	28.20		855330-C3	34.70				
.187 (3/16)	.003	.625 (3x)	3/16	2			34803	30.50		34803-C3	37.10				
.187 (3/16)	.005	.285 (1.5x)	3/16	2			937905	30.50		937905-C3	37.10		937905-C4	47.20	
.187 (3/16)	.005	.625 (3x)	3/16	2	46705		34805	30.50		34805-C3	37.10		34805-C4	47.20	
.187 (3/16)	.008	.285 (1.5x)	3/16	2			937908	30.50		937908-C3	37.10				
.187 (3/16)	.008	.625 (3x)	3/16	2		831908	34808	30.50	831908-C3	34808-C3	37.10				
.187 (3/16)	.010	.285 (1.5x)	3/16	2		833210	937910	28.20	833210-C3	937910-C3	34.70		937910-C4	46.60	
.187 (3/16)	.010	.625 (3x)	3/16	2	46710	831910	34810	28.20	831910-C3	34810-C3	34.70	46710-C4	34810-C4	46.60	
.187 (3/16)	.012	.285 (1.5x)	3/16	2			937912	30.50		937912-C3	37.10				
.187 (3/16)	.012	.625 (3x)	3/16	2			34812	30.50		34812-C3	37.10				
.187 (3/16)	.015	.285 (1.5x)	3/16	2			937915	28.20		937915-C3	34.70				
.187 (3/16)	.015	.625 (3x)	3/16	2	46715		34815	28.20		34815-C3	34.70	46715-C4	34815-C4	46.60	
.187 (3/16)	.020	.150 (0.8x)	3/16	2			697512	30.60		697512-C3	36.80				NEW
.187 (3/16)	.020	.285 (1.5x)	3/16	2	810520	833220	937920	28.50	833220-C3	937920-C3	34.90				NEW
.187 (3/16)	.020	.625 (3x)	3/16	2	46720		34820	28.20		34820-C3	34.70				
.187 (3/16)	.025	.285 (1.5x)	3/16	2			937925	30.50		937925-C3	37.10				
.187 (3/16)	.025	.625 (3x)	3/16	2	46725		34825	30.50		34825-C3	37.10				
.187 (3/16)	.030	.285 (1.5x)	3/16	2	810530		937930	28.50		937930-C3	34.90		937930-C4	46.80	
.187 (3/16)	.030	.625 (3x)	3/16	2	46730	831930	34830	28.20	831930-C3	34830-C3	34.70	46730-C4	34830-C4	46.60	
.187 (3/16)	.035	.625 (3x)	3/16	2			34835	30.50		34835-C3	36.70				

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Corner Radius – Stub & Standard (cont.)

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	CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
	.187 (3/16)	.040	.285 (1.5x)	3/16	2			937940	30.50		937940-C3	37.10			
	.187 (3/16)	.040	.625 (3x)	3/16	2	46740		34840	30.50		34840-C3	37.10		34840-C4	47.20
	.187 (3/16)	.045	.285 (1.5x)	3/16	2			937945	28.20		937945-C3	34.70			
	.187 (3/16)	.045	.625 (3x)	3/16	2	46745		34845	28.20		34845-C3	34.70		34845-C4	44.90
	.187 (3/16)	.050	.285 (1.5x)	3/16	2			937950	30.50		937950-C3	37.10			
	.187 (3/16)	.050	.625 (3x)	3/16	2			34850	30.50		34850-C3	37.10		34850-C4	47.20
	.187 (3/16)	.060	.285 (1.5x)	3/16	2	810560	833260	937960	28.20	833260-C3	937960-C3	34.70			
	.187 (3/16)	.060	.625 (3x)	3/16	2	46760	831960	34860	28.20	831960-C3	34860-C3	34.70		34860-C4	46.60
	.203 (13/64)	.010	.610 (3x)	1/4	2-1/2			865610	35.20		865610-C3	43.90			
	.203 (13/64)	.030	.610 (3x)	1/4	2-1/2			865630	35.20		865630-C3	43.90			
	.203 (13/64)	.040	.610 (3x)	1/4	2-1/2			865640	35.90		865640-C3	44.00			
	.218 (7/32)	.010	.660 (3x)	1/4	2-1/2			863910	34.90		863910-C3	43.50			
	.218 (7/32)	.020	.660 (3x)	1/4	2-1/2			863920	35.40		863920-C3	43.50			
	.218 (7/32)	.030	.660 (3x)	1/4	2-1/2			863930	34.90		863930-C3	43.50			
	.218 (7/32)	.040	.660 (3x)	1/4	2-1/2			863940	34.90		863940-C3	43.50			
	.234 (15/64)	.010	.355 (1.5x)	1/4	2-1/2			734210	35.40		734210-C3	43.50			
	.234 (15/64)	.030	.355 (1.5x)	1/4	2-1/2			734230	35.20		734230-C3	43.30			
	.234 (15/64)	.010	.705 (3x)	1/4	2-1/2			863510	34.90		863510-C3	43.50			
	.234 (15/64)	.030	.705 (3x)	1/4	2-1/2			863530	34.90		863530-C3	43.50			
	.234 (15/64)	.040	.705 (3x)	1/4	2-1/2			863540	35.90		863540-C3	44.50			
	.250 (1/4)	.003	.750 (3x)	1/4	2-1/2			36203	37.70		36203-C3	46.30			
	.250 (1/4)	.005	.375 (1.5x)	1/4	2-1/2	810805	833005	941105	37.70	833005-C3	941105-C3	46.30			
	.250 (1/4)	.005	.750 (3x)	1/4	2-1/2	47405	831805	36205	37.70	831805-C3	36205-C3	46.30		36205-C4	59.10
	.250 (1/4)	.008	.375 (1.5x)	1/4	2-1/2			941108	37.70		941108-C3	46.30			
	.250 (1/4)	.008	.750 (3x)	1/4	2-1/2			36208	37.70		36208-C3	46.30			
	.250 (1/4)	.010	.375 (1.5x)	1/4	2-1/2	810810	833010	941110	34.90	833010-C3	941110-C3	43.50			
	.250 (1/4)	.010	.750 (3x)	1/4	2-1/2	47410	831810	36210	34.90	831810-C3	36210-C3	43.50	47410-C4	36210-C4	56.30
	.250 (1/4)	.012	.750 (3x)	1/4	2-1/2			36212	37.70		36212-C3	46.30			
	.250 (1/4)	.015	.375 (1.5x)	1/4	2-1/2		833015	941115	34.90	833015-C3	941115-C3	43.50			
	.250 (1/4)	.015	.750 (3x)	1/4	2-1/2	47415	831815	36215	34.90	831815-C3	36215-C3	43.50		36215-C4	56.30
	.250 (1/4)	.020	.375 (1.5x)	1/4	2-1/2			941120	34.90		941120-C3	43.50		941120-C4	56.30
	.250 (1/4)	.020	.750 (3x)	1/4	2-1/2	47420		36220	34.90		36220-C3	43.50		36220-C4	56.30
	.250 (1/4)	.025	.375 (1.5x)	1/4	2-1/2		833025	941125	37.70	833025-C3	941125-C3	46.30			
	.250 (1/4)	.025	.750 (3x)	1/4	2-1/2		831825	36225	37.70	831825-C3	36225-C3	45.80			
NEW	.250 (1/4)	.030	.200 (0.8x)	1/4	2-1/2			697416	37.00		697416-C3	45.00			
NEW	.250 (1/4)	.030	.375 (1.5x)	1/4	2-1/2	810830	833030	941130	34.90	833030-C3	941130-C3	43.50		941130-C4	56.30
	.250 (1/4)	.030	.750 (3x)	1/4	2-1/2	47430	831830	36230	34.90	831830-C3	36230-C3	43.50	47430-C4	36230-C4	56.30
	.250 (1/4)	.035	.750 (3x)	1/4	2-1/2			36235	37.70		36235-C3	45.80			
	.250 (1/4)	.040	.375 (1.5x)	1/4	2-1/2	810840	833040	941140	37.70	833040-C3	941140-C3	46.30			
	.250 (1/4)	.040	.750 (3x)	1/4	2-1/2	47440	831840	36240	37.70	831840-C3	36240-C3	46.30			
	.250 (1/4)	.045	.375 (1.5x)	1/4	2-1/2			941145	34.90		941145-C3	43.50			
	.250 (1/4)	.045	.750 (3x)	1/4	2-1/2	47445		36245	34.90		36245-C3	43.50		36245-C4	56.30
	.250 (1/4)	.050	.375 (1.5x)	1/4	2-1/2			941150	37.70		941150-C3	46.30			
	.250 (1/4)	.050	.750 (3x)	1/4	2-1/2	47450		36250	37.70		36250-C3	46.30		36250-C4	59.10
	.250 (1/4)	.060	.375 (1.5x)	1/4	2-1/2			941160	34.90		941160-C3	43.50			
	.250 (1/4)	.060	.750 (3x)	1/4	2-1/2	47460	831860	36260	34.90	831860-C3	36260-C3	43.50	47460-C4	36260-C4	56.30
	.250 (1/4)	.075	.375 (1.5x)	1/4	2-1/2			941175	37.70		941175-C3	46.30			
	.250 (1/4)	.075	.750 (3x)	1/4	2-1/2	47475		36275	37.70		36275-C3	46.30			

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NEW SIZES!

MINIATURE END MILLS

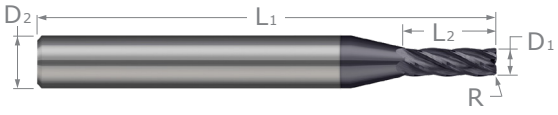
Corner Radius – Stub & Standard (cont.)

continued from previous page

CUTTER DIA.	CORNER RADIUS	LOC	SHANK DIA.	OAL	UNCOATED				AlTiN COATED			AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	3 FL	4 FL	USD$	3 FL	4 FL	USD$	2 FL	4 FL	USD$
.312 (5/16)	.005	1.000 (3x)	5/16	2-1/2			945105	42.10		945105-C3	52.40			
.312 (5/16)	.010	1.000 (3x)	5/16	2-1/2			945110	38.90		945110-C3	49.10			
.312 (5/16)	.020	1.000 (3x)	5/16	2-1/2			945120	38.90		945120-C3	48.60			
.312 (5/16)	.030	1.000 (3x)	5/16	2-1/2			945130	38.90		945130-C3	49.10			
.312 (5/16)	.040	1.000 (3x)	5/16	2-1/2			945140	38.90		945140-C3	49.10			
.312 (5/16)	.060	1.000 (3x)	5/16	2-1/2			945160	38.90		945160-C3	49.10			
.375 (3/8)	.005	.570 (1.5x)	3/8	2-1/2			915205	57.30		915205-C3	68.70			
.375 (3/8)	.005	1.000 (3x)	3/8	2-1/2	804305		72805	57.30		72805-C3	68.70		72805-C4	87.70
.375 (3/8)	.008	1.000 (3x)	3/8	2-1/2			72808	57.30		72808-C3	68.70			
.375 (3/8)	.010	.570 (1.5x)	3/8	2-1/2			915210	52.90		915210-C3	64.40			
.375 (3/8)	.010	1.000 (3x)	3/8	2-1/2			72810	52.90		72810-C3	64.40			
.375 (3/8)	.015	.570 (1.5x)	3/8	2-1/2			915215	53.60		915215-C3	65.00			
.375 (3/8)	.015	1.000 (3x)	3/8	2-1/2			72815	52.90		72815-C3	64.40			
.375 (3/8)	.020	.570 (1.5x)	3/8	2-1/2			915220	53.60		915220-C3	65.00			
.375 (3/8)	.020	1.000 (3x)	3/8	2-1/2	804320		72820	52.90		72820-C3	64.40		72820-C4	82.50
.375 (3/8)	.025	.570 (1.5x)	3/8	2-1/2			915225	53.20		915225-C3	64.70			
.375 (3/8)	.025	1.000 (3x)	3/8	2-1/2			72825	52.90		72825-C3	64.40			
.375 (3/8)	.030	.570 (1.5x)	3/8	2-1/2			915230	52.90		915230-C3	64.40		915230-C4	82.50
.375 (3/8)	.030	1.000 (3x)	3/8	2-1/2			72830	52.90		72830-C3	64.40		72830-C4	82.50
.375 (3/8)	.040	.570 (1.5x)	3/8	2-1/2			915240	57.30		915240-C3	68.70			
.375 (3/8)	.040	1.000 (3x)	3/8	2-1/2	804340	831740	72840	57.30	831740-C3	72840-C3	68.70		72840-C4	86.60
.375 (3/8)	.045	.570 (1.5x)	3/8	2-1/2			915245	53.20		915245-C3	64.70			
.375 (3/8)	.045	1.000 (3x)	3/8	2-1/2			72845	52.90		72845-C3	64.40			
.375 (3/8)	.050	.570 (1.5x)	3/8	2-1/2			915250	52.90		915250-C3	64.40			
.375 (3/8)	.050	1.000 (3x)	3/8	2-1/2			72850	52.90		72850-C3	64.40			
.375 (3/8)	.060	.570 (1.5x)	3/8	2-1/2			915260	53.60		915260-C3	65.00			
.375 (3/8)	.060	1.000 (3x)	3/8	2-1/2		831760	72860	52.90	831760-C3	72860-C3	64.40			
.375 (3/8)	.075	.570 (1.5x)	3/8	2-1/2			915275	53.60		915275-C3	65.00			
.375 (3/8)	.075	1.000 (3x)	3/8	2-1/2			72875	52.90		72875-C3	64.40			
.375 (3/8)	.090	1.000 (3x)	3/8	2-1/2			72890	52.90		72890-C3	64.40			
.375 (3/8)	.125	1.000 (3x)	3/8	2-1/2			72908	52.90		72908-C3	64.40			
.500 (1/2)	.005	1.000 (2x)	1/2	3			74505	82.10		74505-C3	97.70			
.500 (1/2)	.010	1.000 (2x)	1/2	3			74510	82.10		74510-C3	99.10			
.500 (1/2)	.015	1.000 (2x)	1/2	3			74515	82.10		74515-C3	99.10			
.500 (1/2)	.020	1.000 (2x)	1/2	3			74520	82.10		74520-C3	99.10		74520-C4	123.50
.500 (1/2)	.025	1.000 (2x)	1/2	3			74525	82.10		74525-C3	97.70			
.500 (1/2)	.030	1.000 (2x)	1/2	3	733930		74530	82.10		74530-C3	99.10		74530-C4	118.00
.500 (1/2)	.040	1.000 (2x)	1/2	3			74540	82.10		74540-C3	99.10			
.500 (1/2)	.045	1.000 (2x)	1/2	3			74545	82.80		74545-C3	99.80			
.500 (1/2)	.050	1.000 (2x)	1/2	3	733950		74550	82.10		74550-C3	99.10		74550-C4	123.50
.500 (1/2)	.060	1.000 (2x)	1/2	3			74560	82.10		74560-C3	99.10		74560-C4	118.00
.500 (1/2)	.075	1.000 (2x)	1/2	3			74575	82.10		74575-C3	97.70			
.500 (1/2)	.090	1.000 (2x)	1/2	3			74590	82.10		74590-C3	99.10			
.500 (1/2)	.125	1.000 (2x)	1/2	3			74608	82.10		74608-C3	97.70			

MINIATURE END MILLS

Corner Radius – Stub & Standard – 5 Flute



- Corner radius for improved strength
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.020 (.5 mm)	**.005**	.030 (1.5x)	1/8	1-1/2	720020	33.60	720020-C3	39.50
.020 (.5 mm)	**.005**	.060 (3x)	1/8	1-1/2	720120	35.40	720120-C3	41.30
.031 (1/32)	**.005**	.047 (1.5x)	1/8	1-1/2	720031	29.50	720031-C3	35.40
.031 (1/32)	**.005**	.093 (3x)	1/8	1-1/2	720131	31.90	720131-C3	37.80
.047 (3/64)	**.005**	.071 (1.5x)	1/8	1-1/2	720047	30.10	720047-C3	36.00
.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	720147	31.70	720147-C3	37.60
.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2	720062	31.00	720062-C3	37.00
.062 (1/16)	**.005**	.186 (3x)	1/8	1-1/2	720162	32.40	720162-C3	38.30
.078 (5/64)	**.005**	.118 (1.5x)	1/8	1-1/2	720078	31.00	720078-C3	37.00
.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	720178	32.40	720178-C3	38.30
.093 (3/32)	**.005**	.143 (1.5x)	1/8	1-1/2	720093	31.00	720093-C3	37.00
.093 (3/32)	**.005**	.285 (3x)	1/8	1-1/2	720193	32.40	720193-C3	38.30
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	5 FL	USD$	5 FL	USD$
.125 (1/8)	**.010**	.187 (1.5x)	1/8	1-1/2	719610	28.50	719610-C3	34.50
.125 (1/8)	**.010**	.375 (3x)	1/8	1-1/2	719910	29.80	719910-C3	35.70
.187 (3/16)	**.010**	.285 (1.5x)	3/16	2	719510	32.40	719510-C3	38.60
.187 (3/16)	**.010**	.570 (3x)	3/16	2	719810	33.90	719810-C3	40.20
.250 (1/4)	**.010**	.375 (1.5x)	1/4	2-1/2	719410	38.10	719410-C3	46.20
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	719710	39.80	719710-C3	47.90

NEW

MINIATURE END MILLS

Corner Radius – Stub & Standard – Metric



- All dimensions and tolerances in metric values
- Cutter diameter down to 1.00mm
- Corner radius for improved strength
- Center cutting • Solid carbide • CNC ground in the USA

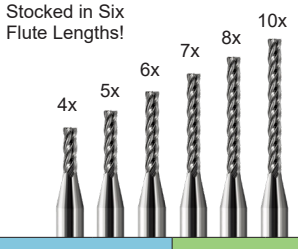
CORNER RADIUS

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 $^{+.00mm}_{-.02mm}$	R $^{+.025mm}_{-.025mm}$	L_2 $^{+.25mm}_{-.00mm}$	D_2	L_1	4 FL	USD$	4 FL	USD$	
1.00 mm	**.20 mm**	1.50 mm (1.5x)	3 mm	38 mm	740922	27.50	740922-C3	33.40	NEW
1.00 mm	**.20 mm**	3.00 mm (3x)	3 mm	38 mm	744122	27.50	744122-C3	33.40	NEW
1.50 mm	**.20 mm**	2.20 mm (1.5x)	3 mm	38 mm	740933	27.50	740933-C3	33.40	NEW
1.50 mm	**.20 mm**	4.50 mm (3x)	3 mm	38 mm	744133	27.50	744133-C3	33.40	NEW
2.00 mm	**.20 mm**	3.00 mm (1.5x)	3 mm	38 mm	740945	27.50	740945-C3	33.40	NEW
2.00 mm	**.20 mm**	6.00 mm (3x)	3 mm	38 mm	744145	27.50	744145-C3	33.40	NEW
3.00 mm	**.20 mm**	4.50 mm (1.5x)	3 mm	38 mm	740957	27.50	740957-C3	33.40	NEW
3.00 mm	**.20 mm**	9.00 mm (3x)	3 mm	38 mm	744157	27.50	744157-C3	33.40	NEW
D_1 $^{+.00mm}_{-.04mm}$	R $^{+.025mm}_{-.025mm}$	L_2 $^{+.75mm}_{-.00mm}$	D_2	L_1	4 FL	USD$	4 FL	USD$	
4.00 mm	**.50 mm**	6.00 mm (1.5x)	4 mm	50 mm	740661	28.20	740661-C3	34.20	NEW
4.00 mm	**.50 mm**	12.00 mm (3x)	4 mm	50 mm	742661	28.20	742661-C3	34.20	NEW
4.00 mm	**1.00 mm**	6.00 mm (1.5x)	4 mm	50 mm	740561	28.20	740561-C3	34.20	NEW
4.00 mm	**1.00 mm**	12.00 mm (3x)	4 mm	50 mm	742561	28.20	742561-C3	34.20	NEW
5.00 mm	**.50 mm**	7.50 mm (1.5x)	5 mm	50 mm	740664	28.20	740664-C3	34.20	NEW
5.00 mm	**.50 mm**	15.00 mm (3x)	5 mm	50 mm	742664	28.20	742664-C3	34.20	NEW
5.00 mm	**1.00 mm**	7.50 mm (1.5x)	5 mm	50 mm	740564	28.20	740564-C3	34.20	NEW
5.00 mm	**1.00 mm**	15.00 mm (3x)	5 mm	50 mm	742564	28.20	742564-C3	34.20	NEW
6.00 mm	**.50 mm**	9.00 mm (1.5x)	6 mm	50 mm	740666	34.90	740666-C3	40.90	NEW
6.00 mm	**.50 mm**	18.00 mm (3x)	6 mm	50 mm	742666	34.90	742666-C3	40.90	NEW
6.00 mm	**1.00 mm**	9.00 mm (1.5x)	6 mm	50 mm	740566	34.90	740566-C3	40.90	NEW
6.00 mm	**1.00 mm**	18.00 mm (3x)	6 mm	50 mm	742566	34.90	742566-C3	40.90	NEW
8.00 mm	**.50 mm**	12.00 mm (1.5x)	8 mm	63 mm	740670	38.90	740670-C3	44.90	NEW
8.00 mm	**.50 mm**	24.00 mm (3x)	8 mm	63 mm	742670	38.90	742670-C3	44.90	NEW
8.00 mm	**1.00 mm**	12.00 mm (1.5x)	8 mm	63 mm	740570	38.90	740570-C3	44.90	NEW
8.00 mm	**1.00 mm**	24.00 mm (3x)	8 mm	63 mm	742570	38.90	742570-C3	44.90	NEW
10.00 mm	**.50 mm**	15.00 mm (1.5x)	10 mm	75 mm	740673	52.90	740673-C3	58.90	NEW
10.00 mm	**.50 mm**	30.00 mm (3x)	10 mm	75 mm	742673	52.90	742673-C3	58.90	NEW
10.00 mm	**1.00 mm**	15.00 mm (1.5x)	10 mm	75 mm	740573	52.90	740573-C3	58.90	NEW
10.00 mm	**1.00 mm**	30.00 mm (3x)	10 mm	75 mm	742573	52.90	742573-C3	58.90	NEW
12.00 mm	**.50 mm**	18.00 mm (1.5x)	12 mm	75 mm	740676	82.10	740676-C3	88.10	NEW
12.00 mm	**.50 mm**	36.00 mm (3x)	12 mm	75 mm	742676	82.10	742676-C3	88.10	NEW
12.00 mm	**1.00 mm**	18.00 mm (1.5x)	12 mm	75 mm	740576	82.10	740576-C3	88.10	NEW
12.00 mm	**1.00 mm**	36.00 mm (3x)	12 mm	75 mm	742576	82.10	742576-C3	88.10	NEW

MINIATURE END MILLS

Corner Radius – Long Flute





- **Long flute and long shank design for deep cavities**
- Mills deep pockets • 4 flutes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$
.015 (1/64)	.003	.078 (5x)	4	1/8	2-1/2	981415	82.40	981415-C3	88.30		
.015 (1/64)	.003	.125 (8x)	4	1/8	2-1/2	933615	94.50	933615-C3	100.40		
.020 (.5 mm)	.003	.100 (5x)	4	1/8	2-1/2	981420	72.50	981420-C3	78.40		
.020 (.5 mm)	.003	.160 (8x)	4	1/8	2-1/2	933620	84.20	933620-C3	90.10		
.020 (.5 mm)	.005	.100 (5x)	4	1/8	2-1/2	959620	72.50	959620-C3	78.40		
.020 (.5 mm)	.005	.160 (8x)	4	1/8	2-1/2	949820	84.20	949820-C3	90.10		
.025	.005	.125 (5x)	4	1/8	2-1/2	959625	68.90	959625-C3	74.80		
.025	.005	.203 (8x)	4	1/8	2-1/2	949825	80.80	949825-C3	86.70		
.031 (1/32)	.005	.125 (4x)	4	1/8	2-1/2	787531	65.50	787531-C3	71.40		
.031 (1/32)	.005	.156 (5x)	4	1/8	2-1/2	959631	66.80	959631-C3	72.80		
.031 (1/32)	.005	.187 (6x)	4	1/8	2-1/2	801131	70.70	801131-C3	76.60		
.031 (1/32)	.005	.218 (7x)	4	1/8	2-1/2	800931	73.30	800931-C3	79.20		
.031 (1/32)	.005	.250 (8x)	4	1/8	2-1/2	949831	78.50	949831-C3	84.40		
.031 (1/32)	.008	.156 (5x)	4	1/8	2-1/2	884231	67.10	884231-C3	73.00		
.031 (1/32)	.008	.250 (8x)	4	1/8	2-1/2	887431	78.50	887431-C3	84.40		
.031 (1/32)	.010	.156 (5x)	4	1/8	2-1/2	964331	66.80	964331-C3	72.80		
.031 (1/32)	.010	.187 (6x)	4	1/8	2-1/2	739831	70.70	739831-C3	76.60		
.031 (1/32)	.010	.250 (8x)	4	1/8	2-1/2	938031	78.50	938031-C3	84.40		
.039 (1 mm)	.005	.203 (5x)	4	1/8	2-1/2	959639	63.50	959639-C3	69.40		
.039 (1 mm)	.005	.325 (8x)	4	1/8	2-1/2	949839	71.00	949839-C3	76.90		
.039 (1 mm)	.010	.203 (5x)	4	1/8	2-1/2	964339	63.50	964339-C3	69.40		
.039 (1 mm)	.010	.325 (8x)	4	1/8	2-1/2	938039	71.00	938039-C3	76.90		
.040	.005	.203 (5x)	4	1/8	2-1/2	959640	63.50	959640-C3	69.40		
.040	.005	.325 (8x)	4	1/8	2-1/2	949840	71.00	949840-C3	76.90		
.040	.010	.203 (5x)	4	1/8	2-1/2	964340	63.50	964340-C3	69.40		
.040	.010	.325 (8x)	4	1/8	2-1/2	938040	71.00	938040-C3	76.90		
.047 (3/64)	.005	.250 (5x)	4	1/8	2-1/2	959647	34.90	959647-C3	40.80		
.047 (3/64)	.005	.375 (8x)	4	1/8	2-1/2	949847	39.70	949847-C3	45.60		
.047 (3/64)	.010	.187 (4x)	4	1/8	2-1/2	787347	33.50	787347-C3	39.40		
.047 (3/64)	.010	.250 (5x)	4	1/8	2-1/2	964347	34.90	964347-C3	40.80		
.047 (3/64)	.010	.375 (8x)	4	1/8	2-1/2	938047	39.70	938047-C3	45.60		
.047 (3/64)	.015	.250 (5x)	4	1/8	2-1/2	885047	34.90	885047-C3	40.80		
.047 (3/64)	.015	.375 (8x)	4	1/8	2-1/2	888247	39.70	888247-C3	45.60		
.050	.005	.250 (5x)	4	1/8	2-1/2	959650	34.90	959650-C3	40.80		
.050	.005	.400 (8x)	4	1/8	2-1/2	949850	40.50	949850-C3	46.40		
.060	.005	.312 (5x)	4	1/8	2-1/2	959660	34.90	959660-C3	40.80		
.060	.005	.500 (8x)	4	1/8	2-1/2	949860	40.50	949860-C3	46.40		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$
.062 (1/16)	.005	.250 (4x)	4	1/8	2-1/2	787562	33.50	787562-C3	39.40		
.062 (1/16)	.005	.312 (5x)	4	1/8	2-1/2	959662	34.90	959662-C3	40.80		
.062 (1/16)	.005	.375 (6x)	4	1/8	2-1/2	801162	37.20	801162-C3	43.10		
.062 (1/16)	.005	.437 (7x)	4	1/8	2-1/2	800962	37.60	800962-C3	43.50		
.062 (1/16)	.005	.500 (8x)	4	1/8	2-1/2	949862	39.70	949862-C3	45.60		
.062 (1/16)	.005	.625 (10x)	4	1/8	2-1/2	870562	46.30	870562-C3	52.20		
.062 (1/16)	.008	.312 (5x)	4	1/8	2-1/2	884262	35.30	884262-C3	41.20		
.062 (1/16)	.008	.500 (8x)	4	1/8	2-1/2	887462	40.50	887462-C3	46.40		
.062 (1/16)	.010	.250 (4x)	4	1/8	2-1/2	787362	33.50	787362-C3	39.40		
.062 (1/16)	.010	.312 (5x)	4	1/8	2-1/2	964362	34.90	964362-C3	40.80	964362-C4	49.90
.062 (1/16)	.010	.375 (6x)	4	1/8	2-1/2	739862	37.20	739862-C3	43.10		
.062 (1/16)	.010	.500 (8x)	4	1/8	2-1/2	938062	39.70	938062-C3	45.60	938062-C4	55.40
.062 (1/16)	.010	.625 (10x)	4	1/8	2-1/2	849262	46.30	849262-C3	52.20		
.062 (1/16)	.015	.312 (5x)	4	1/8	2-1/2	885062	34.90	885062-C3	40.80		
.062 (1/16)	.015	.500 (8x)	4	1/8	2-1/2	888262	39.70	888262-C3	45.60		
.062 (1/16)	.020	.312 (5x)	4	1/8	2-1/2	885862	34.90	885862-C3	40.80	885862-C4	50.70
.062 (1/16)	.020	.375 (6x)	4	1/8	2-1/2	733762	37.20	733762-C3	43.10		
.062 (1/16)	.020	.500 (8x)	4	1/8	2-1/2	889062	39.70	889062-C3	45.60		
.062 (1/16)	.020	.625 (10x)	4	1/8	2-1/2	762662	46.30	762662-C3	52.20		
.078 (5/64)	.005	.406 (5x)	4	1/8	2-1/2	959678	34.90	959678-C3	40.80		
.078 (5/64)	.005	.625 (8x)	4	1/8	2-1/2	949878	39.70	949878-C3	45.60		
.078 (5/64)	.010	.312 (4x)	4	1/8	2-1/2	787378	33.50	787378-C3	39.40		
.078 (5/64)	.010	.406 (5x)	4	1/8	2-1/2	964378	34.90	964378-C3	40.80	964378-C4	50.70
.078 (5/64)	.010	.625 (8x)	4	1/8	2-1/2	938078	39.70	938078-C3	45.60		
.078 (5/64)	.015	.406 (5x)	4	1/8	2-1/2	885078	34.90	885078-C3	40.80		
.078 (5/64)	.015	.625 (8x)	4	1/8	2-1/2	888278	39.70	888278-C3	45.60		
.078 (5/64)	.020	.406 (5x)	4	1/8	2-1/2	885878	34.90	885878-C3	40.80		
.078 (5/64)	.020	.625 (8x)	4	1/8	2-1/2	889078	39.70	889078-C3	45.60		
.078 (5/64)	.025	.406 (5x)	4	1/8	2-1/2	719378	34.90	719378-C3	40.80		
.093 (3/32)	.005	.375 (4x)	4	1/8	2-1/2	787593	33.50	787593-C3	39.40		
.093 (3/32)	.005	.500 (5x)	4	1/8	2-1/2	959693	34.90	959693-C3	40.80		
.093 (3/32)	.005	.585 (6x)	4	1/8	2-1/2	801193	37.20	801193-C3	43.10		
.093 (3/32)	.005	.670 (7x)	4	1/8	2-1/2	800993	37.60	800993-C3	43.50		
.093 (3/32)	.005	.750 (8x)	4	1/8	2-1/2	949893	39.70	949893-C3	45.60		
.093 (3/32)	.005	.950 (10x)	4	1/8	2-1/2	870593	47.10	870593-C3	53.00		
.093 (3/32)	.008	.500 (5x)	4	1/8	2-1/2	884293	35.30	884293-C3	41.20		
.093 (3/32)	.008	.750 (8x)	4	1/8	2-1/2	887493	40.50	887493-C3	46.40		
.093 (3/32)	.010	.375 (4x)	4	1/8	2-1/2	787393	33.50	787393-C3	39.40		
.093 (3/32)	.010	.500 (5x)	4	1/8	2-1/2	964393	34.90	964393-C3	40.80	964393-C4	50.70
.093 (3/32)	.010	.750 (8x)	4	1/8	2-1/2	938093	39.70	938093-C3	45.60		
.093 (3/32)	.010	.950 (10x)	4	1/8	2-1/2	849293	46.30	849293-C3	52.20		
.093 (3/32)	.015	.500 (5x)	4	1/8	2-1/2	885093	34.90	885093-C3	40.80		
.093 (3/32)	.015	.750 (8x)	4	1/8	2-1/2	888293	39.70	888293-C3	45.60		
.093 (3/32)	.020	.500 (5x)	4	1/8	2-1/2	885893	34.90	885893-C3	40.80		
.093 (3/32)	.020	.750 (8x)	4	1/8	2-1/2	889093	39.70	889093-C3	45.60		

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MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	CORNER RADIUS R +.001″ −.001″	LENGTH OF CUT L_2 +.010″ −.000″	FLUTES	SHANK DIA. D_2	OAL L_1	UNCOATED 4 FL	UNCOATED USD$	AlTiN COATED 4 FL	AlTiN COATED USD$	AMORPHOUS DIAMOND 4 FL	AMORPHOUS DIAMOND USD$
.093 (3/32)	.020	.950 (10x)	4	1/8	2-1/2	762693	47.10	762693-C3	53.00		
.093 (3/32)	.025	.500 (5x)	4	1/8	2-1/2	719393	34.90	719393-C3	40.80		
.093 (3/32)	.030	.375 (4x)	4	1/8	2-1/2	719293	33.50	719293-C3	39.40		
.093 (3/32)	.030	.500 (5x)	4	1/8	2-1/2	886693	34.90	886693-C3	40.80		
.093 (3/32)	.030	.750 (8x)	4	1/8	2-1/2	889893	39.70	889893-C3	45.60		
.100	.005	.500 (5x)	4	1/8	2-1/2	959700	34.90	959700-C3	40.80		
.100	.010	.500 (5x)	4	1/8	2-1/2	964400	34.90	964400-C3	40.80		
.100	.010	.800 (8x)	4	1/8	2-1/2	938100	39.70	938100-C3	45.60		
.109 (7/64)	.005	.570 (5x)	4	1/8	2-1/2	912502	34.90	912502-C3	40.80		
.118 (3 mm)	.005	.625 (5x)	4	1/8	2-1/2	912505	34.90	912505-C3	40.80		
.118 (3 mm)	.005	.950 (8x)	4	1/8	2-1/2	905305	39.70	905305-C3	45.60		
.118 (3 mm)	.010	.625 (5x)	4	1/8	2-1/2	912605	34.90	912605-C3	40.80		
.118 (3 mm)	.010	.950 (8x)	4	1/8	2-1/2	905405	39.70	905405-C3	45.60		
NEW .118 (3 mm)	.020	.625 (5x)	4	1/8	2-1/2	885905	34.90	885905-C3	40.80		
NEW .118 (3 mm)	.020	.950 (8x)	4	1/8	2-1/2	889105	39.70	889105-C3	45.60		

D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	FLUTES	D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$
.125 (1/8)	.005	.625 (5x)	4	1/8	2-1/2	950905	33.00	950905-C3	38.90		
.125 (1/8)	.005	1.000 (8x)	4	1/8	2-1/2	981905	36.10	981905-C3	42.00		
.125 (1/8)	.010	.625 (5x)	4	1/8	2-1/2	950910	33.00	950910-C3	38.90	950910-C4	48.50
.125 (1/8)	.010	.750 (6x)	4	1/8	2-1/2	733810	34.60	733810-C3	40.50		
.125 (1/8)	.010	1.000 (8x)	4	1/8	2-1/2	981910	36.10	981910-C3	42.00		
.125 (1/8)	.010	1.250 (10x)	4	1/8	3	762210	42.40	762210-C3	48.30		
.125 (1/8)	.015	.625 (5x)	4	1/8	2-1/2	950915	33.00	950915-C3	38.90		
.125 (1/8)	.015	1.000 (8x)	4	1/8	2-1/2	981915	36.10	981915-C3	42.00		
.125 (1/8)	.020	.625 (5x)	4	1/8	2-1/2	950920	33.00	950920-C3	38.90		
.125 (1/8)	.020	1.000 (8x)	4	1/8	2-1/2	981920	36.10	981920-C3	42.00		
.125 (1/8)	.020	1.250 (10x)	4	1/8	3	762220	42.40	762220-C3	48.30		
.125 (1/8)	.025	.625 (5x)	4	1/8	2-1/2	950925	33.00	950925-C3	38.90		
.125 (1/8)	.030	.625 (5x)	4	1/8	2-1/2	950930	33.00	950930-C3	38.90	950930-C4	48.80
.125 (1/8)	.030	1.000 (8x)	4	1/8	2-1/2	981930	36.10	981930-C3	42.00		
.125 (1/8)	.030	1.250 (10x)	4	1/8	3	762230	42.40	762230-C3	48.30		
.125 (1/8)	.040	.625 (5x)	4	1/8	2-1/2	950940	33.00	950940-C3	38.90		
.125 (1/8)	.040	1.000 (8x)	4	1/8	2-1/2	981940	36.10	981940-C3	42.00		
.140 (9/64)	.010	.750 (5x)	4	3/16	3	793610	40.80	793610-C3	47.30		
.140 (9/64)	.015	.750 (5x)	4	3/16	3	793615	41.60	793615-C3	48.10		
.140 (9/64)	.030	.750 (5x)	4	3/16	3	793630	41.60	793630-C3	48.30		
.156 (5/32)	.010	.750 (5x)	4	3/16	3	830910	40.80	830910-C3	47.30		
.156 (5/32)	.010	1.250 (8x)	4	3/16	3	739710	41.90	739710-C3	48.40		
.156 (5/32)	.030	.750 (5x)	4	3/16	3	830930	40.80	830930-C3	47.30		
.156 (5/32)	.030	1.250 (8x)	4	3/16	3	738330	41.90	738330-C3	48.60		

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Flute (cont.)

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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$
.187 (3/16)	.005	1.000 (5x)	4	3/16	3	932405	38.80	932405-C3	45.50		
.187 (3/16)	.010	1.000 (5x)	4	3/16	3	932410	38.80	932410-C3	45.50		
.187 (3/16)	.010	1.500 (8x)	4	3/16	3	830810	40.00	830810-C3	46.30		
.187 (3/16)	.020	1.000 (5x)	4	3/16	3	932420	38.80	932420-C3	45.50		
.187 (3/16)	.020	1.500 (8x)	4	3/16	3	830820	40.00	830820-C3	46.30		
.187 (3/16)	.025	1.000 (5x)	4	3/16	3	932425	38.80	932425-C3	45.50		
.187 (3/16)	.030	1.000 (5x)	4	3/16	3	932430	38.80	932430-C3	45.50	932430-C4	59.50
.187 (3/16)	.030	1.500 (8x)	4	3/16	3	830830	40.00	830830-C3	46.30		
.187 (3/16)	.040	1.000 (5x)	4	3/16	3	932450	38.80	932450-C3	45.50		
.250 (1/4)	.005	1.250 (5x)	4	1/4	4	917105	43.50	917105-C3	52.10		
.250 (1/4)	.010	1.250 (5x)	4	1/4	4	917110	43.50	917110-C3	52.10		
.250 (1/4)	.020	1.250 (5x)	4	1/4	4	917120	43.50	917120-C3	52.10		
.250 (1/4)	.020	2.000 (8x)	4	1/4	4	763020	44.90	763020-C3	53.60		
.250 (1/4)	.025	1.250 (5x)	4	1/4	4	917125	43.50	917125-C3	52.10		
.250 (1/4)	.030	1.250 (5x)	4	1/4	4	917130	43.50	917130-C3	52.10	917130-C4	66.90
.250 (1/4)	.030	2.000 (8x)	4	1/4	4	763030	44.90	763030-C3	53.60		
.250 (1/4)	.040	1.250 (5x)	4	1/4	4	917140	43.50	917140-C3	52.10		
.375 (3/8)	.005	2.000 (5x)	4	3/8	4	800805	59.00	800805-C3	74.70		
.375 (3/8)	.010	2.000 (5x)	4	3/8	4	800810	59.00	800810-C3	74.70		
.375 (3/8)	.030	2.000 (5x)	4	3/8	4	800830	59.00	800830-C3	71.20		
.375 (3/8)	.040	2.000 (5x)	4	3/8	4	800840	59.00	800840-C3	74.70		

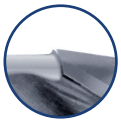
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MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute





Reduced Neck Diameter to Avoid Heeling

- Corner radius for improved strength
- Length of cut = 3x diameter
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
	D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	4 FL	USD$	4 FL	USD$
	.020	.005	.060	.100 (5x)	1/8	1-1/2		864120	54.00	864120-C3	59.90
	.020	.005	.060	.160 (8x)	1/8	1-1/2		865720	56.20	865720-C3	62.10
	.031 (1/32)	.005	.093	.156 (5x)	1/8	1-1/2	864131	875231	52.60	875231-C3	58.50
	.031 (1/32)	.005	.093	.250 (8x)	1/8	1-1/2	865731	876831	53.70	876831-C3	59.60
	.031 (1/32)	.010	.093	.156 (5x)	1/8	1-1/2	864931	876031	52.60	876031-C3	58.50
	.031 (1/32)	.010	.093	.250 (8x)	1/8	1-1/2	866531	877631	53.70	877631-C3	59.60
	.039 (1 mm)	.005	.117	.203 (5x)	1/8	1-1/2		875239	53.70	875239-C3	59.60
	.039 (1 mm)	.005	.117	.325 (8x)	1/8	1-1/2		865739	53.70	865739-C3	59.60
	.039 (1 mm)	.010	.117	.325 (8x)	1/8	1-1/2		876039	53.70	876039-C3	59.60
	.040	.005	.120	.203 (5x)	1/8	1-1/2		875240	53.70	875240-C3	59.60
	.040	.005	.120	.325 (8x)	1/8	1-1/2		865740	53.70	865740-C3	59.60
	.047 (3/64)	.005	.141	.250 (5x)	1/8	1-1/2	864147	875247	51.00	875247-C3	56.90
	.047 (3/64)	.005	.141	.375 (8x)	1/8	1-1/2	865747	876847	52.00	876847-C3	57.90
	.047 (3/64)	.010	.141	.250 (5x)	1/8	1-1/2	864947	876047	51.00	876047-C3	56.90
	.047 (3/64)	.010	.141	.281 (6x)	1/8	1-1/2		730647	51.00	730647-C3	56.90
	.047 (3/64)	.010	.141	.375 (8x)	1/8	1-1/2	866547	877647	52.00	877647-C3	57.90
	.047 (3/64)	.010	.141	.480 (10x)	1/8	1-1/2		730447	52.60	730447-C3	58.50
	.062 (1/16)	.005	.186	.312 (5x)	1/8	1-1/2	864162	875262	51.00	875262-C3	56.90
	.062 (1/16)	.005	.186	.500 (8x)	1/8	1-1/2	865762	876862	52.00	876862-C3	57.90
	.062 (1/16)	.010	.186	.312 (5x)	1/8	1-1/2	864962	876062	51.00	876062-C3	56.90
	.062 (1/16)	.010	.186	.375 (6x)	1/8	1-1/2		730662	51.00	730662-C3	56.90
	.062 (1/16)	.010	.186	.500 (8x)	1/8	1-1/2	866562	877662	52.00	877662-C3	57.90
	.062 (1/16)	.010	.186	.625 (10x)	1/8	2		730462	52.60	730462-C3	58.50
NEW	.062 (1/16)	.015	.186	.312 (5x)	1/8	1-1/2		697162	51.00	697162-C3	56.90
NEW	.062 (1/16)	.015	.186	.500 (8x)	1/8	1-1/2		696962	51.00	696962-C3	56.90
	.062 (1/16)	.020	.186	.312 (5x)	1/8	1-1/2		764362	51.00	764362-C3	56.90
	.062 (1/16)	.020	.186	.500 (8x)	1/8	1-1/2		759362	52.00	759362-C3	57.90
	.078 (5/64)	.005	.234	.406 (5x)	1/8	1-1/2	864178	875278	51.00	875278-C3	56.90
	.078 (5/64)	.005	.234	.625 (8x)	1/8	2	865778	876878	52.60	876878-C3	58.50
	.078 (5/64)	.010	.234	.406 (5x)	1/8	1-1/2	864978	876078	51.00	876078-C3	56.90
	.078 (5/64)	.010	.234	.475 (6x)	1/8	1-1/2		730678	51.00	730678-C3	56.90
	.078 (5/64)	.010	.234	.625 (8x)	1/8	2	866578	877678	52.60	877678-C3	58.50
	.078 (5/64)	.020	.234	.406 (5x)	1/8	1-1/2		764378	52.60	764378-C3	58.50
	.078 (5/64)	.020	.234	.625 (8x)	1/8	2		759378	52.60	759378-C3	58.50
	.093 (3/32)	.005	.279	.500 (5x)	1/8	1-1/2	864193	875293	52.00	875293-C3	57.90
	.093 (3/32)	.005	.279	.750 (8x)	1/8	2	865793	876893	52.60	876893-C3	58.50
	.093 (3/32)	.010	.279	.500 (5x)	1/8	1-1/2	864993	876093	52.00	876093-C3	57.90
	.093 (3/32)	.010	.279	.585 (6x)	1/8	1-1/2		730693	52.00	730693-C3	57.90

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NEW SIZES!

MINIATURE END MILLS

Corner Radius – Long Reach, Standard Flute (cont.)

continued from previous page

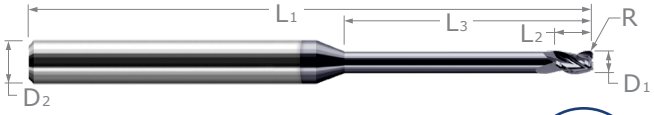
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	4 FL	USD$	4 FL	USD$
.093 (3/32)	.010	.279	.750 (8x)	1/8	2	866593	877693	52.60	877693-C3	58.50
.093 (3/32)	.010	.279	.950 (10x)	1/8	2		730493	52.60	730493-C3	58.50
.093 (3/32)	.020	.279	.500 (5x)	1/8	1-1/2		764393	52.00	764393-C3	57.90
.093 (3/32)	.020	.279	.750 (8x)	1/8	2		759393	52.60	759393-C3	58.50
.093 (3/32)	.030	.279	.500 (5x)	1/8	1-1/2		762793	52.00	762793-C3	57.90
.093 (3/32)	.030	.279	.750 (8x)	1/8	2		762093	52.60	762093-C3	58.50
.109 (7/64)	.010	.327	.900 (8x)	1/8	2		877702	52.60	877702-C3	58.50
.118 (3 mm)	.010	.354	.950 (8x)	1/8	2		866605	53.20	866605-C3	59.20

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	4 FL	USD$	4 FL	USD$
.125 (1/8)	.005	.375	.625 (5x)	1/8	1-1/2	864208	875308	52.00	875308-C3	57.90
.125 (1/8)	.005	.375	1.000 (8x)	1/8	2	865808	876908	52.00	876908-C3	57.90
.125 (1/8)	.010	.375	.625 (5x)	1/8	1-1/2	865008	876108	52.00	876108-C3	57.90
.125 (1/8)	.010	.375	.750 (6x)	1/8	2		730708	52.00	730708-C3	57.90
.125 (1/8)	.010	.375	1.000 (8x)	1/8	2	866608	877708	52.00	877708-C3	57.90
.125 (1/8)	.010	.375	1.250 (10x)	1/8	2-1/2		730508	53.00	730508-C3	59.00
.125 (1/8)	.020	.375	.625 (5x)	1/8	1-1/2		764408	53.00	764408-C3	59.00
.125 (1/8)	.020	.375	1.000 (8x)	1/8	2-1/2		759408	53.00	759408-C3	59.00
.125 (1/8)	.030	.375	.625 (5x)	1/8	1-1/2		762808	52.00	762808-C3	57.90
.125 (1/8)	.030	.375	1.000 (8x)	1/8	2-1/2		762108	52.00	762108-C3	57.90
.140 (9/64)	.010	.422	.750 (5x)	3/16	2		876109	60.70	876109-C3	67.00
.140 (9/64)	.010	.422	1.125 (8x)	3/16	2-1/2		877709	61.60	877709-C3	68.20
.156 (5/32)	.010	.469	.750 (5x)	3/16	2		876110	60.70	876110-C3	67.00
.156 (5/32)	.010	.469	1.250 (8x)	3/16	2-1/2		877710	61.60	877710-C3	68.20
.187 (3/16)	.010	.563	1.000 (5x)	3/16	2		876112	60.70	876112-C3	67.30
.187 (3/16)	.010	.563	1.500 (8x)	3/16	2-1/2		877712	60.70	877712-C3	67.40
.187 (3/16)	.030	.563	1.000 (5x)	3/16	2		762812	60.70	762812-C3	67.00
.250 (1/4)	.010	.750	1.250 (5x)	1/4	2-1/2		876116	68.40	876116-C3	77.10
.250 (1/4)	.010	.750	2.000 (8x)	1/4	4		877716	69.50	877716-C3	79.90
.250 (1/4)	.030	.750	1.250 (5x)	1/4	2-1/2		762816	68.40	762816-C3	76.50

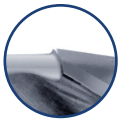
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MINIATURE END MILLS

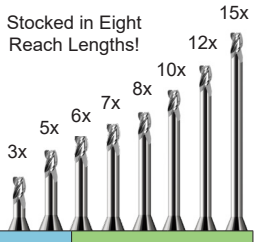
Corner Radius – Long Reach, Stub Flute



- **Long length design for deep cavities**
- Corner radius for improved strength
- Length of cut = 1½ x diameter
- Solid carbide • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling



CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.010	.003	.015	.050 (5x)	3	1/8	2-1/2	968210	65.40	968210-C3	71.30		
.010	.003	.015	.080 (8x)	3	1/8	2-1/2	972710	66.40	972710-C3	72.30		
.015 (1/64)	.003	.022	.078 (5x)	3	1/8	2-1/2	968215	58.40	968215-C3	64.40		
.015 (1/64)	.003	.022	.125 (8x)	3	1/8	2-1/2	972715	60.00	972715-C3	65.90		
.015 (1/64)	.003	.022	.125 (8x)	4	1/8	2-1/2	729615	60.00	729615-C3	65.90		
.015 (1/64)	.003	.022	.156 (10x)	3	1/8	2-1/2	719115	63.50	719115-C3	69.40		
.015 (1/64)	.005	.022	.078 (5x)	3	1/8	2-1/2	37115	58.60	37115-C3	64.60		
.015 (1/64)	.005	.022	.125 (8x)	3	1/8	2-1/2	38315	60.00	38315-C3	65.90		
.020 (.5 mm)	.003	.030	.100 (5x)	3	1/8	2-1/2	968220	56.60	968220-C3	62.50		
.020 (.5 mm)	.005	.030	.100 (5x)	3	1/8	2-1/2	37120	56.60	37120-C3	62.50		
.020 (.5 mm)	.005	.030	.160 (8x)	3	1/8	2-1/2	38320	58.10	38320-C3	64.00		
.020 (.5 mm)	.005	.030	.160 (8x)	4	1/8	2-1/2	729420	58.10	729420-C3	64.00		
.020 (.5 mm)	.005	.030	.200 (10x)	3	1/8	2-1/2	917820	61.80	917820-C3	67.70		
.025	.005	.037	.125 (5x)	3	1/8	2-1/2	37125	56.60	37125-C3	62.50		
.025	.005	.037	.125 (5x)	4	1/8	2-1/2	800525	56.60	800525-C3	62.50		
.025	.005	.037	.203 (8x)	3	1/8	2-1/2	38325	58.10	38325-C3	64.00	38325-C4	73.10
.025	.005	.037	.250 (10x)	3	1/8	2-1/2	917825	61.80	917825-C3	67.70		
.030	.005	.045	.156 (5x)	3	1/8	2-1/2	37130	48.60	37130-C3	54.50		
.030	.005	.045	.250 (8x)	3	1/8	2-1/2	38330	50.00	38330-C3	55.90		
.031 (1/32)	.003	.046	.156 (5x)	3	1/8	2-1/2	968231	48.60	968231-C3	54.50		
.031 (1/32)	.003	.046	.250 (8x)	3	1/8	2-1/2	972731	50.00	972731-C3	55.90		
.031 (1/32)	.005	.046	.156 (5x)	3	1/8	2-1/2	37131	48.60	37131-C3	54.50	37131-C4	63.70
.031 (1/32)	.005	.046	.156 (5x)	4	1/8	2-1/2	800531	52.20	800531-C3	58.10		
.031 (1/32)	.005	.046	.250 (8x)	3	1/8	2-1/2	38331	50.00	38331-C3	55.90	38331-C4	65.00
.031 (1/32)	.005	.046	.250 (8x)	4	1/8	2-1/2	800331	53.40	800331-C3	59.30		
.031 (1/32)	.005	.046	.312 (10x)	3	1/8	2-1/2	917831	53.60	917831-C3	59.50		
.031 (1/32)	.005	.046	.375 (12x)	3	1/8	2-1/2	39431	53.60	39431-C3	59.50	39431-C4	69.00
.031 (1/32)	.008	.046	.156 (5x)	3	1/8	2-1/2	912731	48.60	912731-C3	54.50		
.031 (1/32)	.008	.046	.250 (8x)	3	1/8	2-1/2	909331	50.00	909331-C3	55.90		
.031 (1/32)	.010	.046	.093 (3x)	3	1/8	2-1/2	925631	48.60	925631-C3	54.50		
.031 (1/32)	.010	.046	.156 (5x)	3	1/8	2-1/2	41531	48.60	41531-C3	54.50		
.031 (1/32)	.010	.046	.156 (5x)	4	1/8	2-1/2	730231	48.60	730231-C3	54.50		
.031 (1/32)	.010	.046	.250 (8x)	3	1/8	2-1/2	41731	50.00	41731-C3	55.90		
.031 (1/32)	.010	.046	.312 (10x)	3	1/8	2-1/2	953731	53.60	953731-C3	59.50		
.031 (1/32)	.010	.046	.375 (12x)	3	1/8	2-1/2	41931	53.60	41931-C3	59.50		
.031 (1/32)	.010	.046	.470 (15x)	3	1/8	2-1/2	947831	61.60	947831-C3	67.50		
.039 (1 mm)	.005	.059	.203 (5x)	3	1/8	2-1/2	37139	48.60	37139-C3	54.50		
.039 (1 mm)	.005	.059	.325 (8x)	3	1/8	2-1/2	38339	50.00	38339-C3	55.90		
.039 (1 mm)	.005	.059	.325 (8x)	4	1/8	2-1/2	729439	50.00	729439-C3	55.90		
.039 (1 mm)	.005	.059	.400 (10x)	3	1/8	2-1/2	917839	53.60	917839-C3	59.50		
.039 (1 mm)	.010	.059	.325 (8x)	3	1/8	2-1/2	41739	50.00	41739-C3	55.90		

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.040	.005	.060	.203 (5x)	3	1/8	2-1/2	37140	48.60	37140-C3	54.50		
.040	.005	.060	.325 (8x)	3	1/8	2-1/2	38340	50.00	38340-C3	55.90		
.040	.010	.060	.203 (5x)	3	1/8	2-1/2	41540	48.60	41540-C3	54.50		
.040	.010	.060	.325 (8x)	3	1/8	2-1/2	41740	50.00	41740-C3	55.90		
.047 (3/64)	.005	.070	.250 (5x)	3	1/8	2-1/2	37147	47.90	37147-C3	53.80	37147-C4	63.60
.047 (3/64)	.005	.070	.375 (8x)	3	1/8	2-1/2	38347	48.80	38347-C3	54.70	38347-C4	63.90
.047 (3/64)	.005	.070	.375 (8x)	4	1/8	2-1/2	729447	48.80	729447-C3	54.70		
.047 (3/64)	.005	.070	.480 (10x)	3	1/8	2-1/2	917847	52.30	917847-C3	58.20		
.047 (3/64)	.005	.070	.570 (12x)	3	1/8	2-1/2	39447	52.30	39447-C3	58.20	39447-C4	67.80
.047 (3/64)	.010	.070	.141 (3x)	3	1/8	2-1/2	925647	47.90	925647-C3	53.80		
.047 (3/64)	.010	.070	.250 (5x)	3	1/8	2-1/2	41547	47.90	41547-C3	53.80	41547-C4	62.70
.047 (3/64)	.010	.070	.375 (8x)	3	1/8	2-1/2	41747	48.80	41747-C3	54.70		
.047 (3/64)	.010	.070	.480 (10x)	3	1/8	2-1/2	953747	52.30	953747-C3	58.20		
.047 (3/64)	.010	.070	.570 (12x)	3	1/8	2-1/2	41947	51.60	41947-C3	57.50		
.047 (3/64)	.010	.070	.710 (15x)	3	1/8	2-1/2	947847	59.00	947847-C3	64.90		
.047 (3/64)	.015	.070	.250 (5x)	3	1/8	2-1/2	42747	47.90	42747-C3	53.80		
.047 (3/64)	.015	.070	.375 (8x)	3	1/8	2-1/2	42947	48.80	42947-C3	54.70		
.050	.005	.075	.250 (5x)	3	1/8	2-1/2	37150	47.90	37150-C3	53.80		
.050	.005	.075	.400 (8x)	3	1/8	2-1/2	38350	48.80	38350-C3	54.70		
.050	.010	.075	.250 (5x)	3	1/8	2-1/2	41550	47.90	41550-C3	53.80		
.050	.010	.075	.400 (8x)	3	1/8	2-1/2	41750	48.80	41750-C3	54.70		
.060	.005	.090	.312 (5x)	3	1/8	2-1/2	37160	47.90	37160-C3	53.80		
.060	.005	.090	.500 (8x)	3	1/8	2-1/2	38360	48.80	38360-C3	54.70		
.060	.010	.090	.312 (5x)	3	1/8	2-1/2	41560	47.90	41560-C3	53.80		
.060	.010	.090	.500 (8x)	3	1/8	2-1/2	41760	48.80	41760-C3	54.70		
.060	.015	.090	.500 (8x)	3	1/8	2-1/2	42960	48.80	42960-C3	54.70		
.060	.020	.090	.500 (8x)	3	1/8	2-1/2	970160	48.80	970160-C3	54.70		
.062 (1/16)	.003	.093	.312 (5x)	3	1/8	2-1/2	968262	47.90	968262-C3	53.80		
.062 (1/16)	.003	.093	.500 (8x)	3	1/8	2-1/2	972762	48.80	972762-C3	54.70		
.062 (1/16)	.005	.093	.312 (5x)	3	1/8	2-1/2	37162	47.90	37162-C3	53.80	37162-C4	63.60
.062 (1/16)	.005	.093	.312 (5x)	4	1/8	2-1/2	800562	51.20	800562-C3	57.10		
.062 (1/16)	.005	.093	.500 (8x)	3	1/8	2-1/2	38362	48.80	38362-C3	54.70	38362-C4	63.90
.062 (1/16)	.005	.093	.500 (8x)	4	1/8	2-1/2	800362	52.40	800362-C3	58.30		
.062 (1/16)	.005	.093	.625 (10x)	3	1/8	2-1/2	917862	52.30	917862-C3	58.20		
.062 (1/16)	.005	.093	.750 (12x)	3	1/8	2-1/2	39462	52.30	39462-C3	58.20		
.062 (1/16)	.005	.093	.750 (12x)	4	1/8	2-1/2	706362	52.30	706362-C3	58.20		
.062 (1/16)	.005	.093	.950 (15x)	3	1/8	2-1/2	727662	59.00	727662-C3	64.90		
.062 (1/16)	.008	.093	.312 (5x)	3	1/8	2-1/2	912762	47.90	912762-C3	53.80		
.062 (1/16)	.008	.093	.500 (8x)	3	1/8	2-1/2	909362	48.80	909362-C3	54.70		
.062 (1/16)	.010	.093	.187 (3x)	3	1/8	2-1/2	925662	47.90	925662-C3	53.80		
.062 (1/16)	.010	.093	.312 (5x)	3	1/8	2-1/2	41562	47.90	41562-C3	53.80	41562-C4	62.70
.062 (1/16)	.010	.093	.312 (5x)	4	1/8	2-1/2	730262	47.90	730262-C3	53.80		
.062 (1/16)	.010	.093	.375 (6x)	3	1/8	2-1/2	768462	47.90	768462-C3	53.80		
.062 (1/16)	.010	.093	.437 (7x)	3	1/8	2-1/2	766862	48.80	766862-C3	54.70		
.062 (1/16)	.010	.093	.500 (8x)	3	1/8	2-1/2	41762	48.80	41762-C3	54.70	41762-C4	63.90
.062 (1/16)	.010	.093	.500 (8x)	4	1/8	2-1/2	729862	48.80	729862-C3	54.70		
.062 (1/16)	.010	.093	.625 (10x)	3	1/8	2-1/2	953762	52.30	953762-C3	58.20		
.062 (1/16)	.010	.093	.750 (12x)	3	1/8	2-1/2	41962	52.30	41962-C3	58.20	41962-C4	67.80

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.062 (1/16)	.010	.093	.950 (15x)	3	1/8	2-1/2	947862	59.00	947862-C3	64.90		
.062 (1/16)	.012	.093	.312 (5x)	3	1/8	2-1/2	901962	47.90	901962-C3	53.80		
.062 (1/16)	.012	.093	.500 (8x)	3	1/8	2-1/2	913562	48.80	913562-C3	54.70		
.062 (1/16)	.015	.093	.312 (5x)	3	1/8	2-1/2	42762	47.90	42762-C3	53.80	42762-C4	63.60
.062 (1/16)	.015	.093	.500 (8x)	3	1/8	2-1/2	42962	48.80	42962-C3	54.70	42962-C4	64.60
.062 (1/16)	.015	.093	.625 (10x)	3	1/8	2-1/2	965662	52.30	965662-C3	58.20		
.062 (1/16)	.015	.093	.750 (12x)	3	1/8	2-1/2	43162	52.30	43162-C3	58.20		
.062 (1/16)	.020	.093	.312 (5x)	3	1/8	2-1/2	953562	47.90	953562-C3	53.80	953562-C4	63.60
.062 (1/16)	.020	.093	.312 (5x)	4	1/8	2-1/2	730062	47.90	730062-C3	53.80		
.062 (1/16)	.020	.093	.500 (8x)	3	1/8	2-1/2	970162	48.80	970162-C3	54.70	970162-C4	63.90
.062 (1/16)	.020	.093	.625 (10x)	3	1/8	2-1/2	923262	52.30	923262-C3	58.20		
.062 (1/16)	.020	.093	.750 (12x)	3	1/8	2-1/2	872662	52.30	872662-C3	58.20		
.070	.005	.105	.375 (5x)	3	1/8	2-1/2	37170	47.90	37170-C3	53.80		
.070	.005	.105	.570 (8x)	3	1/8	2-1/2	38370	48.80	38370-C3	54.70		
.070	.010	.105	.375 (5x)	3	1/8	2-1/2	41570	47.90	41570-C3	53.80		
.070	.010	.105	.570 (8x)	3	1/8	2-1/2	41770	48.80	41770-C3	54.70		
.078 (5/64)	.005	.117	.406 (5x)	3	1/8	2-1/2	37178	47.90	37178-C3	53.80		
.078 (5/64)	.005	.117	.406 (5x)	4	1/8	2-1/2	800578	47.90	800578-C3	53.80		
.078 (5/64)	.005	.117	.475 (6x)	3	1/8	2-1/2	729278	47.90	729278-C3	53.80		
.078 (5/64)	.005	.117	.550 (7x)	3	1/8	2-1/2	729078	48.80	729078-C3	54.70		
.078 (5/64)	.005	.117	.625 (8x)	3	1/8	2-1/2	38378	48.80	38378-C3	54.70		
.078 (5/64)	.005	.117	.800 (10x)	3	1/8	2-1/2	917878	52.30	917878-C3	58.20		
.078 (5/64)	.005	.117	.940 (12x)	3	1/8	2-1/2	39478	52.30	39478-C3	58.20		
.078 (5/64)	.010	.117	.406 (5x)	3	1/8	2-1/2	41578	47.90	41578-C3	53.80	41578-C4	62.70
.078 (5/64)	.010	.117	.406 (5x)	4	1/8	2-1/2	730278	47.90	730278-C3	53.80		
.078 (5/64)	.010	.117	.475 (6x)	3	1/8	2-1/2	768478	47.90	768478-C3	53.80		
.078 (5/64)	.010	.117	.550 (7x)	3	1/8	2-1/2	766878	48.80	766878-C3	54.70		
.078 (5/64)	.010	.117	.625 (8x)	3	1/8	2-1/2	41778	48.80	41778-C3	54.70	41778-C4	63.90
.078 (5/64)	.010	.117	.800 (10x)	3	1/8	2-1/2	953778	52.30	953778-C3	58.20		
.078 (5/64)	.010	.117	.940 (12x)	3	1/8	2-1/2	41978	52.30	41978-C3	58.20	41978-C4	67.80
.078 (5/64)	.015	.117	.234 (3x)	3	1/8	2-1/2	944978	47.90	944978-C3	53.80		
.078 (5/64)	.015	.117	.406 (5x)	3	1/8	2-1/2	42778	47.90	42778-C3	53.80		
.078 (5/64)	.015	.117	.625 (8x)	3	1/8	2-1/2	42978	48.80	42978-C3	54.70		
.078 (5/64)	.015	.117	.800 (10x)	3	1/8	2-1/2	965678	52.30	965678-C3	58.20		
.078 (5/64)	.015	.117	.940 (12x)	3	1/8	2-1/2	43178	52.80	43178-C3	58.80		
.078 (5/64)	.015	.117	1.187 (15x)	3	1/8	2-1/2	939378	59.00	939378-C3	64.90		
.078 (5/64)	.020	.117	.406 (5x)	3	1/8	2-1/2	953578	47.90	953578-C3	53.80		
.078 (5/64)	.020	.117	.625 (8x)	3	1/8	2-1/2	970178	48.80	970178-C3	54.70		
.078 (5/64)	.020	.117	.800 (10x)	3	1/8	2-1/2	923278	52.30	923278-C3	58.20		
.080	.005	.120	.406 (5x)	3	1/8	2-1/2	37180	47.90	37180-C3	53.80		
.080	.005	.120	.650 (8x)	3	1/8	2-1/2	38380	48.80	38380-C3	54.70		
.080	.010	.120	.406 (5x)	3	1/8	2-1/2	41580	47.90	41580-C3	53.80		
.080	.010	.120	.650 (8x)	3	1/8	2-1/2	41780	48.80	41780-C3	54.70		
.090	.005	.135	.450 (5x)	3	1/8	2-1/2	37190	47.90	37190-C3	53.80		
.090	.005	.135	.750 (8x)	3	1/8	2-1/2	38390	48.80	38390-C3	54.70		
.090	.010	.135	.450 (5x)	3	1/8	2-1/2	41590	47.90	41590-C3	53.80		
.090	.010	.135	.750 (8x)	3	1/8	2-1/2	41790	48.80	41790-C3	54.70		

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Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.093 (3/32)	.003	.139	.500 (5x)	3	1/8	2-1/2	968293	47.90	968293-C3	53.80		
.093 (3/32)	.003	.139	.750 (8x)	3	1/8	2-1/2	972793	49.80	972793-C3	55.70		
.093 (3/32)	.005	.139	.500 (5x)	3	1/8	2-1/2	37193	47.90	37193-C3	53.80	37193-C4	62.70
.093 (3/32)	.005	.139	.500 (5x)	4	1/8	2-1/2	800593	51.20	800593-C3	57.10		
.093 (3/32)	.005	.139	.750 (8x)	3	1/8	2-1/2	38393	48.80	38393-C3	54.70		
.093 (3/32)	.005	.139	.750 (8x)	4	1/8	2-1/2	800393	52.40	800393-C3	58.30		
.093 (3/32)	.005	.139	.950 (10x)	3	1/8	2-1/2	917893	52.30	917893-C3	58.20		
.093 (3/32)	.005	.139	1.125 (12x)	3	1/8	2-1/2	39493	52.30	39493-C3	58.20		
.093 (3/32)	.008	.139	.500 (5x)	3	1/8	2-1/2	912793	47.90	912793-C3	53.80		
.093 (3/32)	.008	.139	.750 (8x)	3	1/8	2-1/2	909393	48.60	909393-C3	54.50		
.093 (3/32)	.010	.139	.500 (5x)	3	1/8	2-1/2	41593	47.90	41593-C3	53.80	41593-C4	62.70
.093 (3/32)	.010	.139	.750 (8x)	3	1/8	2-1/2	41793	48.80	41793-C3	54.70		
.093 (3/32)	.010	.139	.950 (10x)	3	1/8	2-1/2	953793	52.30	953793-C3	58.20		
.093 (3/32)	.010	.139	1.125 (12x)	3	1/8	2-1/2	41993	52.30	41993-C3	58.20		
.093 (3/32)	.012	.139	.500 (5x)	3	1/8	2-1/2	901993	48.70	901993-C3	54.60		
.093 (3/32)	.012	.139	.750 (8x)	3	1/8	2-1/2	913593	49.80	913593-C3	55.70		
.093 (3/32)	.015	.139	.279 (3x)	3	1/8	2-1/2	944993	47.90	944993-C3	53.80		
.093 (3/32)	.015	.139	.500 (5x)	3	1/8	2-1/2	42793	47.90	42793-C3	53.80	42793-C4	62.70
.093 (3/32)	.015	.139	.500 (5x)	4	1/8	2-1/2	728893	47.90	728893-C3	53.80		
.093 (3/32)	.015	.139	.585 (6x)	3	1/8	2-1/2	765893	47.90	765893-C3	53.80		
.093 (3/32)	.015	.139	.670 (7x)	3	1/8	2-1/2	766093	48.80	766093-C3	54.70		
.093 (3/32)	.015	.139	.750 (8x)	3	1/8	2-1/2	42993	48.80	42993-C3	54.70	42993-C4	63.90
.093 (3/32)	.015	.139	.950 (10x)	3	1/8	2-1/2	965693	52.30	965693-C3	58.20		
.093 (3/32)	.015	.139	1.125 (12x)	3	1/8	2-1/2	43193	52.30	43193-C3	58.20	43193-C4	68.10
.093 (3/32)	.015	.139	1.400 (15x)	3	1/8	3	939393	59.00	939393-C3	64.90		
.093 (3/32)	.020	.139	.500 (5x)	3	1/8	2-1/2	953593	47.90	953593-C3	53.80		
.093 (3/32)	.020	.139	.500 (5x)	4	1/8	2-1/2	730093	47.90	730093-C3	53.80		
.093 (3/32)	.020	.139	.585 (6x)	3	1/8	2-1/2	728493	47.90	728493-C3	53.80		
.093 (3/32)	.020	.139	.670 (7x)	3	1/8	2-1/2	728293	48.80	728293-C3	54.70		
.093 (3/32)	.020	.139	.750 (8x)	3	1/8	2-1/2	970193	48.80	970193-C3	54.70		
.093 (3/32)	.020	.139	.750 (8x)	4	1/8	2-1/2	706593	48.80	706593-C3	54.70		
.093 (3/32)	.020	.139	.950 (10x)	3	1/8	2-1/2	923293	52.30	923293-C3	58.20		
.093 (3/32)	.030	.139	.500 (5x)	3	1/8	2-1/2	42193	47.90	42193-C3	53.80	42193-C4	62.70
.093 (3/32)	.030	.139	.750 (8x)	3	1/8	2-1/2	42393	48.80	42393-C3	54.70		
.093 (3/32)	.030	.139	.950 (10x)	3	1/8	2-1/2	921493	52.30	921493-C3	58.20		
.100	.005	.150	.500 (5x)	3	1/8	2-1/2	37200	47.90	37200-C3	53.80		
.100	.005	.150	.800 (8x)	3	1/8	2-1/2	38400	48.80	38400-C3	54.70		
.100	.010	.150	.500 (5x)	3	1/8	2-1/2	41600	47.90	41600-C3	53.80		
.100	.010	.150	.800 (8x)	3	1/8	2-1/2	41800	48.80	41800-C3	54.70		
.109 (7/64)	.005	.163	.570 (5x)	3	1/8	2-1/2	37202	47.90	37202-C3	53.80		
.109 (7/64)	.005	.163	.900 (8x)	3	1/8	2-1/2	38402	48.80	38402-C3	54.70		
.109 (7/64)	.010	.163	.570 (5x)	3	1/8	2-1/2	41602	47.90	41602-C3	53.80		
.109 (7/64)	.010	.163	.900 (8x)	3	1/8	2-1/2	41802	48.80	41802-C3	54.70		
.118 (3 mm)	.005	.177	.950 (8x)	3	1/8	2-1/2	38405	48.80	38405-C3	54.70		
.118 (3 mm)	.010	.177	.950 (8x)	3	1/8	2-1/2	41805	48.80	41805-C3	54.70		
.118 (3 mm)	.030	.177	.950 (8x)	3	1/8	2-1/2	42405	48.80	42405-C3	54.70		

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MINIATURE END MILLS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.005	.187	.625 (5x)	3	1/8	2-1/2	37208	47.90	37208-C3	53.80	37208-C4	62.70
.125 (1/8)	.005	.187	1.000 (8x)	3	1/8	2-1/2	38408	48.80	38408-C3	54.70		
.125 (1/8)	.005	.187	1.250 (10x)	3	1/8	2-1/2	917908	54.30	917908-C3	60.20		
.125 (1/8)	.005	.187	1.500 (12x)	3	1/8	3	39508	52.60	39508-C3	58.50		
.125 (1/8)	.008	.187	.625 (5x)	3	1/8	2-1/2	912808	47.90	912808-C3	53.80		
.125 (1/8)	.008	.187	1.000 (8x)	3	1/8	2-1/2	909408	48.60	909408-C3	54.50		
.125 (1/8)	.010	.187	.375 (3x)	3	1/8	2-1/2	925708	47.90	925708-C3	53.80		
.125 (1/8)	.010	.187	.625 (5x)	3	1/8	2-1/2	41608	47.90	41608-C3	53.80	41608-C4	62.70
.125 (1/8)	.010	.187	.625 (5x)	4	1/8	2-1/2	800208	52.70	800208-C3	58.60		
.125 (1/8)	.010	.187	.750 (6x)	3	1/8	2-1/2	768508	47.90	768508-C3	53.80		
.125 (1/8)	.010	.187	.875 (7x)	3	1/8	2-1/2	766908	48.80	766908-C3	54.70		
.125 (1/8)	.010	.187	1.000 (8x)	3	1/8	2-1/2	41808	48.80	41808-C3	54.70		
.125 (1/8)	.010	.187	1.000 (8x)	4	1/8	2-1/2	800008	53.90	800008-C3	59.80		
.125 (1/8)	.010	.187	1.250 (10x)	3	1/8	2-1/2	953808	52.40	953808-C3	58.30		
.125 (1/8)	.010	.187	1.500 (12x)	3	1/8	3	42008	52.60	42008-C3	58.50		
.125 (1/8)	.010	.187	1.875 (15x)	3	1/8	3	947908	59.60	947908-C3	65.50		
.125 (1/8)	.015	.187	.625 (5x)	3	1/8	2-1/2	42808	47.90	42808-C3	53.80	42808-C4	62.70
.125 (1/8)	.015	.187	1.000 (8x)	3	1/8	2-1/2	43008	48.80	43008-C3	54.70	43008-C4	63.90
.125 (1/8)	.015	.187	1.250 (10x)	3	1/8	2-1/2	965708	52.40	965708-C3	58.30		
.125 (1/8)	.015	.187	1.500 (12x)	3	1/8	3	43208	52.60	43208-C3	58.50	43208-C4	67.60
.125 (1/8)	.015	.187	1.875 (15x)	3	1/8	3	939408	59.40	939408-C3	65.30		
.125 (1/8)	.020	.187	.625 (5x)	3	1/8	2-1/2	953608	47.90	953608-C3	53.80	953608-C4	63.60
.125 (1/8)	.020	.187	1.000 (8x)	3	1/8	2-1/2	970208	48.80	970208-C3	54.70		
.125 (1/8)	.020	.187	1.250 (10x)	3	1/8	2-1/2	923308	52.40	923308-C3	58.30		
.125 (1/8)	.025	.187	.625 (5x)	3	1/8	2-1/2	839908	47.90	839908-C3	53.80		
.125 (1/8)	.025	.187	1.000 (8x)	3	1/8	2-1/2	840208	48.60	840208-C3	54.50		
.125 (1/8)	.030	.187	.375 (3x)	3	1/8	2-1/2	827108	47.90	827108-C3	53.80		
.125 (1/8)	.030	.187	.625 (5x)	3	1/8	2-1/2	42208	47.90	42208-C3	53.80	42208-C4	63.60
.125 (1/8)	.030	.187	.625 (5x)	4	1/8	2-1/2	728108	47.90	728108-C3	53.80		
.125 (1/8)	.030	.187	1.000 (8x)	3	1/8	2-1/2	42408	48.80	42408-C3	54.70	42408-C4	64.60
.125 (1/8)	.030	.187	1.250 (10x)	3	1/8	2-1/2	921508	52.60	921508-C3	58.50		
.125 (1/8)	.030	.187	1.500 (12x)	3	1/8	3	42608	52.60	42608-C3	58.50		
.125 (1/8)	.030	.187	1.875 (15x)	3	1/8	3	919708	59.40	919708-C3	65.30		
.125 (1/8)	.040	.187	.625 (5x)	3	1/8	2-1/2	930208	47.90	930208-C3	53.80		
.125 (1/8)	.040	.187	1.000 (8x)	3	1/8	2-1/2	924308	48.60	924308-C3	54.50		
.140 (9/64)	.010	.220	.750 (5x)	3	3/16	3	41609	47.90	41609-C3	54.30		
.140 (9/64)	.010	.220	1.125 (8x)	3	3/16	3	41809	48.80	41809-C3	55.40		
.140 (9/64)	.015	.220	.750 (5x)	3	3/16	3	42809	47.90	42809-C3	54.30		
.140 (9/64)	.015	.220	1.125 (8x)	3	3/16	3	43009	49.80	43009-C3	56.20		
.140 (9/64)	.030	.220	.750 (5x)	3	3/16	3	42209	47.90	42209-C3	54.50		
.140 (9/64)	.030	.220	1.125 (8x)	3	3/16	3	42409	49.80	42409-C3	56.50		
.156 (5/32)	.010	.234	.750 (5x)	3	3/16	3	41610	52.60	41610-C3	59.10		
.156 (5/32)	.010	.234	.750 (5x)	4	3/16	3	800210	52.60	800210-C3	59.30		
.156 (5/32)	.010	.234	1.250 (8x)	3	3/16	3	41810	53.70	41810-C3	60.30		
.156 (5/32)	.010	.234	1.570 (10x)	3	3/16	3	953810	57.00	953810-C3	63.60		
.156 (5/32)	.015	.234	.750 (5x)	3	3/16	3	42810	52.60	42810-C3	59.10		
.156 (5/32)	.015	.234	1.250 (8x)	3	3/16	3	43010	53.70	43010-C3	60.30		
.156 (5/32)	.015	.234	1.570 (10x)	3	3/16	3	965710	57.00	965710-C3	63.60		
.156 (5/32)	.020	.234	.750 (5x)	3	3/16	3	953610	52.60	953610-C3	59.10		

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MINIATURE END MILLS

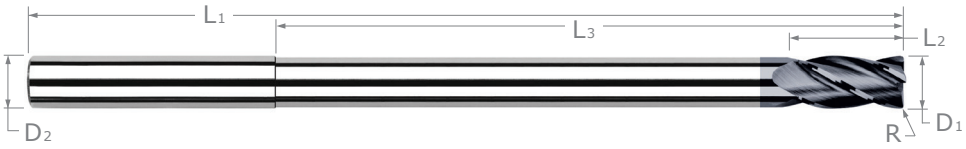
Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIA.	CORNER RADIUS	LOC	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.156 (5/32)	.020	.234	1.250 (8x)	3	3/16	3	970210	53.70	970210-C3	60.30		
.156 (5/32)	.030	.234	.750 (5x)	3	3/16	3	42210	52.60	42210-C3	59.10		
.156 (5/32)	.030	.234	1.250 (8x)	3	3/16	3	42410	53.70	42410-C3	60.30		
.156 (5/32)	.030	.234	1.570 (10x)	3	3/16	3	921510	57.00	921510-C3	63.60		
.187 (3/16)	.005	.281	1.000 (5x)	3	3/16	3	37212	52.60	37212-C3	59.10		
.187 (3/16)	.010	.281	1.000 (5x)	3	3/16	3	41612	52.60	41612-C3	59.10		
.187 (3/16)	.010	.281	1.500 (8x)	3	3/16	3	41812	53.70	41812-C3	60.30		
.187 (3/16)	.015	.281	1.000 (5x)	3	3/16	3	42812	52.60	42812-C3	59.10	42812-C4	73.30
.187 (3/16)	.015	.281	1.000 (5x)	4	3/16	3	728912	52.60	728912-C3	59.30		
.187 (3/16)	.015	.281	1.500 (8x)	3	3/16	3	43012	53.70	43012-C3	60.30	43012-C4	74.30
.187 (3/16)	.015	.281	1.875 (10x)	3	3/16	4	965712	57.00	965712-C3	65.80		
.187 (3/16)	.015	.281	2.250 (12x)	3	3/16	4	43212	57.20	43212-C3	66.00	43212-C4	79.30
.187 (3/16)	.020	.281	1.000 (5x)	3	3/16	3	953612	52.60	953612-C3	59.10		
.187 (3/16)	.020	.281	1.500 (8x)	3	3/16	3	970212	53.70	970212-C3	60.30		
.187 (3/16)	.030	.281	1.000 (5x)	3	3/16	3	42212	52.60	42212-C3	59.10	42212-C4	70.50
.187 (3/16)	.030	.281	1.156 (6x)	3	3/16	3	766512	53.70	766512-C3	60.30		
.187 (3/16)	.030	.281	1.312 (7x)	3	3/16	3	765712	53.70	765712-C3	60.30		
.187 (3/16)	.030	.281	1.500 (8x)	3	3/16	3	42412	53.70	42412-C3	60.30	42412-C4	71.50
.187 (3/16)	.030	.281	1.875 (10x)	3	3/16	4	921512	57.20	921512-C3	66.00		
.187 (3/16)	.030	.281	2.250 (12x)	3	3/16	4	42612	57.20	42612-C3	66.00		
.187 (3/16)	.045	.281	1.000 (5x)	3	3/16	3	978812	52.60	978812-C3	59.10		
.187 (3/16)	.045	.281	1.500 (8x)	3	3/16	3	961812	53.70	961812-C3	60.30		
.187 (3/16)	.060	.281	1.000 (5x)	3	3/16	3	949112	52.60	949112-C3	59.10		
.187 (3/16)	.060	.281	1.500 (8x)	3	3/16	3	866012	53.40	866012-C3	60.00		
.187 (3/16)	.060	.281	1.875 (10x)	3	3/16	4	727912	57.20	727912-C3	64.40		
.250 (1/4)	.005	.375	1.250 (5x)	3	1/4	4	37216	58.10	37216-C3	65.30		
.250 (1/4)	.005	.375	2.000 (8x)	3	1/4	4	38416	59.60	38416-C3	68.20		
.250 (1/4)	.010	.375	1.250 (5x)	3	1/4	4	41616	58.10	41616-C3	68.40		
.250 (1/4)	.010	.375	2.000 (8x)	3	1/4	4	41816	59.60	41816-C3	69.90		
.250 (1/4)	.015	.375	1.250 (5x)	3	1/4	4	42816	58.10	42816-C3	68.40		
.250 (1/4)	.015	.375	2.000 (8x)	3	1/4	4	43016	59.60	43016-C3	69.90		
.250 (1/4)	.015	.375	3.000 (12x)	3	1/4	6	43216	68.30	43216-C3	79.90		
.250 (1/4)	.020	.375	1.250 (5x)	3	1/4	4	953616	58.10	953616-C3	68.40		
.250 (1/4)	.020	.375	2.000 (8x)	3	1/4	4	970216	60.70	970216-C3	70.90		
.250 (1/4)	.030	.375	1.250 (5x)	3	1/4	4	42216	58.10	42216-C3	68.40	42216-C4	81.70
.250 (1/4)	.030	.375	1.250 (5x)	4	1/4	4	728116	58.10	728116-C3	66.70		
.250 (1/4)	.030	.375	2.000 (8x)	3	1/4	4	42416	59.60	42416-C3	69.90	42416-C4	83.10
.250 (1/4)	.030	.375	3.000 (12x)	3	1/4	6	42616	68.30	42616-C3	79.90	42616-C4	96.90
.250 (1/4)	.045	.375	1.250 (5x)	3	1/4	4	978816	58.10	978816-C3	68.40		
.250 (1/4)	.060	.375	1.250 (5x)	3	1/4	4	949116	58.10	949116-C3	68.40	949116-C4	81.00
.250 (1/4)	.060	.375	2.000 (8x)	3	1/4	4	866016	60.70	866016-C3	70.90		
.312 (5/16)	.015	.470	1.625 (5x)	3	5/16	4	42820	92.80	42820-C3	105.00		
.312 (5/16)	.015	.470	2.500 (8x)	3	5/16	4	43020	94.40	43020-C3	106.80		
.375 (3/8)	.030	.570	2.000 (5x)	3	3/8	4	42224	98.10	42224-C3	110.30		
.375 (3/8)	.030	.570	3.000 (8x)	3	3/8	6	42424	133.20	42424-C3	151.00		
.375 (3/8)	.060	.570	2.000 (5x)	3	3/8	4	949124	98.10	949124-C3	110.30		
.375 (3/8)	.060	.570	3.000 (8x)	3	3/8	6	866024	135.70	866024-C3	150.00		

MINIATURE END MILLS

Corner Radius – Extra Long Length



- **Up to 8" overall length**
- Extended reach
- 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

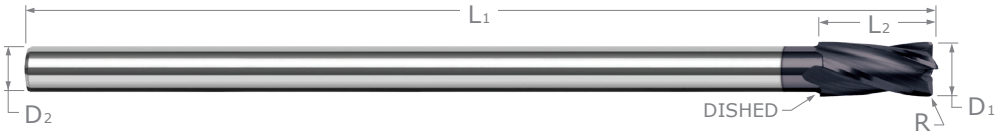
CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.00''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	USD$	4 FL	USD$
.250 (1/4)	**.015**	.375	4.375 (17.5x)	1/4	6	24016	110.20	24016-C3	121.90
.312 (5/16)	**.015**	.470	4.343 (14x)	5/16	6	24020	130.10	24020-C3	147.40
.375 (3/8)	**.030**	.562	4.312 (11.5x)	3/8	6	24024	147.60	24024-C3	165.50
.500 (1/2)	**.030**	.750	5.750 (11.5x)	1/2	8	24032	257.00	24032-C3	292.60
.625 (5/8)	**.030**	.937	5.687 (9x)	5/8	8	24040	429.80	24040-C3	456.30
.750 (3/4)	**.030**	1.125	5.625 (7.5x)	3/4	8	24048	535.60	24048-C3	567.30

Access Simulation Files in DXF Format for Every Harvey Tool Product

harveytool.com/resources/simulation-files

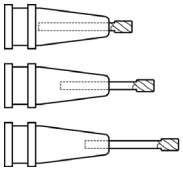
END MILLS

Corner Radius – Reduced Shank



- Reduced straight shank allows any chucking depth
- Solid carbide construction for maximum rigidity
- Long length design for deep cavity machining
- Corner radius for improved strength
- Length of cut = 1½x diameter
- Center cutting
- 4 flutes
- Solid carbide
- CNC ground in the USA

Chuck at Any Depth!



CORNER RADIUS

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
1/8	.010	3/16	**3 mm**	2-1/2	17608	108.40	17608-C3	114.30
1/8	.015	3/16	**3 mm**	2-1/2	829008	108.40	829008-C3	114.30
5/32	.010	15/64	**1/8**	2-1/2	17610	108.40	17610-C3	115.00
5/32	.015	15/64	**1/8**	2-1/2	829010	108.40	829010-C3	115.00
3/16	.015	9/32	**1/8**	2-1/2	17612	108.40	17612-C3	115.00
3/16	.015	9/32	**5/32**	2-1/2	17613	111.50	17613-C3	118.10
3/16	.030	9/32	**1/8**	2-1/2	844912	112.60	844912-C3	119.30
1/4	.015	3/8	**3/16**	3	17616	117.30	17616-C3	126.10
1/4	.030	3/8	**3/16**	3	844916	117.30	844916-C3	124.70
5/16	.015	15/32	**1/4**	4	17620	142.90	17620-C3	155.30
5/16	.030	15/32	**1/4**	4	844920	142.90	844920-C3	155.30
3/8	.015	9/16	**5/16**	4	829024	171.60	829024-C3	183.80
3/8	.030	9/16	**5/16**	4	17624	170.00	17624-C3	186.00
3/8	.060	9/16	**5/16**	4	766324	173.10	766324-C3	185.40
7/16	.015	21/32	**3/8**	6	829028	252.20	829028-C3	268.70
7/16	.030	21/32	**3/8**	6	17628	249.80	17628-C3	269.30
1/2	.015	3/4	**7/16**	6	829032	264.10	829032-C3	275.60
1/2	.030	3/4	**7/16**	6	17632	264.10	17632-C3	281.30
1/2	.060	3/4	**7/16**	6	766332	265.20	766332-C3	284.60
5/8	.030	15/16	**1/2**	6	17640	342.90	17640-C3	365.30
3/4	.030	1-1/8	**5/8**	6	17648	423.20	17648-C3	450.00
3/4	.060	1-1/8	**5/8**	6	766348	425.90	766348-C3	452.70

For Square Reduced Shank, please see page 48.
For Ball Reduced Shank, please see page 76.

MINIATURE END MILLS

Corner Chamfer – Stub & Standard



4 Flutes



Stub Flute & Standard Length



- Chamfered corner creates consistent heat and wear along chamfer by distributing forces evenly
- 45° corner chamfer protects corners on the end mill and can create small chamfers and edge breaks
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER CHAMFER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	4 FL	USD$	4 FL	USD$
.047 (3/64)	**.005**	.141 (3x)	1/8	1-1/2	805147	27.50	805147-C3	33.40
.062 (1/16)	**.005**	.093 (1.5x)	1/8	1-1/2	727462	27.50	727462-C3	33.40
.062 (1/16)	**.005**	.187 (3x)	1/8	1-1/2	805162	27.50	805162-C3	33.40
.062 (1/16)	**.010**	.187 (3x)	1/8	1-1/2	804962	27.50	804962-C3	33.40
.078 (5/64)	**.005**	.234 (3x)	1/8	1-1/2	805178	27.50	805178-C3	33.40
.093 (3/32)	**.005**	.279 (3x)	1/8	1-1/2	805193	28.10	805193-C3	34.00
.093 (3/32)	**.010**	.140 (1.5x)	1/8	1-1/2	727293	27.50	727293-C3	33.40
.093 (3/32)	**.010**	.279 (3x)	1/8	1-1/2	804993	27.50	804993-C3	33.40
D_1 $^{+.000''}_{-.002''}$	L_4 $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	USD$	4 FL	USD$
.125 (1/8)	**.005**	.375 (3x)	1/8	1-1/2	805208	28.10	805208-C3	34.00
.125 (1/8)	**.010**	.375 (3x)	1/8	1-1/2	805008	27.50	805008-C3	33.40
.125 (1/8)	**.020**	.187 (1.5x)	1/8	1-1/2	727108	27.50	727108-C3	33.40
.125 (1/8)	**.020**	.375 (3x)	1/8	1-1/2	804808	27.50	804808-C3	33.40
.125 (1/8)	**.030**	.375 (3x)	1/8	1-1/2	751108	28.10	751108-C3	34.00
.187 (3/16)	**.005**	.570 (3x)	3/16	2	805212	30.50	805212-C3	37.10
.187 (3/16)	**.010**	.570 (3x)	3/16	2	805012	30.50	805012-C3	37.10
.187 (3/16)	**.020**	.285 (1.5x)	3/16	2	727112	30.50	727112-C3	36.70
.187 (3/16)	**.020**	.570 (3x)	3/16	2	804812	30.50	804812-C3	37.10
.187 (3/16)	**.030**	.570 (3x)	3/16	2	751112	30.50	751112-C3	37.10
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	805216	37.70	805216-C3	46.30
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	805016	37.70	805016-C3	45.80
.250 (1/4)	**.020**	.375 (1.5x)	1/4	2-1/2	727116	37.70	727116-C3	45.80
.250 (1/4)	**.020**	.750 (3x)	1/4	2-1/2	804816	37.70	804816-C3	46.30
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	751116	37.70	751116-C3	46.30
.375 (3/8)	**.005**	1.125 (3x)	3/8	2-1/2	805224	55.00	805224-C3	66.40
.375 (3/8)	**.010**	1.125 (3x)	3/8	2-1/2	805024	55.00	805024-C3	66.40
.375 (3/8)	**.020**	1.125 (3x)	3/8	2-1/2	804824	55.00	804824-C3	66.40
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	751124	55.00	751124-C3	66.40
.500 (1/2)	**.005**	1.500 (3x)	1/2	3	805232	85.10	805232-C3	100.70
.500 (1/2)	**.010**	1.500 (3x)	1/2	3	805032	85.10	805032-C3	100.70
.500 (1/2)	**.020**	1.500 (3x)	1/2	3	804832	85.10	804832-C3	100.70
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	751132	85.10	751132-C3	102.40

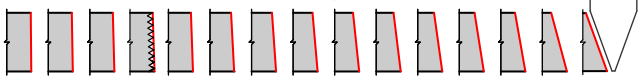
MINIATURE END MILLS

Tapered – Square

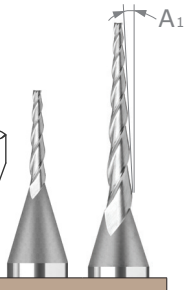


- Length of cut up to 10x end diameter
- Long length design for deep cavity machining
- 3 and 4 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

Stocked in Fifteen Angles Per Side!



(N.P.T.)



ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
0.5°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	997015	50.40	997015-C6	57.30		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20515	83.10	20515-C6	90.40		
	.030	.156 (5x)	3	1/8	1-1/2	997030	42.80	997030-C6	51.60		
	.030	.300 (10x)	3	3/16	3	20530	73.90	20530-C6	82.10		
	.045	.250 (5x)	3	1/8	1-1/2	997045	42.80	997045-C6	51.60		
	.045	.450 (10x)	3	3/16	3	20545	73.90	20545-C6	82.10		
	.060	.312 (5x)	3	1/8	1-1/2	997060	42.80	997060-C6	51.60		
	.060	.600 (10x)	3	3/16	3	20560	73.90	20560-C6	82.10		
	.075	.750 (10x)	3	3/16	3	20575	75.30	20575-C6	83.50		
	.090	.500 (5x)	3	1/8	1-1/2	997090	42.80	997090-C6	51.60		
	.090	.900 (10x)	3	1/4	4	20590	81.80	20590-C6	92.30		
	.125 (1/8)	.625 (5x)	3	3/16	2	997099	66.60	997099-C6	76.10		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20599	80.40	20599-C6	90.90		
1°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	992715	50.40	992715-C6	57.30		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20615	81.50	20615-C6	88.70		
	.030	.156 (5x)	3	1/8	1-1/2	992730	42.80	992730-C6	51.60	992730-C8	50.40
	.030	.300 (10x)	3	3/16	3	20630	73.90	20630-C6	83.30	20630-C8	83.10
	.045	.250 (5x)	3	1/8	1-1/2	992745	42.80	992745-C6	51.60		
	.045	.450 (10x)	3	3/16	3	20645	73.90	20645-C6	82.10		
	.060	.312 (5x)	3	1/8	1-1/2	992760	42.80	992760-C6	51.60		
	.060	.600 (10x)	3	3/16	3	20660	73.90	20660-C6	83.30		
	.075	.750 (10x)	3	3/16	3	20675	73.90	20675-C6	82.10		
	.090	.500 (5x)	3	1/8	1-1/2	992790	42.80	992790-C6	51.60		
	.090	.900 (10x)	3	1/4	4	20690	80.40	20690-C6	90.90		
	.125 (1/8)	.625 (5x)	3	3/16	2	992799	66.60	992799-C6	76.10		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20699	80.40	20699-C6	93.20		
1.5°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	991815	50.40	991815-C6	57.30		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20715	83.10	20715-C6	90.40		
	.030	.156 (5x)	3	1/8	1-1/2	991830	43.70	991830-C6	50.60		
	.030	.300 (10x)	3	3/16	3	20730	75.30	20730-C6	83.50		
	.045	.250 (5x)	3	1/8	1-1/2	991845	42.80	991845-C6	51.60		
	.045	.450 (10x)	3	3/16	3	20745	73.90	20745-C6	82.10		
	.060	.312 (5x)	3	1/8	1-1/2	991860	43.70	991860-C6	50.60		
	.060	.600 (10x)	3	3/16	3	20760	75.30	20760-C6	84.80		
	.075	.750 (10x)	3	1/4	4	20775	81.80	20775-C6	94.70		
	.090	.500 (5x)	3	1/8	1-1/2	991890	43.70	991890-C6	50.60		
	.090	.900 (10x)	3	1/4	4	20790	80.40	20790-C6	90.90		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20799	80.40	20799-C6	93.20		

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MINIATURE END MILLS

Tapered – Square (cont.)

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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1.8° (N.P.T.)	.200	.625 (3x)	3	1/4	2	912282	70.30	912282-C6	83.20		
	.300	.900 (3x)	3	3/8	2-1/2	912286	87.70	912286-C6	102.20		
	.400	1.250 (3x)	3	1/2	3	912292	118.00	912292-C6	136.90		
2°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	991015	49.50	991015-C6	56.40		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20815	81.50	20815-C6	88.70		
	.030	.156 (5x)	3	1/8	1-1/2	991030	42.80	991030-C6	51.60		
	.030	.300 (10x)	3	3/16	3	20830	73.90	20830-C6	82.10		
	.045	.250 (5x)	3	1/8	1-1/2	991045	42.80	991045-C6	51.60		
	.045	.450 (10x)	3	3/16	3	20845	73.90	20845-C6	83.30		
	.060	.312 (5x)	3	1/8	1-1/2	991060	42.80	991060-C6	51.60		
	.060	.600 (10x)	3	3/16	3	20860	73.90	20860-C6	83.30		
	.075	.750 (10x)	3	1/4	4	20875	81.80	20875-C6	94.70		
	.090	.500 (5x)	3	1/8	1-1/2	991090	42.80	991090-C6	51.60		
	.090	.900 (10x)	3	1/4	4	20890	80.40	20890-C6	90.90		
	.125 (1/8)	.625 (5x)	3	3/16	2	991099	66.60	991099-C6	76.10		
	.125 (1/8)	1.250 (10x)	3	1/4	4	20899	80.40	20899-C6	90.90		
3°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	990415	49.50	990415-C6	56.40		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	20915	81.50	20915-C6	90.30		
	.030	.156 (5x)	3	1/8	1-1/2	990430	42.80	990430-C6	51.60	990430-C8	50.40
	.030	.300 (10x)	3	3/16	3	20930	73.90	20930-C6	83.30	20930-C8	83.10
	.045	.250 (5x)	3	1/8	1-1/2	990445	42.80	990445-C6	51.60		
	.045	.450 (10x)	3	3/16	3	20945	73.90	20945-C6	83.30		
	.060	.312 (5x)	3	1/8	1-1/2	990460	42.80	990460-C6	51.60		
	.060	.600 (10x)	3	3/16	3	20960	73.90	20960-C6	83.30		
	.075	.750 (10x)	3	1/4	4	20975	81.80	20975-C6	94.70		
	.090	.500 (5x)	3	3/16	2	990490	66.60	990490-C6	76.10		
	.090	.900 (10x)	3	1/4	4	20990	80.40	20990-C6	93.20		
	.125 (1/8)	.625 (5x)	3	1/4	2-1/2	990499	98.10	990499-C6	107.80		
	.125 (1/8)	1.192 (10x)	3	1/4	4	20999	80.40	20999-C6	93.20		
4°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	996215	81.50	996215-C6	88.70		
	.030	.300 (10x)	3	3/16	3	996230	73.90	996230-C6	83.30		
	.045	.450 (10x)	3	3/16	3	996245	73.90	996245-C6	82.10		
	.060	.600 (10x)	3	3/16	3	996260	73.90	996260-C6	83.30		
	.075	.750 (10x)	3	1/4	4	996275	81.80	996275-C6	92.30		
	.090	.900 (10x)	3	1/4	4	996290	81.80	996290-C6	92.30		
	.125 (1/8)	1.250 (10x)	3	3/8	4	996299	110.70	996299-C6	125.10		
5°	.010	.050 (5x)	3	1/8	1-1/2	989610	58.60	989610-C6	65.50		
	.010	.100 (10x)	3	1/8	2-1/2	27110	90.40	27110-C6	97.70		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	989615	49.50	989615-C6	56.40		
	.015 (1/64)	.078 (5x)	4	1/8	1-1/2	723915	50.70	723915-C6	57.50		
	.015 (1/64)	.120 (8x)	3	1/8	1-1/2	761915	52.30	761915-C6	59.20		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	27115	81.50	27115-C6	90.30		
	.020	.100 (5x)	3	1/8	1-1/2	989620	48.40	989620-C6	55.20		
	.020	.200 (10x)	3	1/8	2-1/2	27120	80.00	27120-C6	88.80		
	.030	.156 (5x)	3	1/8	1-1/2	989630	42.80	989630-C6	51.60	989630-C8	50.40
	.030	.300 (10x)	3	3/16	3	27130	73.90	27130-C6	83.30	27130-C8	83.10
	.045	.250 (5x)	3	1/8	1-1/2	989645	42.80	989645-C6	51.60		
	.045	.450 (10x)	3	3/16	3	27145	73.90	27145-C6	83.30		

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MINIATURE END MILLS

Tapered – Square (cont.)

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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
5°	.060	.312 (5x)	3	1/8	1-1/2	989660	42.80	989660-C6	51.60		
	.060	.600 (10x)	3	3/16	3	27160	73.90	27160-C6	83.30		
	.062 (1/16)	.312 (5x)	3	1/8	1-1/2	989662	42.80	989662-C6	51.60		
	.062 (1/16)	.620 (10x)	3	3/16	3	27162	73.90	27162-C6	82.10		
	.075	.375 (5x)	3	3/16	2	989675	66.60	989675-C6	76.10		
	.075	.750 (10x)	3	1/4	4	27175	81.80	27175-C6	94.70		
	.090	.500 (5x)	3	3/16	2	989690	66.60	989690-C6	76.10		
	.090	.900 (10x)	3	1/4	4	27190	80.40	27190-C6	90.90		
	.093 (3/32)	.500 (5x)	3	3/16	2	989693	66.60	989693-C6	76.10		
	.093 (3/32)	.930 (10x)	3	1/4	4	27193	80.40	27193-C6	90.90		
	.125 (1/8)	.625 (5x)	3	1/4	2-1/2	989699	98.10	989699-C6	107.80		
	.125 (1/8)	1.250 (10x)	3	3/8	4	27199	108.50	27199-C6	123.00		
	.187 (3/16)	1.000 (5x)	3	3/8	2-1/2	989681	108.50	989681-C6	123.00		
	.250 (1/4)	1.250 (5x)	3	1/2	3	989684	146.70	989684-C6	165.60		
6°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	993315	87.00	993315-C6	95.80		
	.030	.300 (10x)	3	3/16	3	993330	80.80	993330-C6	90.30		
	.045	.250 (5x)	3	1/8	1-1/2	904345	70.80	904345-C6	77.60		
	.045	.450 (10x)	3	3/16	3	993345	80.80	993345-C6	90.30		
	.060	.312 (5x)	3	3/16	2	904360	68.30	904360-C6	77.70		
	.060	.600 (10x)	3	3/16	3	993360	80.80	993360-C6	90.30		
	.090	.500 (5x)	3	1/4	2-1/2	904390	102.00	904390-C6	111.80		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	904399	98.10	904399-C6	112.70		
7°	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	922615	51.40	922615-C6	58.20		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	28015	84.60	28015-C6	93.40		
	.030	.156 (5x)	3	1/8	1-1/2	922630	44.40	922630-C6	53.20		
	.030	.300 (10x)	3	3/16	3	28030	76.80	28030-C6	86.20		
	.045	.250 (5x)	3	1/8	1-1/2	922645	44.40	922645-C6	53.20		
	.045	.450 (10x)	3	3/16	3	28045	76.80	28045-C6	85.00		
	.060	.312 (5x)	3	3/16	2	922660	69.20	922660-C6	78.70		
	.060	.600 (10x)	3	1/4	4	28060	83.70	28060-C6	96.50		
	.075	.750 (10x)	3	3/8	4	28075	116.00	28075-C6	131.10		
	.090	.500 (5x)	3	1/4	2-1/2	922690	83.70	922690-C6	93.40		
	.090	.900 (10x)	3	3/8	4	28090	114.20	28090-C6	128.70		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	922699	98.10	922699-C6	112.70		
8°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	995415	87.00	995415-C6	94.30		
	.030	.300 (10x)	3	3/16	3	995430	80.80	995430-C6	90.30		
	.045	.450 (10x)	3	3/16	3	995445	80.80	995445-C6	90.30		
	.060	.600 (10x)	3	1/4	4	995460	86.40	995460-C6	99.20		
	.090	.500 (5x)	3	1/4	2-1/2	903790	83.70	903790-C6	93.40		
	.125 (1/8)	.625 (5x)	3	5/16	2-1/2	903799	98.10	903799-C6	112.70		
9°	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	992115	87.80	992115-C6	95.10		
	.030	.300 (10x)	3	3/16	3	992130	81.60	992130-C6	89.80		
	.045	.450 (10x)	3	3/16	3	992145	81.60	992145-C6	89.80		
	.060	.600 (10x)	3	1/4	4	992160	87.10	992160-C6	97.60		
	.090	.500 (5x)	3	1/4	2-1/2	902490	83.70	902490-C6	93.40		
	.125 (1/8)	.625 (5x)	3	3/8	2-1/2	902499	112.80	902499-C6	127.30		

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MINIATURE END MILLS

Tapered – Square (cont.)

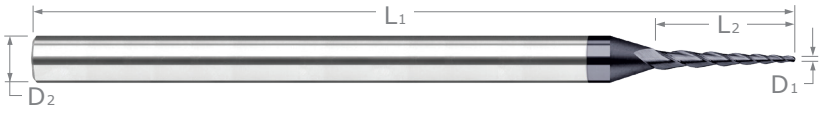
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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN NANO COATED		TiB2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
10°	.010	.050 (5x)	3	1/8	1-1/2	988210	58.60	988210-C6	65.50		
	.010	.100 (10x)	3	1/8	2-1/2	29410	88.70	29410-C6	97.50		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	988215	49.50	988215-C6	56.40		
	.015 (1/64)	.150 (10x)	3	1/8	2-1/2	29415	81.50	29415-C6	90.30		
	.020	.100 (5x)	3	1/8	1-1/2	988220	49.50	988220-C6	56.40		
	.020	.200 (10x)	3	1/8	2-1/2	29420	80.00	29420-C6	88.80		
	.030	.156 (5x)	3	1/8	1-1/2	988230	42.80	988230-C6	51.60	988230-C8	50.40
	.030	.300 (10x)	3	3/16	3	29430	73.90	29430-C6	83.30	29430-C8	83.10
	.045	.250 (5x)	3	3/16	2	988245	73.90	988245-C6	83.30		
	.045	.360 (8x)	3	3/16	3	760845	75.30	760845-C6	84.80		
	.045	.450 (10x)	3	1/4	4	29445	81.80	29445-C6	94.70		
	.060	.312 (5x)	3	3/16	2	988260	73.90	988260-C6	83.30		
	.060	.312 (5x)	4	3/16	2	723860	75.20	723860-C6	82.80		
	.060	.600 (10x)	3	3/8	4	29460	108.50	29460-C6	123.00		
	.075	.375 (5x)	3	1/4	2-1/2	988275	77.70	988275-C6	87.50		
	.075	.750 (10x)	3	3/8	4	29475	110.70	29475-C6	125.70		
	.090	.500 (5x)	3	5/16	2-1/2	988290	92.00	988290-C6	106.60		
	.090	.720 (8x)	3	3/8	4	760890	93.30	760890-C6	108.40		
	.125 (1/8)	.625 (5x)	3	3/8	2-1/2	988299	108.50	988299-C6	123.00		
	.187 (3/16)	.890 (5x)	3	1/2	3	988281	146.70	988281-C6	165.60		
	.250 (1/4)	1.065 (5x)	3	5/8	3-1/2	988284	157.70	988284-C6	179.10		
15°	.015 (1/64)	.031 (3x)	3	1/8	1-1/2	799415	47.20	799415-C6	54.10		
	.015 (1/64)	.078 (5x)	3	1/8	1-1/2	919515	49.50	919515-C6	56.40		
	.015 (1/64)	.078 (5x)	4	1/8	1-1/2	723715	50.70	723715-C6	57.50		
	.015 (1/64)	.120 (8x)	3	1/8	1-1/2	799315	54.70	799315-C6	61.60		
	.015 (1/64)	.150 (10x)	3	1/8	1-1/2	41115	77.70	41115-C6	86.50		
	.030	.093 (3x)	3	1/8	1-1/2	799430	47.20	799430-C6	54.10		
	.030	.156 (5x)	3	1/8	1-1/2	919530	49.50	919530-C6	56.40		
	.030	.240 (8x)	3	3/16	2	799330	54.70	799330-C6	62.40		
	.030	.294 (10x)	3	3/16	2	41130	75.90	41130-C6	85.40		
	.045	.250 (5x)	3	3/16	2	919545	66.60	919545-C6	76.10		
	.045	.250 (5x)	4	3/16	2	723745	68.00	723745-C6	75.70		
	.045	.383 (8x)	3	1/4	2-1/2	41145	81.50	41145-C6	91.20		
	.060	.312 (5x)	3	1/4	2-1/2	919560	80.00	919560-C6	89.80		
	.060	.312 (5x)	4	1/4	2-1/2	723760	81.30	723760-C6	91.00		
	.060	.480 (8x)	3	3/8	2-1/2	799360	106.80	799360-C6	120.70		
	.060	.588 (10x)	3	3/8	2-1/2	41160	110.70	41160-C6	125.10		
	.075	.750 (10x)	3	1/2	3	41175	154.00	41175-C6	172.90		
	.090	.765 (8x)	3	1/2	3	41190	151.10	41190-C6	170.00		
	.125 (1/8)	.625 (5x)	4	1/2	3	723799	153.50	723799-C6	172.40		
	.125 (1/8)	.700 (5x)	3	1/2	3	41199	151.10	41199-C6	170.00		
20°	.015	.078 (5x)	3	1/8	1-1/2	832815	49.50	832815-C6	56.40		
	.015	.120 (8x)	3	1/8	1-1/2	799215	54.70	799215-C6	61.60		
	.030	.156 (5x)	3	3/16	2	832830	49.50	832830-C6	57.20		
	.030	.156 (5x)	4	3/16	2	723630	50.70	723630-C6	58.30		
	.030	.240 (8x)	3	1/4	2-1/2	799230	81.50	799230-C6	91.20		
	.045	.250 (5x)	3	1/4	2-1/2	832845	66.60	832845-C6	79.60		
	.045	.360 (8x)	3	5/16	2-1/2	799245	86.80	799245-C6	101.20		
	.060	.312 (5x)	3	5/16	2-1/2	832860	71.80	832860-C6	83.60		
	.060	.480 (8x)	3	1/2	3	799260	151.10	799260-C6	170.00		

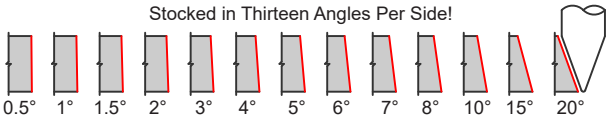
For larger angles, please see Chamfer Cutters on page 333.

MINIATURE END MILLS

Tapered – Ball



- Stocked in 0.5° to 20° tapers
- Long length design for deep cavity machining
- 3 and 4 flutes • Center cutting
- Solid carbide • CNC ground in the USA





ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
0.5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21515	88.60	21515-C6	95.90
	.030	**.300** (10x)	3	3/16	3	21530	81.20	21530-C6	89.40
	.045	**.450** (10x)	3	3/16	3	21545	82.70	21545-C6	90.90
	.060	**.600** (10x)	3	3/16	3	21560	81.20	21560-C6	90.70
	.090	**.900** (10x)	3	1/4	4	21590	87.30	21590-C6	97.80
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21599	87.30	21599-C6	97.80
1°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21615	88.60	21615-C6	95.90
	.030	**.156** (5x)	3	1/8	1-1/2	879830	47.90	879830-C6	54.70
	.030	**.300** (10x)	3	3/16	3	21630	81.20	21630-C6	89.40
	.045	**.450** (10x)	3	3/16	3	21645	82.70	21645-C6	92.20
	.060	**.312** (5x)	3	1/8	1-1/2	879860	47.90	879860-C6	54.70
	.060	**.600** (10x)	3	3/16	3	21660	81.20	21660-C6	90.70
	.090	**.900** (10x)	3	1/4	4	21690	85.60	21690-C6	96.10
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21699	85.60	21699-C6	98.60
1.5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21715	87.00	21715-C6	94.30
	.030	**.300** (10x)	3	3/16	3	21730	81.20	21730-C6	90.70
	.045	**.450** (10x)	3	3/16	3	21745	84.30	21745-C6	92.50
	.060	**.600** (10x)	3	3/16	3	21760	81.20	21760-C6	90.70
	.090	**.900** (10x)	3	1/4	4	21790	87.30	21790-C6	97.80
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21799	85.60	21799-C6	96.10
2°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21815	87.00	21815-C6	95.70
	.030	**.300** (10x)	3	3/16	3	21830	81.20	21830-C6	90.70
	.045	**.450** (10x)	3	3/16	3	21845	82.70	21845-C6	92.20
	.060	**.600** (10x)	3	3/16	3	21860	81.20	21860-C6	90.70
	.090	**.900** (10x)	3	1/4	4	21890	85.60	21890-C6	96.10
	.125 (1/8)	**1.250** (10x)	3	1/4	4	21899	85.60	21899-C6	98.60
3°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	21915	87.00	21915-C6	95.70
	.030	**.156** (5x)	3	1/8	1-1/2	880230	47.90	880230-C6	54.70
	.030	**.300** (10x)	3	3/16	3	21930	81.20	21930-C6	90.70
	.045	**.450** (10x)	3	3/16	3	21945	82.70	21945-C6	92.20
	.060	**.312** (5x)	3	1/8	1-1/2	880260	47.90	880260-C6	54.70
	.060	**.600** (10x)	3	3/16	3	21960	81.20	21960-C6	90.70
	.090	**.900** (10x)	3	1/4	4	21990	85.60	21990-C6	98.60
	.125 (1/8)	**1.192** (10x)	3	1/4	4	21999	85.60	21999-C6	98.60
4°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	840415	91.20	840415-C6	98.50
	.030	**.300** (10x)	3	3/16	3	840430	85.00	840430-C6	93.20
	.060	**.600** (10x)	3	3/16	3	840460	85.00	840460-C6	93.20
	.090	**.900** (10x)	3	1/4	4	840490	89.90	840490-C6	102.70

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MINIATURE END MILLS

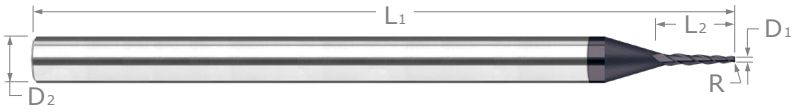
Tapered – Ball (cont.)

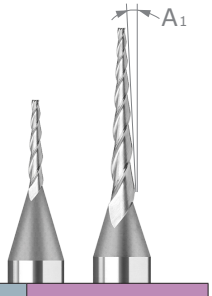
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ANGLE PER SIDE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005"}_{-.0005"}$	L_2 $^{+.020"}_{-.000"}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
5°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	32615	87.00	32615-C6	95.70
	.030	**.156** (5x)	3	1/8	1-1/2	880630	47.90	880630-C6	54.70
	.030	**.300** (10x)	3	3/16	3	32630	81.20	32630-C6	90.70
	.030	**.300** (10x)	4	3/16	3	723530	84.00	723530-C6	92.20
	.045	**.250** (5x)	3	1/8	1-1/2	880645	47.90	880645-C6	54.70
	.045	**.450** (10x)	3	3/16	3	32645	82.70	32645-C6	92.20
	.060	**.312** (5x)	3	1/8	1-1/2	880660	47.90	880660-C6	54.70
	.060	**.480** (8x)	3	3/16	2	761960	74.60	761960-C6	82.30
	.060	**.600** (10x)	3	3/16	3	32660	81.20	32660-C6	90.70
	.060	**.600** (10x)	4	3/16	3	723560	84.00	723560-C6	92.20
	.090	**.900** (10x)	3	1/4	4	32690	85.60	32690-C6	98.60
	.125 (1/8)	**1.250** (10x)	3	3/8	4	32699	114.20	32699-C6	128.60
6°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	835615	91.20	835615-C6	98.50
	.030	**.300** (10x)	3	3/16	3	835630	84.30	835630-C6	93.80
	.060	**.600** (10x)	3	3/16	3	835660	89.10	835660-C6	98.60
	.090	**.900** (10x)	3	3/8	4	835690	118.50	835690-C6	133.60
7°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	34415	90.30	34415-C6	99.10
	.030	**.300** (10x)	3	3/16	3	34430	84.30	34430-C6	92.50
	.045	**.450** (10x)	3	3/16	3	34445	86.10	34445-C6	95.40
	.060	**.600** (10x)	3	1/4	4	34460	89.10	34460-C6	102.00
	.090	**.900** (10x)	3	3/8	4	34490	118.50	34490-C6	133.00
8°	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	853815	91.20	853815-C6	98.50
	.030	**.300** (10x)	3	3/16	3	853830	85.00	853830-C6	93.20
	.060	**.600** (10x)	3	1/4	4	853860	89.10	853860-C6	99.50
	.090	**.900** (10x)	3	3/8	4	853890	118.50	853890-C6	133.00
10°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	881015	49.60	881015-C6	56.50
	.015 (1/64)	**.150** (10x)	3	1/8	2-1/2	35315	90.30	35315-C6	99.10
	.015 (1/64)	**.150** (10x)	4	1/8	2-1/2	723415	92.70	723415-C6	100.00
	.030	**.156** (5x)	3	1/8	1-1/2	881030	49.60	881030-C6	56.50
	.030	**.300** (10x)	3	3/16	3	35330	84.30	35330-C6	93.80
	.045	**.250** (5x)	3	3/16	2	881045	81.70	881045-C6	91.20
	.045	**.450** (10x)	3	1/4	4	35345	90.30	35345-C6	100.80
	.060	**.312** (5x)	3	3/16	2	881060	81.70	881060-C6	91.20
	.060	**.600** (10x)	3	3/8	4	35360	118.50	35360-C6	133.00
	.090	**.500** (5x)	3	5/16	2-1/2	881090	131.80	881090-C6	146.40
	.125 (1/8)	**.625** (5x)	3	3/8	2-1/2	881099	162.10	881099-C6	176.70
	.187 (3/16)	**.937** (5x)	3	1/2	3	881081	185.80	881081-C6	204.70
	.250 (1/4)	**1.177** (5x)	3	5/8	3-1/2	881084	199.80	881084-C6	220.40
15°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	785915	48.80	785915-C6	55.60
	.015 (1/64)	**.150** (10x)	3	1/8	1-1/2	916115	89.60	916115-C6	98.40
	.030	**.156** (5x)	3	1/8	1-1/2	785930	48.80	785930-C6	55.60
	.030	**.300** (10x)	3	3/16	2	916130	83.50	916130-C6	92.80
	.030	**.300** (10x)	4	3/16	2	723330	86.30	723330-C6	93.90
	.045	**.402** (9x)	3	1/4	2-1/2	916145	89.60	916145-C6	99.30
	.060	**.312** (5x)	3	1/4	2	785960	84.90	785960-C6	97.70
	.060	**.600** (10x)	3	3/8	2-1/2	916160	117.80	916160-C6	132.20
	.060	**.600** (10x)	4	3/8	2-1/2	723360	120.70	723360-C6	134.60
20°	.015 (1/64)	**.078** (5x)	3	1/8	1-1/2	802115	49.60	802115-C6	56.50
	.030	**.156** (5x)	3	3/16	2	802130	80.90	802130-C6	90.40
	.045	**.250** (5x)	3	1/4	2-1/2	802145	90.80	802145-C6	100.60
	.060	**.312** (5x)	3	5/16	2-1/2	802160	131.80	802160-C6	143.60

MINIATURE END MILLS

Tapered – Corner Radius





- Corner radius for improved strength
- Long length design for deep cavity machining
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
5°	.015 (1/64)	.005	**.078** (5x)	3	1/8	1-1/2	714715	50.00	714715-C6	56.90
	.015 (1/64)	.005	**.150** (10x)	3	1/8	2-1/2	714515	82.00	714515-C6	89.30
	.030	.005	**.156** (5x)	3	1/8	1-1/2	714730	44.10	714730-C6	51.00
	.030	.005	**.300** (10x)	3	3/16	3	714530	75.50	714530-C6	83.70
	.045	.005	**.250** (5x)	3	1/8	1-1/2	714745	44.10	714745-C6	51.00
	.045	.005	**.450** (10x)	3	3/16	3	714545	76.10	714545-C6	84.30
	.060	.005	**.312** (5x)	3	1/8	1-1/2	714760	44.10	714760-C6	51.00
	.060	.005	**.600** (10x)	3	3/16	3	714560	75.50	714560-C6	83.70
	.125 (1/8)	.005	**.625** (5x)	3	1/4	2-1/2	714799	99.80	714799-C6	109.50
	.125 (1/8)	.005	**1.250** (10x)	3	3/8	4	714599	110.00	714599-C6	125.10
10°	.015 (1/64)	.005	**.078** (5x)	3	1/8	1-1/2	714615	47.40	714615-C6	54.30
	.015 (1/64)	.005	**.150** (10x)	3	1/8	2-1/2	714415	81.30	714415-C6	88.50
	.030	.005	**.156** (5x)	3	1/8	1-1/2	714630	43.80	714630-C6	50.70
	.030	.005	**.300** (10x)	3	3/16	3	714430	74.80	714430-C6	83.00
	.045	.005	**.250** (5x)	3	3/16	2	714645	73.70	714645-C6	81.40
	.045	.005	**.450** (10x)	3	1/4	4	714445	81.40	714445-C6	91.90
	.060	.005	**.312** (5x)	3	3/16	2	714660	73.70	714660-C6	81.40
	.060	.005	**.600** (10x)	3	3/8	4	714460	107.40	714460-C6	122.50
	.125 (1/8)	.005	**.625** (5x)	3	3/8	2-1/2	714699	128.00	714699-C6	141.90
	.125 (1/8)	.005	**1.250** (10x)	3	5/8	4	714499	167.40	714499-C6	191.00

MATERIAL-SPECIFIC END MILLS

FERROUS MATERIALS

End Mills for Hardened Steels mm & in New Sizes! 112

Recommended Materials:
hardened steels up to 68 Rc and high temperature alloys

End Mills for Titanium Alloys mm & in New! 140

Designed & tested specifically for:
Titanium 6Al4V and other titanium alloys

End Mills for High Temp Alloys mm & in New Sizes! 143

Recommended Materials:
titanium, Inconel, nickel alloys, stainless steels, tool steels, and other difficult-to-machine materials

End Mills for Medium Alloy Steels mm & in 188

Recommended Materials:
readily machinable medium alloy steels, stainless steels, and tool steels

End Mills for Free Machining Steels mm & in 211

Recommended Materials:
free machining varieties of carbon steels and stainless steels

NON-FERROUS MATERIALS

End Mills for Aluminum Alloys mm & in New Style & Sizes! 219

Recommended Materials:
aluminum, copper, brass, and bronze alloys, high silicon aluminum, magnesium alloys

End Mills for Non-Ferrous Materials mm & in New Style & Sizes! 251

Recommended Materials:
graphite, composites, green carbides, green ceramics

End Mills for Plastics mm & in New Sizes! 269

Recommended Materials:
filled and unfilled plastics

End Mills for Composites New Sizes! 294

Recommended Materials:
abrasive composites, fiber-reinforced materials, layered composites

End Mills for Wood 301

Recommended Materials:
soft, hard, and engineered woods

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.015 (1/64)		.0150	**.012** (0.8x)	1/4	2-1/2	859415-C6	91.20
.015 (1/64)		.0150	**.023** (1.5x)	1/4	2-1/2	907415-C6	89.00
.015 (1/64)		.0150	**.045** (3x)	1/4	2-1/2	915915-C6	89.00
.015 (1/64)		.0150	**.078** (5x)	1/4	2-1/2	885215-C6	93.20
.020		.0200	**.030** (1.5x)	1/4	2-1/2	907420-C6	89.00
.020		.0200	**.060** (3x)	1/4	2-1/2	915920-C6	89.00
.020		.0200	**.100** (5x)	1/4	2-1/2	885220-C6	93.20
.025		.0250	**.038** (1.5x)	1/4	2-1/2	907425-C6	89.00
.025		.0250	**.075** (3x)	1/4	2-1/2	915925-C6	89.00
.030		.0300	**.045** (1.5x)	1/4	2-1/2	907430-C6	80.90
.030		.0300	**.090** (3x)	1/4	2-1/2	915930-C6	81.60
.031 (1/32)		.0310	**.025** (0.8x)	1/4	2-1/2	859431-C6	79.10
.031 (1/32)		.0310	**.047** (1.5x)	1/4	2-1/2	907431-C6	74.80
.031 (1/32)		.0310	**.093** (3x)	1/4	2-1/2	915931-C6	74.80
.031 (1/32)		.0310	**.125** (4x)	1/4	2-1/2	824931-C6	79.10
.031 (1/32)		.0310	**.156** (5x)	1/4	2-1/2	885231-C6	81.70
.035		.0350	**.053** (1.5x)	1/4	2-1/2	907435-C6	76.00
.035		.0350	**.105** (3x)	1/4	2-1/2	915935-C6	75.40
.039		.0390	**.059** (1.5x)	1/4	2-1/2	907439-C6	76.00
.039		.0390	**.117** (3x)	1/4	2-1/2	915939-C6	75.40
.039		.0390	**.203** (5x)	1/4	2-1/2	885239-C6	82.40
	1.0 mm	.0393	**3.00 mm** (3x)	6 mm	63 mm	897822-C6	82.90
.040		.0400	**.060** (1.5x)	1/4	2-1/2	907440-C6	74.80
.040		.0400	**.120** (3x)	1/4	2-1/2	915940-C6	74.80
.040		.0400	**.203** (5x)	1/4	2-1/2	885240-C6	81.70
.045		.0450	**.068** (1.5x)	1/4	2-1/2	907445-C6	75.40
.045		.0450	**.135** (3x)	1/4	2-1/2	915945-C6	75.40
.047 (3/64)		.0470	**.071** (1.5x)	1/4	2-1/2	907447-C6	74.80
.047 (3/64)		.0470	**.141** (3x)	1/4	2-1/2	915947-C6	74.80
.047 (3/64)		.0470	**.187** (4x)	1/4	2-1/2	824947-C6	78.30
.047 (3/64)		.0470	**.250** (5x)	1/4	2-1/2	885247-C6	81.70
.050		.0500	**.075** (1.5x)	1/4	2-1/2	907450-C6	75.70
.050		.0500	**.150** (3x)	1/4	2-1/2	915950-C6	74.80
.055		.0550	**.083** (1.5x)	1/4	2-1/2	907455-C6	76.00
.055		.0550	**.165** (3x)	1/4	2-1/2	915955-C6	75.40
.060		.0600	**.090** (1.5x)	1/4	2-1/2	907460-C6	74.80
.060		.0600	**.180** (3x)	1/4	2-1/2	915960-C6	74.80

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END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.062 (1/16)		.0620	**.050** (0.8x)	1/4	2-1/2	859462-C6	78.30
.062 (1/16)		.0620	**.093** (1.5x)	1/4	2-1/2	907462-C6	74.80
.062 (1/16)		.0620	**.186** (3x)	1/4	2-1/2	915962-C6	74.80
.062 (1/16)		.0620	**.250** (4x)	1/4	2-1/2	824962-C6	79.10
.062 (1/16)		.0620	**.312** (5x)	1/4	2-1/2	885262-C6	81.70
.070		.0700	**.105** (1.5x)	1/4	2-1/2	907470-C6	78.30
.070		.0700	**.210** (3x)	1/4	2-1/2	915970-C6	78.30
.078 (5/64)		.0780	**.062** (0.8x)	1/4	2-1/2	859478-C6	81.80
.078 (5/64)		.0780	**.117** (1.5x)	1/4	2-1/2	907478-C6	78.30
.078 (5/64)		.0780	**.234** (3x)	1/4	2-1/2	915978-C6	78.30
.078 (5/64)		.0780	**.312** (4x)	1/4	2-1/2	824978-C6	82.50
.078 (5/64)		.0780	**.406** (5x)	1/4	2-1/2	885278-C6	85.30
	2.0 mm	.0787	**3.00 mm** (1.5x)	6 mm	63 mm	777845-C6	87.70
	2.0 mm	.0787	**6.00 mm** (3x)	6 mm	63 mm	897845-C6	86.80
.080		.0800	**.120** (1.5x)	1/4	2-1/2	907480-C6	79.10
.080		.0800	**.240** (3x)	1/4	2-1/2	915980-C6	79.10
.090		.0900	**.135** (1.5x)	1/4	2-1/2	907490-C6	79.10
.090		.0900	**.270** (3x)	1/4	2-1/2	915990-C6	78.30
.093 (3/32)		.0930	**.074** (0.8x)	1/4	2-1/2	859493-C6	83.00
.093 (3/32)		.0930	**.140** (1.5x)	1/4	2-1/2	907493-C6	79.50
.093 (3/32)		.0930	**.279** (3x)	1/4	2-1/2	915993-C6	79.50
.093 (3/32)		.0930	**.372** (4x)	1/4	2-1/2	824993-C6	83.60
.093 (3/32)		.0930	**.500** (5x)	1/4	2-1/2	885293-C6	86.20
.100		.1000	**.150** (1.5x)	1/4	2-1/2	907500-C6	79.50
.100		.1000	**.300** (3x)	1/4	2-1/2	916000-C6	79.50
.109 (7/64)		.1090	**.164** (1.5x)	1/4	2-1/2	907502-C6	80.10
.109 (7/64)		.1090	**.327** (3x)	1/4	2-1/2	916002-C6	80.10
.109 (7/64)		.1090	**.570** (5x)	1/4	2-1/2	885302-C6	86.80
.118		.1180	**.177** (1.5x)	1/4	2-1/2	907505-C6	80.90
.118		.1180	**.354** (3x)	1/4	2-1/2	916005-C6	80.90
	3.0 mm	.1181	**9.00 mm** (3x)	6 mm	63 mm	897857-C6	88.50

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.125 (1/8)		.1250	**.100** (0.8x)	1/4	2-1/2	859508-C6	83.90
.125 (1/8)		.1250	**.187** (1.5x)	1/4	2-1/2	907508-C6	80.30
.125 (1/8)		.1250	**.375** (3x)	1/4	2-1/2	916008-C6	80.30
.125 (1/8)		.1250	**.500** (4x)	1/4	2-1/2	825008-C6	84.40
.125 (1/8)		.1250	**.625** (5x)	1/4	2-1/2	885308-C6	87.30
.140 (9/64)		.1406	**.220** (1.5x)	1/4	2-1/2	907509-C6	84.50
.140 (9/64)		.1406	**.425** (3x)	1/4	2-1/2	916009-C6	84.50
.140 (9/64)		.1406	**.750** (5x)	1/4	2-1/2	885309-C6	88.00
.156 (5/32)		.1562	**.125** (0.8x)	1/4	2-1/2	859510-C6	83.90
.156 (5/32)		.1562	**.235** (1.5x)	1/4	2-1/2	907510-C6	80.30
.156 (5/32)		.1562	**.468** (3x)	1/4	2-1/2	916010-C6	80.30
.156 (5/32)		.1562	**.625** (4x)	1/4	2-1/2	825010-C6	84.40

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END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc (cont.)

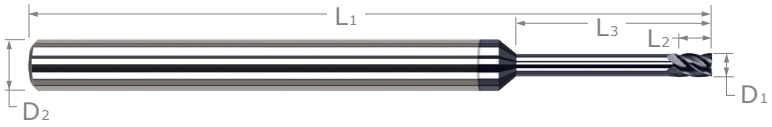
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CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.156 (5/32)		.1562	**.750** (5x)	1/4	3	885310-C6	88.00
.172 (11/64)		.1718	**.516** (3x)	1/4	2-1/2	916011-C6	87.00
.187 (3/16)		.1875	**.150** (0.8x)	1/4	2-1/2	859512-C6	85.70
.187 (3/16)		.1875	**.285** (1.5x)	1/4	2-1/2	907512-C6	83.60
.187 (3/16)		.1875	**.562** (3x)	1/4	2-1/2	916012-C6	83.60
.187 (3/16)		.1875	**.750** (4x)	1/4	3	825012-C6	87.00
.187 (3/16)		.1875	**1.000** (5x)	1/4	3	885312-C6	92.10
.218 (7/32)		.2187	**.656** (3x)	1/4	2-1/2	916014-C6	87.00
	6.0 mm	.2362	**18.00 mm** (3x)	6 mm	63 mm	897866-C6	89.40
.250 (1/4)		.2500	**.200** (0.8x)	1/4	2-1/2	859516-C6	95.30
.250 (1/4)		.2500	**.375** (1.5x)	1/4	2-1/2	907516-C6	93.10
.250 (1/4)		.2500	**.750** (3x)	1/4	2-1/2	916016-C6	93.10
.250 (1/4)		.2500	**1.250** (5x)	1/4	4	885316-C6	101.20
.312 (5/16)		.3125	**.470** (1.5x)	5/16	2-1/2	907520-C6	101.40
.312 (5/16)		.3125	**1.000** (3x)	5/16	2-1/2	916020-C6	102.60
.375 (3/8)		.3750	**.570** (1.5x)	3/8	2-1/2	907524-C6	117.20
.375 (3/8)		.3750	**1.125** (3x)	3/8	2-1/2	916024-C6	117.20
.500 (1/2)		.5000	**.750** (1.5x)	1/2	3	907532-C6	141.70
.500 (1/2)		.5000	**1.500** (3x)	1/2	3	916032-C6	143.00

Please see Speeds & Feeds on page 121

END MILLS FOR HARDENED STEELS

Square – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

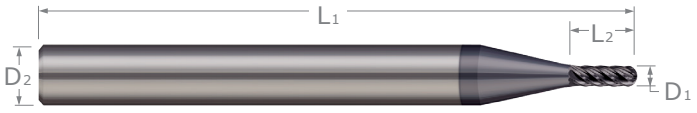
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.031 (1/32)	.047	**.156** (5x)	1/4	2-1/2	825331-C6	84.40
.031 (1/32)	.047	**.250** (8x)	1/4	2-1/2	819031-C6	91.10
.047 (3/64)	.071	**.250** (5x)	1/4	2-1/2	825347-C6	84.40
.047 (3/64)	.071	**.375** (8x)	1/4	2-1/2	819047-C6	91.10
.062 (1/16)	.093	**.312** (5x)	1/4	2-1/2	825362-C6	84.40
.062 (1/16)	.093	**.500** (8x)	1/4	2-1/2	819062-C6	91.10
.078 (5/64)	.117	**.406** (5x)	1/4	2-1/2	825378-C6	84.40
.078 (5/64)	.117	**.625** (8x)	1/4	2-1/2	819078-C6	92.10
.093 (3/32)	.140	**.500** (5x)	1/4	2-1/2	825393-C6	89.10
.093 (3/32)	.140	**.750** (8x)	1/4	2-1/2	819093-C6	95.70
.109 (7/64)	.164	**.570** (5x)	1/4	2-1/2	825402-C6	89.10
.109 (7/64)	.164	**.900** (8x)	1/4	2-1/2	819102-C6	95.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.125 (1/8)	.187	**.625** (5x)	1/4	2-1/2	825408-C6	90.00
.125 (1/8)	.187	**1.000** (8x)	1/4	2-1/2	819108-C6	96.70
.156 (5/32)	.235	**.750** (5x)	1/4	3	825410-C6	94.90
.156 (5/32)	.235	**1.250** (8x)	1/4	3	819110-C6	101.40
.187 (3/16)	.285	**1.000** (5x)	1/4	3	825412-C6	94.90
.187 (3/16)	.285	**1.500** (8x)	1/4	3	819112-C6	101.40
.250 (1/4)	.375	**1.250** (5x)	1/4	4	825416-C6	99.30
.250 (1/4)	.375	**2.000** (8x)	1/4	4	819116-C6	106.30

Please see Speeds & Feeds on page 122

NEW SIZES!

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc



6 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Ball profile for maximum strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$	
.031 (1/32)	.025 (0.8x)	1/4	2-1/2	704931-C6	59.40	
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	798131-C6	55.10	
.031 (1/32)	.093 (3x)	1/4	2-1/2	843431-C6	55.10	
.031 (1/32)	.156 (5x)	1/4	2-1/2	789431-C6	59.20	
.039	.059 (1.5x)	1/4	2-1/2	798139-C6	55.10	
.039	.117 (3x)	1/4	2-1/2	843439-C6	55.10	
.040	.060 (1.5x)	1/4	2-1/2	798140-C6	55.10	NEW
.040	.120 (3x)	1/4	2-1/2	843440-C6	55.10	
.047 (3/64)	.038 (0.8x)	1/4	2-1/2	704947-C6	59.40	
.047 (3/64)	.071 (1.5x)	1/4	2-1/2	798147-C6	55.10	
.047 (3/64)	.141 (3x)	1/4	2-1/2	843447-C6	55.10	
.047 (3/64)	.250 (5x)	1/4	2-1/2	789447-C6	59.20	
.050	.075 (1.5x)	1/4	2-1/2	798150-C6	55.10	NEW
.050	.150 (3x)	1/4	2-1/2	843450-C6	55.10	NEW
.060	.090 (1.5x)	1/4	2-1/2	798160-C6	55.10	NEW
.060	.180 (3x)	1/4	2-1/2	843460-C6	55.10	NEW
.062 (1/16)	.050 (0.8x)	1/4	2-1/2	704962-C6	56.50	
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	798162-C6	52.30	
.062 (1/16)	.186 (3x)	1/4	2-1/2	843462-C6	52.30	
.062 (1/16)	.250 (4x)	1/4	2-1/2	718962-C6	55.70	
.062 (1/16)	.312 (5x)	1/4	2-1/2	789462-C6	59.20	
.078 (5/64)	.062 (0.8x)	1/4	2-1/2	704978-C6	56.50	
.078 (5/64)	.117 (1.5x)	1/4	2-1/2	798178-C6	52.30	
.078 (5/64)	.234 (3x)	1/4	2-1/2	843478-C6	52.30	
.078 (5/64)	.406 (5x)	1/4	2-1/2	789478-C6	59.20	
.093 (3/32)	.074 (0.8x)	1/4	2-1/2	704993-C6	56.50	
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	798193-C6	52.30	
.093 (3/32)	.279 (3x)	1/4	2-1/2	843493-C6	52.30	
.093 (3/32)	.375 (4x)	1/4	2-1/2	718993-C6	55.70	
.093 (3/32)	.500 (5x)	1/4	2-1/2	789493-C6	59.20	
.109 (7/64)	.327 (3x)	1/4	2-1/2	843502-C6	52.30	
.118	.177 (1.5x)	1/4	2-1/2	798205-C6	52.30	
.118	.354 (3x)	1/4	2-1/2	843505-C6	52.30	

continued on next page

Please see Speeds & Feeds on page 117

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.125 (1/8)	.100 (0.8x)	1/4	2-1/2	705008-C6	52.10
.125 (1/8)	.187 (1.5x)	1/4	2-1/2	798208-C6	48.00
.125 (1/8)	.375 (3x)	1/4	2-1/2	843508-C6	48.00
.125 (1/8)	.500 (4x)	1/4	2-1/2	719008-C6	51.40
.125 (1/8)	.625 (5x)	1/4	2-1/2	789508-C6	54.80
.140 (9/64)	.220 (1.5x)	1/4	2-1/2	798209-C6	53.00
.140 (9/64)	.425 (3x)	1/4	2-1/2	843509-C6	53.00
.156 (5/32)	.235 (1.5x)	1/4	2-1/2	798210-C6	49.40
.156 (5/32)	.468 (3x)	1/4	2-1/2	843510-C6	49.40
.156 (5/32)	.750 (5x)	1/4	3	789510-C6	59.40
.187 (3/16)	.150 (0.8x)	1/4	2-1/2	705012-C6	55.20
.187 (3/16)	.285 (1.5x)	1/4	2-1/2	798212-C6	51.00
.187 (3/16)	.562 (3x)	1/4	2-1/2	843512-C6	51.00
.187 (3/16)	1.000 (5x)	1/4	3	789512-C6	59.40
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	798216-C6	61.80
.250 (1/4)	.750 (3x)	1/4	2-1/2	843516-C6	61.80
.375 (3/8)	1.125 (3x)	3/8	2-1/2	843524-C6	97.60

Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00049	.00061	.00073	.00097	1 x Dia	.30 x Dia
			Profiling	.00004	.00007	.00011	.00015	.00018	.00022	.00029	.00044	.00059	.00073	.00088	.00118	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	.00039	.00047	.00062	1 x Dia	.15 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	.00043	.00051	.00068	.15 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Ball – For Steels Up to 55 Rc – Long Reach, Stub Flute



6 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 6 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.031 (1/32)	.047	**.156** (5x)	1/4	2-1/2	786231-C6	83.70
.031 (1/32)	.047	**.250** (8x)	1/4	2-1/2	786031-C6	90.30
.047 (3/64)	.071	**.250** (5x)	1/4	2-1/2	786247-C6	86.90
.047 (3/64)	.071	**.375** (8x)	1/4	2-1/2	786047-C6	93.90
.062 (1/16)	.093	**.312** (5x)	1/4	2-1/2	786262-C6	86.10
.062 (1/16)	.093	**.500** (8x)	1/4	2-1/2	786062-C6	93.00
.078 (5/64)	.117	**.406** (5x)	1/4	2-1/2	786278-C6	89.40
.078 (5/64)	.117	**.625** (8x)	1/4	2-1/2	786078-C6	96.40
.093 (3/32)	.140	**.500** (5x)	1/4	2-1/2	786293-C6	90.80
.093 (3/32)	.140	**.750** (8x)	1/4	2-1/2	786093-C6	98.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.125 (1/8)	.187	**.625** (5x)	1/4	2-1/2	786308-C6	91.80
.125 (1/8)	.187	**1.000** (8x)	1/4	2-1/2	786108-C6	98.60
.187 (3/16)	.285	**1.000** (5x)	1/4	3	786312-C6	97.60
.187 (3/16)	.285	**1.500** (8x)	1/4	3	786112-C6	104.60

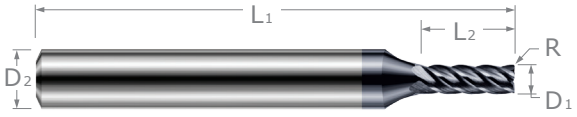
Speeds & Feeds (End Mills for Hardened Steels – Ball – For Steels Up to 55Rc – Long Reach, Stub Flute)

Important Note: Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels	38 - 44 Rc	100	Slotting	.00003	.00005	.00008	.00011	.00013	.00016	.00022	.00032	.00043	.00054	.00065	.00086	1 x Dia	.28 x Dia
			Profiling	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	.00065	.00078	.00105	1 x Dia	.28 x Dia
Titanium Alloys	45 - 55 Rc	60	Slotting	.00002	.00003	.00005	.00007	.00009	.00010	.00014	.00021	.00028	.00035	.00041	.00055	1 x Dia	.14 x Dia
Nickel Alloys			Profiling	.00002	.00004	.00006	.00008	.00009	.00011	.00015	.00023	.00030	.00038	.00046	.00061	1 x Dia	.14 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Corner radius for improved strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.015 (1/64)		.0150	**.003**	.045 (3x)	1/4	2-1/2	760415-C6	76.70
.020		.0200	**.005**	.030 (1.5x)	1/4	2-1/2	920420-C6	75.70
.020		.0200	**.005**	.060 (3x)	1/4	2-1/2	933220-C6	76.00
.031 (1/32)		.0310	**.005**	.025 (0.8x)	1/4	2-1/2	718731-C6	78.30
.031 (1/32)		.0310	**.005**	.047 (1.5x)	1/4	2-1/2	920431-C6	74.80
.031 (1/32)		.0310	**.005**	.093 (3x)	1/4	2-1/2	933231-C6	74.80
.031 (1/32)		.0310	**.005**	.156 (5x)	1/4	2-1/2	851731-C6	81.70
.031 (1/32)		.0310	**.010**	.093 (3x)	1/4	2-1/2	852131-C6	74.80
.039		.0390	**.005**	.117 (3x)	1/4	2-1/2	933239-C6	76.00
	1.0 mm	.0393	**.20 mm**	3.00 mm (3x)	6 mm	63 mm	894622-C6	82.90
.040		.0400	**.005**	.060 (1.5x)	1/4	2-1/2	920440-C6	75.40
.040		.0400	**.005**	.120 (3x)	1/4	2-1/2	933240-C6	75.40
.040		.0400	**.010**	.060 (1.5x)	1/4	2-1/2	872740-C6	75.40
.040		.0400	**.010**	.120 (3x)	1/4	2-1/2	852140-C6	75.40
.047 (3/64)		.0470	**.005**	.071 (1.5x)	1/4	2-1/2	920447-C6	74.80
.047 (3/64)		.0470	**.005**	.141 (3x)	1/4	2-1/2	933247-C6	74.80
.047 (3/64)		.0470	**.005**	.250 (5x)	1/4	2-1/2	851747-C6	81.70
.047 (3/64)		.0470	**.010**	.071 (1.5x)	1/4	2-1/2	872747-C6	74.80
.047 (3/64)		.0470	**.010**	.141 (3x)	1/4	2-1/2	852147-C6	74.80
.047 (3/64)		.0470	**.010**	.250 (5x)	1/4	2-1/2	750047-C6	82.40
.047 (3/64)		.0470	**.015**	.071 (1.5x)	1/4	2-1/2	706147-C6	74.80
.047 (3/64)		.0470	**.015**	.141 (3x)	1/4	2-1/2	852747-C6	74.80
.050		.0500	**.005**	.150 (3x)	1/4	2-1/2	933250-C6	75.40
.060		.0600	**.005**	.090 (1.5x)	1/4	2-1/2	920460-C6	75.70
.060		.0600	**.005**	.180 (3x)	1/4	2-1/2	933260-C6	75.40
.062 (1/16)		.0620	**.005**	.050 (0.8x)	1/4	2-1/2	718762-C6	79.20
.062 (1/16)		.0620	**.005**	.093 (1.5x)	1/4	2-1/2	920462-C6	75.70
.062 (1/16)		.0620	**.005**	.186 (3x)	1/4	2-1/2	933262-C6	74.80
.062 (1/16)		.0620	**.005**	.312 (5x)	1/4	2-1/2	851762-C6	81.70
.062 (1/16)		.0620	**.010**	.093 (1.5x)	1/4	2-1/2	872762-C6	74.80
.062 (1/16)		.0620	**.010**	.186 (3x)	1/4	2-1/2	852162-C6	74.80
.062 (1/16)		.0620	**.010**	.312 (5x)	1/4	2-1/2	750062-C6	82.40
.062 (1/16)		.0620	**.020**	.093 (1.5x)	1/4	2-1/2	705962-C6	74.80
.062 (1/16)		.0620	**.020**	.186 (3x)	1/4	2-1/2	813562-C6	74.80
.070		.0700	**.005**	.210 (3x)	1/4	2-1/2	933270-C6	79.00

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END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	D_1 decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED 5 FL	USD$
.078 (5/64)		.0780	**.005**	.117 (1.5x)	1/4	2-1/2	920478-C6	78.30
.078 (5/64)		.0780	**.005**	.234 (3x)	1/4	2-1/2	933278-C6	78.30
.078 (5/64)		.0780	**.005**	.406 (5x)	1/4	2-1/2	851778-C6	85.30
.078 (5/64)		.0780	**.010**	.117 (1.5x)	1/4	2-1/2	872778-C6	78.30
.078 (5/64)		.0780	**.010**	.234 (3x)	1/4	2-1/2	852178-C6	78.30
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	6 mm	63 mm	894645-C6	87.70
.080		.0800	**.005**	.240 (3x)	1/4	2-1/2	933280-C6	80.10
.090		.0900	**.005**	.270 (3x)	1/4	2-1/2	933290-C6	81.00
.093 (3/32)		.0930	**.005**	.074 (0.8x)	1/4	2-1/2	718793-C6	83.00
.093 (3/32)		.0930	**.005**	.140 (1.5x)	1/4	2-1/2	920493-C6	79.50
.093 (3/32)		.0930	**.005**	.279 (3x)	1/4	2-1/2	933293-C6	79.50
.093 (3/32)		.0930	**.005**	.372 (4x)	1/4	2-1/2	750893-C6	83.80
.093 (3/32)		.0930	**.005**	.500 (5x)	1/4	2-1/2	851793-C6	86.20
.093 (3/32)		.0930	**.010**	.140 (1.5x)	1/4	2-1/2	872793-C6	79.50
.093 (3/32)		.0930	**.010**	.279 (3x)	1/4	2-1/2	852193-C6	79.50
.093 (3/32)		.0930	**.010**	.500 (5x)	1/4	2-1/2	750093-C6	87.00
.093 (3/32)		.0930	**.015**	.279 (3x)	1/4	2-1/2	852793-C6	79.50
.093 (3/32)		.0930	**.020**	.140 (1.5x)	1/4	2-1/2	732093-C6	79.50
.093 (3/32)		.0930	**.020**	.279 (3x)	1/4	2-1/2	813593-C6	79.50
.093 (3/32)		.0930	**.030**	.279 (3x)	1/4	2-1/2	853293-C6	79.50
.100		.1000	**.005**	.300 (3x)	1/4	2-1/2	933300-C6	81.00
.109 (7/64)		.1090	**.005**	.327 (3x)	1/4	2-1/2	933302-C6	79.50
.118		.1180	**.005**	.177 (1.5x)	1/4	2-1/2	920505-C6	80.90
.118		.1180	**.005**	.354 (3x)	1/4	2-1/2	933305-C6	80.90
.118		.1180	**.010**	.354 (3x)	1/4	2-1/2	852205-C6	80.90
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	6 mm	63 mm	894657-C6	88.50

D_1 +.000″ −.002″	D_1 +.00mm −.04mm	D_1 decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.125 (1/8)		.1250	**.005**	.100 (0.8x)	1/4	2-1/2	718808-C6	83.90
.125 (1/8)		.1250	**.005**	.187 (1.5x)	1/4	2-1/2	920508-C6	80.30
.125 (1/8)		.1250	**.005**	.375 (3x)	1/4	2-1/2	933308-C6	80.30
.125 (1/8)		.1250	**.005**	.500 (4x)	1/4	2-1/2	750908-C6	84.50
.125 (1/8)		.1250	**.005**	.625 (5x)	1/4	2-1/2	851808-C6	87.30
.125 (1/8)		.1250	**.010**	.187 (1.5x)	1/4	2-1/2	872808-C6	81.20
.125 (1/8)		.1250	**.010**	.375 (3x)	1/4	2-1/2	852208-C6	80.30
.125 (1/8)		.1250	**.010**	.625 (5x)	1/4	2-1/2	781608-C6	87.30
.125 (1/8)		.1250	**.015**	.187 (1.5x)	1/4	2-1/2	798008-C6	81.20
.125 (1/8)		.1250	**.015**	.375 (3x)	1/4	2-1/2	852808-C6	80.30
.125 (1/8)		.1250	**.015**	.625 (5x)	1/4	2-1/2	730808-C6	87.30
.125 (1/8)		.1250	**.020**	.375 (3x)	1/4	2-1/2	813608-C6	80.30
.125 (1/8)		.1250	**.030**	.187 (1.5x)	1/4	2-1/2	761308-C6	81.20
.125 (1/8)		.1250	**.030**	.375 (3x)	1/4	2-1/2	853308-C6	80.30
.140 (9/64)		.1406	**.005**	.220 (1.5x)	1/4	2-1/2	920509-C6	81.20
.140 (9/64)		.1406	**.005**	.425 (3x)	1/4	2-1/2	933309-C6	80.30

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END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc (cont.)

continued from previous page

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm	D_2 (h6)	L_1	5 FL	USD$
.156 (5/32)		.1562	**.005**	.235 (1.5x)	1/4	2-1/2	920510-C6	80.30
.156 (5/32)		.1562	**.005**	.468 (3x)	1/4	2-1/2	933310-C6	80.30
.156 (5/32)		.1562	**.005**	.625 (4x)	1/4	2-1/2	750910-C6	80.30
.156 (5/32)		.1562	**.005**	.750 (5x)	1/4	3	851810-C6	87.30
.156 (5/32)		.1562	**.010**	.468 (3x)	1/4	2-1/2	852210-C6	81.20
.156 (5/32)		.1562	**.015**	.468 (3x)	1/4	2-1/2	852810-C6	80.30
.156 (5/32)		.1562	**.020**	.468 (3x)	1/4	2-1/2	813610-C6	80.30
.156 (5/32)		.1562	**.030**	.468 (3x)	1/4	2-1/2	853310-C6	80.30
.187 (3/16)		.1875	**.005**	.150 (0.8x)	1/4	2-1/2	718812-C6	87.00
.187 (3/16)		.1875	**.005**	.285 (1.5x)	1/4	2-1/2	920512-C6	83.60
.187 (3/16)		.1875	**.005**	.562 (3x)	1/4	2-1/2	933312-C6	83.60
.187 (3/16)		.1875	**.005**	1.000 (5x)	1/4	3	851812-C6	92.10
.187 (3/16)		.1875	**.010**	.562 (3x)	1/4	2-1/2	852212-C6	83.60
.187 (3/16)		.1875	**.015**	.285 (1.5x)	1/4	2-1/2	798012-C6	83.60
.187 (3/16)		.1875	**.015**	.562 (3x)	1/4	2-1/2	852812-C6	83.60
.187 (3/16)		.1875	**.020**	.562 (3x)	1/4	2-1/2	813612-C6	83.60
.187 (3/16)		.1875	**.030**	.285 (1.5x)	1/4	2-1/2	761312-C6	83.60
.187 (3/16)		.1875	**.030**	.562 (3x)	1/4	2-1/2	853312-C6	83.60
.187 (3/16)		.1875	**.060**	.562 (3x)	1/4	2-1/2	800712-C6	83.60
	6.0 mm	.2362	**.20 mm**	18.00 mm (3x)	6 mm	63 mm	894666-C6	89.40
.250 (1/4)		.2500	**.005**	.200 (0.8x)	1/4	2-1/2	718816-C6	96.60
.250 (1/4)		.2500	**.005**	.375 (1.5x)	1/4	2-1/2	920516-C6	93.10
.250 (1/4)		.2500	**.005**	.750 (3x)	1/4	2-1/2	933316-C6	93.10
.250 (1/4)		.2500	**.005**	1.250 (5x)	1/4	4	851816-C6	101.20
.250 (1/4)		.2500	**.010**	.750 (3x)	1/4	2-1/2	852216-C6	93.10
.250 (1/4)		.2500	**.015**	.375 (1.5x)	1/4	2-1/2	798016-C6	94.00
.250 (1/4)		.2500	**.015**	.750 (3x)	1/4	2-1/2	852816-C6	93.10
.250 (1/4)		.2500	**.020**	.750 (3x)	1/4	2-1/2	813616-C6	93.10
.250 (1/4)		.2500	**.030**	.375 (1.5x)	1/4	2-1/2	761316-C6	93.10
.250 (1/4)		.2500	**.030**	.750 (3x)	1/4	2-1/2	853316-C6	93.10
.312 (5/16)		.3125	**.015**	1.000 (3x)	5/16	2-1/2	852720-C6	109.50
.375 (3/8)		.3750	**.015**	.570 (1.5x)	3/8	2-1/2	798024-C6	120.20
.375 (3/8)		.3750	**.015**	1.125 (3x)	3/8	2-1/2	852824-C6	120.20
.500 (1/2)		.5000	**.015**	1.500 (3x)	1/2	3	852832-C6	146.70
.500 (1/2)		.5000	**.030**	1.500 (3x)	1/2	3	853332-C6	146.70

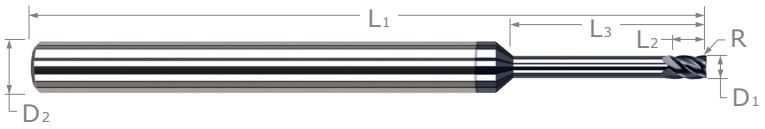
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 90%; for 5x, reduce to 85%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00007	.00010	.00013	.00017	.00020	.00027	.00040	.00054	.00067	.00081	.00108	1 x Dia	.30 x Dia
			Profiling	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00065	.00082	.00098	.00131	.3 x Dia	.5 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00009	.00011	.00013	.00017	.00026	.00035	.00043	.00052	.00069	1 x Dia	.15 x Dia
			Profiling	.00002	.00005	.00007	.00009	.00012	.00014	.00019	.00028	.00038	.00047	.00057	.00076	.15 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels Up to 55 Rc – Long Reach, Stub Flute



5 Flute, Variable Helix Design

- **Designed to mill hardened tool, die, and mold steels up to 55Rc**
- Also excellent for stainless steel, Inconel, titanium, and other high temperature alloys
- 5 flute, variable helix design (approx. 37°) for improved slotting and roughing
- Stub flute for maximum rigidity
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Increased shank diameter to maintain strength and stiffness • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.031 (1/32)	**.005**	.047	**.156** (5x)	1/4	2-1/2	812731-C6	85.30
.031 (1/32)	**.005**	.047	**.250** (8x)	1/4	2-1/2	812531-C6	91.10
.047 (3/64)	**.005**	.071	**.250** (5x)	1/4	2-1/2	812747-C6	84.40
.047 (3/64)	**.005**	.071	**.375** (8x)	1/4	2-1/2	812547-C6	92.10
.062 (1/16)	**.005**	.093	**.312** (5x)	1/4	2-1/2	812762-C6	84.40
.062 (1/16)	**.005**	.093	**.500** (8x)	1/4	2-1/2	812562-C6	91.10
.062 (1/16)	**.010**	.093	**.312** (5x)	1/4	2-1/2	761562-C6	85.30
.062 (1/16)	**.010**	.093	**.500** (8x)	1/4	2-1/2	763762-C6	92.10
.078 (5/64)	**.005**	.117	**.406** (5x)	1/4	2-1/2	812778-C6	85.30
.078 (5/64)	**.005**	.117	**.625** (8x)	1/4	2-1/2	812578-C6	92.10
.093 (3/32)	**.005**	.140	**.500** (5x)	1/4	2-1/2	812793-C6	89.10
.093 (3/32)	**.005**	.140	**.750** (8x)	1/4	2-1/2	812593-C6	95.70
.093 (3/32)	**.010**	.140	**.500** (5x)	1/4	2-1/2	761593-C6	90.00
.093 (3/32)	**.010**	.140	**.750** (8x)	1/4	2-1/2	763793-C6	95.70
.109 (7/64)	**.005**	.164	**.570** (5x)	1/4	2-1/2	812702-C6	90.00
.109 (7/64)	**.005**	.164	**.900** (8x)	1/4	2-1/2	812502-C6	95.70
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.125 (1/8)	**.005**	.187	**.625** (5x)	1/4	2-1/2	812808-C6	90.00
.125 (1/8)	**.005**	.187	**1.000** (8x)	1/4	2-1/2	812608-C6	96.70
.125 (1/8)	**.010**	.187	**.625** (5x)	1/4	2-1/2	761608-C6	90.00
.125 (1/8)	**.010**	.187	**1.000** (8x)	1/4	2-1/2	763808-C6	97.60
.156 (5/32)	**.005**	.235	**.750** (5x)	1/4	3	812810-C6	94.90
.156 (5/32)	**.005**	.235	**1.250** (8x)	1/4	3	812610-C6	101.40
.187 (3/16)	**.005**	.285	**1.000** (5x)	1/4	3	812812-C6	94.90
.187 (3/16)	**.005**	.285	**1.500** (8x)	1/4	3	812612-C6	101.40
.250 (1/4)	**.005**	.375	**1.250** (5x)	1/4	4	812816-C6	102.80
.250 (1/4)	**.005**	.375	**2.000** (8x)	1/4	4	812616-C6	110.50

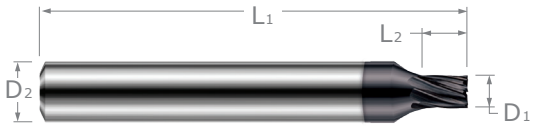
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius – For Steels Up to 55Rc – Long Reach, Stub Flute)

Important Note: Values in tables are in inches and are based on reached (8x Dia) end mills. For shorter reaches, tables values of IPT must be increased (for 5x, increase 125%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	38-44 Rc	100	Slotting	.00003	.00006	.00009	.00012	.00015	.00018	.00024	.00036	.00048	.00060	.00072	.00096	1 x Dia	.28 x Dia
			Profiling	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	.00072	.00087	.00116	1 x Dia	.28 x Dia
	45-55 Rc	60	Slotting	.00002	.00004	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00038	.00046	.00061	1 x Dia	.14 x Dia
			Profiling	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00025	.00034	.00042	.00051	.00068	1 x Dia	.14 x Dia

END MILLS FOR HARDENED STEELS

Square – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

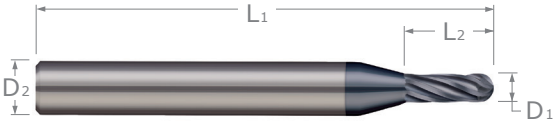
- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	USD$
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	835131-C6	78.20
.031 (1/32)	.093 (3x)	1/4	2-1/2	854831-C6	78.20
.039	.117 (3x)	1/4	2-1/2	854839-C6	79.00
.040	.120 (3x)	1/4	2-1/2	854840-C6	78.20
.047 (3/64)	.071 (1.5x)	1/4	2-1/2	835147-C6	78.20
.047 (3/64)	.141 (3x)	1/4	2-1/2	854847-C6	78.20
.060	.180 (3x)	1/4	2-1/2	854860-C6	79.00
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	835162-C6	78.20
.062 (1/16)	.186 (3x)	1/4	2-1/2	854862-C6	78.20
.062 (1/16)	.312 (5x)	1/4	2-1/2	797762-C6	78.20
.078 (5/64)	.117 (1.5x)	1/4	2-1/2	835178-C6	82.50
.078 (5/64)	.234 (3x)	1/4	2-1/2	854878-C6	82.50
.093 (3/32)	.074 (0.8x)	1/4	2-1/2	749893-C6	85.40
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	835193-C6	83.50
.093 (3/32)	.279 (3x)	1/4	2-1/2	854893-C6	83.50
.093 (3/32)	.500 (5x)	1/4	2-1/2	797793-C6	85.70
.118	.177 (1.5x)	1/4	2-1/2	835205-C6	84.20
.118	.354 (3x)	1/4	2-1/2	854905-C6	84.20
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	USD$
.125 (1/8)	.100 (0.8x)	1/4	2-1/2	749908-C6	86.60
.125 (1/8)	.187 (1.5x)	1/4	2-1/2	835208-C6	84.40
.125 (1/8)	.375 (3x)	1/4	2-1/2	854808-C6	84.40
.125 (1/8)	.625 (5x)	1/4	2-1/2	797808-C6	86.80
.156 (5/32)	.235 (1.5x)	1/4	2-1/2	835210-C6	91.20
.156 (5/32)	.468 (3x)	1/4	2-1/2	854810-C6	91.20
.187 (3/16)	.150 (0.8x)	1/4	2-1/2	749912-C6	90.00
.187 (3/16)	.285 (1.5x)	1/4	2-1/2	835212-C6	87.90
.187 (3/16)	.562 (3x)	1/4	2-1/2	854812-C6	87.90
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	835216-C6	97.80
.250 (1/4)	.750 (3x)	1/4	2-1/2	854816-C6	97.80
.250 (1/4)	1.250 (5x)	1/4	4	797816-C6	102.50
.375 (3/8)	.570 (1.5x)	3/8	2-1/2	835224-C6	122.20
.375 (3/8)	1.125 (3x)	3/8	2-1/2	854824-C6	122.20
.500 (1/2)	.750 (1.5x)	1/2	3	835232-C6	149.90
.500 (1/2)	1.500 (3x)	1/2	3	854832-C6	149.90

Please see Speeds & Feeds on page 126

END MILLS FOR HARDENED STEELS

Ball – For Steels 45 - 68 Rc



6 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 6 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.031 (1/32)	.047 (1.5x)	1/4	2-1/2	759131-C6	56.30
.031 (1/32)	.093 (3x)	1/4	2-1/2	763431-C6	56.30
.047 (3/64)	.071 (1.5x)	1/4	2-1/2	759147-C6	56.30
.047 (3/64)	.141 (3x)	1/4	2-1/2	763447-C6	56.30
.062 (1/16)	.093 (1.5x)	1/4	2-1/2	759162-C6	53.40
.062 (1/16)	.186 (3x)	1/4	2-1/2	763462-C6	53.40
.078 (5/64)	.117 (1.5x)	1/4	2-1/2	759178-C6	53.40
.078 (5/64)	.234 (3x)	1/4	2-1/2	763478-C6	53.40
.093 (3/32)	.140 (1.5x)	1/4	2-1/2	759193-C6	53.40
.093 (3/32)	.279 (3x)	1/4	2-1/2	763493-C6	53.40
.109 (7/64)	.327 (3x)	1/4	2-1/2	763502-C6	53.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.125 (1/8)	.188 (1.5x)	1/4	2-1/2	759208-C6	48.90
.125 (1/8)	.375 (3x)	1/4	2-1/2	763508-C6	48.90
.156 (5/32)	.469 (3x)	1/4	2-1/2	763510-C6	50.60
.187 (3/16)	.281 (1.5x)	1/4	2-1/2	759212-C6	52.00
.187 (3/16)	.563 (3x)	1/4	2-1/2	763512-C6	52.00
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	759216-C6	62.90
.250 (1/4)	.750 (3x)	1/4	2-1/2	763516-C6	62.90
.375 (3/8)	1.125 (3x)	3/8	2-1/2	763524-C6	96.40
.500 (1/2)	1.500 (3x)	1/2	3	763532-C6	140.30

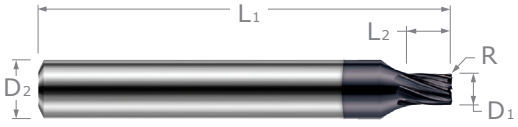
Speeds & Feeds (End Mills for Hardened Steels – Ball - For Steels 45 - 68Rc)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter length of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00009	.00013	.00017	.00021	.00026	.00034	.00051	.00069	.00086	.00103	.00137	.15 x Dia	.25 x Dia
			Finishing	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	.00104	.00125	.00166	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.12 x Dia	.20 x Dia
			Finishing	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00045	.00060	.00075	.00091	.00121	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc



7 Flute, Variable Helix Design

- **Designed to mill hardened steels between 45Rc and 68Rc (including stainless, tool, and mold steels)**
- 7 flute, variable helix design (approx. 20°) and specialized geometry for improved material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Corner radius for improved strength • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	7 FL	USD$
.030	**.005**	.045 (1.5x)	1/4	2-1/2	903130-C6	86.30
.030	**.005**	.090 (3x)	1/4	2-1/2	910830-C6	86.30
.031 (1/32)	**.005**	.047 (1.5x)	1/4	2-1/2	903131-C6	82.90
.031 (1/32)	**.005**	.093 (3x)	1/4	2-1/2	910831-C6	83.70
.031 (1/32)	**.005**	.156 (5x)	1/4	2-1/2	845231-C6	89.70
.040	**.005**	.120 (3x)	1/4	2-1/2	910840-C6	86.30
.047 (3/64)	**.005**	.071 (1.5x)	1/4	2-1/2	903147-C6	82.90
.047 (3/64)	**.005**	.141 (3x)	1/4	2-1/2	910847-C6	82.90
.047 (3/64)	**.010**	.141 (3x)	1/4	2-1/2	850547-C6	82.90
.050	**.005**	.150 (3x)	1/4	2-1/2	910850-C6	86.30
.060	**.005**	.180 (3x)	1/4	2-1/2	910860-C6	86.30
.062 (1/16)	**.005**	.050 (0.8x)	1/4	2-1/2	705762-C6	85.00
.062 (1/16)	**.005**	.093 (1.5x)	1/4	2-1/2	903162-C6	82.90
.062 (1/16)	**.005**	.186 (3x)	1/4	2-1/2	910862-C6	82.90
.062 (1/16)	**.005**	.312 (5x)	1/4	2-1/2	845262-C6	89.70
.062 (1/16)	**.010**	.093 (1.5x)	1/4	2-1/2	705562-C6	82.90
.062 (1/16)	**.010**	.186 (3x)	1/4	2-1/2	850562-C6	82.90
.062 (1/16)	**.020**	.093 (1.5x)	1/4	2-1/2	705362-C6	82.90
.062 (1/16)	**.020**	.186 (3x)	1/4	2-1/2	705162-C6	82.90
.070	**.005**	.210 (3x)	1/4	2-1/2	910870-C6	85.50
.078 (5/64)	**.005**	.117 (1.5x)	1/4	2-1/2	903178-C6	86.90
.078 (5/64)	**.005**	.234 (3x)	1/4	2-1/2	910878-C6	86.90
.078 (5/64)	**.010**	.117 (1.5x)	1/4	2-1/2	705578-C6	86.90
.080	**.005**	.240 (3x)	1/4	2-1/2	910880-C6	89.80
.090	**.005**	.270 (3x)	1/4	2-1/2	910890-C6	90.60
.093 (3/32)	**.005**	.140 (1.5x)	1/4	2-1/2	903193-C6	87.70
.093 (3/32)	**.005**	.279 (3x)	1/4	2-1/2	910893-C6	87.70
.093 (3/32)	**.005**	.500 (5x)	1/4	2-1/2	845293-C6	94.60
.093 (3/32)	**.010**	.279 (3x)	1/4	2-1/2	850593-C6	87.70
.093 (3/32)	**.020**	.140 (1.5x)	1/4	2-1/2	705393-C6	87.70
.093 (3/32)	**.020**	.279 (3x)	1/4	2-1/2	705193-C6	87.70
.100	**.005**	.300 (3x)	1/4	2-1/2	910900-C6	90.60
.109 (7/64)	**.005**	.327 (3x)	1/4	2-1/2	910902-C6	89.80
.118	**.005**	.354 (3x)	1/4	2-1/2	910905-C6	89.80

continued on next page

END MILLS FOR HARDENED STEELS

Corner Radius – For Steels 45 - 68 Rc (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	7 FL	USD$
.125 (1/8)	**.005**	.100 (0.8x)	1/4	2-1/2	705808-C6	91.00
.125 (1/8)	**.005**	.187 (1.5x)	1/4	2-1/2	903208-C6	89.00
.125 (1/8)	**.005**	.375 (3x)	1/4	2-1/2	910908-C6	89.00
.125 (1/8)	**.005**	.625 (5x)	1/4	2-1/2	845308-C6	89.00
.125 (1/8)	**.010**	.375 (3x)	1/4	2-1/2	850608-C6	89.90
.125 (1/8)	**.015**	.187 (1.5x)	1/4	2-1/2	879108-C6	89.00
.125 (1/8)	**.015**	.375 (3x)	1/4	2-1/2	882308-C6	89.00
.125 (1/8)	**.020**	.187 (1.5x)	1/4	2-1/2	705408-C6	89.00
.125 (1/8)	**.020**	.375 (3x)	1/4	2-1/2	705208-C6	89.00
.125 (1/8)	**.030**	.375 (3x)	1/4	2-1/2	883508-C6	89.00
.140 (9/64)	**.005**	.425 (3x)	1/4	2-1/2	910909-C6	91.80
.156 (5/32)	**.005**	.235 (1.5x)	1/4	2-1/2	903210-C6	89.00
.156 (5/32)	**.005**	.468 (3x)	1/4	2-1/2	910910-C6	89.00
.187 (3/16)	**.005**	.285 (1.5x)	1/4	2-1/2	903212-C6	92.70
.187 (3/16)	**.005**	.562 (3x)	1/4	2-1/2	910912-C6	92.70
.187 (3/16)	**.010**	.562 (3x)	1/4	2-1/2	850612-C6	92.70
.187 (3/16)	**.015**	.285 (1.5x)	1/4	2-1/2	879112-C6	92.70
.187 (3/16)	**.015**	.562 (3x)	1/4	2-1/2	882312-C6	92.70
.187 (3/16)	**.015**	1.000 (5x)	1/4	3	723212-C6	95.20
.187 (3/16)	**.020**	.285 (1.5x)	1/4	2-1/2	705412-C6	92.70
.187 (3/16)	**.020**	.562 (3x)	1/4	2-1/2	705212-C6	92.70
.187 (3/16)	**.030**	.562 (3x)	1/4	2-1/2	883512-C6	92.70
.250 (1/4)	**.005**	.200 (0.8x)	1/4	2-1/2	705816-C6	105.10
.250 (1/4)	**.005**	.375 (1.5x)	1/4	2-1/2	903216-C6	103.10
.250 (1/4)	**.005**	.750 (3x)	1/4	2-1/2	910916-C6	104.10
.250 (1/4)	**.010**	.750 (3x)	1/4	2-1/2	850616-C6	103.10
.250 (1/4)	**.015**	.375 (1.5x)	1/4	2-1/2	879116-C6	103.10
.250 (1/4)	**.015**	.750 (3x)	1/4	2-1/2	882316-C6	103.10
.250 (1/4)	**.030**	.750 (3x)	1/4	2-1/2	883516-C6	103.10
.312 (5/16)	**.015**	1.000 (3x)	5/16	2-1/2	882320-C6	107.20
.312 (5/16)	**.030**	1.000 (3x)	5/16	2-1/2	883520-C6	108.30
.375 (3/8)	**.015**	.570 (1.5x)	3/8	2-1/2	879124-C6	115.90
.375 (3/8)	**.015**	1.125 (3x)	3/8	2-1/2	882324-C6	115.90
.375 (3/8)	**.030**	.570 (1.5x)	3/8	2-1/2	868024-C6	115.90
.375 (3/8)	**.030**	1.125 (3x)	3/8	2-1/2	883524-C6	117.00
.500 (1/2)	**.015**	.750 (1.5x)	1/2	3	879132-C6	129.60
.500 (1/2)	**.015**	1.500 (3x)	1/2	3	882332-C6	129.60
.500 (1/2)	**.030**	.750 (1.5x)	1/2	3	868032-C6	129.60
.500 (1/2)	**.030**	1.500 (3x)	1/2	3	883532-C6	129.60

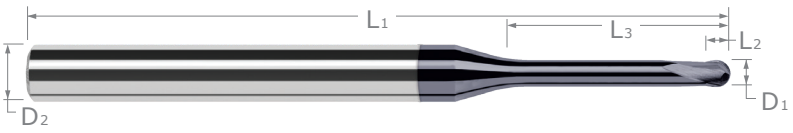
Speeds & Feeds (End Mills for Hardened Steels – Square & Corner Radius For Steels 45 - 68Rc)

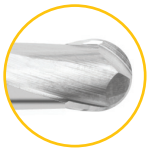
Important Note: Values intable are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 114%; for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
Hardened Steels Titanium Alloys Nickel Alloys	45 - 55 Rc	60	Semi-Roughing	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00047	.00062	.00078	.00094	.00125	.15 x Dia	.25 x Dia
			Finishing	.00005	.00009	.00014	.00019	.00024	.00028	.00038	.00056	.00076	.00094	.00113	.00151	.08 x Dia	.5 x Dia
	56 - 68 Rc	50	Semi-Roughing	.00003	.00006	.00009	.00012	.00016	.00019	.00025	.00037	.00050	.00062	.00075	.00100	.12 x Dia	.20 x Dia
			Finishing	.00003	.00007	.00010	.00014	.00017	.00020	.00027	.00041	.00055	.00069	.00082	.00110	.08 x Dia	.5 x Dia

END MILLS FOR HARDENED STEELS

Finishers – Ball





Stub Flute and
Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders • Center cutting
- Reduced neck diameter to avoid heeling • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	USD$	3 FL	USD$
.008		.0080	.006	**.012** (1.5x)	1/4	2-1/2	37808-C6	124.00		
.008		.0080	.006	**.025** (3x)	1/4	2-1/2	31408-C6	124.00		
.008		.0080	.006	**.040** (5x)	1/4	2-1/2	38708-C6	130.20		
.010		.0100	.008	**.015** (1.5x)	1/4	2-1/2	37810-C6	112.50		
.010		.0100	.008	**.031** (3x)	1/4	2-1/2	31410-C6	112.50		
.010		.0100	.008	**.050** (5x)	1/4	2-1/2	38710-C6	118.00		
.015 (1/64)		.0150	.012	**-**	1/4	2-1/2	958315-C6	94.50		
.015 (1/64)		.0150	.012	**.023** (1.5x)	1/4	2-1/2	37815-C6	88.50		
.015 (1/64)		.0150	.012	**.047** (3x)	1/4	2-1/2	31415-C6	88.50	813115-C6	95.20
.015 (1/64)		.0150	.012	**.062** (4x)	1/4	2-1/2	881515-C6	91.80		
.015 (1/64)		.0150	.012	**.078** (5x)	1/4	2-1/2	38715-C6	91.80	812915-C6	98.50
.015 (1/64)		.0150	.012	**.125** (8x)	1/4	2-1/2	32015-C6	98.20		
.015 (1/64)		.0150	.012	**.187** (12x)	1/4	2-1/2	33815-C6	121.40		
.020		.0200	.016	**-**	1/4	2-1/2	958320-C6	93.40		
.020		.0200	.016	**.031** (1.5x)	1/4	2-1/2	37820-C6	88.50		
.020		.0200	.016	**.062** (3x)	1/4	2-1/2	31420-C6	88.50		
.020		.0200	.016	**.080** (4x)	1/4	2-1/2	881520-C6	91.80		
.020		.0200	.016	**.100** (5x)	1/4	2-1/2	38720-C6	91.80		
.020		.0200	.016	**.160** (8x)	1/4	2-1/2	32020-C6	92.70		
.020		.0200	.016	**.200** (10x)	1/4	2-1/2	919120-C6	108.00		
.025		.0250	.020	**.038** (1.5x)	1/4	2-1/2	37825-C6	88.50		
.025		.0250	.020	**.075** (3x)	1/4	2-1/2	31425-C6	88.50		
.025		.0250	.020	**.125** (5x)	1/4	2-1/2	38725-C6	92.70		
.031 (1/32)		.0310	.025	**-**	1/4	2-1/2	958331-C6	80.30		
.031 (1/32)		.0310	.025	**.047** (1.5x)	1/4	2-1/2	37831-C6	75.70		
.031 (1/32)		.0310	.025	**.093** (3x)	1/4	2-1/2	31431-C6	75.70	813131-C6	81.50
.031 (1/32)		.0310	.025	**.125** (4x)	1/4	2-1/2	881531-C6	80.30		
.031 (1/32)		.0310	.025	**.156** (5x)	1/4	2-1/2	38731-C6	82.90	812931-C6	89.40
.031 (1/32)		.0310	.025	**.187** (6x)	1/4	2-1/2	858031-C6	84.40		
.031 (1/32)		.0310	.025	**.218** (7x)	1/4	2-1/2	863231-C6	85.80		
.031 (1/32)		.0310	.025	**.250** (8x)	1/4	2-1/2	32031-C6	87.40		
.031 (1/32)		.0310	.025	**.312** (10x)	1/4	2-1/2	919131-C6	104.10		
.031 (1/32)		.0310	.025	**.375** (12x)	1/4	2-1/2	33831-C6	104.10		
.031 (1/32)		.0310	.025	**.470** (15x)	1/4	2-1/2	973231-C6	119.70		

continued on next page

END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	USD$	3 FL	USD$
.039		.0390	.031	-	1/4	2-1/2	958339-C6	81.20		
.039		.0390	.031	**.062** (1.5x)	1/4	2-1/2	37839-C6	75.70		
.039		.0390	.031	**.117** (3x)	1/4	2-1/2	31439-C6	75.70		
.039		.0390	.031	**.156** (4x)	1/4	2-1/2	881539-C6	82.90		
.039		.0390	.031	**.203** (5x)	1/4	2-1/2	38739-C6	82.90		
.039		.0390	.031	**.312** (8x)	1/4	2-1/2	32039-C6	87.40		
.039		.0390	.031	**.468** (12x)	1/4	2-1/2	33839-C6	104.10		
	1.0 mm	.0393	.80 mm	**3.00 mm** (3x)	6 mm	63 mm	882922-C6	82.90		
	1.0 mm	.0393	.80 mm	**5.00 mm** (5x)	6 mm	63 mm	881722-C6	90.60		
.040		.0400	.032	**.062** (1.5x)	1/4	2-1/2	37840-C6	75.70		
.040		.0400	.032	**.125** (3x)	1/4	2-1/2	31440-C6	76.40		
.047 (3/64)		.0470	.038	-	1/4	2-1/2	958347-C6	80.30		
.047 (3/64)		.0470	.038	**.071** (1.5x)	1/4	2-1/2	37847-C6	75.70		
.047 (3/64)		.0470	.038	**.141** (3x)	1/4	2-1/2	31447-C6	75.70	813147-C6	82.20
.047 (3/64)		.0470	.038	**.187** (4x)	1/4	2-1/2	881547-C6	82.90		
.047 (3/64)		.0470	.038	**.250** (5x)	1/4	2-1/2	38747-C6	82.90	812947-C6	89.40
.047 (3/64)		.0470	.038	**.375** (8x)	1/4	2-1/2	32047-C6	87.40		
.047 (3/64)		.0470	.038	**.470** (10x)	1/4	2-1/2	919147-C6	104.10		
.047 (3/64)		.0470	.038	**.564** (12x)	1/4	2-1/2	33847-C6	104.10		
.047 (3/64)		.0470	.038	**.710** (15x)	1/4	2-1/2	973247-C6	119.70		
.050		.0500	.040	**.078** (1.5x)	1/4	2-1/2	37850-C6	75.70		
.050		.0500	.040	**.150** (3x)	1/4	2-1/2	31450-C6	76.40		
.060		.0600	.048	**.093** (1.5x)	1/4	2-1/2	37860-C6	75.70		
.060		.0600	.048	**.180** (3x)	1/4	2-1/2	31460-C6	76.40		
.062 (1/16)		.0620	.050	-	1/4	2-1/2	958362-C6	80.30		
.062 (1/16)		.0620	.050	**.093** (1.5x)	1/4	2-1/2	37862-C6	75.70		
.062 (1/16)		.0620	.050	**.187** (3x)	1/4	2-1/2	31462-C6	75.70	813162-C6	81.50
.062 (1/16)		.0620	.050	**.250** (4x)	1/4	2-1/2	881562-C6	80.30		
.062 (1/16)		.0620	.050	**.312** (5x)	1/4	2-1/2	38762-C6	82.90	812962-C6	88.50
.062 (1/16)		.0620	.050	**.375** (6x)	1/4	2-1/2	858062-C6	84.40		
.062 (1/16)		.0620	.050	**.437** (7x)	1/4	2-1/2	863262-C6	85.80		
.062 (1/16)		.0620	.050	**.500** (8x)	1/4	2-1/2	32062-C6	87.40		
.062 (1/16)		.0620	.050	**.625** (10x)	1/4	2-1/2	919162-C6	113.50		
.062 (1/16)		.0620	.050	**.750** (12x)	1/4	4	33862-C6	113.50		
.062 (1/16)		.0620	.050	**.950** (15x)	1/4	4	973262-C6	129.30		
.078 (5/64)		.0780	.062	-	1/4	2-1/2	958378-C6	81.20		
.078 (5/64)		.0780	.062	**.117** (1.5x)	1/4	2-1/2	37878-C6	75.70		
.078 (5/64)		.0780	.062	**.234** (3x)	1/4	2-1/2	31478-C6	75.70	813178-C6	81.50
.078 (5/64)		.0780	.062	**.312** (4x)	1/4	2-1/2	881578-C6	83.70		
.078 (5/64)		.0780	.062	**.406** (5x)	1/4	2-1/2	38778-C6	82.90	812978-C6	89.40
.078 (5/64)		.0780	.062	**.625** (8x)	1/4	2-1/2	32078-C6	87.40		
.078 (5/64)		.0780	.062	**.781** (10x)	1/4	2-1/2	919178-C6	113.50		
.078 (5/64)		.0780	.062	**.937** (12x)	1/4	4	33878-C6	113.50		
.078 (5/64)		.0780	.062	**1.187** (15x)	1/4	4	973278-C6	129.30		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.0000″ −.0006″	+.000mm −.014mm	decimal equivalent	L_2 +.010″ −.000″ +.125mm −.000mm	L_3 +.010″ −.000″ +.125mm −.000mm	D_2 (h6)	L_1	2 FL	USD$	3 FL	USD$
	2.0 mm	.0787	1.60 mm	**6.00 mm** (3x)	6 mm	63 mm	882945-C6	82.90		
	2.0 mm	.0787	1.60 mm	**10.00 mm** (5x)	6 mm	63 mm	881745-C6	89.80		
.093 (3/32)		.0930	.074	**-**	1/4	2-1/2	958393-C6	80.30		
.093 (3/32)		.0930	.074	**.140** (1.5x)	1/4	2-1/2	37893-C6	75.70		
.093 (3/32)		.0930	.074	**.281** (3x)	1/4	2-1/2	31493-C6	75.70	813193-C6	81.50
.093 (3/32)		.0930	.074	**.375** (4x)	1/4	2-1/2	881593-C6	80.30		
.093 (3/32)		.0930	.074	**.500** (5x)	1/4	2-1/2	38793-C6	82.90	812993-C6	89.40
.093 (3/32)		.0930	.074	**.585** (6x)	1/4	2-1/2	858093-C6	85.30		
.093 (3/32)		.0930	.074	**.670** (7x)	1/4	2-1/2	863293-C6	86.70		
.093 (3/32)		.0930	.074	**.750** (8x)	1/4	2-1/2	32093-C6	87.40		
.093 (3/32)		.0930	.074	**.937** (10x)	1/4	4	919193-C6	113.50		
.093 (3/32)		.0930	.074	**1.125** (12x)	1/4	4	33893-C6	113.50		
.093 (3/32)		.0930	.074	**1.400** (15x)	1/4	4	973293-C6	129.30		
.118		.1180	.094	**.177** (1.5x)	1/4	2-1/2	37905-C6	85.70		
.118		.1180	.094	**.354** (3x)	1/4	2-1/2	31505-C6	85.70		
.118		.1180	.094	**.625** (5x)	1/4	2-1/2	38805-C6	96.40		
	3.0 mm	.1181	2.40 mm	**9.00 mm** (3x)	6 mm	63 mm	882957-C6	92.70		
	3.0 mm	.1181	2.40 mm	**15.00 mm** (5x)	6 mm	63 mm	881757-C6	104.60		
.125 (1/8)		.1250	.100	**-**	1/4	2-1/2	958408-C6	90.60		
.125 (1/8)		.1250	.100	**.187** (1.5x)	1/4	2-1/2	37908-C6	85.00		
.125 (1/8)		.1250	.100	**.375** (3x)	1/4	2-1/2	31508-C6	85.00	813208-C6	90.60
.125 (1/8)		.1250	.100	**.500** (4x)	1/4	2-1/2	881608-C6	94.00		
.125 (1/8)		.1250	.100	**.625** (5x)	1/4	2-1/2	38808-C6	96.40	813008-C6	102.20
.125 (1/8)		.1250	.100	**.750** (6x)	1/4	2-1/2	858108-C6	98.40		
.125 (1/8)		.1250	.100	**.875** (7x)	1/4	2-1/2	863308-C6	101.20		
.125 (1/8)		.1250	.100	**1.000** (8x)	1/4	2-1/2	32108-C6	102.20		
.125 (1/8)		.1250	.100	**1.250** (10x)	1/4	4	919208-C6	122.60		
.125 (1/8)		.1250	.100	**1.500** (12x)	1/4	4	33908-C6	122.60		
.125 (1/8)		.1250	.100	**1.875** (15x)	1/4	4	973308-C6	138.40		

D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	USD$	3 FL	USD$
.140 (9/64)		.1406	.112	**.220** (1.5x)	1/4	2-1/2	37909-C6	89.60		
.140 (9/64)		.1406	.112	**.425** (3x)	1/4	2-1/2			813209-C6	89.60
.156 (5/32)		.1560	.125	**.235** (1.5x)	1/4	2-1/2	37910-C6	85.00		
.156 (5/32)		.1560	.125	**.470** (3x)	1/4	2-1/2	31510-C6	85.00		
.156 (5/32)		.1560	.125	**.750** (5x)	1/4	2-1/2	38810-C6	96.40		
.187 (3/16)		.1870	.150	**-**	1/4	2-1/2	958412-C6	90.60		
.187 (3/16)		.1870	.150	**.285** (1.5x)	1/4	2-1/2	37912-C6	85.00		
.187 (3/16)		.1870	.150	**.570** (3x)	1/4	2-1/2	31512-C6	85.00	813212-C6	91.30
.187 (3/16)		.1870	.150	**.750** (4x)	1/4	2-1/2	881612-C6	97.30		
.187 (3/16)		.1870	.150	**1.000** (5x)	1/4	2-1/2	38812-C6	96.40	813012-C6	103.20
.187 (3/16)		.1870	.150	**1.500** (8x)	1/4	4	32112-C6	112.80		
.187 (3/16)		.1870	.150	**2.250** (12x)	1/4	4	33912-C6	138.40		
	6.0 mm	.2362	4.80 mm	**18.00 mm** (3x)	6 mm	63 mm	882966-C6	91.80		
	6.0 mm	.2362	4.80 mm	**30.00 mm** (5x)	6 mm	63 mm	881766-C6	104.60		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 +.000″ −.001″	+.000mm −.018mm	decimal equivalent	L_2 +.020″ −.000″ +.500mm −.000mm	L_3 +.020″ −.000″ +.500mm −.000mm	D_2 (h6)	L_1	2 FL	USD$	3 FL	USD$
.250 (1/4)		.2500	.200	-	1/4	2-1/2	958416-C6	90.60		
.250 (1/4)		.2500	.200	**.375** (1.5x)	1/4	2-1/2	37916-C6	85.00		
.250 (1/4)		.2500	.200	**.750** (3x)	1/4	2-1/2	31516-C6	96.40	813216-C6	103.20
.250 (1/4)		.2500	.200	**1.000** (4x)	1/4	2-1/2	881616-C6	97.30		
.250 (1/4)		.2500	.200	**1.250** (5x)	1/4	2-1/2	38816-C6	96.40	813016-C6	103.20
.250 (1/4)		.2500	.200	**1.500** (6x)	1/4	3	858116-C6	104.70		
.250 (1/4)		.2500	.200	**1.750** (7x)	1/4	3	863316-C6	105.60		
.250 (1/4)		.2500	.200	**2.000** (8x)	1/4	4	32116-C6	114.00		
.312 (5/16)		.3120	.250	**.470** (1.5x)	5/16	2-1/2	37920-C6	112.30		
.312 (5/16)		.3120	.250	**1.000** (3x)	5/16	2-1/2	31520-C6	118.70		
.375 (3/8)		.3750	.300	**.570** (1.5x)	3/8	2-1/2	37924-C6	119.70		
.375 (3/8)		.3750	.300	**1.125** (3x)	3/8	2-1/2	31524-C6	126.20		
.375 (3/8)		.3750	.300	**2.000** (5x)	3/8	4	38824-C6	142.60		

Guidelines For Milling Hardened Steels

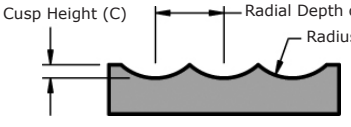
- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

Speeds & Feeds (End Mills for Hardened Steels – Ball)

Important Note: Values in table are in inches and are based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 3 Flutes, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial*	Axial
45-55 Rc	700	Finishing (.8x Reach)	.00028	.00058	.00088	.00116	.00146	.00174	.00234	.00350	.00468	.00584	.00702	.00936	.10 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00027	.00056	.00084	.00111	.00140	.00167	.00224	.00335	.00449	.00560	.00673	.00897	.10 x Dia	.04 x Dia
		Finishing (3x Reach)	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429	.00535	.00644	.00858	.10 x Dia	.04 x Dia
		Finishing (4x Reach)	.00025	.00051	.00077	.00102	.00128	.00152	.00205	.00306	.00410	.00511	.00614	.00819	.10 x Dia	.04 x Dia
		Finishing (5x Reach)	.00023	.00048	.00073	.00097	.00122	.00145	.00195	.00292	.00390	.00487	.00585	.00780	.10 x Dia	.04 x Dia
		Finishing (6x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.10 x Dia	.03 x Dia
		Finishing (7x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.10 x Dia	.03 x Dia
		Finishing (8x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.10 x Dia	.03 x Dia
		Finishing (10x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.10 x Dia	.02 x Dia
		Finishing (12x Reach)	.00016	.00034	.00051	.00068	.00085	.00102	.00137	.00204	.00273	.00341	.00410	.00546	.08 x Dia	.02 x Dia
		Finishing (15x Reach)	.00015	.00031	.00048	.00063	.00079	.00094	.00127	.00190	.00254	.00316	.00380	.00507	.08 x Dia	.01 x Dia
56-68 Rc	600	Finishing (.8x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.07 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.07 x Dia	.04 x Dia
		Finishing (3x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.07 x Dia	.04 x Dia
		Finishing (4x Reach)	.00020	.00041	.00062	.00081	.00102	.00122	.00164	.00245	.00328	.00409	.00491	.00655	.07 x Dia	.04 x Dia
		Finishing (5x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.07 x Dia	.04 x Dia
		Finishing (6x Reach)	.00018	.00037	.00056	.00074	.00093	.00111	.00150	.00224	.00300	.00374	.00449	.00599	.07 x Dia	.03 x Dia
		Finishing (7x Reach)	.00017	.00036	.00054	.00071	.00090	.00107	.00144	.00215	.00287	.00358	.00431	.00574	.07 x Dia	.03 x Dia
		Finishing (8x Reach)	.00016	.00034	.00052	.00068	.00086	.00102	.00137	.00205	.00275	.00343	.00412	.00549	.07 x Dia	.03 x Dia
		Finishing (10x Reach)	.00015	.00031	.00047	.00062	.0078	.00093	.00125	.00187	.00250	.00312	.00374	.00499	.07 x Dia	.02 x Dia
		Finishing (12x Reach)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	.00273	.00328	.00437	.06 x Dia	.02 x Dia
		Finishing (15x Reach)	.00012	.00025	.00038	.00050	.00063	.00075	.00101	.00152	.00203	.00253	.00304	.00406	.06 x Dia	.01 x Dia

* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish



$$P = 2\,[R^2-(C-R)^2]^{1/2}$$

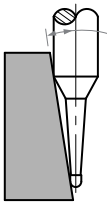
$$C = R-[R^2-(P^2/4)]^{1/2}$$

END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach



- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA

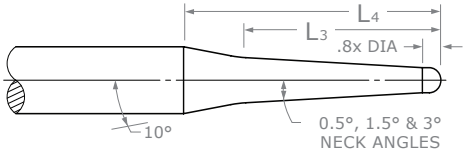


Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

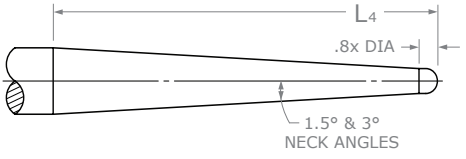
NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$
0.5°	.031 (1/32)	.025	I	**.093**	**.757**	8.4°	1/4	2-1/2	998703-C6	77.50
	.031 (1/32)	.025	I	**.156**	**.817**	7.8°	1/4	2-1/2	998706-C6	85.60
	.031 (1/32)	.025	I	**.250**	**.906**	7.0°	1/4	2-1/2	998709-C6	90.80
	.047 (3/64)	.038	I	**.156**	**.772**	7.7°	1/4	2-1/2	998712-C6	79.00
	.047 (3/64)	.038	I	**.250**	**.862**	6.9°	1/4	2-1/2	998715-C6	85.60
	.047 (3/64)	.038	I	**.375**	**.981**	6.1°	1/4	2-1/2	998718-C6	90.80
	.062 (1/16)	.050	I	**.312**	**.879**	6.4°	1/4	2-1/2	998721-C6	77.50
	.062 (1/16)	.050	I	**.500**	**1.057**	5.3°	1/4	2-1/2	998724-C6	85.60
	.062 (1/16)	.050	I	**.750**	**1.295**	4.3°	1/4	2-1/2	998727-C6	90.00
	.078 (5/64)	.062	I	**.437**	**.953**	5.4°	1/4	2-1/2	998730-C6	79.00
	.078 (5/64)	.062	I	**.625**	**1.131**	4.5°	1/4	2-1/2	998733-C6	85.60
	.078 (5/64)	.062	I	**1.000**	**1.488**	3.4°	1/4	3	998736-C6	99.50
	.093 (3/32)	.074	I	**.500**	**.971**	4.9°	1/4	2-1/2	998739-C6	77.50
	.093 (3/32)	.074	I	**.750**	**1.208**	3.9°	1/4	2-1/2	998742-C6	84.10
	.093 (3/32)	.074	I	**1.125**	**1.565**	3.0°	1/4	3	998745-C6	99.50
	.125 (1/8)	.100	I	**.625**	**1.000**	3.9°	1/4	2-1/2	998748-C6	83.80
	.125 (1/8)	.100	I	**1.000**	**1.357**	2.8°	1/4	2-1/2	998751-C6	84.70
	.125 (1/8)	.100	I	**1.500**	**1.832**	2.1°	1/4	3	998754-C6	101.00

continued on next page

TYPE I



TYPE II



END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach (cont.)

continued from previous page

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0000''}_{-.0006''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$
1.5°	.031 (1/32)	.025	I	**.250**	**.875**	7.3°	1/4	2-1/2	997407-C6	85.60
	.031 (1/32)	.025	I	**.500**	**1.088**	5.9°	1/4	2-1/2	997414-C6	90.80
	.047 (3/64)	.038	I	**.375**	**.938**	6.4°	1/4	2-1/2	997421-C6	84.10
	.062 (1/16)	.050	I	**.500**	**1.004**	5.6°	1/4	2-1/2	997428-C6	84.10
	.062 (1/16)	.050	I	**1.000**	**1.429**	3.9°	1/4	3	997435-C6	99.50
	.078 (5/64)	.062	I	**.625**	**1.066**	4.8°	1/4	2-1/2	997442-C6	85.60
	.078 (5/64)	.062	I	**1.250**	**1.599**	3.2°	1/4	3	997449-C6	99.50
	.093 (3/32)	.074	I	**.750**	**1.132**	4.2°	1/4	2-1/2	997456-C6	84.10
	.093 (3/32)	.074	I	**1.500**	**1.771**	2.7°	1/4	3	997463-C6	99.50
	.125 (1/8)	.100	I	**1.000**	**1.258**	3.0°	1/4	2-1/2	997470-C6	86.40
	.125 (1/8)	.100	II	**2.487**	**2.487**	1.5°	1/4	4	997477-C6	100.10
3.0°	.031 (1/32)	.025	I	**.312**	**.714**	8.9°	1/4	2-1/2	994907-C6	90.30
	.031 (1/32)	.025	I	**.750**	**1.067**	6.0°	1/4	2-1/2	994914-C6	92.10
	.047 (3/64)	.038	I	**.875**	**1.140**	5.2°	1/4	2-1/2	994921-C6	90.30
	.047 (3/64)	.038	I	**1.250**	**1.442**	4.1°	1/4	3	994928-C6	100.60
	.062 (1/16)	.050	I	**.875**	**1.114**	5.0°	1/4	2-1/2	994935-C6	89.50
	.062 (1/16)	.050	II	**1.844**	**1.844**	3.0°	1/4	3	994942-C6	100.60
	.078 (5/64)	.062	I	**1.125**	**1.288**	4.0°	1/4	2-1/2	994949-C6	89.50
	.078 (5/64)	.062	II	**1.703**	**1.703**	3.0°	1/4	3	994956-C6	99.50
	.093 (3/32)	.074	I	**1.000**	**1.162**	4.1°	1/4	2-1/2	994963-C6	89.50
	.093 (3/32)	.074	II	**1.572**	**1.572**	3.0°	1/4	3	994970-C6	100.60
	.125 (1/8)	.100	II	**1.293**	**1.293**	2.9°	1/4	2-1/2	994977-C6	99.10
	.125 (1/8)	.100	II	**2.485**	**2.485**	3.0°	3/8	4	994984-C6	144.00

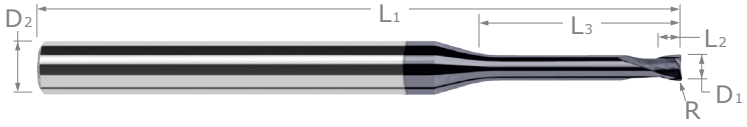


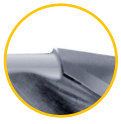
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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius





Reduced Neck Diameter to Avoid Heeling

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders • Center cutting
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$	4 FL	USD$
.010	**.002**	.008	**.015** (1.5x)	1/4	2-1/2	40210-C6	108.40		
.010	**.002**	.008	**.031** (3x)	1/4	2-1/2	30610-C6	108.40		
.015 (1/64)	**.002**	.012	**.023** (1.5x)	1/4	2-1/2	40215-C6	85.70	951415-C6	87.00
.015 (1/64)	**.002**	.012	**.047** (3x)	1/4	2-1/2	30615-C6	85.70		
.015 (1/64)	**.002**	.012	**.078** (5x)	1/4	2-1/2	40615-C6	95.70		
.015 (1/64)	**.002**	.012	**.125** (8x)	1/4	2-1/2	31015-C6	97.30		
.015 (1/64)	**.002**	.012	**.187** (12x)	1/4	2-1/2	33015-C6	115.30		
.020	**.004**	.016	**.031** (1.5x)	1/4	2-1/2	40220-C6	85.70	951420-C6	87.00
.020	**.004**	.016	**.062** (3x)	1/4	2-1/2	30620-C6	85.70	938720-C6	87.00
.020	**.004**	.016	**.100** (5x)	1/4	2-1/2	40620-C6	92.70	996320-C6	94.00
.025	**.004**	.020	**.038** (1.5x)	1/4	2-1/2	40225-C6	85.70		
.025	**.004**	.020	**.075** (3x)	1/4	2-1/2	30625-C6	85.70		
.025	**.004**	.020	**.125** (5x)	1/4	2-1/2	40625-C6	91.80		
.031 (1/32)	**.005**	.025	**.047** (1.5x)	1/4	2-1/2	40231-C6	75.70	951431-C6	77.10
.031 (1/32)	**.005**	.025	**.093** (3x)	1/4	2-1/2	30631-C6	74.80	938731-C6	76.40
.031 (1/32)	**.005**	.025	**.156** (5x)	1/4	2-1/2	40631-C6	81.90	996331-C6	82.90
.031 (1/32)	**.005**	.025	**.250** (8x)	1/4	2-1/2	31031-C6	86.70	999031-C6	88.10
.031 (1/32)	**.005**	.025	**.375** (12x)	1/4	2-1/2	33031-C6	98.70		
.031 (1/32)	**.005**	.025	**.470** (15x)	1/4	2-1/2	942431-C6	115.60		
.031 (1/32)	**.010**	.025	**.093** (3x)	1/4	2-1/2	982631-C6	78.30		
.031 (1/32)	**.010**	.025	**.156** (5x)	1/4	2-1/2	957431-C6	84.80		
.039 (1 mm)	**.005**	.031	**.062** (1.5x)	1/4	2-1/2	40239-C6	74.80	951439-C6	77.10
.039 (1 mm)	**.005**	.031	**.117** (3x)	1/4	2-1/2	30639-C6	75.70	938739-C6	77.10
.039 (1 mm)	**.005**	.031	**.203** (5x)	1/4	2-1/2	40639-C6	81.20	996339-C6	82.90
.039 (1 mm)	**.005**	.031	**.312** (8x)	1/4	2-1/2	31039-C6	86.70		
.039 (1 mm)	**.005**	.031	**.468** (12x)	1/4	2-1/2	33039-C6	98.70		
.047 (3/64)	**.008**	.038	**.071** (1.5x)	1/4	2-1/2	40247-C6	74.80		
.047 (3/64)	**.008**	.038	**.141** (3x)	1/4	2-1/2	30647-C6	74.80	938747-C6	77.10
.047 (3/64)	**.008**	.038	**.250** (5x)	1/4	2-1/2	40647-C6	81.20	996347-C6	82.90
.047 (3/64)	**.008**	.038	**.375** (8x)	1/4	2-1/2	31047-C6	85.80	999047-C6	87.40
.047 (3/64)	**.008**	.038	**.564** (12x)	1/4	2-1/2	33047-C6	98.70		
.047 (3/64)	**.008**	.038	**.710** (15x)	1/4	2-1/2	942447-C6	115.60		

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.0000''}_{-.0006''}$	R $^{+.0002''}_{-.0002''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$	4 FL	USD$
.062 (1/16)	**.005**	.050	**.187** (3x)	1/4	2-1/2	893162-C6	74.80		
.062 (1/16)	**.010**	.050	**-**	1/4	2-1/2	870362-C6	73.80	862262-C6	75.20
.062 (1/16)	**.010**	.050	**.093** (1.5x)	1/4	2-1/2	40262-C6	74.80	951462-C6	76.40
.062 (1/16)	**.010**	.050	**.187** (3x)	1/4	2-1/2	30662-C6	74.80	938762-C6	76.40
.062 (1/16)	**.010**	.050	**.250** (4x)	1/4	2-1/2	784162-C6	78.30	783762-C6	79.90
.062 (1/16)	**.010**	.050	**.312** (5x)	1/4	2-1/2	40662-C6	81.20	996362-C6	82.90
.062 (1/16)	**.010**	.050	**.375** (6x)	1/4	2-1/2	783362-C6	83.50	782562-C6	85.20
.062 (1/16)	**.010**	.050	**.437** (7x)	1/4	2-1/2	782962-C6	85.00	782162-C6	86.40
.062 (1/16)	**.010**	.050	**.500** (8x)	1/4	2-1/2	31062-C6	85.80	999062-C6	87.40
.062 (1/16)	**.010**	.050	**.750** (12x)	1/4	4	33062-C6	110.90	924162-C6	112.30
.062 (1/16)	**.010**	.050	**.950** (15x)	1/4	4	942462-C6	127.40		
.062 (1/16)	**.020**	.050	**.187** (3x)	1/4	2-1/2	991562-C6	78.30		
.062 (1/16)	**.020**	.050	**.312** (5x)	1/4	2-1/2	953162-C6	84.00		
.078 (5/64)	**.010**	.062	**.117** (1.5x)	1/4	2-1/2	40278-C6	75.70		
.078 (5/64)	**.010**	.062	**.234** (3x)	1/4	2-1/2	30678-C6	74.80	938778-C6	77.10
.078 (5/64)	**.010**	.062	**.406** (5x)	1/4	2-1/2	40678-C6	81.20	996378-C6	82.90
.078 (5/64)	**.010**	.062	**.625** (8x)	1/4	2-1/2	31078-C6	86.70	999078-C6	87.40
.078 (5/64)	**.010**	.062	**.937** (12x)	1/4	4	33078-C6	110.90		
.093 (3/32)	**.005**	.074	**.281** (3x)	1/4	2-1/2	893193-C6	75.70		
.093 (3/32)	**.010**	.074	**.281** (3x)	1/4	2-1/2	982693-C6	75.70		
.093 (3/32)	**.015**	.074	**-**	1/4	2-1/2	850893-C6	73.80		
.093 (3/32)	**.015**	.074	**.140** (1.5x)	1/4	2-1/2	40293-C6	74.80	951493-C6	77.10
.093 (3/32)	**.015**	.074	**.281** (3x)	1/4	2-1/2	30693-C6	74.80	938793-C6	76.40
.093 (3/32)	**.015**	.074	**.375** (4x)	1/4	2-1/2	783993-C6	78.30	783593-C6	79.90
.093 (3/32)	**.015**	.074	**.500** (5x)	1/4	2-1/2	40693-C6	81.20	996393-C6	82.90
.093 (3/32)	**.015**	.074	**.585** (6x)	1/4	2-1/2	783193-C6	83.50	782393-C6	85.20
.093 (3/32)	**.015**	.074	**.670** (7x)	1/4	2-1/2	782793-C6	85.00	781993-C6	86.40
.093 (3/32)	**.015**	.074	**.750** (8x)	1/4	2-1/2	31093-C6	86.70	999093-C6	87.40
.093 (3/32)	**.015**	.074	**1.125** (12x)	1/4	4	33093-C6	110.90	924193-C6	112.30
.093 (3/32)	**.030**	.074	**.281** (3x)	1/4	2-1/2	963393-C6	78.30		
.093 (3/32)	**.030**	.074	**.500** (5x)	1/4	2-1/2	946393-C6	84.00		
.118 (3 mm)	**.015**	.094	**.177** (1.5x)	1/4	2-1/2	40305-C6	81.20		
.118 (3 mm)	**.015**	.094	**.354** (3x)	1/4	2-1/2	30705-C6	81.20		
.125 (1/8)	**.005**	.100	**.375** (3x)	1/4	2-1/2	893208-C6	81.20		
.125 (1/8)	**.010**	.100	**.375** (3x)	1/4	2-1/2	982708-C6	81.20		
.125 (1/8)	**.015**	.100	**-**	1/4	2-1/2	850908-C6	79.20		
.125 (1/8)	**.015**	.100	**.187** (1.5x)	1/4	2-1/2	40308-C6	80.30	951508-C6	81.70
.125 (1/8)	**.015**	.100	**.375** (3x)	1/4	2-1/2	30708-C6	80.30	938808-C6	81.70
.125 (1/8)	**.015**	.100	**.500** (4x)	1/4	2-1/2	784008-C6	85.10	783608-C6	88.00
.125 (1/8)	**.015**	.100	**.625** (5x)	1/4	2-1/2	40708-C6	88.10	996408-C6	96.40
.125 (1/8)	**.015**	.100	**.750** (6x)	1/4	2-1/2	783208-C6	90.90	782408-C6	99.00
.125 (1/8)	**.015**	.100	**.875** (7x)	1/4	2-1/2	782808-C6	92.80	782008-C6	100.60
.125 (1/8)	**.015**	.100	**1.000** (8x)	1/4	2-1/2	31108-C6	93.40	999108-C6	102.60
.125 (1/8)	**.015**	.100	**1.500** (12x)	1/4	4	33108-C6	118.70	924208-C6	127.90
.125 (1/8)	**.030**	.100	**.375** (3x)	1/4	2-1/2	963408-C6	83.10		
.125 (1/8)	**.030**	.100	**.625** (5x)	1/4	2-1/2	946408-C6	91.10	781808-C6	100.50

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED			
D_1 $^{+.000''}_{-.001''}$	R $^{+.0005''}_{-.0005''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$	4 FL	USD$
.156 (5/32)	**.015**	.125	**.235** (1.5x)	1/4	2-1/2	40310-C6	81.20		
.156 (5/32)	**.015**	.125	**.470** (3x)	1/4	2-1/2	30710-C6	80.30		
.187 (3/16)	**.015**	.150	**.285** (1.5x)	1/4	2-1/2	40312-C6	80.30	951512-C6	81.70
.187 (3/16)	**.015**	.150	**.570** (3x)	1/4	2-1/2	30712-C6	80.30	938812-C6	81.70
.187 (3/16)	**.015**	.150	**1.000** (5x)	1/4	2-1/2	40712-C6	88.10	996412-C6	96.40
.187 (3/16)	**.015**	.150	**1.500** (8x)	1/4	4	31112-C6	106.40		
.187 (3/16)	**.015**	.150	**2.250** (12x)	1/4	4	33112-C6	127.40		
.187 (3/16)	**.060**	.150	**.570** (3x)	1/4	2-1/2	939212-C6	93.10	934412-C6	100.40
.250 (1/4)	**.015**	.200	**.375** (1.5x)	1/4	2-1/2	40316-C6	80.30	951516-C6	81.70
.250 (1/4)	**.015**	.200	**.750** (3x)	1/4	2-1/2	30716-C6	84.20	938816-C6	92.10
.250 (1/4)	**.015**	.200	**1.000** (4x)	1/4	2-1/2	784016-C6	87.00	783616-C6	94.80
.250 (1/4)	**.015**	.200	**1.250** (5x)	1/4	2-1/2	40716-C6	88.10	996416-C6	96.70
.250 (1/4)	**.015**	.200	**2.000** (8x)	1/4	4	31116-C6	106.40		
.250 (1/4)	**.030**	.200	**1.000** (3x)	1/4	2-1/2			750716-C6	94.80
.250 (1/4)	**.060**	.200	**.750** (3x)	1/4	2-1/2	939216-C6	93.10	934416-C6	100.40
.312 (5/16)	**.030**	.250	**1.000** (3x)	5/16	2-1/2			938820-C6	101.40
.375 (3/8)	**.030**	.300	**.570** (1.5x)	3/8	2-1/2			951524-C6	113.80
.375 (3/8)	**.030**	.300	**1.125** (3x)	3/8	2-1/2			938824-C6	117.20
.375 (3/8)	**.030**	.300	**2.000** (5x)	3/8	4			996424-C6	122.90
.500 (1/2)	**.030**	.400	**1.500** (3x)	1/2	3			938832-C6	148.70

Guidelines For Milling Hardened Steels

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

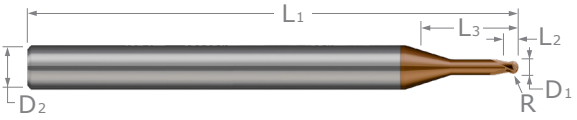
Speeds & Feeds (End Mills for Hardened Steels – Corner Radius)

Important Note: Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial
45-55 Rc	700	Finishing (0.8x Reach)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.00292	.00351	.00468	.35 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00013	.00028	.00042	.00056	.00070	.00083	.00112	.00168	.00224	.00280	.00336	.00449	.35 x Dia	.02 x Dia
		Finishing (3x Reach)	.00013	.00027	.00040	.00053	.00067	.00080	.00107	.00160	.00215	.00268	.00322	.00429	.35 x Dia	.02 x Dia
		Finishing (4x Reach)	.00013	.00025	.00039	.00050	.00064	.00077	.00103	.00153	.00205	.00255	.00308	.00410	.35 x Dia	.02 x Dia
		Finishing (5x Reach)	.00012	.00024	.00037	.00048	.00061	.00073	.00098	.00146	.00195	.00243	.00293	.00390	.35 x Dia	.02 x Dia
		Finishing (6x Reach)	.00012	.00023	.00036	.00046	.00059	.00070	.00094	.00140	.00187	.00233	.00281	.00374	.35 x Dia	.02 x Dia
		Finishing (7x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00270	.00359	.35 x Dia	.02 x Dia
		Finishing (8x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.35 x Dia	.02 x Dia
		Finishing (12x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00068	.00102	.00137	.00170	.00205	.00273	.35 x Dia	.01 x Dia
		Finishing (15x Reach)	.00008	.00016	.00024	.00031	.00040	.00047	.00063	.00095	.00127	.00158	.00190	.00254	.35 x Dia	.01 x Dia
56-68 Rc	600	Finishing (0.8x Reach)	.00011	.00023	.00035	.00046	.00058	.00070	.00094	.00140	.00187	.00234	.00281	.00374	.25 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00269	.00359	.25 x Dia	.02 x Dia
		Finishing (3x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.25 x Dia	.02 x Dia
		Finishing (4x Reach)	.00009	.00020	.00030	.00041	.00051	.00061	.00082	.00123	.00164	.00205	.00246	.00328	.25 x Dia	.02 x Dia
		Finishing (5x Reach)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	.00195	.00234	.00312	.25 x Dia	.02 x Dia
		Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00047	.00056	.00075	.00112	.00150	.00187	.00225	.00300	.25 x Dia	.02 x Dia
		Finishing (7x Reach)	.00008	.00017	.00027	.00036	.00045	.00053	.00072	.00108	.00144	.00179	.00215	.00287	.25 x Dia	.02 x Dia
		Finishing (8x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00137	.00171	.00206	.00275	.25 x Dia	.02 x Dia
		Finishing (12x Reach)	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00109	.00136	.00164	.00218	.25 x Dia	.01 x Dia
		Finishing (15x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00076	.00101	.00127	.00152	.00203	.25 x Dia	.01 x Dia

END MILLS FOR HARDENED STEELS

Finishers – Tight Tolerance – Ball



- Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc
- Tightly-toleranced radii offer unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- Ti Hard Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in hardened steels
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • Solid carbide • CNC ground in Switzerland

CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	Ti HARD NANO COATED	
D_1 $^{-.002mm}_{-.010mm}$	R $^{+.002mm}_{-.002mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
.30 mm	.15 mm	.25 mm	1 mm (3x)	4 mm	50 mm	688206-C12	56.10
.30 mm	.15 mm	.25 mm	1 mm (3x)	6 mm	55 mm	687606-C12	63.70
.40 mm	.20 mm	.30 mm	2 mm (5x)	4 mm	50 mm	688009-C12	56.10
.40 mm	.20 mm	.30 mm	2 mm (5x)	6 mm	55 mm	687409-C12	63.70
.50 mm	.25 mm	.40 mm	2 mm (4x)	4 mm	50 mm	688111-C12	52.80
.50 mm	.25 mm	.40 mm	2 mm (4x)	6 mm	55 mm	687511-C12	60.40
.60 mm	.30 mm	.50 mm	2 mm (3x)	4 mm	50 mm	688213-C12	52.80
.60 mm	.30 mm	.50 mm	2 mm (3x)	6 mm	55 mm	687613-C12	60.40
.60 mm	.30 mm	.50 mm	3 mm (5x)	4 mm	50 mm	688013-C12	52.80
.60 mm	.30 mm	.50 mm	3 mm (5x)	6 mm	55 mm	687413-C12	60.40
.60 mm	.30 mm	.50 mm	4 mm (6x)	6 mm	55 mm	687313-C12	59.40
.80 mm	.40 mm	.60 mm	2 mm (2x)	4 mm	50 mm	688318-C12	52.80
.80 mm	.40 mm	.60 mm	2 mm (2x)	6 mm	55 mm	687718-C12	60.40
.80 mm	.40 mm	.60 mm	4 mm (5x)	4 mm	50 mm	688018-C12	52.80
.80 mm	.40 mm	.60 mm	4 mm (5x)	6 mm	55 mm	687418-C12	60.40
.80 mm	.40 mm	.60 mm	8 mm (10x)	6 mm	55 mm	687018-C12	59.40
1.00 mm	.50 mm	.80 mm	3 mm (3x)	4 mm	50 mm	688222-C12	52.80
1.00 mm	.50 mm	.80 mm	3 mm (3x)	6 mm	55 mm	687622-C12	60.40
1.00 mm	.50 mm	.80 mm	4 mm (4x)	4 mm	50 mm	688122-C12	52.80
1.00 mm	.50 mm	.80 mm	4 mm (4x)	6 mm	55 mm	687522-C12	60.40
1.00 mm	.50 mm	.80 mm	5 mm (5x)	4 mm	50 mm	688022-C12	52.80
1.00 mm	.50 mm	.80 mm	5 mm (5x)	6 mm	55 mm	687422-C12	60.40
1.00 mm	.50 mm	.80 mm	6 mm (6x)	4 mm	50 mm	687922-C12	52.80
1.00 mm	.50 mm	.80 mm	6 mm (6x)	6 mm	55 mm	687322-C12	60.40
1.00 mm	.50 mm	.80 mm	8 mm (8x)	4 mm	50 mm	687822-C12	52.80
1.00 mm	.50 mm	.80 mm	8 mm (8x)	6 mm	55 mm	687122-C12	60.40
1.00 mm	.50 mm	.80 mm	10 mm (10x)	6 mm	65 mm	687022-C12	62.60
1.00 mm	.50 mm	.80 mm	12 mm (12x)	6 mm	65 mm	686922-C12	61.60

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END MILLS FOR HARDENED STEELS

Finishers – Tight Tolerance – Ball (cont.)

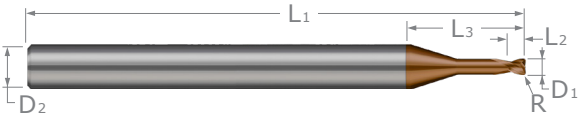
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CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	Ti HARD NANO COATED	
D_1 $^{-.002mm}_{-.010mm}$	R $^{+.002mm}_{-.002mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
1.50 mm	.75 mm	1.20 mm	6 mm (4x)	4 mm	50 mm	688133-C12	53.90
1.50 mm	.75 mm	1.20 mm	6 mm (4x)	6 mm	55 mm	687533-C12	62.60
1.50 mm	.75 mm	1.20 mm	8 mm (5x)	4 mm	50 mm	688033-C12	53.90
1.50 mm	.75 mm	1.20 mm	8 mm (5x)	6 mm	55 mm	687433-C12	62.60
1.50 mm	.75 mm	1.20 mm	10 mm (6x)	6 mm	65 mm	687333-C12	64.80
1.50 mm	.75 mm	1.20 mm	12 mm (8x)	6 mm	65 mm	687133-C12	63.70
1.50 mm	.75 mm	1.20 mm	15 mm (10x)	6 mm	65 mm	687033-C12	62.60
2.00 mm	1.00 mm	1.50 mm	6 mm (3x)	6 mm	55 mm	687645-C12	59.40
2.00 mm	1.00 mm	1.50 mm	8 mm (4x)	4 mm	50 mm	688145-C12	53.90
2.00 mm	1.00 mm	1.50 mm	8 mm (4x)	6 mm	55 mm	687545-C12	62.60
2.00 mm	1.00 mm	1.50 mm	10 mm (5x)	4 mm	50 mm	688045-C12	53.90
2.00 mm	1.00 mm	1.50 mm	10 mm (5x)	6 mm	65 mm	687445-C12	64.80
2.00 mm	1.00 mm	1.50 mm	12 mm (6x)	6 mm	65 mm	687345-C12	63.70
2.00 mm	1.00 mm	1.50 mm	15 mm (7x)	6 mm	65 mm	687245-C12	62.60
2.00 mm	1.00 mm	1.50 mm	20 mm (10x)	6 mm	65 mm	687045-C12	61.60
2.50 mm	1.25 mm	2.50 mm	10 mm (4x)	6 mm	65 mm	687551-C12	60.40
2.50 mm	1.25 mm	2.50 mm	15 mm (6x)	6 mm	65 mm	687351-C12	67.00
3.00 mm	1.50 mm	2.50 mm	10 mm (3x)	6 mm	65 mm	687657-C12	65.90
3.00 mm	1.50 mm	2.50 mm	15 mm (5x)	6 mm	65 mm	687457-C12	67.00
3.00 mm	1.50 mm	2.50 mm	20 mm (6x)	6 mm	65 mm	687357-C12	65.90
3.00 mm	1.50 mm	2.50 mm	25 mm (8x)	6 mm	70 mm	687157-C12	69.10
3.00 mm	1.50 mm	2.50 mm	30 mm (10x)	6 mm	75 mm	687057-C12	70.30
4.00 mm	2.00 mm	3.20 mm	10 mm (2x)	6 mm	65 mm	687761-C12	68.10
4.00 mm	2.00 mm	3.20 mm	15 mm (3x)	6 mm	65 mm	687661-C12	67.00
4.00 mm	2.00 mm	3.20 mm	20 mm (5x)	6 mm	65 mm	687461-C12	68.10
4.00 mm	2.00 mm	3.20 mm	25 mm (6x)	6 mm	70 mm	687361-C12	69.10
5.00 mm	2.50 mm	4.00 mm	20 mm (4x)	6 mm	65 mm	687564-C12	67.00

D_1 $^{-.004mm}_{-.016mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
6.00 mm	3.00 mm	5.00 mm	20 mm (3x)	6 mm	65 mm	687666-C12	67.00
6.00 mm	3.00 mm	5.00 mm	30 mm (5x)	6 mm	75 mm	687466-C12	69.10

END MILLS FOR HARDENED STEELS

Finishers – Tight Tolerance – Corner Radius



- Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc
- Tightly-toleranced radii offer unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- Ti Hard Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in hardened steels
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • Solid carbide • CNC ground in Switzerland

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	Ti HARD NANO COATED	
D_1 $^{-.002mm}_{-.010mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
.40 mm	.05 mm	.60 mm	2 mm (5x)	6 mm	55 mm	682509-C12	68.10
.50 mm	.05 mm	.70 mm	2 mm (4x)	6 mm	55 mm	683111-C12	68.10
.50 mm	.05 mm	.70 mm	3 mm (6x)	6 mm	55 mm	681511-C12	68.10
.60 mm	.06 mm	.90 mm	2 mm (3x)	6 mm	55 mm	683413-C12	68.10
.60 mm	.06 mm	.90 mm	3 mm (5x)	6 mm	55 mm	682413-C12	68.10
.60 mm	.06 mm	.90 mm	4 mm (6x)	6 mm	55 mm	681213-C12	68.10
.60 mm	.06 mm	.90 mm	6 mm (10x)	6 mm	55 mm	680213-C12	68.10
.80 mm	.08 mm	1.20 mm	2 mm (2x)	6 mm	55 mm	683818-C12	68.10
.80 mm	.08 mm	1.20 mm	4 mm (5x)	6 mm	55 mm	682318-C12	68.10
1.00 mm	.10 mm	1.60 mm	3 mm (3x)	6 mm	55 mm	683622-C12	68.10
1.00 mm	.10 mm	1.60 mm	4 mm (4x)	6 mm	55 mm	683022-C12	68.10
1.00 mm	.10 mm	1.60 mm	5 mm (5x)	6 mm	55 mm	682222-C12	68.10
1.00 mm	.10 mm	1.60 mm	6 mm (6x)	6 mm	55 mm	681422-C12	68.10
1.00 mm	.10 mm	1.60 mm	8 mm (8x)	6 mm	55 mm	680522-C12	68.10
1.00 mm	.10 mm	1.60 mm	10 mm (10x)	6 mm	65 mm	680122-C12	70.80
1.20 mm	.12 mm	1.90 mm	6 mm (5x)	6 mm	55 mm	682127-C12	68.10
1.20 mm	.12 mm	1.90 mm	8 mm (6x)	6 mm	55 mm	681127-C12	68.10
1.40 mm	.14 mm	2.20 mm	8 mm (5x)	6 mm	55 mm	681631-C12	68.10
1.50 mm	.15 mm	2.40 mm	6 mm (4x)	6 mm	55 mm	682933-C12	68.10
1.50 mm	.15 mm	2.40 mm	8 mm (5x)	6 mm	55 mm	681833-C12	68.10
1.50 mm	.15 mm	2.40 mm	10 mm (6x)	6 mm	65 mm	681033-C12	68.10
1.50 mm	.15 mm	2.40 mm	12 mm (8x)	6 mm	65 mm	680433-C12	68.10
1.50 mm	.15 mm	2.40 mm	15 mm (10x)	6 mm	65 mm	680033-C12	70.80
1.80 mm	.18 mm	2.60 mm	10 mm (5x)	6 mm	65 mm	681740-C12	70.30
2.00 mm	.20 mm	2.80 mm	6 mm (3x)	6 mm	55 mm	683545-C12	68.10
2.00 mm	.20 mm	2.80 mm	8 mm (4x)	6 mm	55 mm	682845-C12	68.10
2.00 mm	.50 mm	2.80 mm	8 mm (4x)	6 mm	55 mm	682745-C12	68.10
2.00 mm	.20 mm	2.80 mm	10 mm (5x)	6 mm	65 mm	682045-C12	70.30
2.00 mm	.20 mm	2.80 mm	12 mm (6x)	6 mm	65 mm	681345-C12	70.30
2.00 mm	.20 mm	2.80 mm	15 mm (7x)	6 mm	65 mm	680745-C12	70.30
2.00 mm	.50 mm	2.80 mm	15 mm (7x)	6 mm	65 mm	680645-C12	70.30
2.00 mm	.20 mm	2.80 mm	20 mm (10x)	6 mm	65 mm	679945-C12	70.80

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END MILLS FOR HARDENED STEELS

Finishers – Tight Tolerance – Corner Radius (cont.)

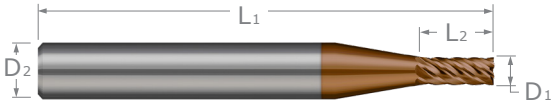
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CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	Ti HARD NANO COATED	
D_1 $^{-.002mm}_{-.010mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
2.50 mm	.25 mm	2.50 mm	10 mm (4x)	6 mm	65 mm	682651-C12	70.30
2.50 mm	.25 mm	2.50 mm	20 mm (8x)	6 mm	65 mm	680351-C12	70.30
2.50 mm	.25 mm	2.50 mm	25 mm (10x)	6 mm	70 mm	679851-C12	70.80
3.00 mm	.30 mm	3.00 mm	10 mm (3x)	6 mm	65 mm	683357-C12	70.30
3.00 mm	.50 mm	3.00 mm	10 mm (3x)	6 mm	65 mm	683257-C12	70.30
3.00 mm	.50 mm	3.00 mm	15 mm (5x)	6 mm	65 mm	681957-C12	70.30
3.00 mm	.30 mm	3.00 mm	20 mm (6x)	6 mm	65 mm	680957-C12	70.30
3.00 mm	.50 mm	3.00 mm	20 mm (6x)	6 mm	65 mm	680857-C12	70.30
3.00 mm	.30 mm	3.00 mm	30 mm (10x)	6 mm	75 mm	679757-C12	71.30
4.00 mm	.50 mm	4.00 mm	10 mm (2x)	6 mm	65 mm	683761-C12	70.30
4.00 mm	.50 mm	4.00 mm	15 mm (3x)	6 mm	65 mm	683261-C12	70.30
4.00 mm	.50 mm	4.00 mm	20 mm (5x)	6 mm	65 mm	681961-C12	70.30
4.00 mm	.50 mm	4.00 mm	30 mm (7x)	6 mm	75 mm	680661-C12	71.30
5.00 mm	.50 mm	5.00 mm	20 mm (4x)	6 mm	65 mm	682764-C12	70.30

D_1 $^{-.004mm}_{-.016mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2 (h5)	L_1	2 FL	USD$
6.00 mm	.50 mm	6.00 mm	10 mm (1x)	6 mm	65 mm	683966-C12	70.30
6.00 mm	.50 mm	6.00 mm	20 mm (3x)	6 mm	65 mm	683266-C12	70.30
6.00 mm	.50 mm	6.00 mm	30 mm (5x)	6 mm	75 mm	681966-C12	71.30

VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

Square



- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.062 (1/16)	.186 (3x)	1/4	2-1/2	711762-C10	57.40
.062 (1/16)	.312 (5x)	1/4	2-1/2	710362-C10	57.40
.078 (5/64)	.234 (3x)	1/4	2-1/2	711778-C10	57.40
.078 (5/64)	.406 (5x)	1/4	2-1/2	710378-C10	57.40
.093 (3/32)	.279 (3x)	1/4	2-1/2	711793-C10	57.40
.093 (3/32)	.500 (5x)	1/4	2-1/2	710393-C10	57.40

D_1 $^{+.002''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.125 (1/8)	.375 (3x)	1/4	2-1/2	711808-C10	56.40
.125 (1/8)	.625 (5x)	1/4	2-1/2	710408-C10	56.40
.187 (3/16)	.570 (3x)	1/4	2-1/2	711812-C10	59.20
.187 (3/16)	1.000 (5x)	1/4	3	710412-C10	60.40
.250 (1/4)	.750 (3x)	1/4	2-1/2	711816-C10	57.20
.250 (1/4)	1.250 (5x)	1/4	4	710416-C10	72.90

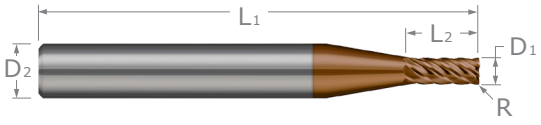
SCAN THE QR CODE TO LEARN ABOUT HREM MACHINING

Backed by data, real-world trials, and Helical Solutions tooling, Harvey Performance Company's novel Heavy Radial Efficiency Machining (HREM) strategy for machining titanium offers a compelling alternative for shops looking to optimize machining performance in the most demanding applications.

harveyperformance.com/in-the-loupe/hrem

VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

Corner Radius



- Corner radius for improved strength
- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers our best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.062 (1/16)	.005	**.186** (3x)	1/4	2-1/2	711562-C10	59.80
.062 (1/16)	.005	**.312** (5x)	1/4	2-1/2	711162-C10	61.80
.062 (1/16)	.010	**.186** (3x)	1/4	2-1/2	711362-C10	59.80
.062 (1/16)	.010	**.312** (5x)	1/4	2-1/2	710962-C10	61.80
.078 (5/64)	.005	**.234** (3x)	1/4	2-1/2	711578-C10	59.80
.078 (5/64)	.005	**.406** (5x)	1/4	2-1/2	711178-C10	61.80
.078 (5/64)	.010	**.234** (3x)	1/4	2-1/2	711378-C10	59.80
.078 (5/64)	.010	**.406** (5x)	1/4	2-1/2	710978-C10	61.80
.093 (3/32)	.005	**.279** (3x)	1/4	2-1/2	711593-C10	59.80
.093 (3/32)	.005	**.500** (5x)	1/4	2-1/2	711193-C10	61.80
.093 (3/32)	.010	**.279** (3x)	1/4	2-1/2	711393-C10	59.80
.093 (3/32)	.010	**.500** (5x)	1/4	2-1/2	710993-C10	61.80

D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$
.125 (1/8)	.005	**.375** (3x)	1/4	2-1/2	711608-C10	60.60
.125 (1/8)	.005	**.625** (5x)	1/4	2-1/2	711208-C10	60.60
.125 (1/8)	.010	**.375** (3x)	1/4	2-1/2	711408-C10	60.60
.125 (1/8)	.010	**.625** (5x)	1/4	2-1/2	711008-C10	60.60
.187 (3/16)	.005	**.570** (3x)	1/4	2-1/2	711612-C10	63.80
.187 (3/16)	.005	**1.000** (5x)	1/4	3	711212-C10	65.10
.187 (3/16)	.010	**.570** (3x)	1/4	2-1/2	711412-C10	63.80
.187 (3/16)	.010	**1.000** (5x)	1/4	3	711012-C10	65.10
.250 (1/4)	.005	**.750** (3x)	1/4	2-1/2	711616-C10	64.10
.250 (1/4)	.005	**1.250** (5x)	1/4	4	711216-C10	79.80
.250 (1/4)	.010	**.750** (3x)	1/4	2-1/2	711416-C10	64.10
.250 (1/4)	.010	**1.250** (5x)	1/4	4	711016-C10	79.80

SCAN THE QR CODE TO LEARN ABOUT HREM MACHINING

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harveyperformance.com/in-the-loupe/hrem

NEW

VARIABLE PITCH END MILLS FOR TITANIUM ALLOYS

Ball



- Engineered for outstanding performance in Heavy Radial Efficiency Milling (HREM) of Titanium 6Al4V and other titanium alloys
- Variable pitch design decreases chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- 6 flute • Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED		
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$	
.062 (1/16)	.186 (3x)	1/4	2-1/2	696762-C10	54.50	NEW
.062 (1/16)	.312 (5x)	1/4	2-1/2	696562-C10	57.40	NEW
.078 (5/64)	.234 (3x)	1/4	2-1/2	696778-C10	54.50	NEW
.078 (5/64)	.406 (5x)	1/4	2-1/2	696578-C10	57.40	NEW
.093 (3/32)	.279 (3x)	1/4	2-1/2	696793-C10	54.50	NEW
.093 (3/32)	.500 (5x)	1/4	2-1/2	696593-C10	57.40	NEW
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	6 FL	USD$	
.125 (1/8)	.375 (3x)	1/4	2-1/2	696808-C10	57.10	NEW
.125 (1/8)	.625 (5x)	1/4	2-1/2	696608-C10	61.20	NEW
.187 (3/16)	.570 (3x)	1/4	2-1/2	696812-C10	57.10	NEW
.187 (3/16)	1.000 (5x)	1/4	3	696612-C10	63.30	NEW
.250 (1/4)	.750 (3x)	1/4	2-1/2	696816-C10	61.20	NEW
.250 (1/4)	1.250 (5x)	1/4	4	696616-C10	70.60	NEW

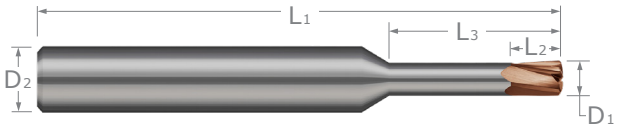
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harveyperformance.com/in-the-loupe/hrem

HIGH FEED END MILLS FOR HIGH TEMP ALLOYS

High Feed End Mills



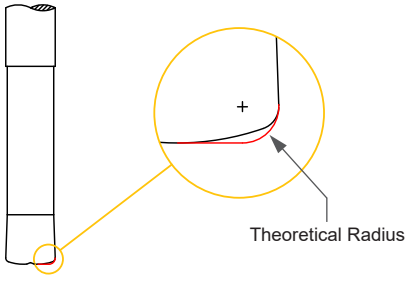
- Engineered to achieve maximum feed rates in steels up to 45 Rc
- Unique end profile geometry developed for ideal tool engagement and lowered cutting forces
- Variable pitch design decreases chatter and harmonics
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- End cutting geometry (non-center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	NECK DIA.	FLUTES	THEORETICAL RADIUS*	SHANK DIA.	OVERALL LENGTH	Ti NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$				D_2 (h6)	L_1	TOOL #	USD$
.078 (5/64)	.078	.234 (3x)	.069	4	.0098	1/4	2	712378-C10	56.10
.078 (5/64)	.078	.391 (5x)	.069	4	.0098	1/4	2	712178-C10	56.10
.078 (5/64)	.078	.625 (8x)	.069	4	.0098	1/4	2	711978-C10	58.20
.093 (3/32)	.093	.279 (3x)	.082	4	.0117	1/4	2	712393-C10	59.40
.093 (3/32)	.093	.465 (5x)	.082	4	.0117	1/4	2	712193-C10	59.40
.093 (3/32)	.093	.744 (8x)	.082	4	.0117	1/4	2-1/2	711993-C10	61.60
.125 (1/8)	.125	.375 (3x)	.113	4	.0157	1/4	2	712408-C10	62.60
.125 (1/8)	.125	.625 (5x)	.113	4	.0157	1/4	2	712208-C10	62.60
.125 (1/8)	.125	1.000 (8x)	.113	4	.0157	1/4	2-1/2	712008-C10	64.80
.187 (3/16)	.187	.563 (3x)	.165	4	.0236	1/4	2	712412-C10	65.90
.187 (3/16)	.187	.938 (5x)	.165	4	.0236	1/4	2-1/2	712212-C10	65.90
.187 (3/16)	.187	1.500 (8x)	.165	4	.0236	1/4	3	712012-C10	69.10
.250 (1/4)	.250	.750 (3x)	.245	5	.0314	1/4	2	710216-C10	70.30
.250 (1/4)	.250	1.250 (5x)	.245	5	.0314	1/4	2-1/2	710016-C10	70.30
.250 (1/4)	.250	2.000 (8x)	.245	5	.0314	1/4	3-1/2	709816-C10	73.50

*Theoretical radius for use when programming in CAM software

Visit www.harveytool.com to download precise Simulation Files for all Feed Mills.

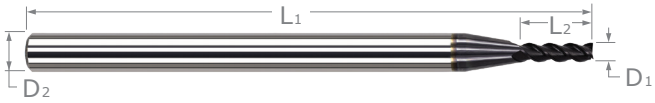
In the absence of a Simulation File, use the Theoretical Radius to approximate Harvey Tool's feed mills as corner radius end mills within your CAM software.



NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	ALTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	942804-C6	70.80
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	973710-C6	65.90
.010		.0100	**.030** (3x)	3	1/8	1-1/2	967010-C6	64.30
.010		.0100	**.050** (5x)	3	1/8	2-1/2	990710-C6	75.70
.015 (1/64)		.0150	**.012** (0.8x)	3	1/8	1-1/2	888015-C6	55.40
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	973715-C6	54.00
.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	841615-C6	56.20
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	967015-C6	52.60
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	875415-C6	54.80
.015 (1/64)		.0150	**.062** (4x)	3	1/8	2-1/2	886215-C6	62.30
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	990715-C6	64.80
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	942809-C6	52.30
	.5 mm	.0196	**.40 mm** (0.8x)	3	4 mm	50 mm	848011-C6	54.60
	.5 mm	.0196	**.75 mm** (1.5x)	3	4 mm	50 mm	954511-C6	52.30
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	942811-C6	52.30
.020		.0200	**.016** (0.8x)	3	1/8	1-1/2	888020-C6	48.80
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	973720-C6	47.20
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	841620-C6	50.60
.020		.0200	**.060** (3x)	3	1/8	1-1/2	967020-C6	46.20
.020		.0200	**.060** (3x)	4	1/8	1-1/2	875420-C6	48.40
.020		.0200	**.080** (4x)	3	1/8	2-1/2	886220-C6	52.30
.020		.0200	**.100** (5x)	3	1/8	2-1/2	990720-C6	54.80
.020		.0200	**.100** (5x)	4	1/8	2-1/2	852920-C6	58.30
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	942813-C6	50.90
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	973725-C6	45.60
.025		.0250	**.075** (3x)	3	1/8	1-1/2	967025-C6	44.50
.025		.0250	**.075** (3x)	4	1/8	1-1/2	875425-C6	46.60
.025		.0250	**.100** (4x)	3	1/8	2-1/2	886225-C6	54.10
.025		.0250	**.125** (5x)	3	1/8	2-1/2	990725-C6	53.00
.025		.0250	**.125** (5x)	4	1/8	2-1/2	852925-C6	55.00
.030		.0300	**.024** (0.8x)	3	1/8	1-1/2	888030-C6	44.70
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	973730-C6	45.60
.030		.0300	**.045** (1.5x)	4	1/8	1-1/2	841630-C6	48.00
.030		.0300	**.090** (3x)	3	1/8	1-1/2	967030-C6	44.50
.030		.0300	**.090** (3x)	4	1/8	1-1/2	875430-C6	46.60
.030		.0300	**.125** (4x)	3	1/8	2-1/2	886230-C6	54.10
.030		.0300	**.156** (5x)	3	1/8	2-1/2	990730-C6	53.00

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	888031-C6	41.20
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	973731-C6	38.90
.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	841631-C6	40.20
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	967031-C6	37.90
.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	875431-C6	40.20
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	886231-C6	45.60
.031 (1/32)		.0310	**.125** (4x)	4	1/8	2-1/2	790731-C6	47.70
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	990731-C6	48.20
.031 (1/32)		.0310	**.156** (5x)	4	1/8	2-1/2	852931-C6	50.30
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	942818-C6	44.40
	.8 mm	.0314	**4.00 mm** (5x)	3	4 mm	50 mm	910518-C6	46.70
.035		.0350	**.028** (0.8x)	3	1/8	1-1/2	888035-C6	40.10
.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	973735-C6	38.90
.035		.0350	**.053** (1.5x)	4	1/8	1-1/2	841635-C6	41.10
.035		.0350	**.105** (3x)	3	1/8	1-1/2	967035-C6	37.90
.035		.0350	**.105** (3x)	4	1/8	1-1/2	875435-C6	40.20
.035		.0350	**.140** (4x)	3	1/8	2-1/2	886235-C6	46.50
.035		.0350	**.187** (5x)	3	1/8	2-1/2	990735-C6	48.20
	1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	848022-C6	45.60
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	954522-C6	45.00
	1.0 mm	.0393	**1.50 mm** (1.5x)	4	4 mm	50 mm	841622-C6	47.40
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	942822-C6	44.00
	1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	821322-C6	46.40
	1.0 mm	.0393	**4.00 mm** (4x)	3	4 mm	50 mm	820722-C6	49.60
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	910522-C6	54.50
	1.0 mm	.0393	**5.00 mm** (5x)	4	4 mm	50 mm	726822-C6	57.10
.039		.0390	**.117** (3x)	3	1/8	1-1/2	967039-C6	41.00
.040		.0400	**.032** (0.8x)	3	1/8	1-1/2	888040-C6	39.80
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	973740-C6	38.90
.040		.0400	**.060** (1.5x)	4	1/8	1-1/2	841640-C6	41.10
.040		.0400	**.120** (3x)	3	1/8	1-1/2	967040-C6	37.90
.040		.0400	**.120** (3x)	4	1/8	1-1/2	875440-C6	40.20
.040		.0400	**.160** (4x)	3	1/8	2-1/2	886240-C6	45.80
.040		.0400	**.203** (5x)	3	1/8	2-1/2	990740-C6	48.20
.040		.0400	**.203** (5x)	4	1/8	2-1/2	852940-C6	51.30
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	973745-C6	38.90
.045		.0450	**.135** (3x)	3	1/8	1-1/2	967045-C6	37.90
.045		.0450	**.135** (3x)	4	1/8	1-1/2	875445-C6	40.20
.045		.0450	**.225** (5x)	3	1/8	2-1/2	990745-C6	48.20
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	888047-C6	43.10
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	973747-C6	38.90
.047 (3/64)		.0470	**.071** (1.5x)	4	1/8	1-1/2	841647-C6	40.40
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	967047-C6	37.90
.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	875447-C6	40.20
.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	886247-C6	45.60
.047 (3/64)		.0470	**.187** (4x)	4	1/8	2-1/2	790747-C6	47.70
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	990747-C6	48.20
.047 (3/64)		.0470	**.250** (5x)	4	1/8	2-1/2	852947-C6	50.30
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	942827-C6	44.40

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.050		.0500	**.040** (0.8x)	3	1/8	1-1/2	888050-C6	38.00
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	973750-C6	38.90
.050		.0500	**.150** (3x)	3	1/8	1-1/2	967050-C6	37.90
.050		.0500	**.150** (3x)	4	1/8	1-1/2	875450-C6	40.20
.050		.0500	**.203** (4x)	3	1/8	1-1/2	886250-C6	46.50
.050		.0500	**.250** (5x)	3	1/8	2-1/2	990750-C6	48.20
.055		.0550	**.044** (0.8x)	3	1/8	1-1/2	888055-C6	38.00
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	973755-C6	38.90
.055		.0550	**.165** (3x)	3	1/8	1-1/2	967055-C6	37.90
.055		.0550	**.165** (3x)	4	1/8	1-1/2	875455-C6	40.90
.055		.0550	**.275** (5x)	3	1/8	2-1/2	990755-C6	48.20
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	942831-C6	41.70
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	954533-C6	42.20
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	942833-C6	41.40
	1.5 mm	.0590	**4.50 mm** (3x)	4	4 mm	50 mm	821333-C6	44.00
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	910533-C6	52.10
.060		.0600	**.048** (0.8x)	3	1/8	1-1/2	888060-C6	38.70
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	973760-C6	38.90
.060		.0600	**.180** (3x)	3	1/8	1-1/2	967060-C6	37.90
.060		.0600	**.180** (3x)	4	1/8	1-1/2	875460-C6	40.20
.060		.0600	**.312** (5x)	3	1/8	2-1/2	990760-C6	48.20
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	888062-C6	40.60
.062 (1/16)		.0620	**.050** (0.8x)	4	1/8	1-1/2	790562-C6	42.80
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	973762-C6	36.30
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	841662-C6	37.80
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	967062-C6	35.50
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	875462-C6	37.70
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	886262-C6	43.70
.062 (1/16)		.0620	**.250** (4x)	4	1/8	2-1/2	790762-C6	45.90
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	990762-C6	46.20
.062 (1/16)		.0620	**.312** (5x)	4	1/8	2-1/2	852962-C6	48.40
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	942836-C6	42.60
.065		.0650	**.195** (3x)	3	1/8	1-1/2	967065-C6	40.80
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	973770-C6	36.30
.070		.0700	**.210** (3x)	3	1/8	1-1/2	967070-C6	35.50
.070		.0700	**.210** (3x)	4	1/8	1-1/2	875470-C6	37.70
.070		.0700	**.375** (5x)	3	1/8	2-1/2	990770-C6	46.20
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	942840-C6	42.60
.075		.0750	**.225** (3x)	3	1/8	1-1/2	967075-C6	40.80
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	888078-C6	40.60
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	973778-C6	36.30
.078 (5/64)		.0780	**.118** (1.5x)	4	1/8	1-1/2	841678-C6	37.80
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	967078-C6	35.50
.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	875478-C6	37.70
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	886278-C6	43.70
.078 (5/64)		.0780	**.312** (4x)	4	1/8	2-1/2	790778-C6	45.20 NEW
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	990778-C6	46.20
.078 (5/64)		.0780	**.406** (5x)	4	1/8	2-1/2	852978-C6	48.40

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	USD$
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	954545-C6	42.20
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	942845-C6	41.40
	2.0 mm	.0787	**6.00 mm** (3x)	4	4 mm	50 mm	821345-C6	44.00
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	910545-C6	52.10
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	973780-C6	36.30
.080		.0800	**.240** (3x)	3	1/8	1-1/2	967080-C6	35.50
.080		.0800	**.406** (5x)	3	1/8	2-1/2	990780-C6	47.00
.085		.0850	**.255** (3x)	3	1/8	1-1/2	967085-C6	40.80
.090		.0900	**.072** (0.8x)	3	1/8	1-1/2	888090-C6	40.60
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	973790-C6	36.30
.090		.0900	**.135** (1.5x)	4	1/8	1-1/2	841690-C6	38.30
.090		.0900	**.270** (3x)	3	1/8	1-1/2	967090-C6	35.50
.090		.0900	**.450** (5x)	3	1/8	2-1/2	990790-C6	46.20
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	888093-C6	40.60
.093 (3/32)		.0930	**.074** (0.8x)	4	1/8	1-1/2	790593-C6	43.30
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	973793-C6	36.30
.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	841693-C6	37.80
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	967093-C6	35.50
.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	875493-C6	37.70
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	886293-C6	43.70
.093 (3/32)		.0930	**.375** (4x)	4	1/8	2-1/2	790793-C6	45.90
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	990793-C6	46.20
.093 (3/32)		.0930	**.500** (5x)	4	1/8	2-1/2	852993-C6	48.40
.095		.0950	**.285** (3x)	3	1/8	1-1/2	967095-C6	40.70
	2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	954551-C6	42.20
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	942851-C6	41.40
	2.5 mm	.0984	**7.50 mm** (3x)	4	4 mm	50 mm	821351-C6	44.00
	2.5 mm	.0984	**12.00 mm** (5x)	3	4 mm	50 mm	910551-C6	52.10
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	973800-C6	36.30
.100		.1000	**.300** (3x)	3	1/8	1-1/2	967100-C6	35.50
.100		.1000	**.500** (5x)	3	1/8	2-1/2	990800-C6	46.20
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	973802-C6	36.30
.109 (7/64)		.1090	**.164** (1.5x)	4	1/8	1-1/2	790802-C6	38.90
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	967102-C6	35.50
.109 (7/64)		.1090	**.327** (3x)	4	1/8	1-1/2	875502-C6	37.70
.109 (7/64)		.1090	**.570** (5x)	3	1/8	2-1/2	990802-C6	46.20
.118		.1180	**.354** (3x)	3	1/8	1-1/2	967105-C6	37.80
	3.0 mm	.1181	**2.40 mm** (0.8x)	3	4 mm	50 mm	848057-C6	41.90
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	954557-C6	42.20
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	942857-C6	41.40
NEW	3.0 mm	.1181	**9.00 mm** (3x)	4	4 mm	50 mm	821357-C6	43.60
	3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	910557-C6	52.10

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square (cont.)

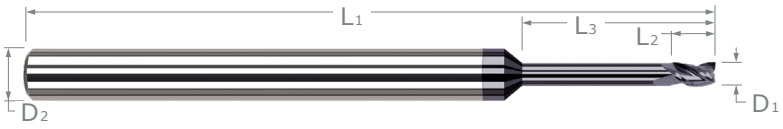
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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	888108-C6	40.60	
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	973808-C6	32.90	
.125 (1/8)		.1250	**.187** (1.5x)	5	1/8	1-1/2	747108-C6	37.40	
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	967108-C6	32.90	
.125 (1/8)		.1250	**.375** (3x)	5	1/8	1-1/2	747308-C6	37.40	
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	886308-C6	43.70	
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	990808-C6	46.20	
.140 (9/64)		.1406	**.112** (0.8x)	4	3/16	2	888109-C6	37.20	
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	973809-C6	38.60	
.140 (9/64)		.1406	**.220** (1.5x)	5	3/16	2	747109-C6	41.90	
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	967109-C6	38.60	
.140 (9/64)		.1406	**.562** (4x)	4	3/16	3	886309-C6	46.50	
.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	990809-C6	48.90	
.156 (5/32)		.1562	**.125** (0.8x)	4	3/16	2	888110-C6	37.90	
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	973810-C6	38.60	
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	967110-C6	38.60	
.156 (5/32)		.1562	**.470** (3x)	5	3/16	2	747310-C6	42.90	NEW
.156 (5/32)		.1562	**.625** (4x)	4	3/16	3	886310-C6	40.80	
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	990810-C6	48.90	
	4.0 mm	.1574	**12.00 mm** (3x)	4	6 mm	63 mm	942861-C6	52.30	
.172 (11/64)		.1718	**.505** (3x)	4	3/16	2	967111-C6	42.50	
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	888112-C6	43.80	
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	973812-C6	35.80	
.187 (3/16)		.1875	**.285** (1.5x)	5	3/16	2	747112-C6	40.40	
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	967112-C6	36.10	
.187 (3/16)		.1875	**.562** (3x)	5	3/16	2	747312-C6	40.40	
.187 (3/16)		.1875	**.750** (4x)	4	3/16	3	886312-C6	46.80	
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	990812-C6	48.90	
	5.0 mm	.1968	**15.00 mm** (3x)	4	6 mm	63 mm	821364-C6	52.70	
.218 (7/32)		.2187	**.330** (1.5x)	4	1/4	2-1/2	973814-C6	50.60	
.218 (7/32)		.2187	**.660** (3x)	4	1/4	2-1/2	967114-C6	50.60	
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	942866-C6	52.30	
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	888116-C6	54.20	
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	973816-C6	44.80	
.250 (1/4)		.2500	**.375** (1.5x)	5	1/4	2-1/2	747116-C6	50.10	
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	967116-C6	45.30	
.250 (1/4)		.2500	**.750** (3x)	5	1/4	2-1/2	747316-C6	50.10	
.250 (1/4)		.2500	**1.000** (4x)	4	1/4	4	886316-C6	56.50	
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	990816-C6	58.60	
.312 (5/16)		.3125	**1.000** (3x)	4	5/16	2-1/2	967120-C6	63.10	
.375 (3/8)		.3750	**.570** (1.5x)	4	3/8	2-1/2	973824-C6	72.50	
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	967124-C6	73.20	
	10.0 mm	.3937	**30.0 mm** (3x)	4	10 mm	75 mm	942873-C6	84.00	
.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	973832-C6	94.60	
.500 (1/2)		.5000	**1.500** (3x)	4	1/2	3	967132-C6	94.60	

Please see Speeds & Feeds on page 167

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.010		.0100	.015	**.050** (5x)	3	1/8	2-1/2	985310-C6	82.20
.010		.0100	.015	**.080** (8x)	3	1/8	2-1/2	978210-C6	83.10
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	985315-C6	70.40
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	978215-C6	71.60
.020		.0200	.030	**.060** (3x)	3	1/8	1-1/2	940520-C6	65.90
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	985320-C6	67.20
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	791320-C6	69.80
.020		.0200	.030	**.120** (6x)	3	1/8	2-1/2	895520-C6	67.20
.020		.0200	.030	**.140** (7x)	3	1/8	2-1/2	880720-C6	69.30
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	978220-C6	68.60
.020		.0200	.030	**.200** (10x)	3	1/8	2-1/2	935720-C6	75.50
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	985325-C6	67.20
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	978225-C6	68.60
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	985330-C6	67.20
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	978230-C6	68.60
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	940531-C6	61.00
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	985331-C6	62.30
.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	791331-C6	64.80
.031 (1/32)		.0310	.047	**.187** (6x)	3	1/8	2-1/2	895531-C6	62.30
.031 (1/32)		.0310	.047	**.218** (7x)	3	1/8	2-1/2	880731-C6	63.80
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	978231-C6	63.80
.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	812331-C6	66.20
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	935731-C6	70.30
.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	901331-C6	72.50
.031 (1/32)		.0310	.047	**.470** (15x)	3	1/8	2-1/2	851531-C6	73.90
.035		.0350	.053	**.187** (5x)	3	1/8	2-1/2	985335-C6	61.00
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	905022-C6	69.90
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	911422-C6	70.20
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	985340-C6	61.00
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	791340-C6	63.50
.040		.0400	.060	**.240** (6x)	3	1/8	2-1/2	895540-C6	61.70
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	978240-C6	62.30
.045		.0450	.068	**.225** (5x)	3	1/8	2-1/2	985345-C6	61.00

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	985347-C6	61.00
.047 (3/64)		.0470	.071	**.250** (5x)	4	1/8	2-1/2	791347-C6	64.00
.047 (3/64)		.0470	.071	**.281** (6x)	3	1/8	2-1/2	895547-C6	61.70
.047 (3/64)		.0470	.071	**.328** (7x)	3	1/8	2-1/2	880747-C6	62.80
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	978247-C6	62.30
.047 (3/64)		.0470	.071	**.375** (8x)	4	1/8	2-1/2	812347-C6	64.70
.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	935747-C6	68.40
.050		.0500	.075	**.250** (5x)	3	1/8	2-1/2	985350-C6	61.00
.055		.0550	.083	**.275** (5x)	3	1/8	2-1/2	985355-C6	61.00
.060		.0600	.090	**.312** (5x)	3	1/8	2-1/2	985360-C6	61.00
.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	978260-C6	62.30
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	940562-C6	61.00
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	985362-C6	62.30
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	791362-C6	64.70
.062 (1/16)		.0620	.093	**.375** (6x)	3	1/8	2-1/2	895562-C6	62.30
.062 (1/16)		.0620	.093	**.375** (6x)	4	1/8	2-1/2	720962-C6	65.40
.062 (1/16)		.0620	.093	**.437** (7x)	3	1/8	2-1/2	880762-C6	63.80
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	978262-C6	63.80
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	812362-C6	66.20
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	935762-C6	70.30
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	901362-C6	72.50
.062 (1/16)		.0620	.093	**.950** (15x)	3	1/8	2-1/2	851562-C6	73.90
.070		.0700	.105	**.375** (5x)	3	1/8	2-1/2	985370-C6	66.40
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	985378-C6	61.00
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	978278-C6	62.30
.078 (5/64)		.0780	.118	**.625** (8x)	4	1/8	2-1/2	812378-C6	64.70
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	935778-C6	68.40
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	905045-C6	70.70
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	911445-C6	71.40
	2.0 mm	.0787	3.00 mm	**20.0 mm** (10x)	3	4 mm	50 mm	935745-C6	75.20
.080		.0800	.120	**.406** (5x)	3	1/8	2-1/2	985380-C6	67.00
.090		.0900	.135	**.450** (5x)	3	1/8	2-1/2	985390-C6	66.40
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	940593-C6	61.00
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	985393-C6	62.30
.093 (3/32)		.0930	.140	**.500** (5x)	4	1/8	2-1/2	791393-C6	65.50
.093 (3/32)		.0930	.140	**.585** (6x)	3	1/8	2-1/2	895593-C6	62.30
.093 (3/32)		.0930	.140	**.670** (7x)	3	1/8	2-1/2	880793-C6	63.80
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	978293-C6	63.80
.093 (3/32)		.0930	.140	**.750** (8x)	4	1/8	2-1/2	812393-C6	66.20
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	935793-C6	70.30
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	901393-C6	72.50
.093 (3/32)		.0930	.140	**1.400** (15x)	3	1/8	3	851593-C6	73.90
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	985400-C6	61.00
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	978300-C6	62.80
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	985402-C6	61.00
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	978302-C6	62.30

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Long Reach, Stub Flute (cont.)

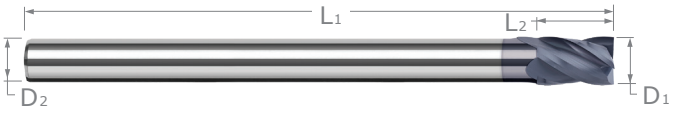
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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	L_3 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	905057-C6	63.60
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	911457-C6	63.80
.125 (1/8)		.1250	.187	**.375** (3x)	4	1/8	1-1/2	940608-C6	61.00
.125 (1/8)		.1250	.187	**.625** (5x)	4	1/8	2-1/2	985408-C6	62.30
.125 (1/8)		.1250	.187	**.750** (6x)	4	1/8	2-1/2	895608-C6	62.30
.125 (1/8)		.1250	.187	**.875** (7x)	4	1/8	2-1/2	880808-C6	63.80
.125 (1/8)		.1250	.187	**1.000** (8x)	4	1/8	2-1/2	978308-C6	63.80
.125 (1/8)		.1250	.187	**1.250** (10x)	4	1/8	2-1/2	935808-C6	70.30
.125 (1/8)		.1250	.187	**1.500** (12x)	4	1/8	3	901408-C6	74.80
.140 (9/64)		.1406	.220	**.750** (5x)	4	3/16	3	985409-C6	71.60
.140 (9/64)		.1406	.220	**1.125** (8x)	4	3/16	3	978309-C6	74.10
.156 (5/32)		.1562	.235	**.750** (5x)	4	3/16	3	985410-C6	67.20
.156 (5/32)		.1562	.235	**1.250** (8x)	4	3/16	3	978310-C6	68.60
.156 (5/32)		.1562	.235	**1.570** (10x)	4	3/16	3	935810-C6	74.80
.187 (3/16)		.1875	.285	**1.000** (5x)	4	3/16	3	985412-C6	67.20
.187 (3/16)		.1875	.285	**1.500** (8x)	4	3/16	3	978312-C6	68.60
.187 (3/16)		.1875	.285	**1.875** (10x)	4	3/16	4	935812-C6	74.80
	6.0 mm	.2362	9.00mm	**30.0mm** (5x)	4	6 mm	63 mm	905066-C6	80.90
.250 (1/4)		.2500	.375	**1.250** (5x)	4	1/4	4	985416-C6	75.20
.250 (1/4)		.2500	.375	**2.000** (8x)	4	1/4	4	978316-C6	76.70
.375 (3/8)		.3750	.570	**2.000** (5x)	4	3/8	4	985424-C6	85.50

Please see Speeds & Feeds on page 159

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Square – Reduced Shank



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Reduced straight shank allows any chucking depth
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$
.125 (1/8)	**.187** (1.5x)	4	3 mm	2-1/2	740108-C6	126.10
.156 (5/32)	**.235** (1.5x)	4	1/8	2-1/2	740110-C6	126.10
.187 (3/16)	**.285** (1.5x)	4	5/32	2-1/2	740112-C6	129.00
.250 (1/4)	**.375** (1.5x)	4	3/16	3	740116-C6	140.10
.312 (5/16)	**.470** (1.5x)	4	1/4	4	740120-C6	168.70
.375 (3/8)	**.570** (1.5x)	4	5/16	4	740124-C6	189.20
.500 (1/2)	**.750** (1.5x)	4	7/16	6	740132-C6	204.70

In The Loupe TV

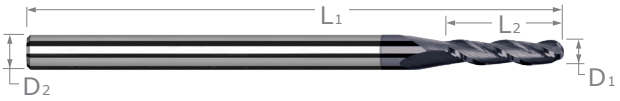
Check Out Our New CNC Show!

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	975304-C6	81.20
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	944210-C6	75.20
.010		.0100	**.030** (3x)	3	1/8	1-1/2	970510-C6	75.20
.010		.0100	**.050** (5x)	3	1/8	2-1/2	930610-C6	86.90
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	944215-C6	63.80
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	970515-C6	63.80
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	930615-C6	76.00
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	975309-C6	67.00
	.5 mm	.0196	**.750 mm** (1.5x)	3	4 mm	50 mm	968011-C6	60.20
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	975311-C6	60.20
.020		.0200	**.016** (0.8x)	3	1/8	1-1/2	848120-C6	58.40
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	944220-C6	57.00
.020		.0200	**.060** (3x)	3	1/8	1-1/2	970520-C6	57.00
.020		.0200	**.060** (3x)	4	1/8	1-1/2	893020-C6	59.80
.020		.0200	**.080** (4x)	3	1/8	2-1/2	811220-C6	62.60
.020		.0200	**.100** (5x)	3	1/8	2-1/2	930620-C6	62.60
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	975313-C6	58.40
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	944225-C6	55.10
.025		.0250	**.075** (3x)	3	1/8	1-1/2	970525-C6	55.10
.025		.0250	**.125** (5x)	3	1/8	2-1/2	930625-C6	61.00
.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	944230-C6	48.80
.030		.0300	**.090** (3x)	3	1/8	1-1/2	970530-C6	48.80
.030		.0300	**.156** (5x)	3	1/8	2-1/2	930630-C6	55.00
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	848131-C6	50.10
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	944231-C6	48.60
.031 (1/32)		.0310	**.047** (1.5x)	4	1/8	1-1/2	814531-C6	51.30
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	970531-C6	48.60
.031 (1/32)		.0310	**.093** (3x)	4	1/8	1-1/2	893031-C6	51.30
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	811231-C6	58.60
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	930631-C6	58.60
.031 (1/32)		.0310	**.156** (5x)	4	1/8	2-1/2	778831-C6	61.40
	.8 mm	.0314	**1.20 mm** (1.5x)	3	4 mm	50 mm	968018-C6	51.80
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	975318-C6	51.30
.035		.0350	**.105** (3x)	3	1/8	1-1/2	970535-C6	48.80

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	
	1.0 mm	.0393	**.80 mm** (0.8x)	3	4 mm	50 mm	872422-C6	52.00	
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	968022-C6	51.30	
	1.0 mm	.0393	**1.50 mm** (1.5x)	4	4 mm	50 mm	726622-C6	54.70	
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	975322-C6	51.30	
	1.0 mm	.0393	**3.00 mm** (3x)	4	4 mm	50 mm	793822-C6	54.70	
	1.0 mm	.0393	**4.00 mm** (4x)	3	4 mm	50 mm	790122-C6	62.10	
	1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	911322-C6	61.60	
.040		.0400	**.032** (0.8x)	3	1/8	1-1/2	848140-C6	48.90	
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	944240-C6	48.60	
.040		.0400	**.060** (1.5x)	4	1/8	1-1/2	814540-C6	51.70	
.040		.0400	**.120** (3x)	3	1/8	1-1/2	970540-C6	48.60	
.040		.0400	**.120** (3x)	4	1/8	1-1/2	893040-C6	51.30	
.040		.0400	**.160** (4x)	3	1/8	2-1/2	811240-C6	59.50	
.040		.0400	**.203** (5x)	3	1/8	2-1/2	930640-C6	59.00	
.045		.0450	**.135** (3x)	3	1/8	1-1/2	970545-C6	49.20	
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	848147-C6	48.90	
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	944247-C6	48.60	
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	970547-C6	48.60	
.047 (3/64)		.0470	**.141** (3x)	4	1/8	1-1/2	893047-C6	51.30	
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	930647-C6	59.00	
	1.2 mm	.0472	**1.80 mm** (1.5x)	3	4 mm	50 mm	968027-C6	51.80	
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	975327-C6	51.80	
.050		.0500	**.040** (0.8x)	3	1/8	1-1/2	848150-C6	48.90	NEW
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	944250-C6	48.60	
.050		.0500	**.150** (3x)	3	1/8	1-1/2	970550-C6	48.60	
.050		.0500	**.250** (5x)	3	1/8	2-1/2	930650-C6	59.00	
.055		.0550	**.165** (3x)	3	1/8	1-1/2	970555-C6	48.80	
	1.4 mm	.0551	**2.10 mm** (1.5x)	3	4 mm	50 mm	968031-C6	51.80	
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	975331-C6	51.30	
	1.4 mm	.0551	**7.00 mm** (5x)	3	4 mm	50 mm	911331-C6	61.60	NEW
	1.5 mm	.0590	**2.20 mm** (1.5x)	3	4 mm	50 mm	968033-C6	51.80	
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	975333-C6	51.30	
	1.5 mm	.0590	**7.50 mm** (5x)	3	4 mm	50 mm	911333-C6	61.60	
.060		.0600	**.048** (0.8x)	3	1/8	1-1/2	848160-C6	48.90	
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	944260-C6	48.60	
.060		.0600	**.090** (1.5x)	4	1/8	1-1/2	814560-C6	51.30	
.060		.0600	**.180** (3x)	3	1/8	1-1/2	970560-C6	48.60	
.060		.0600	**.312** (5x)	3	1/8	2-1/2	930660-C6	59.00	
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	848162-C6	47.20	
.062 (1/16)		.0620	**.050** (0.8x)	4	1/8	1-1/2	787162-C6	50.10	
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	944262-C6	45.60	
.062 (1/16)		.0620	**.093** (1.5x)	4	1/8	1-1/2	814562-C6	48.60	
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	970562-C6	45.60	
.062 (1/16)		.0620	**.186** (3x)	4	1/8	1-1/2	893062-C6	48.60	
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	811262-C6	56.30	
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	930662-C6	56.30	
.062 (1/16)		.0620	**.312** (5x)	4	1/8	2-1/2	778862-C6	59.10	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1			L_2		D_2 (h6)	L_1	TOOL #	USD$
	+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
		1.6 mm	.0629	**2.40 mm** (1.5x)	3	4 mm	50 mm	968036-C6	48.30
		1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	975336-C6	48.70
	.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	944270-C6	46.40
	.070		.0700	**.210** (3x)	3	1/8	1-1/2	970570-C6	46.40
	.070		.0700	**.210** (3x)	4	1/8	1-1/2	893070-C6	49.50
	.070		.0700	**.375** (5x)	3	1/8	2-1/2	930670-C6	55.50
		1.8 mm	.0708	**2.70 mm** (1.5x)	3	4 mm	50 mm	968040-C6	48.70
		1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	975340-C6	48.30
	.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	848178-C6	47.20
	.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	944278-C6	45.60
	.078 (5/64)		.0780	**.118** (1.5x)	4	1/8	1-1/2	814578-C6	48.60
	.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	970578-C6	45.60
	.078 (5/64)		.0780	**.234** (3x)	4	1/8	1-1/2	893078-C6	48.60
	.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	930678-C6	55.60
		2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	968045-C6	48.70
		2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	975345-C6	48.30
		2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	911345-C6	58.40
	.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	944280-C6	46.70
	.080		.0800	**.240** (3x)	3	1/8	1-1/2	970580-C6	46.40
	.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	944290-C6	46.70
	.090		.0900	**.270** (3x)	3	1/8	1-1/2	970590-C6	46.70
	.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	848193-C6	47.20
	.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	944293-C6	45.60
	.093 (3/32)		.0930	**.140** (1.5x)	4	1/8	1-1/2	814593-C6	48.60
	.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	970593-C6	45.60
	.093 (3/32)		.0930	**.279** (3x)	4	1/8	1-1/2	893093-C6	48.60
	.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	811293-C6	56.30
NEW	.093 (3/32)		.0930	**.375** (4x)	4	1/8	2-1/2	696396-C6	59.30
	.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	930693-C6	56.30
		2.5 mm	.0984	**3.70 mm** (1.5x)	3	4 mm	50 mm	968051-C6	51.30
		2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	975351-C6	50.80
	.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	944300-C6	46.00
	.100		.1000	**.300** (3x)	3	1/8	1-1/2	970600-C6	46.00
	.100		.1000	**.500** (5x)	3	1/8	2-1/2	930700-C6	56.90
	.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	944302-C6	48.80
	.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	970602-C6	48.80
		3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	968057-C6	48.70
		3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	975357-C6	48.30
		3.0 mm	.1181	**9.00 mm** (3x)	4	4 mm	50 mm	793857-C6	51.50
		3.0 mm	.1181	**15.00 mm** (5x)	3	4 mm	50 mm	911357-C6	58.40

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball (cont.)

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CUTTER DIAMETER D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	LENGTH OF CUT L_2 +.030″ −.000″ +.75mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	USD$
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	848208-C6	47.20
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	944308-C6	40.90
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	970608-C6	40.90
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	811308-C6	56.30
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	930708-C6	56.30
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	944309-C6	59.00
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	970609-C6	59.00
.140 (9/64)		.1406	**.750** (5x)	4	3/16	3	930709-C6	66.50
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	944310-C6	48.80
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	970610-C6	49.20
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	930710-C6	59.40
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	848212-C6	50.30
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	944312-C6	43.50
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	970612-C6	43.90
.187 (3/16)		.1875	**.750** (4x)	4	3/16	3	811312-C6	50.10
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	930712-C6	59.40
	5.0 mm	.1968	**15.00 mm** (3x)	4	6 mm	63 mm	975364-C6	62.00
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	975372-C6	64.60
.250 (1/4)		.2500	**.200** (0.8x)	4	1/4	2-1/2	848216-C6	60.80
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	944316-C6	52.60
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	970616-C6	53.10
.250 (1/4)		.2500	**1.000** (4x)	4	1/4	4	811316-C6	66.70
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	930716-C6	70.30
.375 (3/8)		.3750	**.570** (1.5x)	4	3/8	2-1/2	944324-C6	87.50
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	970624-C6	86.70
.500 (1/2)		.5000	**.750** (1.5x)	4	1/2	3	944332-C6	105.50
.500 (1/2)		.5000	**1.500** (3x)	4	1/2	3	970632-C6	105.50

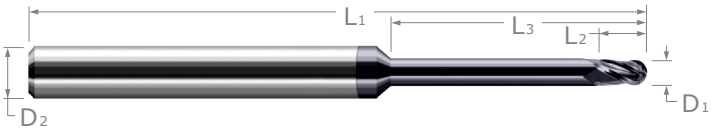
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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
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Improves Performance

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	63615-C6	80.30
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56115-C6	81.90
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	64815-C6	87.30
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	988709-C6	87.20
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	974009-C6	89.50
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	981309-C6	95.90
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	988711-C6	85.20
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	974011-C6	85.70
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	981311-C6	92.60
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	976511-C6	96.80
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	63620-C6	76.00
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56120-C6	77.60
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	64820-C6	84.00
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	988713-C6	82.20
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	974013-C6	84.10
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	981313-C6	90.50
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	63625-C6	74.10
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56125-C6	75.70
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	64825-C6	82.20
.031 (1/32)		.0310	.047	**.093** (3x)	4	1/8	1-1/2	929031-C6	67.90
.031 (1/32)		.0310	.047	**.156** (5x)	4	1/8	2-1/2	63631-C6	69.50
.031 (1/32)		.0310	.047	**.187** (6x)	4	1/8	2-1/2	797531-C6	70.30
.031 (1/32)		.0310	.047	**.250** (8x)	4	1/8	2-1/2	56131-C6	71.30
.031 (1/32)		.0310	.047	**.312** (10x)	4	1/8	2-1/2	887231-C6	73.40
.031 (1/32)		.0310	.047	**.375** (12x)	4	1/8	2-1/2	64831-C6	74.20
.031 (1/32)		.0310	.047	**.470** (15x)	4	1/8	2-1/2	953331-C6	77.10
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	988718-C6	77.40
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	974018-C6	78.60
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	981318-C6	81.20
.035		.0350	.052	**.187** (5x)	4	1/8	2-1/2	63635-C6	69.50

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	USD$
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	988722-C6	76.80
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	974022-C6	78.60
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	981322-C6	80.40
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	976522-C6	84.40
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	63640-C6	69.50
.040		.0400	.060	**.325** (8x)	4	1/8	2-1/2	56140-C6	71.30
.045		.0450	.067	**.225** (5x)	4	1/8	2-1/2	63645-C6	69.50
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	63647-C6	69.50
.047 (3/64)		.0470	.070	**.281** (6x)	4	1/8	2-1/2	797547-C6	69.50
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56147-C6	71.30
.047 (3/64)		.0470	.070	**.480** (10x)	4	1/8	2-1/2	887247-C6	72.70
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	64847-C6	73.50
.050		.0500	.075	**.250** (5x)	4	1/8	2-1/2	63650-C6	69.50
.050		.0500	.075	**.400** (8x)	4	1/8	2-1/2	56150-C6	71.30
.055		.0550	.082	**.275** (5x)	4	1/8	2-1/2	63655-C6	70.30
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	988733-C6	76.80
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	974033-C6	78.60
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	981333-C6	80.40
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	976533-C6	85.20
.060		.0600	.090	**.312** (5x)	4	1/8	2-1/2	63660-C6	69.50
.060		.0600	.090	**.500** (8x)	4	1/8	2-1/2	56160-C6	71.30
.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	929062-C6	67.90
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	63662-C6	69.50
.062 (1/16)		.0620	.093	**.375** (6x)	4	1/8	2-1/2	797562-C6	69.50
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56162-C6	71.30
.062 (1/16)		.0620	.093	**.625** (10x)	4	1/8	2-1/2	887262-C6	72.70
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	64862-C6	73.50
.062 (1/16)		.0620	.093	**.950** (15x)	4	1/8	2-1/2	953362-C6	77.10
.070		.0700	.105	**.375** (5x)	4	1/8	2-1/2	63670-C6	70.30
.070		.0700	.105	**.570** (8x)	4	1/8	2-1/2	56170-C6	72.00
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	63678-C6	69.50
.078 (5/64)		.0780	.117	**.475** (6x)	4	1/8	2-1/2	797578-C6	69.50
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56178-C6	71.30
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	64878-C6	73.50
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	988745-C6	76.50
	2.0 mm	.0787	3.00 mm	**12.0 mm** (6x)	4	4 mm	50 mm	749245-C6	78.10
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	974045-C6	78.20
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	981345-C6	80.40
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	976545-C6	85.20
.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	929093-C6	67.90
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	63693-C6	69.50
.093 (3/32)		.0930	.139	**.585** (6x)	4	1/8	2-1/2	797593-C6	69.50
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56193-C6	71.30
.093 (3/32)		.0930	.139	**.950** (10x)	4	1/8	2-1/2	887293-C6	72.70
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	64893-C6	74.20
.093 (3/32)		.0930	.139	**1.400** (15x)	4	1/8	3	953393-C6	77.10

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Ball – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	USD$
.100		.1000	.150	**.500** (5x)	4	1/8	2-1/2	63700-C6	68.80
.100		.1000	.150	**.800** (8x)	4	1/8	2-1/2	56200-C6	70.90
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	988757-C6	72.60
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	4	4 mm	50 mm	974057-C6	74.30

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	929108-C6	67.90
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	63708-C6	69.00
.125 (1/8)	.1250	.187	**.750** (6x)	4	1/8	2-1/2	797608-C6	69.00
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56208-C6	70.60
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	3	887308-C6	72.70
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	64908-C6	73.50
.140 (9/64)	.1406	.220	**.750** (5x)	4	3/16	3	63709-C6	75.70
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	63710-C6	74.80
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56210-C6	76.40
.156 (5/32)	.1562	.234	**1.570** (10x)	4	3/16	4	887310-C6	79.90
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	63712-C6	76.00
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56212-C6	77.70
.187 (3/16)	.1875	.281	**1.875** (10x)	4	3/16	4	887312-C6	81.40
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	63716-C6	84.20
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56216-C6	85.80
.250 (1/4)	.2500	.375	**2.500** (10x)	4	1/4	6	887316-C6	100.90
.375 (3/8)	.3750	.570	**2.000** (5x)	4	3/8	4	63724-C6	105.00

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For High Temp Alloys)

Important Note: Values in table are in inches and are based on 4 flute, reached (8x Dia) end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different reaches. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%; for 6x, increase to 120%; for 7x, increase to 110%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 15x, reduce to 75%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00004	.00008	.00012	.00016	.00021	.00025	.00033	.00049	.00066	.00086	.00104	.00139
Roughing	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00063	.00084	.00110	.00132	.00176
Finishing	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00110	.00144	.00173	.00231
Max	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00099	.00132	.00173	.00208	.00277

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .28x Dia
Finishing: .1x Dia

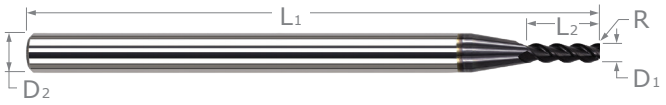
Axial Depth of Cut*:
Slotting: .28x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			R	L_2		D_2 (h6)	L_1	TOOL #	USD$
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm					
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	984104-C6	71.60
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	979304-C6	71.60
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52210-C6	67.20
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	46810-C6	67.70
	.3 mm	.0118	**.08 mm**	.45 mm (1.5x)	3	4 mm	50 mm	984106-C6	69.90
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	979306-C6	69.90
.015 (1/64)		.0150	**.003**	.012 (0.8x)	3	1/8	1-1/2	954215-C6	59.30
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52215-C6	54.70
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	46815-C6	54.70
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53615-C6	67.10
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	936415-C6	63.40
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	984109-C6	60.00
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	979309-C6	60.00
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	984111-C6	53.60
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	979311-C6	53.00
	.5 mm	.0196	**.10 mm**	2.50 mm (5x)	3	4 mm	50 mm	965811-C6	67.70
.020		.0200	**.004**	.016 (0.8x)	3	1/8	1-1/2	954220-C6	51.70
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52220-C6	48.20
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	46820-C6	48.20
.020		.0200	**.004**	.060 (3x)	4	1/8	1-1/2	786620-C6	51.70
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53620-C6	59.70
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	984113-C6	51.90
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	979313-C6	51.90
.025		.0250	**.004**	.020 (0.8x)	3	1/8	1-1/2	954225-C6	51.00
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52225-C6	46.60
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	46825-C6	46.60
.025		.0250	**.004**	.075 (3x)	4	1/8	1-1/2	786625-C6	49.30
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53625-C6	57.70
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	979315-C6	51.40
.030		.0300	**.004**	.045 (1.5x)	3	1/8	1-1/2	52230-C6	47.40
.030		.0300	**.004**	.090 (3x)	3	1/8	1-1/2	46830-C6	46.60
.030		.0300	**.004**	.156 (5x)	3	1/8	2-1/2	53630-C6	58.20

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	853631-C6	42.80
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	923631-C6	40.10
.031 (1/32)		.0310	**.005**	.025 (0.8x)	3	1/8	1-1/2	954231-C6	41.50
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52231-C6	39.80
.031 (1/32)		.0310	**.005**	.047 (1.5x)	4	1/8	1-1/2	795531-C6	43.00
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	46831-C6	39.80
.031 (1/32)		.0310	**.005**	.093 (3x)	4	1/8	1-1/2	850731-C6	42.60
.031 (1/32)		.0310	**.005**	.125 (4x)	3	1/8	2-1/2	796731-C6	44.80
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53631-C6	50.10
.031 (1/32)		.0310	**.005**	.156 (5x)	4	1/8	2-1/2	796931-C6	53.60
.031 (1/32)		.0310	**.008**	.047 (1.5x)	3	1/8	1-1/2	847831-C6	43.00
.031 (1/32)		.0310	**.008**	.093 (3x)	3	1/8	1-1/2	848431-C6	43.90
.031 (1/32)		.0310	**.010**	.047 (1.5x)	3	1/8	1-1/2	912931-C6	42.80
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	950731-C6	43.00
.031 (1/32)		.0310	**.010**	.093 (3x)	4	1/8	1-1/2	856431-C6	43.00
.031 (1/32)		.0310	**.010**	.156 (5x)	3	1/8	2-1/2	869831-C6	53.60
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	984118-C6	45.00
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	979318-C6	45.00
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52235-C6	39.80
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	46835-C6	39.80
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53635-C6	50.10
.035		.0350	**.010**	.105 (3x)	3	1/8	1-1/2	950735-C6	43.00
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	979320-C6	45.00
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	984122-C6	44.60
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979322-C6	44.60
	1.0 mm	.0393	**.10 mm**	5.00 mm (5x)	3	4 mm	50 mm	965822-C6	55.40
	1.0 mm	.0393	**.30 mm**	3.00 mm (3x)	3	4 mm	50 mm	843322-C6	45.00
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	923640-C6	39.80
.040		.0400	**.005**	.032 (0.8x)	3	1/8	1-1/2	954240-C6	43.80
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52240-C6	39.80
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	46840-C6	39.80
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53640-C6	50.10
.040		.0400	**.005**	.203 (5x)	4	1/8	2-1/2	796940-C6	53.60
.040		.0400	**.010**	.120 (3x)	3	1/8	1-1/2	950740-C6	43.00
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	979324-C6	44.80
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52245-C6	39.80
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	46845-C6	39.80
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53645-C6	50.10
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	923647-C6	39.30
.047 (3/64)		.0470	**.005**	.038 (0.8x)	3	1/8	1-1/2	954247-C6	41.50
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52247-C6	39.80
.047 (3/64)		.0470	**.005**	.071 (1.5x)	4	1/8	1-1/2	795547-C6	42.60
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	46847-C6	39.80
.047 (3/64)		.0470	**.005**	.141 (3x)	4	1/8	1-1/2	850747-C6	42.60
.047 (3/64)		.0470	**.005**	.187 (4x)	3	1/8	2-1/2	796747-C6	45.30
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53647-C6	50.10
.047 (3/64)		.0470	**.005**	.250 (5x)	4	1/8	2-1/2	796947-C6	53.60
.047 (3/64)		.0470	**.010**	.071 (1.5x)	3	1/8	1-1/2	912947-C6	42.80
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	950747-C6	43.00
.047 (3/64)		.0470	**.015**	.071 (1.5x)	3	1/8	1-1/2	975647-C6	40.40
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	964147-C6	43.00

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	984127-C6	45.00	
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	979327-C6	45.00	
.050		.0500	**.005**	.040 (0.8x)	3	1/8	1-1/2	954250-C6	43.30	
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52250-C6	39.30	
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	46850-C6	39.30	
.050		.0500	**.005**	.150 (3x)	4	1/8	1-1/2	850750-C6	42.10	
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53650-C6	50.10	
.050		.0500	**.010**	.075 (1.5x)	3	1/8	1-1/2	912950-C6	42.80	
.050		.0500	**.010**	.150 (3x)	3	1/8	1-1/2	950750-C6	43.90	
.050		.0500	**.015**	.075 (1.5x)	3	1/8	1-1/2	975650-C6	43.00	
.050		.0500	**.015**	.150 (3x)	3	1/8	1-1/2	964150-C6	41.60	
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979329-C6	45.00	
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52255-C6	39.30	
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	46855-C6	39.30	
.055		.0550	**.005**	.165 (3x)	4	1/8	1-1/2	850755-C6	42.10	NEW
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53655-C6	50.10	
.055		.0550	**.010**	.083 (1.5x)	3	1/8	1-1/2	912955-C6	43.60	
.055		.0550	**.010**	.165 (3x)	3	1/8	1-1/2	950755-C6	43.90	
.055		.0550	**.015**	.083 (1.5x)	3	1/8	1-1/2	975655-C6	43.90	
.055		.0550	**.015**	.165 (3x)	3	1/8	1-1/2	964155-C6	43.90	
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	984131-C6	45.00	
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	979331-C6	45.00	
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	984133-C6	41.80	
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	979333-C6	41.80	
	1.5 mm	.0590	**.20 mm**	7.50 mm (5x)	3	4 mm	50 mm	965833-C6	51.60	
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	908860-C6	39.30	
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	936460-C6	39.30	
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	869060-C6	50.10	
.060		.0600	**.010**	.048 (0.8x)	3	1/8	1-1/2	954260-C6	43.80	
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52260-C6	39.30	
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	46860-C6	39.30	
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53660-C6	50.10	
.060		.0600	**.015**	.090 (1.5x)	3	1/8	1-1/2	975660-C6	39.80	
.060		.0600	**.015**	.180 (3x)	3	1/8	1-1/2	964160-C6	40.40	
.060		.0600	**.020**	.090 (1.5x)	3	1/8	1-1/2	931760-C6	40.90	
.060		.0600	**.020**	.180 (3x)	3	1/8	1-1/2	959260-C6	41.20	
.062 (1/16)		.0620	**.003**	.093 (1.5x)	3	1/8	1-1/2	853662-C6	37.70	
.062 (1/16)		.0620	**.003**	.186 (3x)	3	1/8	1-1/2	923662-C6	36.80	
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	908862-C6	36.80	
.062 (1/16)		.0620	**.005**	.093 (1.5x)	4	1/8	1-1/2	795562-C6	40.40	
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	936462-C6	36.80	
.062 (1/16)		.0620	**.005**	.186 (3x)	4	1/8	1-1/2	850762-C6	39.80	
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	869062-C6	47.60	
.062 (1/16)		.0620	**.008**	.093 (1.5x)	3	1/8	1-1/2	847862-C6	36.80	
.062 (1/16)		.0620	**.008**	.186 (3x)	3	1/8	1-1/2	848462-C6	37.70	
.062 (1/16)		.0620	**.010**	.050 (0.8x)	3	1/8	1-1/2	954262-C6	37.50	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52262-C6	36.80	
.062 (1/16)		.0620	**.010**	.093 (1.5x)	4	1/8	1-1/2	797162-C6	42.60	
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	46862-C6	36.80	
.062 (1/16)		.0620	**.010**	.186 (3x)	4	1/8	1-1/2	856462-C6	42.60	
.062 (1/16)		.0620	**.010**	.250 (4x)	3	1/8	2-1/2	796562-C6	44.10	

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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	CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53662-C6	48.00
	.062 (1/16)		.0620	**.010**	.312 (5x)	4	1/8	2-1/2	797362-C6	52.70
	.062 (1/16)		.0620	**.015**	.093 (1.5x)	3	1/8	1-1/2	975662-C6	36.80
	.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	964162-C6	36.80
NEW	.062 (1/16)		.0620	**.015**	.186 (3x)	4	1/8	1-1/2	696262-C6	42.60
NEW	.062 (1/16)		.0620	**.015**	.250 (4x)	3	1/8	2-1/2	696162-C6	44.10
	.062 (1/16)		.0620	**.015**	.312 (5x)	3	1/8	2-1/2	860262-C6	48.50
	.062 (1/16)		.0620	**.020**	.093 (1.5x)	3	1/8	1-1/2	931762-C6	40.60
	.062 (1/16)		.0620	**.020**	.093 (1.5x)	4	1/8	1-1/2	702862-C6	46.30
	.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	959262-C6	44.50
	.062 (1/16)		.0620	**.020**	.186 (3x)	4	1/8	1-1/2	786462-C6	46.40
	.062 (1/16)		.0620	**.020**	.312 (5x)	3	1/8	2-1/2	870662-C6	48.00
		1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	984136-C6	41.80
		1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979336-C6	41.80
		1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	979338-C6	41.80
	.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	936470-C6	37.70
	.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52270-C6	36.80
	.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	46870-C6	36.80
	.070		.0700	**.010**	.375 (5x)	3	1/8	2-1/2	53670-C6	48.50
		1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	984140-C6	42.10
		1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979340-C6	42.10
		1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	979342-C6	42.10
	.078 (5/64)		.0780	**.003**	.234 (3x)	3	1/8	1-1/2	923678-C6	38.30
	.078 (5/64)		.0780	**.005**	.117 (1.5x)	3	1/8	1-1/2	908878-C6	36.80
	.078 (5/64)		.0780	**.005**	.117 (1.5x)	4	1/8	1-1/2	795578-C6	39.80
	.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	936478-C6	36.80
	.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	869078-C6	47.60
	.078 (5/64)		.0780	**.010**	.062 (0.8x)	3	1/8	1-1/2	954278-C6	37.50
	.078 (5/64)		.0780	**.010**	.117 (1.5x)	3	1/8	1-1/2	52278-C6	36.80
	.078 (5/64)		.0780	**.010**	.117 (1.5x)	4	1/8	1-1/2	797178-C6	43.00
	.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	46878-C6	36.80
	.078 (5/64)		.0780	**.010**	.234 (3x)	4	1/8	1-1/2	856478-C6	42.60
	.078 (5/64)		.0780	**.010**	.312 (4x)	3	1/8	2-1/2	796578-C6	44.80
	.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53678-C6	47.60
	.078 (5/64)		.0780	**.010**	.406 (5x)	4	1/8	2-1/2	797378-C6	54.00
	.078 (5/64)		.0780	**.015**	.117 (1.5x)	3	1/8	1-1/2	975678-C6	40.90
	.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	964178-C6	40.90
NEW	.078 (5/64)		.0780	**.015**	.406 (5x)	3	1/8	2-1/2	860278-C6	53.00
	.078 (5/64)		.0780	**.020**	.117 (1.5x)	3	1/8	1-1/2	931778-C6	44.50
	.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	959278-C6	44.50
	.078 (5/64)		.0780	**.020**	.406 (5x)	3	1/8	2-1/2	870678-C6	56.70
	.078 (5/64)		.0780	**.025**	.234 (3x)	3	1/8	1-1/2	848878-C6	44.50
		2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	984145-C6	41.80
		2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	979345-C6	41.80
		2.0 mm	.0787	**.20 mm**	10.00 mm (5x)	3	4 mm	50 mm	965845-C6	51.20
		2.0 mm	.0787	**.50 mm**	6.00 mm (3x)	3	4 mm	50 mm	842545-C6	42.10
	.080		.0800	**.010**	.120 (1.5x)	3	1/8	1-1/2	52280-C6	37.70
	.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	46880-C6	36.80
	.090		.0900	**.010**	.135 (1.5x)	3	1/8	1-1/2	52290-C6	36.80
	.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	46890-C6	37.70

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.025mm −.025mm	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN NANO COATED TOOL #	USD$
.093 (3/32)		.0930	**.003**	.279 (3x)	3	1/8	1-1/2	923693-C6	37.10
.093 (3/32)		.0930	**.005**	.074 (0.8x)	3	1/8	1-1/2	840593-C6	37.80
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	908893-C6	36.80
.093 (3/32)		.0930	**.005**	.140 (1.5x)	4	1/8	1-1/2	795593-C6	42.60
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	936493-C6	36.80
.093 (3/32)		.0930	**.005**	.279 (3x)	4	1/8	1-1/2	850793-C6	43.00
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	869093-C6	47.50
.093 (3/32)		.0930	**.008**	.140 (1.5x)	3	1/8	1-1/2	847893-C6	36.80
.093 (3/32)		.0930	**.008**	.279 (3x)	3	1/8	1-1/2	848493-C6	36.80
.093 (3/32)		.0930	**.010**	.074 (0.8x)	3	1/8	1-1/2	954293-C6	37.80
.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52293-C6	36.80
.093 (3/32)		.0930	**.010**	.140 (1.5x)	4	1/8	1-1/2	797193-C6	42.60
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	46893-C6	36.80
.093 (3/32)		.0930	**.010**	.279 (3x)	4	1/8	1-1/2	856493-C6	42.60
.093 (3/32)		.0930	**.010**	.375 (4x)	3	1/8	2-1/2	796593-C6	44.80
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53693-C6	47.60
.093 (3/32)		.0930	**.010**	.500 (5x)	4	1/8	2-1/2	797393-C6	53.50
.093 (3/32)		.0930	**.015**	.140 (1.5x)	3	1/8	1-1/2	975693-C6	37.70
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	964193-C6	36.80
.093 (3/32)		.0930	**.020**	.140 (1.5x)	3	1/8	1-1/2	931793-C6	36.80
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	959293-C6	36.80
.093 (3/32)		.0930	**.020**	.279 (3x)	4	1/8	1-1/2	786493-C6	42.60
.093 (3/32)		.0930	**.020**	.500 (5x)	3	1/8	2-1/2	870693-C6	48.30
.093 (3/32)		.0930	**.025**	.279 (3x)	3	1/8	1-1/2	848893-C6	44.70
.093 (3/32)		.0930	**.030**	.140 (1.5x)	3	1/8	1-1/2	929393-C6	44.70
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	943893-C6	44.70
.093 (3/32)		.0930	**.030**	.279 (3x)	4	1/8	1-1/2	702693-C6	50.40
.093 (3/32)		.0930	**.030**	.500 (5x)	3	1/8	2-1/2	871493-C6	55.30
	2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	984151-C6	38.70
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	979351-C6	41.80
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	4	4 mm	50 mm	722951-C6	47.20
	2.5 mm	.0984	**.20 mm**	12.00 mm (5x)	3	4 mm	50 mm	965851-C6	51.20
.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	908800-C6	36.80
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	936500-C6	36.80
.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52300-C6	36.80
.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	46900-C6	36.80
.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53700-C6	48.50
.100		.1000	**.015**	.150 (1.5x)	3	1/8	1-1/2	907700-C6	41.80
.100		.1000	**.015**	.300 (3x)	3	1/8	1-1/2	964200-C6	41.80
.100		.1000	**.020**	.150 (1.5x)	3	1/8	1-1/2	931800-C6	44.50
.100		.1000	**.020**	.300 (3x)	3	1/8	1-1/2	959300-C6	45.40
.100		.1000	**.030**	.150 (1.5x)	3	1/8	1-1/2	929400-C6	45.50
.100		.1000	**.030**	.300 (3x)	3	1/8	1-1/2	943900-C6	44.70
.109 (7/64)		.1090	**.005**	.327 (3x)	3	1/8	1-1/2	936502-C6	36.80
.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	46902-C6	36.80
.109 (7/64)		.1090	**.015**	.327 (3x)	3	1/8	1-1/2	964202-C6	40.90
.118		.1180	**.010**	.177 (1.5x)	3	1/8	1-1/2	52305-C6	36.80
.118		.1180	**.010**	.354 (3x)	3	1/8	1-1/2	46905-C6	36.80

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Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	984157-C6	41.80
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	979357-C6	41.80
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	4	4 mm	50 mm	723057-C6	47.20
	3.0 mm	.1181	**.20 mm**	15.00 mm (5x)	3	4 mm	50 mm	965857-C6	51.20
	3.0 mm	.1181	**.50 mm**	9.00 mm (3x)	3	4 mm	50 mm	842557-C6	42.10
	3.0 mm	.1181	**.50 mm**	15.00 mm (5x)	3	4 mm	50 mm	760957-C6	51.60
	3.0 mm	.1181	**1.00 mm**	9.00 mm (3x)	3	4 mm	50 mm	842157-C6	49.10

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)		.1250	**.003**	.187 (1.5x)	4	1/8	1-1/2	853708-C6	36.10
.125 (1/8)		.1250	**.003**	.375 (3x)	4	1/8	1-1/2	923708-C6	36.10
.125 (1/8)		.1250	**.005**	.100 (0.8x)	4	1/8	1-1/2	840608-C6	36.10
.125 (1/8)		.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	908908-C6	36.10
.125 (1/8)		.1250	**.005**	.375 (3x)	4	1/8	1-1/2	936508-C6	36.10
.125 (1/8)		.1250	**.005**	.625 (5x)	4	1/8	2-1/2	869108-C6	48.30
.125 (1/8)		.1250	**.008**	.187 (1.5x)	4	1/8	1-1/2	847908-C6	36.10
.125 (1/8)		.1250	**.008**	.375 (3x)	4	1/8	1-1/2	848508-C6	36.10
.125 (1/8)		.1250	**.010**	.187 (1.5x)	4	1/8	1-1/2	913008-C6	33.40
.125 (1/8)		.1250	**.010**	.375 (3x)	4	1/8	1-1/2	950808-C6	33.40
.125 (1/8)		.1250	**.010**	.625 (5x)	4	1/8	2-1/2	869908-C6	48.30
.125 (1/8)		.1250	**.015**	.100 (0.8x)	4	1/8	1-1/2	954308-C6	37.50
.125 (1/8)		.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52308-C6	33.40
.125 (1/8)		.1250	**.015**	.375 (3x)	4	1/8	1-1/2	46908-C6	33.40
.125 (1/8)		.1250	**.015**	.500 (4x)	4	1/8	2-1/2	796408-C6	41.40
.125 (1/8)		.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53708-C6	47.20
.125 (1/8)		.1250	**.020**	.100 (0.8x)	4	1/8	1-1/2	816408-C6	37.80
.125 (1/8)		.1250	**.020**	.187 (1.5x)	4	1/8	1-1/2	931808-C6	40.50
.125 (1/8)		.1250	**.020**	.375 (3x)	4	1/8	1-1/2	959308-C6	40.50
.125 (1/8)		.1250	**.020**	.625 (5x)	4	1/8	2-1/2	870708-C6	54.90
.125 (1/8)		.1250	**.025**	.187 (1.5x)	4	1/8	1-1/2	749408-C6	41.50
.125 (1/8)		.1250	**.025**	.375 (3x)	4	1/8	1-1/2	848908-C6	40.70
.125 (1/8)		.1250	**.030**	.100 (0.8x)	4	1/8	1-1/2	718630-C6	42.70
.125 (1/8)		.1250	**.030**	.187 (1.5x)	4	1/8	1-1/2	929408-C6	40.70
.125 (1/8)		.1250	**.030**	.375 (3x)	4	1/8	1-1/2	943908-C6	40.70
.125 (1/8)		.1250	**.030**	.625 (5x)	4	1/8	2-1/2	871508-C6	55.10
.125 (1/8)		.1250	**.040**	.375 (3x)	4	1/8	1-1/2	844008-C6	44.50
.140 (9/64)		.1406	**.005**	.425 (3x)	4	3/16	2	936505-C6	43.70
.140 (9/64)		.1406	**.010**	.425 (3x)	4	3/16	2	950809-C6	43.70
.140 (9/64)		.1406	**.015**	.112 (0.8x)	4	3/16	2	954309-C6	44.80
.140 (9/64)		.1406	**.015**	.220 (1.5x)	4	3/16	2	52309-C6	43.10
.140 (9/64)		.1406	**.015**	.425 (3x)	4	3/16	2	46909-C6	44.00
.140 (9/64)		.1406	**.015**	.750 (5x)	4	3/16	3	53709-C6	55.80
.140 (9/64)		.1406	**.020**	.425 (3x)	4	3/16	2	959309-C6	44.80
.140 (9/64)		.1406	**.030**	.425 (3x)	4	3/16	2	943909-C6	44.80

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NEW SIZES!

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.156 (5/32)		.1562	**.005**	.235 (1.5x)	4	3/16	2	908956-C6	39.10
.156 (5/32)		.1562	**.005**	.470 (3x)	4	3/16	2	936510-C6	39.10
.156 (5/32)		.1562	**.010**	.235 (1.5x)	4	3/16	2	913010-C6	36.50
.156 (5/32)		.1562	**.010**	.470 (3x)	4	3/16	2	950810-C6	36.50
.156 (5/32)		.1562	**.010**	.750 (5x)	4	3/16	3	869910-C6	51.30
.156 (5/32)		.1562	**.015**	.125 (0.8x)	4	3/16	2	954310-C6	40.60
.156 (5/32)		.1562	**.015**	.235 (1.5x)	4	3/16	2	52310-C6	39.10
.156 (5/32)		.1562	**.015**	.470 (3x)	4	3/16	2	46910-C6	39.10
.156 (5/32)		.1562	**.015**	.750 (5x)	4	3/16	3	53710-C6	52.40
.156 (5/32)		.1562	**.020**	.470 (3x)	4	3/16	2	959310-C6	39.10
.156 (5/32)		.1562	**.025**	.470 (3x)	4	3/16	2	848910-C6	39.10
.156 (5/32)		.1562	**.030**	.235 (1.5x)	4	3/16	2	929410-C6	36.50
.156 (5/32)		.1562	**.030**	.470 (3x)	4	3/16	2	943910-C6	36.50
.156 (5/32)		.1562	**.030**	.750 (5x)	4	3/16	3	871510-C6	51.30
	4.0 mm	.1574	**.40 mm**	6.00 mm (1.5x)	4	6 mm	63 mm	984161-C6	44.80
	4.0 mm	.1574	**.40 mm**	12.00 mm (3x)	4	6 mm	63 mm	979361-C6	44.80
.187 (3/16)		.1875	**.005**	.285 (1.5x)	4	3/16	2	908910-C6	39.10
.187 (3/16)		.1875	**.005**	.562 (3x)	4	3/16	2	936512-C6	39.10
.187 (3/16)		.1875	**.005**	1.000 (5x)	4	3/16	3	869112-C6	51.80
.187 (3/16)		.1875	**.008**	.562 (3x)	4	3/16	2	848512-C6	39.10
.187 (3/16)		.1875	**.010**	.150 (0.8x)	4	3/16	2	763212-C6	42.60
.187 (3/16)		.1875	**.010**	.285 (1.5x)	4	3/16	2	913012-C6	36.20
.187 (3/16)		.1875	**.010**	.562 (3x)	4	3/16	2	950812-C6	36.50
.187 (3/16)		.1875	**.010**	1.000 (5x)	4	3/16	3	869912-C6	52.40
.187 (3/16)		.1875	**.015**	.150 (0.8x)	4	3/16	2	954312-C6	40.60
.187 (3/16)		.1875	**.015**	.285 (1.5x)	4	3/16	2	52312-C6	36.20
.187 (3/16)		.1875	**.015**	.562 (3x)	4	3/16	2	46912-C6	36.50
.187 (3/16)		.1875	**.015**	.750 (4x)	4	3/16	3	796412-C6	44.30
.187 (3/16)		.1875	**.015**	1.000 (5x)	4	3/16	3	53712-C6	52.40
.187 (3/16)		.1875	**.020**	.150 (0.8x)	4	3/16	2	816412-C6	49.30
.187 (3/16)		.1875	**.020**	.285 (1.5x)	4	3/16	2	931812-C6	43.00
.187 (3/16)		.1875	**.020**	.562 (3x)	4	3/16	2	959312-C6	43.00
.187 (3/16)		.1875	**.020**	1.000 (5x)	4	3/16	3	870712-C6	49.10
.187 (3/16)		.1875	**.025**	.285 (1.5x)	4	3/16	2	749412-C6	43.30
.187 (3/16)		.1875	**.025**	.562 (3x)	4	3/16	2	848912-C6	51.80
.187 (3/16)		.1875	**.030**	.285 (1.5x)	4	3/16	2	929412-C6	43.30
.187 (3/16)		.1875	**.030**	.562 (3x)	4	3/16	2	943912-C6	44.70
.187 (3/16)		.1875	**.030**	1.000 (5x)	4	3/16	3	871512-C6	51.80
.187 (3/16)		.1875	**.040**	.562 (3x)	4	3/16	2	844012-C6	48.30
.187 (3/16)		.1875	**.045**	.285 (1.5x)	4	3/16	2	857612-C6	47.20
.187 (3/16)		.1875	**.045**	.562 (3x)	4	3/16	2	864512-C6	47.20
.187 (3/16)		.1875	**.060**	.285 (1.5x)	4	3/16	2	845412-C6	43.00
.187 (3/16)		.1875	**.060**	.562 (3x)	4	3/16	2	885612-C6	43.00
.187 (3/16)		.1875	**.060**	1.000 (5x)	4	3/16	3	804412-C6	48.00
	5.0 mm	.1968	**.40 mm**	7.50 mm (1.5x)	4	6 mm	63 mm	984164-C6	44.80
	5.0 mm	.1968	**.40 mm**	15.00 mm (3x)	4	6 mm	63 mm	979364-C6	44.80
	5.0 mm	.1968	**1.00 mm**	7.50 mm (1.5x)	4	6 mm	63 mm	752464-C6	45.30
	5.0 mm	.1968	**1.00 mm**	15.00 mm (3x)	4	6 mm	63 mm	752964-C6	45.30
	6.0 mm	.2362	**.40 mm**	9.00 mm (1.5x)	4	6 mm	63 mm	984166-C6	45.30
	6.0 mm	.2362	**.40 mm**	18.00 mm (3x)	4	6 mm	63 mm	979366-C6	45.30

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.250 (1/4)	.2500	**.005**	.375 (1.5x)	4	1/4	2-1/2	908916-C6	48.90
.250 (1/4)	.2500	**.005**	.750 (3x)	4	1/4	2-1/2	936516-C6	48.90
.250 (1/4)	.2500	**.008**	.750 (3x)	4	1/4	2-1/2	848516-C6	48.90
.250 (1/4)	.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	913016-C6	45.80
.250 (1/4)	.2500	**.010**	.750 (3x)	4	1/4	2-1/2	950816-C6	45.80
.250 (1/4)	.2500	**.015**	.200 (0.8x)	4	1/4	2-1/2	954316-C6	51.20
.250 (1/4)	.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52316-C6	46.10
.250 (1/4)	.2500	**.015**	.750 (3x)	4	1/4	2-1/2	46916-C6	46.10
.250 (1/4)	.2500	**.015**	1.250 (5x)	4	1/4	4	53716-C6	64.80
.250 (1/4)	.2500	**.020**	.200 (0.8x)	4	1/4	2-1/2	816416-C6	57.70
.250 (1/4)	.2500	**.020**	.375 (1.5x)	4	1/4	2-1/2	931816-C6	52.10
.250 (1/4)	.2500	**.020**	.750 (3x)	4	1/4	2-1/2	959316-C6	52.60
.250 (1/4)	.2500	**.025**	.750 (3x)	4	1/4	2-1/2	848916-C6	52.60
.250 (1/4)	.2500	**.030**	.375 (1.5x)	4	1/4	2-1/2	929416-C6	52.60
.250 (1/4)	.2500	**.030**	.750 (3x)	4	1/4	2-1/2	943916-C6	52.10
.250 (1/4)	.2500	**.030**	1.250 (5x)	4	1/4	4	871516-C6	61.10
.250 (1/4)	.2500	**.040**	.750 (3x)	4	1/4	2-1/2	844016-C6	57.40
.250 (1/4)	.2500	**.045**	.750 (3x)	4	1/4	2-1/2	864516-C6	58.30
.250 (1/4)	.2500	**.060**	.375 (1.5x)	4	1/4	2-1/2	845416-C6	52.60
.250 (1/4)	.2500	**.060**	.750 (3x)	4	1/4	2-1/2	885616-C6	52.60
.312 (5/16)	.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52320-C6	66.10
.312 (5/16)	.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	46920-C6	66.70
.375 (3/8)	.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52324-C6	76.20
.375 (3/8)	.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	46924-C6	77.00
.375 (3/8)	.3750	**.020**	.570 (1.5x)	4	3/8	2-1/2	931824-C6	82.60
.375 (3/8)	.3750	**.030**	.570 (1.5x)	4	3/8	2-1/2	929424-C6	82.60
.375 (3/8)	.3750	**.030**	1.125 (3x)	4	3/8	2-1/2	943924-C6	85.00
.375 (3/8)	.3750	**.040**	1.125 (3x)	4	3/8	2-1/2	844024-C6	85.00
.500 (1/2)	.5000	**.015**	.750 (1.5x)	4	1/2	3	816232-C6	98.50
.500 (1/2)	.5000	**.030**	.750 (1.5x)	4	1/2	3	52332-C6	99.50
.500 (1/2)	.5000	**.030**	1.500 (3x)	4	1/2	3	843932-C6	98.50
.500 (1/2)	.5000	**.060**	.750 (1.5x)	4	1/2	3	845532-C6	98.50

Speeds & Feeds (Variable Helix For High Temp Alloys)

Important Note:Values in table are in inches and are based on 4 flute, standard (3x Dia) length of cut end mills. For 3 flutes, table values of IPT must be increased to 105% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 115%; for 1.5x, increase to 108%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7 **Tool Steels**: D, H, M, T, S series	275 - 300	160
	300 - 350	140
	350 - 400	100
	400 - 425	80
Titanium: All alloys	275 - 300	200
	300 - 350	125
	350 - 400	75
	400 - 425	75
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	80
	300 - 350	60
	350 - 400	50
	400 - 425	40

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00005	.00010	.00016	.00020	.00026	.00031	.00041	.00062	.00083	.00108	.00130	.00173
Roughing	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	.00138	.00165	.00221
Finishing	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	.00180	.00217	.00289
Max	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	.00216	.00260	.00347

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .4x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .4x Dia
Roughing: .5x - .7x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Chipbreaker

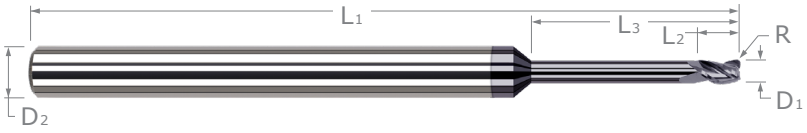


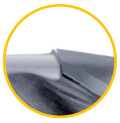
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Chipbreaker geometry for efficient chip evacuation, reduced heat buildup, and prolonged tool life in high-temperature alloys
- Ti Nano coating offers extreme hardness for improved tool life and superior edge strength in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	Ti NANO COATED	
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.010	.187 (1.5x)	1/8	1-1/2	701708-C10	39.50
.125 (1/8)	.010	.375 (3x)	1/8	1-1/2	701108-C10	39.50
.187 (3/16)	.010	.285 (1.5x)	3/16	2	701712-C10	42.80
.187 (3/16)	.010	.562 (3x)	3/16	2	701112-C10	42.80
.250 (1/4)	.020	.375 (1.5x)	1/4	2-1/2	701516-C10	55.00
.250 (1/4)	.020	.750 (3x)	1/4	2-1/2	700916-C10	55.00
.312 (5/16)	.020	.470 (1.5x)	5/16	2-1/2	701520-C10	76.80
.312 (5/16)	.020	1.000 (3x)	5/16	2-1/2	700920-C10	76.80
.375 (3/8)	.020	.570 (1.5x)	3/8	2-1/2	701524-C10	87.40
.375 (3/8)	.020	1.125 (3x)	3/8	2-1/2	700924-C10	87.40
.500 (1/2)	.030	.750 (1.5x)	1/2	3	701332-C10	108.60
.500 (1/2)	.030	1.500 (3x)	1/2	3	700732-C10	108.60

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute





Reduced Neck Diameter to Avoid Heeling

- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 34°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders • Suitable for steels up to 45Rc
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.003**	.022	.045 (3x)	3	1/8	1-1/2	947615-C6	71.60
.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	64415-C6	72.00
.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	54815-C6	72.80
.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63015-C6	80.30
.015 (1/64)		.0150	**.003**	.022	.225 (15x)	3	1/8	2-1/2	968915-C6	88.10
	.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	980709-C6	79.90
	.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	975009-C6	82.50
	.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	987309-C6	88.10
	.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	980711-C6	76.80
	.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	975011-C6	79.20
	.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	987311-C6	85.50
	.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	971511-C6	89.50
.020		.0200	**.004**	.030	.060 (3x)	3	1/8	1-1/2	947620-C6	68.10
.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	64420-C6	68.10
.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	54820-C6	69.50
.020		.0200	**.004**	.030	.200 (10x)	3	1/8	2-1/2	932520-C6	73.80
.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63020-C6	76.70
	.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	980713-C6	76.10
	.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	975013-C6	77.40
	.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	987313-C6	82.80
.025		.0250	**.004**	.038	.075 (3x)	3	1/8	1-1/2	947625-C6	66.00
.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	64425-C6	66.50
.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	54825-C6	67.90
.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63025-C6	74.80
.031 (1/32)		.0310	**.005**	.047	.093 (3x)	3	1/8	1-1/2	947631-C6	61.80
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	64431-C6	63.00
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	4	1/8	2-1/2	812131-C6	66.10
.031 (1/32)		.0310	**.005**	.047	.187 (6x)	3	1/8	2-1/2	796131-C6	66.10
.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	54831-C6	64.50
.031 (1/32)		.0310	**.005**	.047	.312 (10x)	3	1/8	2-1/2	932531-C6	66.10
.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63031-C6	67.20
.031 (1/32)		.0310	**.005**	.047	.470 (15x)	3	1/8	2-1/2	968931-C6	74.70
.031 (1/32)		.0310	**.010**	.047	.156 (5x)	3	1/8	2-1/2	917331-C6	60.50
.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	908631-C6	63.60
	.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	980718-C6	69.20
	.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	975018-C6	71.90
	.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	987318-C6	73.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	D_1 +.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.035		.0350	**.005**	.053	.105 (3x)	3	1/8	1-1/2	947635-C6	61.80
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	64435-C6	63.70
.035		.0350	**.005**	.053	.281 (8x)	3	1/8	2-1/2	54835-C6	64.50
.035		.0350	**.005**	.053	.350 (10x)	3	1/8	2-1/2	932535-C6	67.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	980722-C6	69.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	975022-C6	71.10
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	987322-C6	73.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	971522-C6	77.90
.040		.0400	**.005**	.060	.120 (3x)	3	1/8	1-1/2	947640-C6	61.80
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	64440-C6	63.00
.040		.0400	**.005**	.060	.325 (8x)	3	1/8	2-1/2	54840-C6	64.50
.045		.0450	**.005**	.068	.135 (3x)	3	1/8	1-1/2	947645-C6	63.00
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	64445-C6	63.00
.045		.0450	**.005**	.068	.375 (8x)	3	1/8	2-1/2	54845-C6	64.50
.047 (3/64)		.0470	**.005**	.070	.141 (3x)	3	1/8	1-1/2	947647-C6	61.80
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	64447-C6	63.00
.047 (3/64)		.0470	**.005**	.070	.281 (6x)	3	1/8	2-1/2	796147-C6	63.00
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	54847-C6	64.50
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63047-C6	67.20
.047 (3/64)		.0470	**.005**	.070	.710 (15x)	3	1/8	2-1/2	968947-C6	74.10
.047 (3/64)		.0470	**.010**	.070	.250 (5x)	3	1/8	2-1/2	917347-C6	63.00
.047 (3/64)		.0470	**.010**	.070	.375 (8x)	3	1/8	2-1/2	908647-C6	65.00
.050		.0500	**.005**	.075	.150 (3x)	3	1/8	1-1/2	947650-C6	63.00
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	64450-C6	62.10
.050		.0500	**.005**	.075	.400 (8x)	3	1/8	2-1/2	54850-C6	63.60
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	64455-C6	63.40
.055		.0550	**.005**	.083	.450 (8x)	3	1/8	2-1/2	54855-C6	63.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	980733-C6	69.20
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	975033-C6	71.90
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	987333-C6	73.80
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	971533-C6	77.90
.060		.0600	**.005**	.090	.312 (5x)	3	1/8	2-1/2	919860-C6	63.40
.060		.0600	**.005**	.090	.500 (8x)	3	1/8	2-1/2	915360-C6	64.80
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	64460-C6	62.10
.060		.0600	**.010**	.090	.500 (8x)	3	1/8	2-1/2	54860-C6	63.60
.060		.0600	**.010**	.090	.625 (10x)	3	1/8	2-1/2	932560-C6	67.20
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	919862-C6	60.50
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	915362-C6	63.60
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	884462-C6	64.30
.062 (1/16)		.0620	**.010**	.093	.186 (3x)	3	1/8	1-1/2	947662-C6	60.50
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	64462-C6	62.10
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	4	1/8	2-1/2	811862-C6	64.50
.062 (1/16)		.0620	**.010**	.093	.375 (6x)	3	1/8	2-1/2	795962-C6	64.50
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	54862-C6	63.60
.062 (1/16)		.0620	**.010**	.093	.625 (10x)	3	1/8	2-1/2	932562-C6	66.10
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63062-C6	67.20
.062 (1/16)		.0620	**.010**	.093	.950 (15x)	3	1/8	2-1/2	968962-C6	74.70

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.062 (1/16)		.0620	**.015**	.093	.312 (5x)	3	1/8	2-1/2	902662-C6	61.70
.062 (1/16)		.0620	**.015**	.093	.500 (8x)	3	1/8	2-1/2	912062-C6	63.60
.062 (1/16)		.0620	**.020**	.093	.312 (5x)	3	1/8	2-1/2	866862-C6	62.50
.062 (1/16)		.0620	**.020**	.093	.500 (8x)	3	1/8	2-1/2	847562-C6	64.80
.078 (5/64)		.0780	**.005**	.117	.406 (5x)	3	1/8	2-1/2	919878-C6	62.10
.078 (5/64)		.0780	**.005**	.117	.625 (8x)	3	1/8	2-1/2	915378-C6	63.60
.078 (5/64)		.0780	**.010**	.117	.234 (3x)	3	1/8	1-1/2	947678-C6	61.70
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	64478-C6	62.10
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	4	1/8	2-1/2	811878-C6	64.50
.078 (5/64)		.0780	**.010**	.117	.475 (6x)	3	1/8	2-1/2	795978-C6	62.10
.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	54878-C6	63.60
.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63078-C6	67.20
.078 (5/64)		.0780	**.010**	.117	1.187 (15x)	3	1/8	2-1/2	968978-C6	74.70
	2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	980745-C6	70.10
	2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	975045-C6	71.10
	2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	987345-C6	73.80
	2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	971545-C6	77.90
.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	919893-C6	60.50
.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	915393-C6	64.80
.093 (3/32)		.0930	**.010**	.139	.279 (3x)	3	1/8	1-1/2	947693-C6	60.50
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	64493-C6	62.10
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	4	1/8	2-1/2	811893-C6	64.50
.093 (3/32)		.0930	**.010**	.139	.585 (6x)	3	1/8	2-1/2	795993-C6	62.10
.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	54893-C6	63.60
.093 (3/32)		.0930	**.010**	.139	.950 (10x)	3	1/8	2-1/2	932593-C6	66.10
.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63093-C6	67.20
.093 (3/32)		.0930	**.010**	.139	1.400 (15x)	3	1/8	3	968993-C6	74.10
.093 (3/32)		.0930	**.015**	.139	.500 (5x)	3	1/8	2-1/2	902693-C6	60.50
.093 (3/32)		.0930	**.015**	.139	.750 (8x)	3	1/8	2-1/2	912093-C6	64.80
.093 (3/32)		.0930	**.020**	.139	.500 (5x)	3	1/8	2-1/2	866893-C6	62.50
.093 (3/32)		.0930	**.020**	.139	.750 (8x)	3	1/8	2-1/2	847593-C6	64.80
.093 (3/32)		.0930	**.030**	.139	.500 (5x)	3	1/8	2-1/2	910193-C6	61.70
.093 (3/32)		.0930	**.030**	.139	.750 (8x)	3	1/8	2-1/2	906493-C6	63.60
.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	64500-C6	61.40
.100		.1000	**.010**	.150	.800 (8x)	3	1/8	2-1/2	54900-C6	63.20
	3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	980757-C6	65.80
	3.0 mm	.1181	**.20 mm**	4.50 mm	24.0 mm (8x)	3	4 mm	50 mm	975057-C6	65.90

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

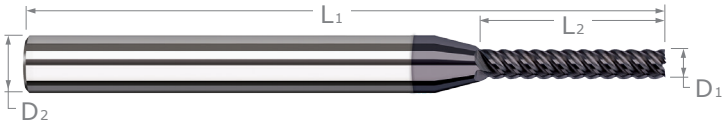
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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.005**	.187	.625 (5x)	4	1/8	2-1/2	919908-C6	57.00
.125 (1/8)	.1250	**.005**	.187	1.000 (8x)	4	1/8	2-1/2	915408-C6	59.90
.125 (1/8)	.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	917408-C6	60.10
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	908708-C6	63.20
.125 (1/8)	.1250	**.015**	.187	.375 (3x)	4	1/8	1-1/2	947708-C6	57.80
.125 (1/8)	.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	64508-C6	61.40
.125 (1/8)	.1250	**.015**	.187	.750 (6x)	4	1/8	2-1/2	795808-C6	62.50
.125 (1/8)	.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	54908-C6	63.20
.125 (1/8)	.1250	**.015**	.187	1.250 (10x)	4	1/8	2-1/2	932608-C6	66.10
.125 (1/8)	.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63108-C6	67.20
.125 (1/8)	.1250	**.020**	.187	.625 (5x)	4	1/8	2-1/2	866908-C6	61.10
.125 (1/8)	.1250	**.020**	.187	1.000 (8x)	4	1/8	2-1/2	847608-C6	63.20
.125 (1/8)	.1250	**.030**	.187	.625 (5x)	4	1/8	2-1/2	910208-C6	60.10
.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	4	1/8	2-1/2	906508-C6	63.20
.140 (9/64)	.1406	**.015**	.220	.750 (5x)	4	3/16	3	64509-C6	69.20
.140 (9/64)	.1406	**.015**	.220	1.125 (8x)	4	3/16	3	54909-C6	70.60
.156 (5/32)	.1562	**.010**	.235	.750 (5x)	4	3/16	3	917410-C6	67.90
.156 (5/32)	.1562	**.015**	.235	.750 (5x)	4	3/16	3	64510-C6	67.90
.156 (5/32)	.1562	**.015**	.235	1.250 (8x)	4	3/16	3	54910-C6	69.30
.156 (5/32)	.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63110-C6	85.30
.156 (5/32)	.1562	**.030**	.235	.750 (5x)	4	3/16	3	910210-C6	67.90
.187 (3/16)	.1875	**.005**	.281	1.000 (5x)	4	3/16	3	919912-C6	66.50
.187 (3/16)	.1875	**.005**	.281	1.500 (8x)	4	3/16	3	915412-C6	68.20
.187 (3/16)	.1875	**.010**	.281	1.000 (5x)	4	3/16	3	917412-C6	70.00
.187 (3/16)	.1875	**.010**	.281	1.500 (8x)	4	3/16	3	908712-C6	70.30
.187 (3/16)	.1875	**.015**	.281	1.000 (5x)	4	3/16	3	64512-C6	68.60
.187 (3/16)	.1875	**.015**	.281	1.156 (6x)	4	3/16	3	795812-C6	70.00
.187 (3/16)	.1875	**.015**	.281	1.500 (8x)	4	3/16	3	54912-C6	70.30
.187 (3/16)	.1875	**.015**	.281	1.875 (10x)	4	3/16	4	932612-C6	83.10
.187 (3/16)	.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63112-C6	84.40
.187 (3/16)	.1875	**.020**	.281	1.000 (5x)	4	3/16	3	866912-C6	69.40
.187 (3/16)	.1875	**.020**	.281	1.500 (8x)	4	3/16	3	847612-C6	71.20
.187 (3/16)	.1875	**.030**	.281	1.000 (5x)	4	3/16	3	910212-C6	68.10
.187 (3/16)	.1875	**.030**	.281	1.500 (8x)	4	3/16	3	906512-C6	69.90
.187 (3/16)	.1875	**.040**	.281	1.000 (5x)	4	3/16	3	785612-C6	68.10
.187 (3/16)	.1875	**.040**	.281	1.500 (8x)	4	3/16	3	785412-C6	71.20
.250 (1/4)	.2500	**.015**	.375	1.250 (5x)	4	1/4	4	64516-C6	77.70
.250 (1/4)	.2500	**.015**	.375	2.000 (8x)	4	1/4	4	54916-C6	77.40
.250 (1/4)	.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63116-C6	95.40
.250 (1/4)	.2500	**.030**	.375	1.250 (5x)	4	1/4	4	910216-C6	77.30
.250 (1/4)	.2500	**.030**	.375	2.000 (8x)	4	1/4	4	906516-C6	78.50
.375 (3/8)	.3750	**.015**	.570	2.000 (5x)	4	3/8	4	64524-C6	87.40

Please see Speeds & Feeds on page 159

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square



Up to 7 Flutes!

- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	967604-C6	70.10
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	974504-C6	80.40
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	976104-C6	82.50
.010		.0100	**.030** (3x)	4	1/8	1-1/2	57810-C6	68.60
.010		.0100	**.050** (5x)	4	1/8	2-1/2	62610-C6	78.80
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	967606-C6	64.60
.015 (1/64)		.0150	**.023** (1.5x)	4	1/8	1-1/2	946115-C6	53.40
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	57815-C6	53.40
.015 (1/64)		.0150	**.062** (4x)	4	1/8	2-1/2	890115-C6	66.30
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	62615-C6	66.30
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	59015-C6	69.00
.015 (1/64)		.0150	**.156** (10x)	4	1/8	2-1/2	941815-C6	81.20
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	967609-C6	61.40
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	974509-C6	72.00
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	976109-C6	74.20
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	967611-C6	61.40
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	974511-C6	70.30
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	976111-C6	72.80
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	946120-C6	52.40
.020		.0200	**.060** (3x)	4	1/8	1-1/2	57820-C6	52.40
.020		.0200	**.080** (4x)	4	1/8	2-1/2	890120-C6	66.00
.020		.0200	**.100** (5x)	4	1/8	2-1/2	62620-C6	66.00
.020		.0200	**.160** (8x)	4	1/8	2-1/2	59020-C6	68.80
.020		.0200	**.200** (10x)	4	1/8	2-1/2	941820-C6	81.20
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	967613-C6	61.40
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	974513-C6	70.30
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	976113-C6	72.80
.025		.0250	**.075** (3x)	4	1/8	1-1/2	57825-C6	49.10
.025		.0250	**.125** (5x)	4	1/8	2-1/2	62625-C6	63.60
.025		.0250	**.150** (6x)	4	1/8	2-1/2	718425-C6	65.10
.025		.0250	**.203** (8x)	4	1/8	2-1/2	59025-C6	66.50
.025		.0250	**.250** (10x)	4	1/8	2-1/2	941825-C6	78.20
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	967615-C6	61.10
.030		.0300	**.090** (3x)	6	1/8	1-1/2	57830-C6	49.10
.030		.0300	**.156** (5x)	6	1/8	2-1/2	62630-C6	64.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.031 (1/32)		.0310	**.047** (1.5x)	6	1/8	1-1/2	946131-C6	44.00
.031 (1/32)		.0310	**.093** (3x)	6	1/8	1-1/2	57831-C6	44.00
.031 (1/32)		.0310	**.125** (4x)	6	1/8	2-1/2	890131-C6	60.80
.031 (1/32)		.0310	**.156** (5x)	6	1/8	2-1/2	62631-C6	60.80
.031 (1/32)		.0310	**.187** (6x)	6	1/8	2-1/2	868531-C6	62.40
.031 (1/32)		.0310	**.218** (7x)	6	1/8	2-1/2	881331-C6	62.40
.031 (1/32)		.0310	**.250** (8x)	6	1/8	2-1/2	59031-C6	63.60
.031 (1/32)		.0310	**.312** (10x)	6	1/8	2-1/2	941831-C6	74.80
.031 (1/31)		.0310	**.375** (12x)	6	1/8	2-1/2	69131-C6	80.40
	.8 mm	.0314	**2.40 mm** (3x)	6	4 mm	50 mm	967618-C6	54.60
	.8 mm	.0314	**4.00 mm** (5x)	6	4 mm	50 mm	974518-C6	63.90
	.8 mm	.0314	**6.50 mm** (8x)	6	4 mm	50 mm	976118-C6	65.90
.035		.0350	**.105** (3x)	6	1/8	1-1/2	57835-C6	48.30
.035		.0350	**.187** (5x)	6	1/8	2-1/2	62635-C6	50.60
	.9 mm	.0354	**2.70 mm** (3x)	6	4 mm	50 mm	967620-C6	53.00
	1.0 mm	.0393	**1.50 mm** (1.5x)	6	4 mm	50 mm	846722-C6	53.00
	1.0 mm	.0393	**3.00 mm** (3x)	6	4 mm	50 mm	967622-C6	53.00
	1.0 mm	.0393	**4.00 mm** (4x)	6	4 mm	50 mm	726422-C6	59.50
	1.0 mm	.0393	**5.00 mm** (5x)	6	4 mm	50 mm	974522-C6	65.80
	1.0 mm	.0393	**8.00 mm** (8x)	6	4 mm	50 mm	976122-C6	69.90
	1.0 mm	.0393	**10.00 mm** (10x)	6	4 mm	50 mm	938322-C6	78.70
.040		.0400	**.060** (1.5x)	6	1/8	1-1/2	946140-C6	44.00
.040		.0400	**.120** (3x)	6	1/8	1-1/2	57840-C6	44.00
.040		.0400	**.160** (4x)	6	1/8	2-1/2	890140-C6	62.00
.040		.0400	**.203** (5x)	6	1/8	2-1/2	62640-C6	60.80
.040		.0400	**.240** (6x)	6	1/8	2-1/2	868540-C6	62.90
.040		.0400	**.325** (8x)	6	1/8	2-1/2	59040-C6	63.60
	1.1 mm	.0433	**3.00 mm** (3x)	6	4 mm	50 mm	967624-C6	51.40
.045		.0450	**.135** (3x)	6	1/8	1-1/2	57845-C6	48.30
.045		.0450	**.225** (5x)	6	1/8	2-1/2	62645-C6	51.00
.047 (3/64)		.0470	**.071** (1.5x)	6	1/8	1-1/2	946147-C6	45.00
.047 (3/64)		.0470	**.141** (3x)	6	1/8	1-1/2	57847-C6	44.00
.047 (3/64)		.0470	**.187** (4x)	6	1/8	2-1/2	890147-C6	60.80
.047 (3/64)		.0470	**.250** (5x)	6	1/8	2-1/2	62647-C6	60.80
.047 (3/64)		.0470	**.281** (6x)	6	1/8	2-1/2	868547-C6	62.40
.047 (3/64)		.0470	**.328** (7x)	6	1/8	2-1/2	881347-C6	62.40
.047 (3/64)		.0470	**.375** (8x)	6	1/8	2-1/2	59047-C6	63.60
.047 (3/64)		.0470	**.480** (10x)	6	1/8	2-1/2	941847-C6	74.80
.047 (3/64)		.0470	**.570** (12x)	6	1/8	2-1/2	69147-C6	81.20
	1.2 mm	.0472	**3.50 mm** (3x)	6	4 mm	50 mm	967627-C6	53.70
	1.2 mm	.0472	**6.00 mm** (5x)	6	4 mm	50 mm	974527-C6	66.40
	1.2 mm	.0472	**9.50 mm** (8x)	6	4 mm	50 mm	976127-C6	69.90

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.050		.0500	**.075** (1.5x)	7	1/8	1-1/2	946150-C6	45.00
.050		.0500	**.150** (3x)	7	1/8	1-1/2	57850-C6	44.00
.050		.0500	**.250** (5x)	7	1/8	2-1/2	62650-C6	60.80
.050		.0500	**.400** (8x)	7	1/8	2-1/2	59050-C6	63.60
	1.3 mm	.0511	**4.00 mm** (3x)	7	4 mm	50 mm	967629-C6	53.70
.055		.0550	**.165** (3x)	7	1/8	1-1/2	57855-C6	47.40
.055		.0550	**.275** (5x)	7	1/8	2-1/2	62655-C6	49.20
	1.4 mm	.0551	**4.00 mm** (3x)	7	4 mm	50 mm	967631-C6	53.00
	1.4 mm	.0551	**7.00 mm** (5x)	7	4 mm	50 mm	974531-C6	65.80
	1.4 mm	.0551	**11.00 mm** (8x)	7	4 mm	50 mm	976131-C6	69.90
	1.5 mm	.0590	**2.20 mm** (1.5x)	7	4 mm	50 mm	846733-C6	51.80
	1.5 mm	.0590	**4.50 mm** (3x)	7	4 mm	50 mm	967633-C6	51.80
	1.5 mm	.0590	**7.50 mm** (5x)	7	4 mm	50 mm	974533-C6	63.90
	1.5 mm	.0590	**12.00 mm** (8x)	7	4 mm	50 mm	976133-C6	67.90
	1.5 mm	.0590	**15.00 mm** (10x)	7	4 mm	50 mm	938333-C6	80.20
.060		.0600	**.090** (1.5x)	7	1/8	1-1/2	946160-C6	43.30
.060		.0600	**.180** (3x)	7	1/8	1-1/2	57860-C6	43.30
.060		.0600	**.312** (5x)	7	1/8	2-1/2	62660-C6	56.10
.060		.0600	**.500** (8x)	7	1/8	2-1/2	59060-C6	59.00
.062 (1/16)		.0620	**.093** (1.5x)	7	1/8	1-1/2	946162-C6	43.30
.062 (1/16)		.0620	**.186** (3x)	7	1/8	1-1/2	57862-C6	43.30
.062 (1/16)		.0620	**.250** (4x)	7	1/8	2-1/2	890162-C6	57.40
.062 (1/16)		.0620	**.312** (5x)	7	1/8	2-1/2	62662-C6	57.40
.062 (1/16)		.0620	**.375** (6x)	7	1/8	2-1/2	868562-C6	59.10
.062 (1/16)		.0620	**.437** (7x)	7	1/8	2-1/2	881362-C6	59.10
.062 (1/16)		.0620	**.500** (8x)	7	1/8	2-1/2	59062-C6	60.00
.062 (1/16)		.0620	**.625** (10x)	7	1/8	2-1/2	941862-C6	76.30
.062 (1/16)		.0620	**.750** (12x)	7	1/8	2-1/2	69162-C6	86.50
.062 (1/16)		.0620	**.950** (15x)	7	1/8	2-1/2	68762-C6	109.00
	1.6 mm	.0629	**5.00 mm** (3x)	7	4 mm	50 mm	967636-C6	51.80
	1.6 mm	.0629	**8.00 mm** (5x)	7	4 mm	50 mm	974536-C6	63.90
	1.6 mm	.0629	**13.00 mm** (8x)	7	4 mm	50 mm	976136-C6	67.90
	1.7 mm	.0669	**5.00 mm** (3x)	7	4 mm	50 mm	967638-C6	51.30
	1.7 mm	.0669	**8.50 mm** (5x)	7	4 mm	50 mm	974538-C6	63.90
.070		.0700	**.210** (3x)	7	1/8	1-1/2	57870-C6	40.90
.070		.0700	**.375** (5x)	7	1/8	2-1/2	62670-C6	57.40
.070		.0700	**.570** (8x)	7	1/8	2-1/2	59070-C6	60.00
	1.8 mm	.0708	**5.50 mm** (3x)	7	4 mm	50 mm	967640-C6	51.80
	1.8 mm	.0708	**9.00 mm** (5x)	7	4 mm	50 mm	974540-C6	63.90
	1.8 mm	.0708	**14.00 mm** (8x)	7	4 mm	50 mm	976140-C6	67.90
	1.9 mm	.0748	**5.50 mm** (3x)	7	4 mm	50 mm	967642-C6	51.80

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1			L_2		D_2 (h6)	L_1	TOOL #	USD$
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.010″ −.000″ +.25mm −.00mm					
.078 (5/64)		.0780	**.117** (1.5x)	7	1/8	1-1/2	946178-C6	40.90
.078 (5/64)		.0780	**.234** (3x)	7	1/8	1-1/2	57878-C6	40.90
.078 (5/64)		.0780	**.312** (4x)	7	1/8	2-1/2	890178-C6	57.40
.078 (5/64)		.0780	**.406** (5x)	7	1/8	2-1/2	62678-C6	57.40
.078 (5/64)		.0780	**.475** (6x)	7	1/8	2-1/2	868578-C6	59.10
.078 (5/64)		.0780	**.550** (7x)	7	1/8	2-1/2	881378-C6	59.10
.078 (5/64)		.0780	**.625** (8x)	7	1/8	2-1/2	59078-C6	60.00
.078 (5/64)		.0780	**.800** (10x)	7	1/8	2-1/2	941878-C6	76.30
.078 (5/64)		.0780	**.940** (12x)	7	1/8	2-1/2	69178-C6	86.50
.078 (5/64)		.0780	**1.187** (15x)	7	1/8	2-1/2	68778-C6	109.00
	2.0 mm	.0787	**3.00 mm** (1.5x)	7	4 mm	50 mm	846745-C6	51.30
	2.0 mm	.0787	**6.00 mm** (3x)	7	4 mm	50 mm	967645-C6	51.30
	2.0 mm	.0787	**10.00 mm** (5x)	7	4 mm	50 mm	974545-C6	63.60
	2.0 mm	.0787	**16.00 mm** (8x)	7	4 mm	50 mm	976145-C6	67.30
.080		.0800	**.120** (1.5x)	7	1/8	1-1/2	946180-C6	44.20
.080		.0800	**.240** (3x)	7	1/8	1-1/2	57880-C6	40.90
.080		.0800	**.406** (5x)	7	1/8	2-1/2	62680-C6	58.30
.080		.0800	**.650** (8x)	7	1/8	2-1/2	59080-C6	60.50
.090		.0900	**.270** (3x)	7	1/8	1-1/2	57890-C6	41.80
.090		.0900	**.450** (5x)	7	1/8	2-1/2	62690-C6	57.40
.090		.0900	**.750** (8x)	7	1/8	2-1/2	59090-C6	60.50
.093 (3/32)		.0930	**.074** (0.8x)	7	1/8	1-1/2	836593-C6	45.20
.093 (3/32)		.0930	**.140** (1.5x)	7	1/8	1-1/2	946193-C6	40.90
.093 (3/32)		.0930	**.279** (3x)	7	1/8	1-1/2	57893-C6	40.90
.093 (3/32)		.0930	**.375** (4x)	7	1/8	2-1/2	890193-C6	57.40
.093 (3/32)		.0930	**.500** (5x)	7	1/8	2-1/2	62693-C6	57.40
.093 (3/32)		.0930	**.585** (6x)	7	1/8	2-1/2	868593-C6	59.10
.093 (3/32)		.0930	**.670** (7x)	7	1/8	2-1/2	881393-C6	59.10
.093 (3/32)		.0930	**.750** (8x)	7	1/8	2-1/2	59093-C6	60.00
.093 (3/32)		.0930	**.950** (10x)	7	1/8	2-1/2	941893-C6	77.00
.093 (3/32)		.0930	**1.125** (12x)	7	1/8	2-1/2	69193-C6	85.70
.093 (3/32)		.0930	**1.400** (15x)	7	1/8	3	68793-C6	108.30
	2.5 mm	.0984	**7.50 mm** (3x)	7	4 mm	50 mm	967651-C6	51.30
.100		.1000	**.150** (1.5x)	7	1/8	1-1/2	960100-C6	42.00
.100		.1000	**.300** (3x)	7	1/8	1-1/2	57900-C6	40.90
.100		.1000	**.500** (5x)	7	1/8	2-1/2	62700-C6	57.40
.100		.1000	**.800** (8x)	7	1/8	2-1/2	59100-C6	60.00
.109 (7/64)		.1090	**.164** (1.5x)	7	1/8	1-1/2	960102-C6	42.00
.109 (7/64)		.1090	**.327** (3x)	7	1/8	1-1/2	57902-C6	40.90
.109 (7/64)		.1090	**.570** (5x)	7	1/8	2-1/2	62702-C6	57.40
.109 (7/64)		.1090	**.900** (8x)	7	1/8	2-1/2	59102-C6	63.30
	3.0 mm	.1181	**4.50 mm** (1.5x)	7	4 mm	50 mm	846757-C6	51.80
	3.0 mm	.1181	**9.00 mm** (3x)	7	4 mm	50 mm	967657-C6	51.30
	3.0 mm	.1181	**12.00 mm** (4x)	7	4 mm	50 mm	773057-C6	51.80
	3.0 mm	.1181	**15.00 mm** (5x)	7	4 mm	50 mm	974557-C6	52.90
	3.0 mm	.1181	**24.00 mm** (8x)	7	4 mm	50 mm	976157-C6	58.10

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)		.1250	**.100** (0.8x)	7	1/8	1-1/2	836608-C6	43.70
.125 (1/8)		.1250	**.187** (1.5x)	7	1/8	1-1/2	960108-C6	39.30
.125 (1/8)		.1250	**.375** (3x)	7	1/8	1-1/2	57908-C6	38.50
.125 (1/8)		.1250	**.500** (4x)	7	1/8	2-1/2	890208-C6	56.40
.125 (1/8)		.1250	**.625** (5x)	7	1/8	2-1/2	62708-C6	56.40
.125 (1/8)		.1250	**.750** (6x)	7	1/8	2-1/2	868608-C6	58.10
.125 (1/8)		.1250	**.875** (7x)	7	1/8	2-1/2	881408-C6	58.10
.125 (1/8)		.1250	**1.000** (8x)	7	1/8	2-1/2	59108-C6	59.10
.125 (1/8)		.1250	**1.250** (10x)	7	1/8	2-1/2	941908-C6	75.50
.125 (1/8)		.1250	**1.500** (12x)	7	1/8	3	69208-C6	85.80
.125 (1/8)		.1250	**1.875** (15x)	7	1/8	3	68808-C6	111.30
.140 (9/64)		.1406	**.220** (1.5x)	7	3/16	2	960109-C6	54.70
.140 (9/64)		.1406	**.425** (3x)	7	3/16	2	57909-C6	54.00
.140 (9/64)		.1406	**.750** (5x)	7	3/16	3	62709-C6	56.40
.140 (9/64)		.1406	**1.125** (8x)	7	3/16	3	59109-C6	61.90
.156 (5/32)		.1562	**.235** (1.5x)	7	3/16	2	960110-C6	44.50
.156 (5/32)		.1562	**.470** (3x)	7	3/16	2	57910-C6	44.00
.156 (5/32)		.1562	**.625** (4x)	7	3/16	3	890210-C6	44.80
.156 (5/32)		.1562	**.750** (5x)	7	3/16	3	62710-C6	59.40
.156 (5/32)		.1562	**1.250** (8x)	7	3/16	3	59110-C6	65.60
.187 (3/16)		.1875	**.150** (0.8x)	7	3/16	2	836612-C6	49.00
.187 (3/16)		.1875	**.285** (1.5x)	7	3/16	2	960112-C6	44.50
.187 (3/16)		.1875	**.570** (3x)	7	3/16	2	57912-C6	44.00
.187 (3/16)		.1875	**.750** (4x)	7	3/16	3	890212-C6	60.40
.187 (3/16)		.1875	**1.000** (5x)	7	3/16	3	62712-C6	59.40
.187 (3/16)		.1875	**1.156** (6x)	7	3/16	3	868612-C6	64.00
.187 (3/16)		.1875	**1.312** (7x)	7	3/16	3	881412-C6	64.70
.187 (3/16)		.1875	**1.500** (8x)	7	3/16	3	59112-C6	65.10
	5.0 mm	.1968	**25.00 mm** (5x)	7	6 mm	63 mm	974564-C6	61.90
.218 (7/32)		.2187	**.660** (3x)	7	1/4	2-1/2	57814-C6	59.60
.218 (7/32)		.2187	**1.125** (5x)	7	1/4	4	62714-C6	75.60
	6.0 mm	.2362	**18.00 mm** (3x)	7	6 mm	63 mm	967666-C6	58.20
	6.0 mm	.2362	**30.00 mm** (5x)	7	6 mm	63 mm	974566-C6	61.90
.250 (1/4)		.2500	**.200** (0.8x)	7	1/4	2-1/2	836616-C6	62.60
.250 (1/4)		.2500	**.375** (1.5x)	7	1/4	2-1/2	960116-C6	58.00
.250 (1/4)		.2500	**.750** (3x)	7	1/4	2-1/2	57916-C6	57.20
.250 (1/4)		.2500	**1.000** (4x)	7	1/4	4	890216-C6	74.30
.250 (1/4)		.2500	**1.250** (5x)	7	1/4	4	62716-C6	72.90
.250 (1/4)		.2500	**1.500** (6x)	7	1/4	4	868616-C6	79.20
.250 (1/4)		.2500	**1.750** (7x)	7	1/4	4	881416-C6	79.20
.250 (1/4)		.2500	**2.000** (8x)	7	1/4	4	59116-C6	79.30
.312 (5/16)		.3125	**.470** (1.5x)	7	5/16	2-1/2	960120-C6	80.00
.312 (5/16)		.3125	**1.000** (3x)	7	5/16	2-1/2	57920-C6	77.40
.375 (3/8)		.3750	**.570** (1.5x)	7	3/8	2-1/2	960124-C6	89.10
.375 (3/8)		.3750	**1.125** (3x)	7	3/8	2-1/2	57924-C6	88.40
.375 (3/8)		.3750	**2.000** (5x)	7	3/8	4	62724-C6	114.40
.500 (1/2)		.5000	**.750** (1.5x)	7	1/2	3	960132-C6	116.80
.500 (1/2)		.5000	**1.500** (3x)	7	1/2	3	57932-C6	116.80

Please see Speeds & Feeds on page 178-179

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
	300 - 350	350	Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
	350 - 400	250	Finishing (0.8x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00085	.00127	.00169	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00009	.00019	.00029	.00038	.00048	.00057	.00077	.00115	.00154	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00140	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00008	.00017	.00025	.00033	.00042	.00050	.00067	.00100	.00134	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00006	.00012	.00018	.00024	.00030	.00035	.00048	.00071	.00095	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00005	.00010	.00014	.00019	.00024	.00029	.00039	.00058	.00077	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00009	.00014	.00018	.00023	.00027	.00036	.00054	.00073	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00016	.00020	.00023	.00032	.00047	.00063	< .02x Dia	.5x - 15x Dia
	400 - 540	200	Finishing (0.8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00125	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00007	.00014	.00021	.00028	.00035	.00042	.00057	.00085	.00114	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00007	.00013	.00020	.00027	.00034	.00040	.00054	.00081	.00109	< .10x Dia	.5x - 5x Dia
			Finishing (5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00077	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00050	.00067	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00004	.00008	.00012	.00016	.00020	.00023	.00031	.00047	.00063	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00007	.00011	.00015	.00018	.00022	.00030	.00044	.00059	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00007	.00011	.00014	.00018	.00021	.00028	.00043	.00057	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00013	.00016	.00019	.00026	.00038	.00051	< .02x Dia	.5x - 15x Dia

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square (cont.)

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SPEEDS & FEEDS (Finishers for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Titanium: All alloys	275 - 300 300 - 350	300 200	Finishing (0.8x LOC)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00070	.00094	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00078	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00009	.00014	.00018	.00023	.00028	.00037	.00055	.00074	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00053	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00034	.00046	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00003	.00005	.00008	.00011	.00013	.00016	.00021	.00032	.00043	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00005	.00008	.00010	.00013	.00015	.00020	.00030	.00040	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00005	.00007	.00010	.00012	.00014	.00019	.00029	.00039	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00009	.00011	.00013	.00017	.00026	.00035	< .02x Dia	.5x - 15x Dia
	350 - 400 400 - 425	150 100	Finishing (0.8x LOC)	.00005	.00009	.00014	.00019	.00023	.00028	.00038	.00056	.00075	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00051	.00068	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00046	.00062	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00044	.00059	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00006	.00009	.00012	.00015	.00017	.00023	.00035	.00047	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00032	.00042	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00002	.00005	.00007	.00009	.00011	.00014	.00018	.00028	.00037	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00032	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00007	.00009	.00010	.00014	.00021	.00028	< .02x Dia	.5x - 15x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300 300 - 350	150 100	Finishing (0.8x LOC)	.00002	.00005	.00007	.00010	.00012	.00015	.00020	.00029	.00039	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00007	.00009	.00011	.00013	.00018	.00027	.00036	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00033	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00015	.00020	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00005	.00006	.00007	.00009	.00014	.00018	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00007	.00011	.00015	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00011	.00015	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00002	.00002	.00003	.00004	.00005	.00007	.00010	.00013	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00003	.00004	.00004	.00006	.00009	.00011	< .01x Dia	.5x - 15x Dia
	350 - 400 400 - 425	80 60	Finishing (0.8x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00031	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00003	.00005	.00006	.00008	.00010	.00013	.00019	.00026	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00001	.00003	.00004	.00006	.00007	.00009	.00011	.00017	.00023	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00004	.00005	.00005	.00007	.00011	.00015	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00001	.00002	.00003	.00004	.00004	.00006	.00009	.00012	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00009	.00012	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00006	.00008	.00011	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00010	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00002	.00003	.00003	.00005	.00007	.00009	< .01x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity • Reduced neck diameter to avoid heeling
  - Length of cut = 3x diameter • Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
  - Latest generation AlTiN Nano coating offers superior hardness and heat resistance
  - h6 shank tolerance for high precision tool holders • End cutting (not center cutting)
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	.045	**.078** (5x)	4	1/8	2-1/2	940715-C6	71.60
.015 (1/64)		.0150	.045	**.125** (8x)	4	1/8	2-1/2	962115-C6	74.10
.015 (1/64)		.0150	.045	**.187** (12x)	4	1/8	2-1/2	951815-C6	78.80
.020		.0200	.060	**.160** (8x)	4	1/8	2-1/2	962120-C6	65.50
.025		.0250	.075	**.203** (8x)	4	1/8	2-1/2	962125-C6	64.70
.031 (1/32)		.0310	.093	**.156** (5x)	6	1/8	2-1/2	940731-C6	63.00
.031 (1/32)		.0310	.093	**.187** (6x)	6	1/8	2-1/2	792531-C6	63.00
.031 (1/32)		.0310	.093	**.250** (8x)	6	1/8	2-1/2	962131-C6	64.70
.031 (1/32)		.0310	.093	**.312** (10x)	6	1/8	2-1/2	862831-C6	67.70
.031 (1/32)		.0310	.093	**.375** (12x)	6	1/8	2-1/2	951831-C6	68.80
	1.0 mm	.0393	3.00 mm	**8.0 mm** (8x)	6	4 mm	50 mm	924722-C6	66.00
.040		.0400	.120	**.325** (8x)	6	1/8	2-1/2	962140-C6	65.50
.047 (3/64)		.0470	.141	**.250** (5x)	6	1/8	2-1/2	940747-C6	63.00
.047 (3/64)		.0470	.141	**.375** (8x)	6	1/8	2-1/2	962147-C6	64.70
.047 (3/64)		.0470	.141	**.570** (12x)	6	1/8	2-1/2	951847-C6	68.80
.050		.0500	.150	**.250** (5x)	7	1/8	2-1/2	940750-C6	63.00
.050		.0500	.150	**.400** (8x)	7	1/8	2-1/2	962150-C6	64.70
	1.5 mm	.0590	4.50 mm	**12.0 mm** (8x)	7	4 mm	50 mm	924733-C6	66.00
.060		.0600	.180	**.500** (8x)	7	1/8	2-1/2	962160-C6	64.70
.062 (1/16)		.0620	.186	**.312** (5x)	7	1/8	2-1/2	940762-C6	60.20
.062 (1/16)		.0620	.186	**.375** (6x)	7	1/8	2-1/2	792562-C6	60.20
.062 (1/16)		.0620	.186	**.500** (8x)	7	1/8	2-1/2	962162-C6	62.10
.062 (1/16)		.0620	.186	**.625** (10x)	7	1/8	2-1/2	862862-C6	64.30
.062 (1/16)		.0620	.186	**.750** (12x)	7	1/8	2-1/2	951862-C6	66.30
.070		.0700	.210	**.570** (8x)	7	1/8	2-1/2	962170-C6	62.60
.078 (5/64)		.0780	.234	**.406** (5x)	7	1/8	2-1/2	940778-C6	60.20
.078 (5/64)		.0780	.234	**.625** (8x)	7	1/8	2-1/2	962178-C6	62.10
.078 (5/64)		.0780	.234	**.940** (12x)	7	1/8	2-1/2	951878-C6	66.30
	2.0 mm	.0787	6.00 mm	**16.0 mm** (8x)	7	4 mm	50 mm	924745-C6	63.30

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VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Square – Long Reach (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.080		.0800	.240	**.650** (8x)	7	1/8	2-1/2	962180-C6	62.60
.090		.0900	.270	**.750** (8x)	7	1/8	2-1/2	962190-C6	62.60
.093 (3/32)		.0930	.279	**.500** (5x)	7	1/8	2-1/2	940793-C6	60.20
.093 (3/32)		.0930	.279	**.585** (6x)	7	1/8	2-1/2	792593-C6	60.70
.093 (3/32)		.0930	.279	**.750** (8x)	7	1/8	2-1/2	962193-C6	62.10
.093 (3/32)		.0930	.279	**.950** (10x)	7	1/8	2-1/2	862893-C6	64.80
.093 (3/32)		.0930	.279	**1.125** (12x)	7	1/8	2-1/2	951893-C6	66.30
.100		.1000	.300	**.800** (8x)	7	1/8	2-1/2	962200-C6	62.10
.109 (7/64)		.1094	.327	**.570** (5x)	7	1/8	2-1/2	940802-C6	60.20
.109 (7/64)		.1094	.327	**.900** (8x)	7	1/8	2-1/2	962202-C6	62.10
	3.0 mm	.1181	9.00 mm	**24.0 mm** (8x)	7	4 mm	50 mm	924757-C6	62.60

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	.375	**.625** (5x)	7	1/8	2-1/2	940808-C6	58.20
.125 (1/8)	.1250	.375	**.750** (6x)	7	1/8	2-1/2	792608-C6	58.60
.125 (1/8)	.1250	.375	**1.000** (8x)	7	1/8	2-1/2	962208-C6	59.90
.125 (1/8)	.1250	.375	**1.250** (10x)	7	1/8	3	862908-C6	62.40
.125 (1/8)	.1250	.375	**1.500** (12x)	7	1/8	3	951908-C6	63.80
.140 (9/64)	.1406	.425	**.703** (5x)	7	3/16	3	940809-C6	62.60
.140 (9/64)	.1406	.425	**1.125** (8x)	7	3/16	3	962209-C6	64.40
.156 (5/32)	.1562	.470	**.750** (5x)	7	3/16	3	940810-C6	58.20
.156 (5/32)	.1562	.470	**1.250** (8x)	7	3/16	3	962210-C6	59.90
.187 (3/16)	.1875	.570	**1.000** (5x)	7	3/16	3	940812-C6	61.80
.187 (3/16)	.1875	.570	**1.500** (8x)	7	3/16	3	962212-C6	63.90
.250 (1/4)	.2500	.750	**1.250** (5x)	7	1/4	4	940816-C6	74.50
.250 (1/4)	.2500	.750	**2.000** (8x)	7	1/4	4	962216-C6	77.70

Please see Speeds & Feeds on page 182

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

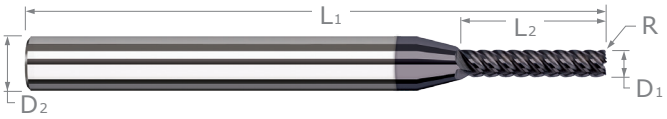
Finishers – Square – Long Reach (cont.)

SPEEDS & FEEDS (Finishers – Long Reach for High Temp Alloys)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300	400	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00046	.00055	.00074	.00111	.00148	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia
	300 - 350	350	Finishing (10x Reach)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00009	.00018	.00028	.00037	.00046	.00055	.00074	.00111	.00148	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia
	350 - 400	250	Finishing (5x Reach)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00126	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00089	.00118	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00006	.00013	.00020	.00026	.00033	.00039	.00052	.00078	.00105	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00006	.00012	.00019	.00025	.00031	.00037	.00050	.00074	.00100	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00071	.00095	< .05x Dia	.5x - 3x Dia
	400 - 540	200	Finishing (5x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00077	.00102	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00005	.00011	.00016	.00021	.00027	.00032	.00042	.00064	.00085	< .07x Dia	.5x - 3x Dia
			Finishing (10x Reach)	.00005	.00010	.00015	.00020	.00025	.00030	.00040	.00060	.00081	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00005	.00010	.00014	.00019	.00024	.00029	.00038	.00057	.00077	< .05x Dia	.5x - 3x Dia
Titanium: All alloys	275 - 300	300	Finishing (5x Reach)	.00004	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00004	.00008	.00012	.00016	.00020	.00024	.00033	.00049	.00066	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 3x Dia
	300 - 350	200	Finishing (10x Reach)	.00003	.00007	.00010	.00014	.00017	.00020	.00028	.00041	.00055	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	< .05x Dia	.5x - 3x Dia
	350 - 400	150	Finishing (5x Reach)	.00003	.00007	.00010	.00014	.00017	.00021	.00028	.00042	.00056	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00052	< .07x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00035	.00046	< .07x Dia	.5x - 3x Dia
	400 - 425	100	Finishing (10x Reach)	.00003	.00005	.00008	.00011	.00014	.00016	.00022	.00033	.00044	< .05x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00031	.00042	< .05x Dia	.5x - 3x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300	150	Finishing (5x Reach)	.00002	.00004	.00005	.00007	.00009	.00011	.00015	.00022	.00029	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00014	.00019	< .05x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00004	.00005	.00007	.00009	.00013	.00018	< .05x Dia	.5x - 3x Dia
	300 - 350	100	Finishing (10x Reach)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .03x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .03x Dia	.5x - 3x Dia
	350 - 400	80	Finishing (5x Reach)	.00001	.00003	.00004	.00006	.00007	.00009	.00012	.00018	.00023	< .10x Dia	.5x - 3x Dia
			Finishing (6x Reach)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00015	< .05x Dia	.5x - 3x Dia
			Finishing (8x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00011	.00014	< .05x Dia	.5x - 3x Dia
	400 - 425	60	Finishing (10x Reach)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00010	.00013	< .03x Dia	.5x - 3x Dia
			Finishing (12x Reach)	.00001	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00011	< .03x Dia	.5x - 3x Dia

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Corner Radius



- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.25mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.003**	.045 (3x)	4	1/8	1-1/2	775615-C6	50.20
.015 (1/64)		.0150	**.003**	.078 (5x)	4	1/8	2-1/2	774715-C6	67.70
.020		.0200	**.003**	.060 (3x)	4	1/8	1-1/2	775620-C6	50.20
.020		.0200	**.003**	.100 (5x)	4	1/8	2-1/2	774720-C6	67.70
.020		.0200	**.005**	.060 (3x)	4	1/8	1-1/2	873020-C6	50.20
.020		.0200	**.005**	.100 (5x)	4	1/8	1-1/2	874620-C6	66.80
.031 (1/32)		.0310	**.005**	.093 (3x)	6	1/8	1-1/2	873031-C6	47.20
.031 (1/32)		.0310	**.005**	.156 (5x)	6	1/8	2-1/2	874631-C6	64.50
.031 (1/32)		.0310	**.010**	.093 (3x)	6	1/8	1-1/2	882631-C6	47.60
.031 (1/32)		.0310	**.010**	.156 (5x)	6	1/8	2-1/2	885431-C6	65.00
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	6	4 mm	50 mm	749122-C6	49.80
	1.0 mm	.0393	**.10 mm**	5.00 mm (5x)	6	4 mm	50 mm	748522-C6	67.40
.040		.0400	**.005**	.120 (3x)	6	1/8	1-1/2	873040-C6	47.60
.040		.0400	**.010**	.120 (3x)	6	1/8	1-1/2	882640-C6	65.00
.047 (3/64)		.0470	**.005**	.141 (3x)	6	1/8	1-1/2	873047-C6	47.20
.047 (3/64)		.0470	**.005**	.250 (5x)	6	1/8	2-1/2	874647-C6	65.00
.047 (3/64)		.0470	**.010**	.141 (3x)	6	1/8	1-1/2	882647-C6	47.20
.047 (3/64)		.0470	**.010**	.250 (5x)	6	1/8	2-1/2	885447-C6	65.00
.062 (1/16)		.0620	**.005**	.093 (1.5x)	7	1/8	1-1/2	872262-C6	47.00
.062 (1/16)		.0620	**.005**	.186 (3x)	7	1/8	1-1/2	873062-C6	47.00
.062 (1/16)		.0620	**.005**	.312 (5x)	7	1/8	2-1/2	874662-C6	61.80
.062 (1/16)		.0620	**.010**	.186 (3x)	7	1/8	1-1/2	882662-C6	47.00
.062 (1/16)		.0620	**.010**	.312 (5x)	7	1/8	2-1/2	885462-C6	61.80
.078 (5/64)		.0780	**.005**	.234 (3x)	7	1/8	1-1/2	873078-C6	44.80
.078 (5/64)		.0780	**.005**	.406 (5x)	7	1/8	2-1/2	874678-C6	61.80
.078 (5/64)		.0780	**.010**	.234 (3x)	7	1/8	1-1/2	882678-C6	45.30
.078 (5/64)		.0780	**.010**	.406 (5x)	7	1/8	2-1/2	885478-C6	61.80
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	7	4 mm	50 mm	748745-C6	49.80
	2.0 mm	.0787	**.20 mm**	10.00 mm (5x)	7	4 mm	50 mm	747945-C6	67.40
.093 (3/32)		.0930	**.005**	.140 (1.5x)	7	1/8	1-1/2	872293-C6	44.80
.093 (3/32)		.0930	**.005**	.279 (3x)	7	1/8	1-1/2	873093-C6	44.80
.093 (3/32)		.0930	**.005**	.500 (5x)	7	1/8	2-1/2	874693-C6	61.80
.093 (3/32)		.0930	**.010**	.279 (3x)	7	1/8	1-1/2	882693-C6	44.80
.093 (3/32)		.0930	**.010**	.500 (5x)	7	1/8	2-1/2	885493-C6	61.80
.093 (3/32)		.0930	**.020**	.279 (3x)	7	1/8	1-1/2	774093-C6	45.30
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	7	4 mm	50 mm	748757-C6	49.80
	3.0 mm	.1181	**.20 mm**	15.00 mm (5x)	7	4 mm	50 mm	747957-C6	67.40

continued on next page

VARIABLE HELIX END MILLS FOR HIGH TEMP ALLOYS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.005**	.187 (1.5x)	7	1/8	1-1/2	872308-C6	38.40
.125 (1/8)	.1250	**.005**	.375 (3x)	7	1/8	1-1/2	873108-C6	38.40
.125 (1/8)	.1250	**.005**	.625 (5x)	7	1/8	2-1/2	874708-C6	41.50
.125 (1/8)	.1250	**.010**	.187 (1.5x)	7	1/8	1-1/2	880108-C6	38.40
.125 (1/8)	.1250	**.010**	.375 (3x)	7	1/8	1-1/2	882708-C6	38.40
.125 (1/8)	.1250	**.010**	.625 (5x)	7	1/8	2-1/2	885508-C6	41.50
.125 (1/8)	.1250	**.015**	.375 (3x)	7	1/8	1-1/2	813808-C6	38.40
.125 (1/8)	.1250	**.020**	.375 (3x)	7	1/8	1-1/2	774108-C6	38.40
.125 (1/8)	.1250	**.030**	.187 (1.5x)	7	1/8	1-1/2	890508-C6	39.50
.125 (1/8)	.1250	**.030**	.375 (3x)	7	1/8	1-1/2	892708-C6	38.40
.156 (5/32)	.1560	**.005**	.470 (3x)	7	3/16	2	873110-C6	43.10
.156 (5/32)	.1560	**.010**	.470 (3x)	7	3/16	2	882710-C6	43.10
.187 (3/16)	.1870	**.005**	.285 (1.5x)	7	3/16	2	872312-C6	43.30
.187 (3/16)	.1870	**.005**	.570 (3x)	7	3/16	2	873112-C6	43.10
.187 (3/16)	.1870	**.010**	.285 (1.5x)	7	3/16	2	880112-C6	44.40
.187 (3/16)	.1870	**.010**	.570 (3x)	7	3/16	2	882712-C6	43.10
.187 (3/16)	.1870	**.015**	.570 (3x)	7	3/16	2	813812-C6	43.10
.187 (3/16)	.1870	**.020**	.570 (3x)	7	3/16	2	774112-C6	43.10
.187 (3/16)	.1870	**.030**	.285 (1.5x)	7	3/16	2	890512-C6	43.70
.187 (3/16)	.1870	**.030**	.570 (3x)	7	3/16	2	892712-C6	43.10
.250 (1/4)	.2500	**.005**	.375 (1.5x)	7	1/4	2-1/2	872316-C6	55.70
.250 (1/4)	.2500	**.005**	.750 (3x)	7	1/4	2-1/2	873116-C6	55.40
.250 (1/4)	.2500	**.010**	.375 (1.5x)	7	1/4	2-1/2	880116-C6	56.30
.250 (1/4)	.2500	**.010**	.750 (3x)	7	1/4	2-1/2	882716-C6	55.40
.250 (1/4)	.2500	**.010**	1.250 (5x)	7	1/4	4	885516-C6	62.50
.250 (1/4)	.2500	**.015**	.750 (3x)	7	1/4	2-1/2	813816-C6	55.40
.250 (1/4)	.2500	**.020**	.750 (3x)	7	1/4	2-1/2	774116-C6	55.40
.250 (1/4)	.2500	**.030**	.375 (1.5x)	7	1/4	2-1/2	890516-C6	56.30
.250 (1/4)	.2500	**.030**	.750 (3x)	7	1/4	2-1/2	892716-C6	55.40
.375 (3/8)	.3750	**.005**	1.125 (3x)	7	3/8	2-1/2	873124-C6	68.80

Please see Speeds & Feeds on page 178

MULTI-AXIS FINISHERS

Technical Information

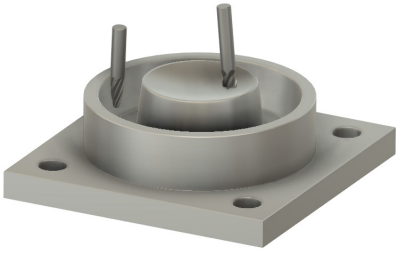
Multi-Axis Finishers are for operations with extremely high surface finish requirements. When switching from a traditional ball end mill, finish requirements can be dramatically improved, and cycle times can be cut down to a fraction of the time.

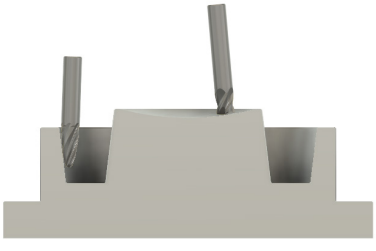




Benefits of Multi-Axis Finishing Techniques

The basic principle of a Multi-Axis Finisher comes down to the large radius included in the profile of the tool. With a larger radius, a far greater stepover can be used pass-to-pass while keeping the same cusp height as a ball end mill. This decreases the cycle time by a known value called the Benefit Multiple. If a Multi-Axis Finisher is used with the same pass-to-pass stepover as a ball end mill, the finish will be drastically improved due to exponentially smaller cusp heights. Most situations allow both reduced cycle time and improved surface finish to be achieved.





The images above show the comparison of a ball end mill to an oval shape Multi-Axis Finisher with a benefit multiple of 4.

Due to their large radii, Multi-Axis Finishers are best suited for wide open, flowing, and somewhat flat surfaces. Smaller spaces, especially tight corners, will generally not see as much benefit from these tools due to limited use of the major radius.

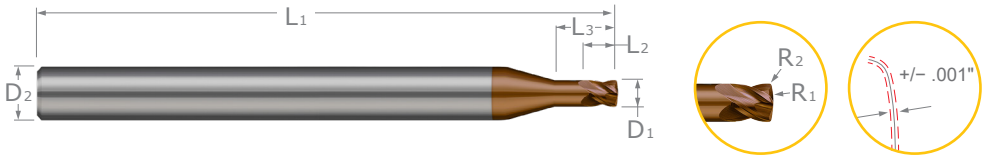
	Lens	Oval
Geometry	2 tangential radii on the end of the tool	2 tangential radii
Main Use	Primarily on the face of a part	In smaller spaces where a slightly varied approach angle is required
Tip	Tilt angles of approximately 5 degrees are recommended for these tools to avoid working on-center	This form offers the most versatility and is a common choice for machinists machining impellers or fan blades

CAM Resources

Programming Multi-Axis Finishers requires some additional consideration compared to a typical end mill. Luckily, many modern CAM packages offer support for these unique profiles, including many of Harvey Tools CAM partners. Each software has their own name for these toolpaths, so reach out to your CAM or Harvey sales rep to find how you can program yours!

MULTI-AXIS FINISHERS FOR HIGH TEMP ALLOYS

Lens Form



- Designed for massive reduction in cycle time with top quality results for finishing operations
- Lens form with two tangential radii for finishing floors
- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 tolerance for high precision tool holders • 4 flutes
- Center cutting • Solid carbide • CNC ground in the USA

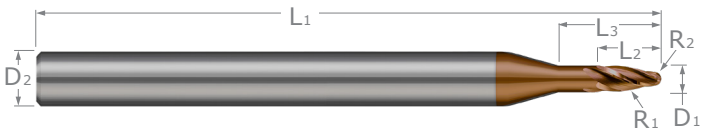
CUTTER DIAMETER	SKANK DIAMETER	MAJOR RADIUS	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	OVERALL LENGTH	BENEFIT MULTIPLE	Ti NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.062 (1/16)	1/8	.125 (1/8)	.004	.062 (1/16)	.163	1-1/2	2x	698262-C10	38.90
.078 (5/64)	1/8	.156 (5/32)	.005	.078 (5/64)	.178	1-1/2	2x	698278-C10	38.90
.093 (3/32)	1/8	.187 (3/16)	.006	.093 (3/32)	.194	1-1/2	2x	698293-C10	38.90

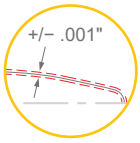
D_1 $^{+.000''}_{-.002''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.125 (1/8)	1/8	.250 (1/4)	.008	.125 (1/8)		1-1/2	2x	698308-C10	41.50
.156 (5/32)	3/16	.312 (5/16)	.010	.156 (5/32)	.356	2	2x	698310-C10	50.10
.187 (3/16)	3/16	.375 (3/8)	.012	.187 (3/16)		2	2x	698312-C10	59.10
.250 (1/4)	1/4	.500 (1/2)	.015	.250 (1/4)		2	2x	698316-C10	75.30
.312 (5/16)	5/16	.625 (5/8)	.018	.312 (5/16)		2-1/2	2x	698320-C10	83.50
.375 (3/8)	3/8	.750 (3/4)	.020	.375 (3/8)		2-1/2	2x	698324-C10	91.00
.500 (1/2)	1/2	1.000	.030	.500 (1/2)		3	2x	698332-C10	108.70

Technical information found on page 185.

MULTI-AXIS FINISHERS FOR HIGH TEMP ALLOYS

Oval Form





- Designed for massive reduction in cycle time with top quality results for finishing operations
- Oval form with two tangential radii for versatility in angle of approach and clearance in tight spaces
- Optimized for titanium alloys, Inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Ti Nano coating offers best-in-class hardness and heat resistance for improved tool life and edge retention in difficult-to-machine materials
- h6 tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

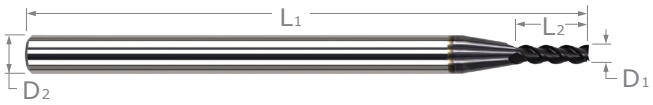
CUTTER DIAMETER	SKANK DIAMETER	MAJOR RADIUS	TIP RADIUS	LENGTH OF CUT	OVERALL REACH	OVERALL LENGTH	BENEFIT MULTIPLE	Ti NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.062 (1/16)	1/8	.500 (1/2)	.016	.138	.168	1-1/2	4x	698462-C10	39.80
.078 (5/64)	1/8	.625 (5/8)	.020	.172	.202	1-1/2	4x	698478-C10	39.80
.093 (3/32)	1/8	.750 (3/4)	.023	.206	.236	1-1/2	4x	698493-C10	39.80

D_1 $^{+.000''}_{-.002''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.125 (1/8)	1/8	1.000	.031	.275		2	4x	698508-C10	42.40
.156 (5/32)	3/16	1.250	.039	.344	.374	2	4x	698510-C10	51.10
.187 (3/16)	3/16	1.500	.047	.413		2	4x	698512-C10	60.20
.250 (1/4)	1/4	2.000	.063	.551		2-1/2	4x	698516-C10	76.80
.312 (5/16)	5/16	2.500	.078	.688		2-1/2	4x	698520-C10	85.10
.375 (3/8)	3/8	3.000	.094	.826		2-1/2	4x	698524-C10	92.90
.500 (1/2)	1/2	4.000	.125	1.101		3	4x	698532-C10	110.90

Technical information found on page 185.

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	964910-C3	64.50
.010		.0100	**.030** (3x)	3	1/8	1-1/2	958510-C3	64.50
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	964915-C3	51.30
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	958515-C3	51.30
.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	952615-C3	65.70
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	945911-C3	51.40
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	964920-C3	45.00
.020		.0200	**.060** (3x)	3	1/8	1-1/2	958520-C3	45.00
.020		.0200	**.100** (5x)	3	1/8	2-1/2	952620-C3	57.20
.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	964925-C3	43.40
.025		.0250	**.075** (3x)	3	1/8	1-1/2	958525-C3	43.40
.025		.0250	**.125** (5x)	3	1/8	2-1/2	952625-C3	55.90
.030		.0300	**.090** (3x)	3	1/8	1-1/2	958530-C3	43.10
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	964931-C3	36.40
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	958531-C3	36.40
.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	814831-C3	48.60
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	952631-C3	48.60
.035		.0350	**.053** (1.5x)	3	1/8	1-1/2	964935-C3	37.30
.035		.0350	**.105** (3x)	3	1/8	1-1/2	958535-C3	36.40
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	945922-C3	42.60
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	964940-C3	36.60
.040		.0400	**.120** (3x)	3	1/8	1-1/2	958540-C3	36.60
.040		.0400	**.203** (5x)	3	1/8	2-1/2	952640-C3	48.80
.045		.0450	**.068** (1.5x)	3	1/8	1-1/2	964945-C3	36.60
.045		.0450	**.135** (3x)	3	1/8	1-1/2	958545-C3	36.60
.045		.0450	**.225** (5x)	3	1/8	2-1/2	952645-C3	49.20
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	964947-C3	36.40
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	958547-C3	36.40
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	952647-C3	49.00
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	964950-C3	36.60
.050		.0500	**.150** (3x)	3	1/8	1-1/2	958550-C3	36.60
.050		.0500	**.250** (5x)	3	1/8	2-1/2	952650-C3	49.20
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	964955-C3	37.30
.055		.0550	**.165** (3x)	3	1/8	1-1/2	958555-C3	36.40
.055		.0550	**.275** (5x)	3	1/8	2-1/2	952655-C3	49.00
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	945933-C3	39.90
.060		.0600	**.180** (3x)	3	1/8	1-1/2	958560-C3	37.90
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	835762-C3	37.80
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	964962-C3	34.20
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	958562-C3	34.20
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	814862-C3	39.50

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square (cont.)

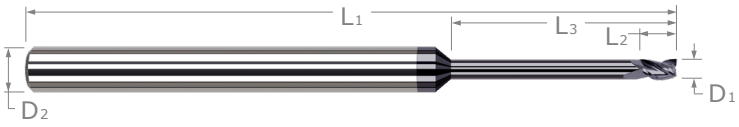
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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	952662-C3	46.40
.062 (1/16)		.0620	**.500** (8x)	3	1/8	2-1/2	714262-C3	48.60
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	964970-C3	34.80
.070		.0700	**.210** (3x)	3	1/8	1-1/2	958570-C3	34.80
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	964978-C3	34.20
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	958578-C3	34.20
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	952678-C3	46.40
.078 (5/64)		.0780	**.625** (8x)	3	1/8	2-1/2	714278-C3	48.60
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	945945-C3	39.90
.080		.0800	**.240** (3x)	3	1/8	1-1/2	958580-C3	34.20
.090		.0900	**.270** (3x)	3	1/8	1-1/2	958590-C3	34.20
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	835793-C3	37.80
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	964993-C3	34.20
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	958593-C3	34.20
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	814893-C3	39.50
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	952693-C3	46.40
.093 (3/32)		.0930	**.750** (8x)	3	1/8	2-1/2	714293-C3	48.60
.100		.1000	**.150** (1.5x)	3	1/8	1-1/2	965000-C3	34.20
.100		.1000	**.300** (3x)	3	1/8	1-1/2	958600-C3	34.20
.109 (7/64)		.1090	**.164** (1.5x)	3	1/8	1-1/2	965002-C3	34.20
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	958602-C3	34.20
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	945957-C3	39.90
D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)		.1250	**.100** (0.8x)	4	1/8	1-1/2	835808-C3	35.40
.125 (1/8)		.1250	**.187** (1.5x)	4	1/8	1-1/2	965008-C3	31.60
.125 (1/8)		.1250	**.375** (3x)	4	1/8	1-1/2	958608-C3	31.60
.125 (1/8)		.1250	**.500** (4x)	4	1/8	2-1/2	814908-C3	41.30
.125 (1/8)		.1250	**.625** (5x)	4	1/8	2-1/2	952708-C3	44.70
.125 (1/8)		.1250	**1.000** (8x)	4	1/8	2-1/2	714308-C3	49.70
.140 (9/64)		.1406	**.220** (1.5x)	4	3/16	2	965009-C3	47.20
.140 (9/64)		.1406	**.425** (3x)	4	3/16	2	958609-C3	47.20
.156 (5/32)		.1562	**.235** (1.5x)	4	3/16	2	965010-C3	34.00
.156 (5/32)		.1562	**.470** (3x)	4	3/16	2	958610-C3	34.40
.156 (5/32)		.1562	**.750** (5x)	4	3/16	3	952710-C3	47.90
.187 (3/16)		.1875	**.150** (0.8x)	4	3/16	2	835812-C3	37.90
.187 (3/16)		.1875	**.285** (1.5x)	4	3/16	2	965012-C3	34.00
.187 (3/16)		.1875	**.562** (3x)	4	3/16	2	958612-C3	34.40
.187 (3/16)		.1875	**1.000** (5x)	4	3/16	3	952712-C3	47.90
	6.0 mm	.2362	**18.00 mm** (3x)	4	6 mm	63 mm	945972-C3	40.20
.250 (1/4)		.2500	**.375** (1.5x)	4	1/4	2-1/2	965016-C3	43.30
.250 (1/4)		.2500	**.750** (3x)	4	1/4	2-1/2	958616-C3	43.70
.250 (1/4)		.2500	**1.250** (5x)	4	1/4	4	952716-C3	53.60
.312 (5/16)		.3125	**1.000** (3x)	4	5/16	2-1/2	958620-C3	48.90
.375 (3/8)		.3750	**.570** (1.5x)	4	3/8	2-1/2	965024-C3	54.10
.375 (3/8)		.3750	**1.125** (3x)	4	3/8	2-1/2	958624-C3	54.10
.500 (1/2)		.5000	**1.500** (3x)	4	1/2	3	958632-C3	78.10

Please see Speeds & Feeds on page 193

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	936115-C3	69.40
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	933815-C3	69.90
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	936120-C3	65.70
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	933820-C3	68.30
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	936125-C3	65.10
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	933825-C3	65.70
.030		.0300	.045	**.156** (5x)	3	1/8	2-1/2	936130-C3	60.10
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	933830-C3	62.50
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	945331-C3	58.50
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	936131-C3	61.30
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	933831-C3	61.40
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	931131-C3	66.00
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	886422-C3	65.00
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	3	4 mm	50 mm	887122-C3	66.30
.040		.0400	.060	**.203** (5x)	3	1/8	2-1/2	936140-C3	63.60
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	933840-C3	65.40
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	936147-C3	60.10
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	933847-C3	61.40
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	945362-C3	59.70
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	936162-C3	59.80
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	933862-C3	61.40
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	931162-C3	65.50
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	936178-C3	59.80
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	933878-C3	62.50
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	886445-C3	65.00
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	3	4 mm	50 mm	887145-C3	66.30
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	945393-C3	58.50
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	936193-C3	59.80
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	933893-C3	61.40
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	931193-C3	66.00

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.100		.1000	.150	**.500** (5x)	3	1/8	2-1/2	936200-C3	64.80
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	933900-C3	66.50
.109 (7/64)		.1090	.164	**.570** (5x)	3	1/8	2-1/2	936202-C3	64.80
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	933902-C3	66.50
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	886457-C3	66.60
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	887157-C3	68.20

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	1-1/2	945408-C3	59.70
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	936208-C3	59.10
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	933908-C3	60.80
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	931208-C3	61.80
.156 (5/32)	.1562	.235	**.750** (5x)	4	3/16	3	936210-C3	65.70
.187 (3/16)	.1875	.285	**1.000** (5x)	4	3/16	3	936212-C3	65.70
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	936216-C3	73.30

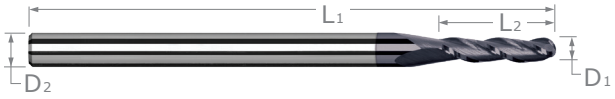
Please See Speeds & Feeds On Page 195

Download Speeds & Feeds Charts For Every Harvey Tool End Mill

harveytool.com/resources/speeds-feeds

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	974804-C3	76.00
.010		.0100	**.030** (3x)	3	1/8	1-1/2	971810-C3	74.20
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	963015-C3	62.30
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	971815-C3	61.20
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	974809-C3	65.90
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	974811-C3	56.80
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	963020-C3	56.30
.020		.0200	**.060** (3x)	3	1/8	1-1/2	971820-C3	55.60
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	974813-C3	55.00
.025		.0250	**.075** (3x)	3	1/8	1-1/2	971825-C3	54.50
.031 (1/32)		.0310	**.025** (0.8x)	3	1/8	1-1/2	883931-C3	49.30
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	963031-C3	46.10
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	971831-C3	46.10
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	888631-C3	57.70
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	974818-C3	47.60
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	929222-C3	47.60
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	974822-C3	47.60
.040		.0400	**.120** (3x)	3	1/8	1-1/2	971840-C3	47.10
.047 (3/64)		.0470	**.038** (0.8x)	3	1/8	1-1/2	883947-C3	51.40
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	963047-C3	46.10
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	971847-C3	46.90
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	974827-C3	47.60
.050		.0500	**.150** (3x)	3	1/8	1-1/2	971850-C3	46.70
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	974831-C3	47.60
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	974833-C3	45.00
.060		.0600	**.180** (3x)	3	1/8	1-1/2	971860-C3	47.10
.062 (1/16)		.0620	**.050** (0.8x)	3	1/8	1-1/2	883962-C3	46.60
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	963062-C3	43.40
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	971862-C3	43.40
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	888662-C3	54.90
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	974836-C3	45.00
.070		.0700	**.210** (3x)	3	1/8	1-1/2	971870-C3	44.50
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	974840-C3	45.00
.078 (5/64)		.0780	**.062** (0.8x)	3	1/8	1-1/2	883978-C3	49.90
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	963078-C3	44.30
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	971878-C3	44.30

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	974845-C3	45.00
.080		.0800	**.240** (3x)	3	1/8	1-1/2	971880-C3	44.50
.090		.0900	**.270** (3x)	3	1/8	1-1/2	971890-C3	44.50
.093 (3/32)		.0930	**.074** (0.8x)	3	1/8	1-1/2	883993-C3	47.40
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	963093-C3	43.40
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	971893-C3	43.40
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	888693-C3	54.90
.100		.1000	**.300** (3x)	3	1/8	1-1/2	971900-C3	44.10
.109 (7/64)		.1090	**.327** (3x)	3	1/8	1-1/2	971902-C3	44.30
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	929257-C3	45.30
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	974857-C3	45.30

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.100** (0.8x)	4	1/8	1-1/2	884008-C3	47.40
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	963108-C3	39.40
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	971908-C3	39.90
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	888708-C3	54.90
.140 (9/64)	.1406	**.425** (3x)	4	3/16	2	971909-C3	59.00
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	963110-C3	47.20
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	971910-C3	47.20
.187 (3/16)	.1875	**.150** (0.8x)	4	3/16	2	884012-C3	50.80
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	963112-C3	43.40
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	971912-C3	42.50
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	963116-C3	51.50
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	971916-C3	51.90

Speeds & Feeds (Variable Helix For Medium Alloy Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00008	.00017	.00026	.00035	.00043	.00052	.00066	.00099	.00133	.00174	.00209	.00278
Roughing	.00010	.00021	.00032	.00042	.00052	.00062	.00080	.00120	.00160	.00210	.00252	.00336
Finishing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00193	.00252	.00303	.00404
Max	.00016	.00032	.00049	.00064	.00081	.00097	.00124	.00185	.00248	.00324	.00390	.00520

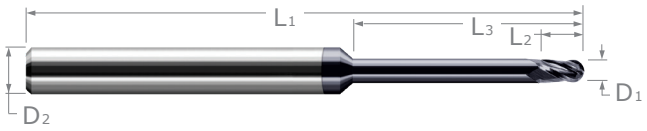
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

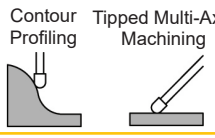
VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

IMPROVES PERFORMANCE



CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)		.0150	.022	**.078** (5x)	4	1/8	2-1/2	64215-C3	78.80
.015 (1/64)		.0150	.022	**.125** (8x)	4	1/8	2-1/2	56615-C3	80.30
.015 (1/64)		.0150	.022	**.187** (12x)	4	1/8	2-1/2	65415-C3	85.30
	.4 mm	.0157	.60 mm	**2.0 mm** (5x)	4	4 mm	50 mm	984709-C3	86.50
	.4 mm	.0157	.60 mm	**3.2 mm** (8x)	4	4 mm	50 mm	971009-C3	88.10
	.4 mm	.0157	.60 mm	**4.8 mm** (12x)	4	4 mm	50 mm	988309-C3	95.10
	.5 mm	.0196	.75 mm	**2.5 mm** (5x)	4	4 mm	50 mm	984711-C3	83.20
	.5 mm	.0196	.75 mm	**4.0 mm** (8x)	4	4 mm	50 mm	971011-C3	84.40
	.5 mm	.0196	.75 mm	**6.0 mm** (12x)	4	4 mm	50 mm	988311-C3	92.00
	.5 mm	.0196	.75 mm	**8.0 mm** (16x)	4	4 mm	50 mm	979511-C3	95.90
.020		.0200	.030	**.100** (5x)	4	1/8	2-1/2	64220-C3	74.50
.020		.0200	.030	**.160** (8x)	4	1/8	2-1/2	56620-C3	76.00
.020		.0200	.030	**.250** (12x)	4	1/8	2-1/2	65420-C3	81.70
	.6 mm	.0236	.90 mm	**3.0 mm** (5x)	4	4 mm	50 mm	984713-C3	81.40
	.6 mm	.0236	.90 mm	**4.8 mm** (8x)	4	4 mm	50 mm	971013-C3	83.00
	.6 mm	.0236	.90 mm	**7.2 mm** (12x)	4	4 mm	50 mm	988313-C3	88.40
.025		.0250	.037	**.125** (5x)	4	1/8	2-1/2	64225-C3	73.50
.025		.0250	.037	**.203** (8x)	4	1/8	2-1/2	56625-C3	74.10
.025		.0250	.037	**.312** (12x)	4	1/8	2-1/2	65425-C3	81.00
.031 (1/32)		.0310	.046	**.156** (5x)	4	1/8	2-1/2	64231-C3	68.10
.031 (1/32)		.0310	.046	**.250** (8x)	4	1/8	2-1/2	56631-C3	69.50
.031 (1/32)		.0310	.046	**.375** (12x)	4	1/8	2-1/2	65431-C3	72.80
	.8 mm	.0314	1.20 mm	**4.0 mm** (5x)	4	4 mm	50 mm	984718-C3	76.10
	.8 mm	.0314	1.20 mm	**6.5 mm** (8x)	4	4 mm	50 mm	971018-C3	77.40
	.8 mm	.0314	1.20 mm	**9.5 mm** (12x)	4	4 mm	50 mm	988318-C3	80.00
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	4	4 mm	50 mm	984722-C3	75.50
	1.0 mm	.0393	1.50 mm	**8.0 mm** (8x)	4	4 mm	50 mm	971022-C3	76.80
	1.0 mm	.0393	1.50 mm	**12.0 mm** (12x)	4	4 mm	50 mm	988322-C3	80.00
	1.0 mm	.0393	1.50 mm	**16.0 mm** (16x)	4	4 mm	50 mm	979522-C3	83.70
.040		.0400	.060	**.203** (5x)	4	1/8	2-1/2	64240-C3	68.10
.040		.0400	.060	**.325** (8x)	4	1/8	2-1/2	56640-C3	69.50
.047 (3/64)		.0470	.070	**.250** (5x)	4	1/8	2-1/2	64247-C3	68.10
.047 (3/64)		.0470	.070	**.375** (8x)	4	1/8	2-1/2	56647-C3	69.50
.047 (3/64)		.0470	.070	**.570** (12x)	4	1/8	2-1/2	65447-C3	72.10
	1.5 mm	.0590	2.20 mm	**7.5 mm** (5x)	4	4 mm	50 mm	984733-C3	75.50
	1.5 mm	.0590	2.20 mm	**12.0 mm** (8x)	4	4 mm	50 mm	971033-C3	77.40
	1.5 mm	.0590	2.20 mm	**18.0 mm** (12x)	4	4 mm	50 mm	988333-C3	80.00
	1.5 mm	.0590	2.20 mm	**24.0 mm** (16x)	4	4 mm	63 mm	979533-C3	83.70

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	4 FL	USD$
.062 (1/16)		.0620	.093	**.186** (3x)	4	1/8	1-1/2	755462-C3	66.40
.062 (1/16)		.0620	.093	**.312** (5x)	4	1/8	2-1/2	64262-C3	68.10
.062 (1/16)		.0620	.093	**.500** (8x)	4	1/8	2-1/2	56662-C3	69.50
.062 (1/16)		.0620	.093	**.750** (12x)	4	1/8	2-1/2	65462-C3	72.10
.078 (5/64)		.0780	.117	**.234** (3x)	4	1/8	1-1/2	755478-C3	66.40
.078 (5/64)		.0780	.117	**.406** (5x)	4	1/8	2-1/2	64278-C3	68.10
.078 (5/64)		.0780	.117	**.625** (8x)	4	1/8	2-1/2	56678-C3	69.50
.078 (5/64)		.0780	.117	**.940** (12x)	4	1/8	2-1/2	65478-C3	72.10
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	4	4 mm	50 mm	984745-C3	76.10
	2.0 mm	.0787	3.00 mm	**16.0 mm** (8x)	4	4 mm	50 mm	971045-C3	77.40
	2.0 mm	.0787	3.00 mm	**24.0 mm** (12x)	4	4 mm	63 mm	988345-C3	80.00
	2.0 mm	.0787	3.00 mm	**32.0 mm** (16x)	4	4 mm	63 mm	979545-C3	83.70
.093 (3/32)		.0930	.139	**.279** (3x)	4	1/8	1-1/2	755493-C3	66.40
.093 (3/32)		.0930	.139	**.500** (5x)	4	1/8	2-1/2	64293-C3	68.10
.093 (3/32)		.0930	.139	**.750** (8x)	4	1/8	2-1/2	56693-C3	69.50
.093 (3/32)		.0930	.139	**1.125** (12x)	4	1/8	2-1/2	65493-C3	72.80
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	4	4 mm	50 mm	984757-C3	71.90

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.1250	.187	**.375** (3x)	4	1/8	2-1/2	755508-C3	68.00
.125 (1/8)	.1250	.187	**.625** (5x)	4	1/8	2-1/2	64308-C3	67.20
.125 (1/8)	.1250	.187	**1.000** (8x)	4	1/8	2-1/2	56708-C3	68.80
.125 (1/8)	.1250	.187	**1.250** (10x)	4	1/8	2-1/2	733108-C3	70.50
.125 (1/8)	.1250	.187	**1.500** (12x)	4	1/8	3	65508-C3	72.10
.156 (5/32)	.1562	.234	**.750** (5x)	4	3/16	3	64310-C3	74.10
.156 (5/32)	.1562	.234	**1.250** (8x)	4	3/16	3	56710-C3	75.70
.187 (3/16)	.1875	.281	**1.000** (5x)	4	3/16	3	64312-C3	75.70
.187 (3/16)	.1875	.281	**1.500** (8x)	4	3/16	3	56712-C3	76.40
.250 (1/4)	.2500	.375	**.750** (3x)	4	1/4	4	755516-C3	83.40
.250 (1/4)	.2500	.375	**1.250** (5x)	4	1/4	4	64316-C3	82.50
.250 (1/4)	.2500	.375	**2.000** (8x)	4	1/4	4	56716-C3	84.20

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Medium Alloy Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%; for 16x, reduce to 75%) For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250	250
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	250 - 275	220
Tool Steels: A, L, O, P, W series	275 - 300	180

	Chip Load Per Tooth (IPT) By Cutter Diameter								
	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00007	.00014	.00021	.00028	.00035	.00041	.00053	.00079	.00106
Roughing	.00008	.00017	.00025	.00033	.00042	.00050	.00064	.00096	.00128
Finishing	.00010	.00020	.00030	.00040	.00050	.00060	.00077	.00115	.00154
Max	.00012	.00026	.00039	.00052	.00065	.00077	.00099	.00148	.00198

Radial Depth of Cut*:	Axial Depth of Cut*:
Slotting: 1x Dia	Slotting: .35x Dia
Roughing: .35x Dia	Roughing: .5x - 1x Dia
Finishing: .1x Dia	Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

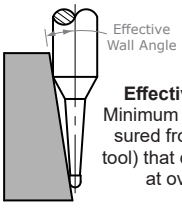
HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters)



Excellent in Readily Machinable Mold Steels, Stainless Steels, & Tool Steels

- Very short length of cut and solid tapered neck for maximum rigidity
- Ideal for contour machining of mold and die cavities
- 35° helix for increased cutting performance
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 2 flutes to center • Solid carbide • CNC ground in the USA

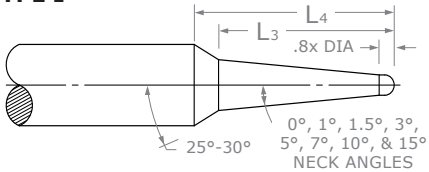


Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

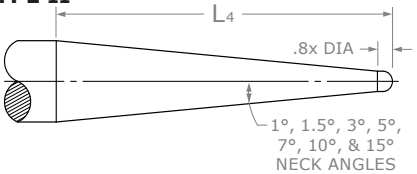
NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 +0°00′ −0°30′	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$
0° (straight neck)	.062 (1/16)	.050	I	.500	**.610**	6.2°	3/16	2	882843-C6	70.30
	.062 (1/16)	.050	I	1.000	**1.110**	3.3°	3/16	2-1/2	882850-C6	76.70
	.093 (3/32)	.074	I	.750	**.833**	3.4°	3/16	2	882864-C6	70.30
	.093 (3/32)	.074	I	1.125	**1.208**	2.3°	3/16	2-1/2	882871-C6	76.70
	.125 (1/8)	.100	I	1.000	**1.058**	1.8°	3/16	2-1/2	882877-C6	76.70
	.125 (1/8)	.100	I	1.750	**1.808**	1.0°	3/16	3	882885-C6	79.10
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	927543-C6	69.00
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	927550-C6	75.50
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	927564-C6	69.90
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	927571-C6	75.50
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	927577-C6	71.90
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	927585-C6	78.00
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	927587-C6	91.70
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	927592-C6	97.80
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	19001-C6	78.50
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	19008-C6	78.50
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	19015-C6	76.70
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	19022-C6	76.70
	.039 (1 mm)	.031	I	.375	**.488**	9.0°	3/16	2	19025-C6	73.40
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	19029-C6	73.40
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	19036-C6	73.40
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	19043-C6	69.00
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	19050-C6	76.10
	.062 (1/16)	.050	I	1.500	**1.543**	2.4°	3/16	3	19053-C6	78.30
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	19057-C6	69.90
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	19064-C6	69.00
	.093 (3/32)	.074	I	1.500	**1.517**	1.9°	3/16	2-1/2	19066-C6	75.50
	.093 (3/32)	.074	II	1.878	**1.878**	1.5°	3/16	3	19068-C6	79.10
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	19071-C6	71.90
	.125 (1/8)	.100	II	2.487	**2.487**	1.5°	1/4	4	19078-C6	84.40
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	19085-C6	78.10
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	19092-C6	99.60

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TYPE I



TYPE II



HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

Ball – Tapered Reach (Mold Cutters) (cont.)

continued from previous page

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$
	.015 (1/64)	.012	I	.156	**.292**	16.8°	3/16	2-1/2	36901-C6	84.30
	.015 (1/64)	.012	I	.375	**.491**	10.1°	3/16	2-1/2	66643-C6	79.10
	.015 (1/64)	.012	I	.875	**.946**	5.3°	3/16	2-1/2	66648-C6	78.30
	.020	.016	I	.250	**.374**	13.0°	3/16	2-1/2	36904-C6	83.60
	.020	.016	I	.500	**.601**	8.1°	3/16	2-1/2	36907-C6	83.60
	.025	.020	I	.250	**.370**	12.8°	3/16	2-1/2	36910-C6	84.00
	.025	.020	I	.500	**.597**	7.9°	3/16	2-1/2	36913-C6	83.20
	.031 (1/32)	.025	I	.312	**.421**	10.9°	3/16	2-1/2	36916-C6	84.00
	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	67046-C6	68.80
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	36931-C6	68.80
	.039 (1 mm)	.031	I	.375	**.472**	9.3°	3/16	2-1/2	36917-C6	84.00
	.039 (1 mm)	.031	I	.750	**.813**	5.4°	3/16	2-1/2	36919-C6	83.20
	.039 (1 mm)	.031	II	1.448	**1.448**	3.0°	3/16	2-1/2	36921-C6	84.00
	.047 (3/64)	.038	I	.375	**.466**	9.0°	3/16	2-1/2	36922-C6	80.30
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	67348-C6	64.90
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	36947-C6	64.90
	.050	.040	I	.500	**.577**	7.1°	3/16	2-1/2	36925-C6	80.30
	.060	.048	I	.625	**.683**	5.6°	3/16	2-1/2	36928-C6	80.30
	.062 (1/16)	.050	I	.375	**.454**	8.4°	3/16	2-1/2	36934-C6	75.80
3°	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	66946-C6	64.90
	.062 (1/16)	.050	I	.875	**.909**	4.1°	3/16	2-1/2	36937-C6	75.20
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	36962-C6	64.90
	.062 (1/16)	.050	II	1.843	**1.843**	3.0°	1/4	3	37362-C6	85.80
	.078 (5/64)	.062	I	.500	**.555**	6.1°	3/16	2-1/2	36940-C6	75.20
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	36978-C6	63.20
	.093 (3/32)	.074	I	.625	**.657**	4.5°	3/16	2	36943-C6	69.00
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	36993-C6	57.50
	.093 (3/32)	.074	II	1.572	**1.572**	3.0°	1/4	3	37393-C6	84.30
	.100	.080	II	1.511	**1.511**	3.0°	1/4	3	37400-C6	87.30
	.109 (7/64)	.087	II	1.432	**1.432**	3.0°	1/4	3	37402-C6	87.30
	.118 (3 mm)	.094	II	1.354	**1.354**	2.9°	1/4	2-1/2	37405-C6	86.40
	.125 (1/8)	.100	I	.875	**.913**	4.2°	1/4	2-1/2	36946-C6	82.50
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	37408-C6	78.60
	.125 (1/8)	.100	II	2.485	**2.485**	3.0°	3/8	4	37708-C6	123.20
	.156 (5/32)	.125	II	1.020	**1.020**	2.8°	1/4	2-1/2	37410-C6	85.80
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	37412-C6	85.10
	.187 (3/16)	.150	II	1.343	**1.343**	2.9°	5/16	2-1/2	36949-C6	99.60
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	37712-C6	123.20
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	37716-C6	102.80
	.015 (1/64)	.012	I	.375	**.469**	10.6°	3/16	2	66664-C6	70.90
	.015 (1/64)	.012	II	.998	**.998**	5.0°	3/16	2	38515-C6	70.60
	.020	.016	I	.562	**.624**	7.8°	3/16	2	38907-C6	77.10
	.020	.016	II	.973	**.973**	5.0°	3/16	2	38520-C6	76.70
5°	.025	.020	I	.562	**.621**	7.6°	3/16	2	38914-C6	77.90
	.025	.020	II	.949	**.949**	5.0°	3/16	2	38525-C6	77.50
	.031 (1/32)	.025	I	.375	**.457**	10.1°	3/16	2	67065-C6	63.00
	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	38531-C6	63.00
	.039 (1 mm)	.031	I	.625	**.664**	6.6°	3/16	2	38921-C6	76.70

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HIGH HELIX END MILLS FOR MEDIUM ALLOY STEELS

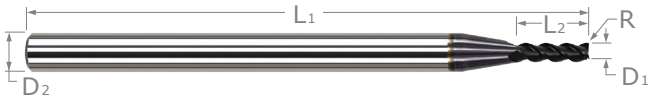
Ball – Tapered Reach (Mold Cutters) (cont.)

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NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$
5°	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	38547-C6	63.70
	.047 (3/64)	.038	II	1.198	**1.198**	5.0°	1/4	2-1/2	38947-C6	85.10
	.050	.040	II	.826	**.826**	4.9°	3/16	2	38928-C6	64.10
	.060	.048	II	.777	**.777**	4.9°	3/16	2	38935-C6	63.60
	.060	.048	II	1.134	**1.134**	5.0°	1/4	2-1/2	38960-C6	85.10
	.062 (1/16)	.050	I	.375	**.434**	8.8°	3/16	2	66963-C6	60.00
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	38562-C6	59.40
	.062 (1/16)	.050	II	1.124	**1.124**	5.0°	1/4	2-1/2	38962-C6	85.10
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	38978-C6	81.20
	.093 (3/32)	.074	II	.972	**.972**	4.9°	1/4	2-1/2	38993-C6	81.90
	.093 (3/32)	.074	II	1.686	**1.686**	5.0°	3/8	3	39293-C6	108.70
	.100	.080	II	.937	**.937**	4.9°	1/4	2-1/2	39000-C6	82.40
	.109 (7/64)	.087	II	.893	**.893**	4.8°	1/4	2-1/2	39002-C6	82.40
	.118 (3 mm)	.094	II	.849	**.849**	4.7°	1/4	2-1/2	39005-C6	81.70
	.125 (1/8)	.100	I	.500	**.548**	7.3°	1/4	2-1/2	38942-C6	77.70
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	39008-C6	77.30
	.125 (1/8)	.100	II	1.529	**1.529**	4.9°	3/8	3	39308-C6	103.90
	.156 (5/32)	.125	II	.661	**.661**	4.6°	1/4	2-1/2	39010-C6	81.20
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	39312-C6	99.60
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	4	922312-C6	111.20
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	39316-C6	100.70
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	4	922316-C6	111.20
7°	.015 (1/64)	.012	I	.187	**.299**	16.5°	3/16	2	66678-C6	70.90
	.015 (1/64)	.012	II	.714	**.714**	7.0°	3/16	2	40015-C6	71.60
	.020	.016	II	.698	**.698**	7.0°	3/16	2	40020-C6	70.90
	.031 (1/32)	.025	I	.250	**.338**	13.6°	3/16	2	67078-C6	63.60
	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	40031-C6	63.60
	.031 (1/32)	.025	II	.917	**.917**	7.0°	1/4	2-1/2	40431-C6	81.20
	.039 (1 mm)	.031	II	.636	**.636**	6.9°	3/16	2	40007-C6	63.60
	.047 (3/64)	.038	I	.375	**.425**	9.9°	3/16	2	40014-C6	63.60
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	40047-C6	63.60
	.047 (3/64)	.038	II	.864	**.864**	6.9°	1/4	2-1/2	40447-C6	81.20
	.060	.048	II	.822	**.822**	6.9°	1/4	2-1/2	40460-C6	81.90
	.062 (1/16)	.050	I	.500	**.567**	9.9°	1/4	2-1/2	66980-C6	81.20
	.062 (1/16)	.050	II	.815	**.815**	6.9°	1/4	2-1/2	40462-C6	81.20
	.062 (1/16)	.050	II	1.324	**1.324**	6.9°	3/8	2-1/2	40862-C6	104.10
	.078 (5/64)	.062	II	1.272	**1.272**	6.9°	3/8	2-1/2	40878-C6	104.10
	.093 (3/32)	.074	II	.714	**.714**	6.7°	1/4	2-1/2	40493-C6	77.30
	.093 (3/32)	.074	II	1.223	**1.223**	6.9°	3/8	2-1/2	40893-C6	104.10
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	40508-C6	73.70
	.125 (1/8)	.100	II	1.118	**1.118**	6.8°	3/8	2-1/2	40908-C6	100.70
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	40912-C6	100.70
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	4	917212-C6	112.30
10°	.031 (1/32)	.025	I	.250	**.317**	14.5°	3/16	2	774631-C6	64.10
	.062 (1/16)	.050	I	.500	**.525**	10.7°	1/4	2	774662-C6	81.90
	.125 (1/8)	.100	II	.632	**.632**	9.0°	5/16	2-1/2	774608-C6	100.70
15°	.031 (1/32)	.025	I	.250	**.281**	16.3°	3/16	2	773931-C6	64.10
	.062 (1/16)	.050	II	.401	**.401**	14.1°	1/4	2	773962-C6	81.90
	.125 (1/8)	.100	II	.567	**.567**	13.7°	3/8	2-1/2	773908-C6	100.70

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.05 mm**	.30 mm (1.5x)	3	4 mm	50 mm	985604-C3	69.90
	.2 mm	.0078	**.05 mm**	.60 mm (3x)	3	4 mm	50 mm	976804-C3	69.90
.010		.0100	**.003**	.015 (1.5x)	3	1/8	1-1/2	52610-C3	65.60
.010		.0100	**.003**	.030 (3x)	3	1/8	1-1/2	45610-C3	65.60
	.3 mm	.0118	**.08 mm**	.90 mm (3x)	3	4 mm	50 mm	976806-C3	68.40
.015 (1/64)		.0150	**.003**	.022 (1.5x)	3	1/8	1-1/2	52615-C3	54.10
.015 (1/64)		.0150	**.003**	.045 (3x)	3	1/8	1-1/2	45615-C3	53.10
.015 (1/64)		.0150	**.003**	.078 (5x)	3	1/8	2-1/2	53815-C3	65.70
	.4 mm	.0157	**.08 mm**	.60 mm (1.5x)	3	4 mm	50 mm	985609-C3	58.20
	.4 mm	.0157	**.08 mm**	1.20 mm (3x)	3	4 mm	50 mm	976809-C3	57.70
	.5 mm	.0196	**.10 mm**	.75 mm (1.5x)	3	4 mm	50 mm	985611-C3	52.10
	.5 mm	.0196	**.10 mm**	1.50 mm (3x)	3	4 mm	50 mm	976811-C3	52.10
.020		.0200	**.004**	.030 (1.5x)	3	1/8	1-1/2	52620-C3	47.40
.020		.0200	**.004**	.060 (3x)	3	1/8	1-1/2	45620-C3	47.40
.020		.0200	**.004**	.100 (5x)	3	1/8	2-1/2	53820-C3	58.10
	.6 mm	.0236	**.10 mm**	.90 mm (1.5x)	3	4 mm	50 mm	985613-C3	50.60
	.6 mm	.0236	**.10 mm**	1.80 mm (3x)	3	4 mm	50 mm	976813-C3	50.60
.025		.0250	**.004**	.038 (1.5x)	3	1/8	1-1/2	52625-C3	45.00
.025		.0250	**.004**	.075 (3x)	3	1/8	1-1/2	45625-C3	46.00
.025		.0250	**.004**	.125 (5x)	3	1/8	2-1/2	53825-C3	55.40
	.7 mm	.0275	**.10 mm**	2.10 mm (3x)	3	4 mm	50 mm	976815-C3	50.60
.031 (1/32)		.0310	**.005**	.047 (1.5x)	3	1/8	1-1/2	52631-C3	37.50
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	45631-C3	37.50
.031 (1/32)		.0310	**.005**	.156 (5x)	3	1/8	2-1/2	53831-C3	47.70
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	907231-C3	37.40
	.8 mm	.0314	**.10 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	985618-C3	43.60
	.8 mm	.0314	**.10 mm**	2.40 mm (3x)	3	4 mm	50 mm	976818-C3	43.10
.035		.0350	**.005**	.053 (1.5x)	3	1/8	1-1/2	52635-C3	38.80
.035		.0350	**.005**	.105 (3x)	3	1/8	1-1/2	45635-C3	38.80
.035		.0350	**.005**	.187 (5x)	3	1/8	2-1/2	53835-C3	48.80
	.9 mm	.0354	**.10 mm**	2.70 mm (3x)	3	4 mm	50 mm	976820-C3	43.10

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	1.0 mm	.0393	**.10 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	985622-C3	43.60
	1.0 mm	.0393	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976822-C3	43.60
.040		.0400	**.005**	.060 (1.5x)	3	1/8	1-1/2	52640-C3	38.80
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	45640-C3	38.80
.040		.0400	**.005**	.203 (5x)	3	1/8	2-1/2	53840-C3	47.70
	1.1 mm	.0433	**.10 mm**	3.00 mm (3x)	3	4 mm	50 mm	976824-C3	43.60
.045		.0450	**.005**	.068 (1.5x)	3	1/8	1-1/2	52645-C3	38.80
.045		.0450	**.005**	.135 (3x)	3	1/8	1-1/2	45645-C3	38.10
.045		.0450	**.005**	.225 (5x)	3	1/8	2-1/2	53845-C3	48.80
.047 (3/64)		.0470	**.005**	.071 (1.5x)	3	1/8	1-1/2	52647-C3	38.20
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	45647-C3	37.50
.047 (3/64)		.0470	**.005**	.250 (5x)	3	1/8	2-1/2	53847-C3	47.70
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	907247-C3	37.50
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	903447-C3	37.50
	1.2 mm	.0472	**.10 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	985627-C3	43.60
	1.2 mm	.0472	**.10 mm**	3.50 mm (3x)	3	4 mm	50 mm	976827-C3	43.10
.050		.0500	**.005**	.075 (1.5x)	3	1/8	1-1/2	52650-C3	38.80
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	45650-C3	38.10
.050		.0500	**.005**	.250 (5x)	3	1/8	2-1/2	53850-C3	47.70
	1.3 mm	.0511	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976829-C3	43.60
.055		.0550	**.005**	.083 (1.5x)	3	1/8	1-1/2	52655-C3	38.80
.055		.0550	**.005**	.165 (3x)	3	1/8	1-1/2	45655-C3	38.10
.055		.0550	**.005**	.275 (5x)	3	1/8	2-1/2	53855-C3	47.70
	1.4 mm	.0551	**.10 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	985631-C3	43.60
	1.4 mm	.0551	**.10 mm**	4.00 mm (3x)	3	4 mm	50 mm	976831-C3	43.60
	1.5 mm	.0590	**.20 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	985633-C3	41.00
	1.5 mm	.0590	**.20 mm**	4.50 mm (3x)	3	4 mm	50 mm	976833-C3	40.60
.060		.0600	**.010**	.090 (1.5x)	3	1/8	1-1/2	52660-C3	38.80
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	45660-C3	38.80
.060		.0600	**.010**	.312 (5x)	3	1/8	2-1/2	53860-C3	48.80
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	881862-C3	34.70
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	913862-C3	34.70
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	759662-C3	46.90
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	52662-C3	34.70
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	45662-C3	34.70
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	53862-C3	46.10
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	903462-C3	34.70
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	931362-C3	34.70
	1.6 mm	.0629	**.20 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	985636-C3	41.00
	1.6 mm	.0629	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976836-C3	41.00
	1.7 mm	.0669	**.20 mm**	5.00 mm (3x)	3	4 mm	50 mm	976838-C3	41.00
.070		.0700	**.010**	.105 (1.5x)	3	1/8	1-1/2	52670-C3	36.00
.070		.0700	**.010**	.210 (3x)	3	1/8	1-1/2	45670-C3	35.30
	1.8 mm	.0708	**.20 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	985640-C3	41.00
	1.8 mm	.0708	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976840-C3	41.00

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	1.9 mm	.0748	**.20 mm**	5.50 mm (3x)	3	4 mm	50 mm	976842-C3	41.00
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	881878-C3	34.80
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	913878-C3	35.30
.078 (5/64)		.0780	**.010**	.118 (1.5x)	3	1/8	1-1/2	52678-C3	35.30
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	45678-C3	35.30
.078 (5/64)		.0780	**.010**	.406 (5x)	3	1/8	2-1/2	53878-C3	46.10
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	903478-C3	36.00
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	931378-C3	36.00
	2.0 mm	.0787	**.20 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	985645-C3	41.00
	2.0 mm	.0787	**.20 mm**	6.00 mm (3x)	3	4 mm	50 mm	976845-C3	41.00
.080		.0800	**.010**	.120 (1.5x)	3	1/8	1-1/2	52680-C3	36.00
.080		.0800	**.010**	.240 (3x)	3	1/8	1-1/2	45680-C3	36.00
.090		.0900	**.010**	.270 (3x)	3	1/8	1-1/2	45690-C3	36.00
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	881893-C3	34.70
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	913893-C3	34.70
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	759693-C3	46.90
.093 (3/32)		.0930	**.010**	.140 (1.5x)	3	1/8	1-1/2	52693-C3	34.70
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	45693-C3	34.70
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	53893-C3	46.10
.093 (3/32)		.0930	**.015**	.140 (1.5x)	3	1/8	1-1/2	792393-C3	34.70
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	903493-C3	34.70
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	931393-C3	34.70
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	927893-C3	40.70
	2.5 mm	.0984	**.20 mm**	3.70 mm (1.5x)	3	4 mm	50 mm	985651-C3	40.60
	2.5 mm	.0984	**.20 mm**	7.50 mm (3x)	3	4 mm	50 mm	976851-C3	40.60
.100		.1000	**.010**	.150 (1.5x)	3	1/8	1-1/2	52700-C3	36.00
.100		.1000	**.010**	.300 (3x)	3	1/8	1-1/2	45700-C3	36.00
.100		.1000	**.010**	.500 (5x)	3	1/8	2-1/2	53900-C3	46.50
.109 (7/64)		.1090	**.010**	.164 (1.5x)	3	1/8	1-1/2	52702-C3	35.30
.109 (7/64)		.1090	**.010**	.327 (3x)	3	1/8	1-1/2	45702-C3	36.00
	3.0 mm	.1181	**.20 mm**	4.50 mm (1.5x)	3	4 mm	50 mm	985657-C3	41.00
	3.0 mm	.1181	**.20 mm**	9.00 mm (3x)	3	4 mm	50 mm	976857-C3	41.00

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	881908-C3	36.00
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	913908-C3	35.30
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	907308-C3	32.50
.125 (1/8)	.1250	**.015**	.187 (1.5x)	4	1/8	1-1/2	52708-C3	32.10
.125 (1/8)	.1250	**.015**	.375 (3x)	4	1/8	1-1/2	45708-C3	32.10
.125 (1/8)	.1250	**.015**	.625 (5x)	4	1/8	2-1/2	53908-C3	46.10
.125 (1/8)	.1250	**.020**	.187 (1.5x)	4	1/8	1-1/2	778708-C3	32.50
.125 (1/8)	.1250	**.020**	.375 (3x)	4	1/8	1-1/2	931408-C3	32.10
.125 (1/8)	.1250	**.020**	.625 (5x)	4	1/8	2-1/2	767308-C3	44.00
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	927908-C3	38.00
.140 (9/64)	.1406	**.015**	.220 (1.5x)	4	3/16	2	52709-C3	42.70
.140 (9/64)	.1406	**.015**	.425 (3x)	4	3/16	2	45709-C3	43.40

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius (cont.)

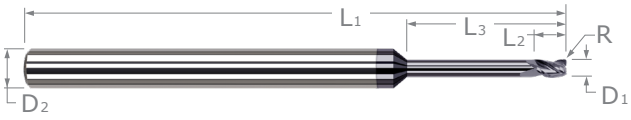
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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.156 (5/32)	.1562	**.015**	.235 (1.5x)	4	3/16	2	52710-C3	38.30
.156 (5/32)	.1562	**.015**	.470 (3x)	4	3/16	2	45710-C3	39.00
.156 (5/32)	.1562	**.015**	.750 (5x)	4	3/16	3	53910-C3	50.80
.156 (5/32)	.1562	**.030**	.470 (3x)	4	3/16	2	927910-C3	45.30
.187 (3/16)	.1875	**.005**	.562 (3x)	4	3/16	2	913912-C3	38.90
.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	907312-C3	38.90
.187 (3/16)	.1875	**.015**	.285 (1.5x)	4	3/16	2	52712-C3	35.20
.187 (3/16)	.1875	**.015**	.562 (3x)	4	3/16	2	45712-C3	35.20
.187 (3/16)	.1875	**.015**	1.000 (5x)	4	3/16	3	53912-C3	50.80
.187 (3/16)	.1875	**.020**	.562 (3x)	4	3/16	2	931412-C3	43.70
.187 (3/16)	.1875	**.030**	.562 (3x)	4	3/16	2	927912-C3	43.70
.187 (3/16)	.1875	**.060**	.562 (3x)	4	3/16	2	816812-C3	43.70
.250 (1/4)	.2500	**.015**	.375 (1.5x)	4	1/4	2-1/2	52716-C3	44.30
.250 (1/4)	.2500	**.015**	.750 (3x)	4	1/4	2-1/2	45716-C3	44.30
.250 (1/4)	.2500	**.015**	1.250 (5x)	4	1/4	4	53916-C3	63.00
.250 (1/4)	.2500	**.020**	.750 (3x)	4	1/4	2-1/2	931416-C3	44.30
.250 (1/4)	.2500	**.060**	.750 (3x)	4	1/4	2-1/2	816816-C3	44.30
.312 (5/16)	.3125	**.015**	.470 (1.5x)	4	5/16	2-1/2	52720-C3	66.40
.312 (5/16)	.3125	**.015**	1.000 (3x)	4	5/16	2-1/2	45720-C3	65.30
.375 (3/8)	.3750	**.015**	.570 (1.5x)	4	3/8	2-1/2	52724-C3	75.90
.375 (3/8)	.3750	**.015**	1.125 (3x)	4	3/8	2-1/2	45724-C3	75.90
.500 (1/2)	.5000	**.030**	.750 (1.5x)	4	1/2	3	52732-C3	98.10

Please See Speeds & Feeds On Page 193

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute



- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 37°) reduces chatter and harmonics and increases material removal rates
- Corner radius for improved strength • AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.003**	.022	.078 (5x)	3	1/8	2-1/2	62415-C3	70.50
.015 (1/64)		.0150	**.003**	.022	.125 (8x)	3	1/8	2-1/2	55015-C3	72.00
.015 (1/64)		.0150	**.003**	.022	.187 (12x)	3	1/8	2-1/2	63815-C3	78.80
	.4 mm	.0157	**.08 mm**	.60 mm	2.0 mm (5x)	3	4 mm	50 mm	986709-C3	79.20
	.4 mm	.0157	**.08 mm**	.60 mm	3.2 mm (8x)	3	4 mm	50 mm	978009-C3	80.90
	.4 mm	.0157	**.08 mm**	.60 mm	4.8 mm (12x)	3	4 mm	50 mm	982309-C3	87.70
	.5 mm	.0196	**.10 mm**	.75 mm	2.5 mm (5x)	3	4 mm	50 mm	986711-C3	76.10
	.5 mm	.0196	**.10 mm**	.75 mm	4.0 mm (8x)	3	4 mm	50 mm	978011-C3	77.40
	.5 mm	.0196	**.10 mm**	.75 mm	6.0 mm (12x)	3	4 mm	50 mm	982311-C3	84.80
	.5 mm	.0196	**.10 mm**	.75 mm	8.0 mm (16x)	3	4 mm	50 mm	975511-C3	88.60
.020		.0200	**.004**	.030	.100 (5x)	3	1/8	2-1/2	62420-C3	67.20
.020		.0200	**.004**	.030	.160 (8x)	3	1/8	2-1/2	55020-C3	68.60
.020		.0200	**.004**	.030	.250 (12x)	3	1/8	2-1/2	63820-C3	76.00
	.6 mm	.0236	**.10 mm**	.90 mm	3.0 mm (5x)	3	4 mm	50 mm	986713-C3	74.40
	.6 mm	.0236	**.10 mm**	.90 mm	4.8 mm (8x)	3	4 mm	50 mm	978013-C3	76.10
	.6 mm	.0236	**.10 mm**	.90 mm	7.2 mm (12x)	3	4 mm	50 mm	982313-C3	81.20
.025		.0250	**.004**	.038	.125 (5x)	3	1/8	2-1/2	62425-C3	64.70
.025		.0250	**.004**	.038	.203 (8x)	3	1/8	2-1/2	55025-C3	66.50
.025		.0250	**.004**	.038	.312 (12x)	3	1/8	2-1/2	63825-C3	73.90
.031 (1/32)		.0310	**.005**	.047	.156 (5x)	3	1/8	2-1/2	62431-C3	61.30
.031 (1/32)		.0310	**.005**	.047	.250 (8x)	3	1/8	2-1/2	55031-C3	62.60
.031 (1/32)		.0310	**.005**	.047	.375 (12x)	3	1/8	2-1/2	63831-C3	65.50
	.8 mm	.0314	**.10 mm**	1.20 mm	4.0 mm (5x)	3	4 mm	50 mm	986718-C3	68.60
	.8 mm	.0314	**.10 mm**	1.20 mm	6.5 mm (8x)	3	4 mm	50 mm	978018-C3	70.10
	.8 mm	.0314	**.10 mm**	1.20 mm	9.5 mm (12x)	3	4 mm	50 mm	982318-C3	72.60
.035		.0350	**.005**	.053	.187 (5x)	3	1/8	2-1/2	62435-C3	62.30
	1.0 mm	.0393	**.10 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	986722-C3	68.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	8.0 mm (8x)	3	4 mm	50 mm	978022-C3	69.20
	1.0 mm	.0393	**.10 mm**	1.50 mm	12.0 mm (12x)	3	4 mm	50 mm	982322-C3	72.60
	1.0 mm	.0393	**.10 mm**	1.50 mm	16.0 mm (16x)	3	4 mm	50 mm	975522-C3	76.80
.040		.0400	**.005**	.060	.203 (5x)	3	1/8	2-1/2	62440-C3	61.80
.045		.0450	**.005**	.068	.225 (5x)	3	1/8	2-1/2	62445-C3	62.30
.047 (3/64)		.0470	**.005**	.070	.250 (5x)	3	1/8	2-1/2	62447-C3	61.80
.047 (3/64)		.0470	**.005**	.070	.375 (8x)	3	1/8	2-1/2	55047-C3	62.60
.047 (3/64)		.0470	**.005**	.070	.570 (12x)	3	1/8	2-1/2	63847-C3	66.00

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Corner Radius – Long Reach, Stub Flute (cont.)

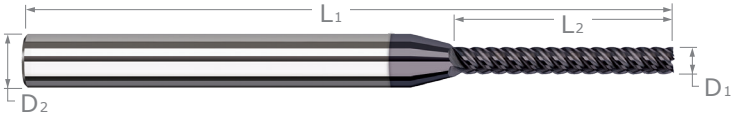
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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm	L_3 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.050		.0500	**.005**	.075	.250 (5x)	3	1/8	2-1/2	62450-C3	61.00
.055		.0550	**.005**	.083	.275 (5x)	3	1/8	2-1/2	62455-C3	61.70
	1.5 mm	.0590	**.20 mm**	2.20 mm	7.5 mm (5x)	3	4 mm	50 mm	986733-C3	68.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	12.0 mm (8x)	3	4 mm	50 mm	978033-C3	70.10
	1.5 mm	.0590	**.20 mm**	2.20 mm	18.0 mm (12x)	3	4 mm	50 mm	982333-C3	72.60
	1.5 mm	.0590	**.20 mm**	2.20 mm	24.0 mm (16x)	3	4 mm	63 mm	975533-C3	76.80
.060		.0600	**.010**	.090	.312 (5x)	3	1/8	2-1/2	62460-C3	62.30
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	815662-C3	64.60
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	816562-C3	66.00
.062 (1/16)		.0620	**.010**	.093	.312 (5x)	3	1/8	2-1/2	62462-C3	61.30
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	55062-C3	62.60
.062 (1/16)		.0620	**.010**	.093	.750 (12x)	3	1/8	2-1/2	63862-C3	65.50
.078 (5/64)		.0780	**.010**	.117	.406 (5x)	3	1/8	2-1/2	62478-C3	61.30
.078 (5/64)		.0780	**.010**	.117	.625 (8x)	3	1/8	2-1/2	55078-C3	62.60
.078 (5/64)		.0780	**.010**	.117	.940 (12x)	3	1/8	2-1/2	63878-C3	66.00
	2.0 mm	.0787	**.20 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	986745-C3	68.60
	2.0 mm	.0787	**.20 mm**	3.00 mm	16.0 mm (8x)	3	4 mm	50 mm	978045-C3	70.10
	2.0 mm	.0787	**.20 mm**	3.00 mm	24.0 mm (12x)	3	4 mm	63 mm	982345-C3	72.60
	2.0 mm	.0787	**.20 mm**	3.00 mm	32.0 mm (16x)	3	4 mm	63 mm	975545-C3	76.80
.093 (3/32)		.0930	**.005**	.139	.500 (5x)	3	1/8	2-1/2	815693-C3	64.60
.093 (3/32)		.0930	**.005**	.139	.750 (8x)	3	1/8	2-1/2	816593-C3	66.00
.093 (3/32)		.0930	**.010**	.139	.500 (5x)	3	1/8	2-1/2	62493-C3	61.30
.093 (3/32)		.0930	**.010**	.139	.750 (8x)	3	1/8	2-1/2	55093-C3	62.60
.093 (3/32)		.0930	**.010**	.139	1.125 (12x)	3	1/8	2-1/2	63893-C3	66.00
.100		.1000	**.010**	.150	.500 (5x)	3	1/8	2-1/2	62500-C3	64.30
	3.0 mm	.1181	**.20 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	986757-C3	64.50
D_1 +.000″ −.002″		decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)		.1250	**.010**	.187	.625 (5x)	4	1/8	2-1/2	815708-C3	61.30
.125 (1/8)		.1250	**.010**	.187	1.000 (8x)	4	1/8	2-1/2	816608-C3	62.50
.125 (1/8)		.1250	**.015**	.187	.625 (5x)	4	1/8	2-1/2	62508-C3	61.30
.125 (1/8)		.1250	**.015**	.187	1.000 (8x)	4	1/8	2-1/2	55108-C3	61.40
.125 (1/8)		.1250	**.015**	.187	1.500 (12x)	4	1/8	3	63908-C3	65.50
.156 (5/32)		.1562	**.015**	.235	.750 (5x)	4	3/16	3	62510-C3	66.30
.156 (5/32)		.1562	**.015**	.235	1.250 (8x)	4	3/16	3	55110-C3	67.90
.156 (5/32)		.1562	**.015**	.235	1.875 (12x)	4	3/16	4	63910-C3	85.10
.156 (5/32)		.1562	**.030**	.235	1.250 (8x)	4	3/16	3	817310-C3	74.10
.187 (3/16)		.1875	**.015**	.281	1.000 (5x)	4	3 /16	3	62512-C3	66.30
.187 (3/16)		.1875	**.015**	.281	1.500 (8x)	4	3/16	3	55112-C3	67.90
.187 (3/16)		.1875	**.015**	.281	2.250 (12x)	4	3/16	4	63912-C3	85.10
.187 (3/16)		.1875	**.030**	.281	1.500 (8x)	4	3/16	3	817312-C3	75.60
.250 (1/4)		.2500	**.015**	.375	1.250 (5x)	4	1/4	4	62516-C3	75.40
.250 (1/4)		.2500	**.015**	.375	2.000 (8x)	4	1/4	4	55116-C3	75.40
.250 (1/4)		.2500	**.015**	.375	3.000 (12x)	4	1/4	6	63916-C3	94.00

Please See Speeds & Feeds On Page 195

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square



Down to .2 mm!

- Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels • Can be used in light duty roughing and profiling applications
- AlTiN Nano coating offers superior hardness and heat resistance • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	.2 mm	.0078	**.60 mm** (3x)	4	4 mm	50 mm	977704-C6	65.50
	.2 mm	.0078	**1.00 mm** (5x)	4	4 mm	50 mm	980104-C6	75.70
	.2 mm	.0078	**1.60 mm** (8x)	4	4 mm	50 mm	981704-C6	77.50
.010		.0100	**.050** (5x)	4	1/8	2-1/2	53310-C6	65.90
	.3 mm	.0118	**.90 mm** (3x)	4	4 mm	50 mm	977706-C6	60.40
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	24315-C6	52.80
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	53315-C6	65.90
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	62815-C6	67.20
	.4 mm	.0157	**1.20 mm** (3x)	4	4 mm	50 mm	977709-C6	57.50
	.4 mm	.0157	**2.00 mm** (5x)	4	4 mm	50 mm	980109-C6	67.20
	.4 mm	.0157	**3.20 mm** (8x)	4	4 mm	50 mm	981709-C6	69.50
	.5 mm	.0196	**1.50 mm** (3x)	4	4 mm	50 mm	977711-C6	56.80
	.5 mm	.0196	**2.50 mm** (5x)	4	4 mm	50 mm	980111-C6	65.50
	.5 mm	.0196	**4.00 mm** (8x)	4	4 mm	50 mm	981711-C6	68.40
.020		.0200	**.030** (1.5x)	4	1/8	1-1/2	935920-C6	52.10
.020		.0200	**.060** (3x)	4	1/8	1-1/2	24320-C6	51.60
.020		.0200	**.080** (4x)	4	1/8	1-1/2	835320-C6	54.50
.020		.0200	**.100** (5x)	4	1/8	2-1/2	53320-C6	64.70
.020		.0200	**.160** (8x)	4	1/8	2-1/2	62820-C6	66.60
	.6 mm	.0236	**1.80 mm** (3x)	4	4 mm	50 mm	977713-C6	56.80
	.6 mm	.0236	**3.00 mm** (5x)	4	4 mm	50 mm	980113-C6	66.00
	.6 mm	.0236	**4.80 mm** (8x)	4	4 mm	50 mm	981713-C6	68.40
.025		.0250	**.038** (1.5x)	4	1/8	1-1/2	935925-C6	48.60
.025		.0250	**.075** (3x)	4	1/8	1-1/2	24325-C6	48.60
.025		.0250	**.125** (5x)	4	1/8	2-1/2	53325-C6	62.60
.025		.0250	**.203** (8x)	4	1/8	2-1/2	62825-C6	64.00
	.7 mm	.0275	**2.10 mm** (3x)	4	4 mm	50 mm	977715-C6	56.80
.030		.0300	**.156** (5x)	5	1/8	2-1/2	53330-C6	60.70
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935931-C6	42.60
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	24331-C6	42.60
.031 (1/32)		.0310	**.125** (4x)	5	1/8	2-1/2	835331-C6	60.20
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	53331-C6	60.20
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	62831-C6	62.00
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	882431-C6	70.90
.031 (1/32)		.0310	**.375** (12x)	5	1/8	2-1/2	68531-C6	75.70
	.8 mm	.0314	**2.40 mm** (3x)	5	4 mm	50 mm	977718-C6	49.40
	.8 mm	.0314	**4.00 mm** (5x)	5	4 mm	50 mm	980118-C6	62.30
	.8 mm	.0314	**6.50 mm** (8x)	5	4 mm	50 mm	981718-C6	64.10
	.9 mm	.0354	**2.70 mm** (3x)	5	4 mm	50 mm	977720-C6	49.40

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
	1.0 mm	.0393	**1.50 mm** (1.5x)	5	4 mm	50 mm	778522-C6	49.80
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	977722-C6	49.80
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	980122-C6	61.80
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	981722-C6	64.10
.040		.0400	**.060** (1.5x)	5	1/8	1-1/2	935940-C6	43.10
.040		.0400	**.120** (3x)	5	1/8	1-1/2	24340-C6	43.10
.040		.0400	**.160** (4x)	5	1/8	2-1/2	835340-C6	60.20
.040		.0400	**.203** (5x)	5	1/8	2-1/2	53340-C6	60.20
.040		.0400	**.325** (8x)	5	1/8	2-1/2	62840-C6	61.30
	1.1 mm	.0433	**3.00 mm** (3x)	5	4 mm	50 mm	977724-C6	49.80
.047 (3/64)		.0470	**.071** (1.5x)	5	1/8	1-1/2	935947-C6	42.60
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	24347-C6	42.60
.047 (3/64)		.0470	**.187** (4x)	5	1/8	2-1/2	835347-C6	55.20
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	53347-C6	60.20
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	62847-C6	61.30
.047 (3/64)		.0470	**.480** (10x)	5	1/8	2-1/2	882447-C6	70.90
.047 (3/64)		.0470	**.570** (12x)	5	1/8	2-1/2	68547-C6	76.40
	1.2 mm	.0472	**3.50 mm** (3x)	5	4 mm	50 mm	977727-C6	49.40
	1.2 mm	.0472	**6.00 mm** (5x)	5	4 mm	50 mm	980127-C6	62.30
	1.2 mm	.0472	**9.50 mm** (8x)	5	4 mm	50 mm	981727-C6	64.10
.050		.0500	**.075** (1.5x)	5	1/8	1-1/2	935950-C6	43.60
.050		.0500	**.150** (3x)	5	1/8	1-1/2	24350-C6	43.10
.050		.0500	**.250** (5x)	5	1/8	2-1/2	53350-C6	60.20
.050		.0500	**.400** (8x)	5	1/8	2-1/2	62850-C6	61.30
	1.3 mm	.0511	**4.00 mm** (3x)	5	4 mm	50 mm	977729-C6	49.80
	1.4 mm	.0551	**4.00 mm** (3x)	5	4 mm	50 mm	977731-C6	49.80
	1.4 mm	.0551	**7.00 mm** (5x)	5	4 mm	50 mm	980131-C6	62.30
	1.4 mm	.0551	**11.00 mm** (8x)	5	4 mm	50 mm	981731-C6	64.10
	1.5 mm	.0590	**4.50 mm** (3x)	5	4 mm	50 mm	977733-C6	47.60
	1.5 mm	.0590	**7.50 mm** (5x)	5	4 mm	50 mm	980133-C6	60.40
	1.5 mm	.0590	**12.00 mm** (8x)	5	4 mm	50 mm	981733-C6	62.10
.060		.0600	**.090** (1.5x)	5	1/8	1-1/2	935960-C6	43.60
.060		.0600	**.180** (3x)	5	1/8	1-1/2	24360-C6	43.10
.060		.0600	**.312** (5x)	5	1/8	2-1/2	53360-C6	60.20
.060		.0600	**.500** (8x)	5	1/8	2-1/2	62860-C6	61.30
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935962-C6	40.10
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	24362-C6	40.10
.062 (1/16)		.0620	**.250** (4x)	5	1/8	2-1/2	835362-C6	56.20
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	53362-C6	56.80
.062 (1/16)		.0620	**.375** (6x)	5	1/8	2-1/2	778362-C6	56.80
.062 (1/16)		.0620	**.437** (7x)	5	1/8	2-1/2	726262-C6	57.50
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	62862-C6	57.50
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	882462-C6	71.60
.062 (1/16)		.0620	**.750** (12x)	5	1/8	2-1/2	68562-C6	80.90
.062 (1/16)		.0620	**.950** (15x)	5	1/8	2-1/2	68962-C6	101.80
	1.6 mm	.0629	**5.00 mm** (3x)	5	4 mm	50 mm	977736-C6	47.60
	1.6 mm	.0629	**8.00 mm** (5x)	5	4 mm	50 mm	980136-C6	60.20
	1.6 mm	.0629	**13.00 mm** (8x)	5	4 mm	50 mm	981736-C6	62.00
	1.7 mm	.0669	**5.00 mm** (3x)	5	4 mm	50 mm	977738-C6	47.60

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VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.070		.0700	**.210** (3x)	5	1/8	1-1/2	24370-C6	40.60
.070		.0700	**.375** (5x)	5	1/8	2-1/2	53370-C6	56.80
.070		.0700	**.570** (8x)	5	1/8	2-1/2	62870-C6	58.10
	1.8 mm	.0708	**5.50 mm** (3x)	5	4 mm	50 mm	977740-C6	48.30
	1.8 mm	.0708	**9.00 mm** (5x)	5	4 mm	50 mm	980140-C6	60.40
	1.8 mm	.0708	**14.00 mm** (8x)	5	4 mm	50 mm	981740-C6	62.60
	1.9 mm	.0748	**5.50 mm** (3x)	5	4 mm	50 mm	977742-C6	48.30
.078 (5/64)		.0780	**.117** (1.5x)	5	1/8	1-1/2	935978-C6	40.10
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	24378-C6	40.10
.078 (5/64)		.0780	**.312** (4x)	5	1/8	2-1/2	835378-C6	51.70
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	53378-C6	56.80
.078 (5/64)		.0780	**.475** (6x)	5	1/8	2-1/2	778378-C6	56.80
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	62878-C6	57.50
.078 (5/64)		.0780	**.800** (10x)	5	1/8	2-1/2	882478-C6	72.30
.078 (5/64)		.0780	**.940** (12x)	5	1/8	2-1/2	68578-C6	80.90
.078 (5/64)		.0780	**1.187** (15x)	5	1/8	2-1/2	68978-C6	102.90
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	977745-C6	47.60
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	980145-C6	59.90
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	981745-C6	62.60
.080		.0800	**.120** (1.5x)	5	1/8	1-1/2	935980-C6	41.00
.080		.0800	**.240** (3x)	5	1/8	1-1/2	24380-C6	40.60
.080		.0800	**.406** (5x)	5	1/8	2-1/2	53380-C6	56.80
.080		.0800	**.650** (8x)	5	1/8	2-1/2	62880-C6	58.10
.090		.0900	**.270** (3x)	5	1/8	1-1/2	24390-C6	40.60
.090		.0900	**.450** (5x)	5	1/8	2-1/2	53390-C6	56.80
.090		.0900	**.750** (8x)	5	1/8	2-1/2	62890-C6	58.10
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935993-C6	40.10
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	24393-C6	40.10
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	835393-C6	56.20
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	53393-C6	56.80
.093 (3/32)		.0930	**.585** (6x)	5	1/8	2-1/2	778393-C6	56.80
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	62893-C6	57.50
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	882493-C6	71.60
.093 (3/32)		.0930	**1.125** (12x)	5	1/8	2-1/2	68593-C6	81.60
.093 (3/32)		.0930	**1.400** (15x)	5	1/8	3	68993-C6	103.60
	2.5 mm	.0984	**7.50 mm** (3x)	5	4 mm	50 mm	977751-C6	47.60
	2.5 mm	.0984	**12.00 mm** (5x)	5	4 mm	50 mm	980151-C6	60.00
.100		.1000	**.150** (1.5x)	5	1/8	1-1/2	936000-C6	41.00
.100		.1000	**.300** (3x)	5	1/8	1-1/2	24399-C6	40.60
.100		.1000	**.500** (5x)	5	1/8	2-1/2	53399-C6	56.80
.100		.1000	**.800** (8x)	5	1/8	2-1/2	53400-C6	58.10
.109 (7/64)		.1090	**.327** (3x)	5	1/8	1-1/2	24402-C6	40.80
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	63502-C6	56.80
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	977757-C6	47.60
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	980157-C6	59.40
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	981757-C6	62.30

continued on next page

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	936008-C6	34.50
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	795408-C6	34.90
.125 (1/8)	.1250	**.500** (4x)	5	1/8	1-1/2	24408-C6	34.50
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	776908-C6	54.70
.125 (1/8)	.1250	**.750** (6x)	5	1/8	2-1/2	63508-C6	54.70
.125 (1/8)	.1250	**.875** (7x)	5	1/8	2-1/2	726308-C6	56.80
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	53408-C6	56.80
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	882508-C6	70.50
.125 (1/8)	.1250	**1.500** (12x)	5	1/8	3	68608-C6	80.30
.125 (1/8)	.1250	**1.875** (15x)	5	1/8	3	69008-C6	101.40
.140 (9/64)	.1406	**.500** (3x)	5	3/16	2	24409-C6	53.60
.140 (9/64)	.1406	**.750** (5x)	5	3/16	3	63509-C6	55.90
.156 (5/32)	.1562	**.235** (1.5x)	5	3/16	2	936010-C6	44.40
.156 (5/32)	.1562	**.562** (3x)	5	3/16	2	24410-C6	44.00
.156 (5/32)	.1562	**.625** (4x)	5	3/16	3	835410-C6	59.10
.156 (5/32)	.1562	**.875** (5x)	5	3/16	3	63510-C6	59.70
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	53410-C6	60.50
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	936012-C6	39.80
.187 (3/16)	.1875	**.625** (3x)	5	3/16	2	24412-C6	39.80
.187 (3/16)	.1875	**.750** (4x)	5	3/16	3	835412-C6	53.20
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	63512-C6	59.70
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	53412-C6	60.50
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	936016-C6	50.60
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	24416-C6	50.60
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	63516-C6	72.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	53416-C6	74.20
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	24424-C6	80.40
.500 (1/2)	.5000	**.750** (1.5x)	5	1/2	3	936032-C6	111.90
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	24432-C6	104.70
.500 (1/2)	.5000	**2.625** (5x)	5	1/2	4	63532-C6	120.50

Please See Speeds & Feeds On Page 209

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

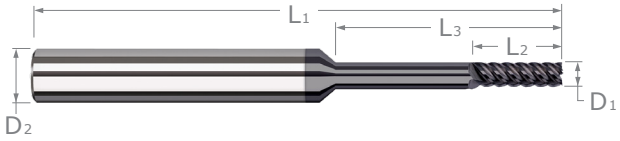
Finishers

SPEEDS & FEEDS (High-Helix Finishers for Medium Alloy Steels)

Material	Hardness (HBn)	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter									Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	225 - 250 250 - 275	600 550	Finishing (1.5x LOC)	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00018	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00016	.00032	.00049	.00065	.00081	.00097	.00131	.00195	.00261	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00011	.00023	.00035	.00047	.00059	.00070	.00094	.00140	.00188	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00010	.00020	.00031	.00041	.00051	.00061	.00083	.00123	.00165	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00019	.00028	.00037	.00047	.00056	.00075	.00112	.00150	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00033	.00042	.00050	.00068	.00101	.00135	< .02x Dia	.5x - 15x Dia
	275 - 300	500	Finishing (1.5x LOC)	.00018	.00038	.00057	.00075	.00094	.00113	.00151	.00226	.00303	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00017	.00034	.00052	.00068	.00086	.00102	.00138	.00206	.00275	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00014	.00030	.00045	.00059	.00075	.00089	.00120	.00179	.00239	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00129	.00172	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00009	.00019	.00028	.00038	.00047	.00056	.00076	.00113	.00151	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00018	.00027	.00035	.00045	.00053	.00072	.00107	.00143	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00031	.00039	.00046	.00062	.00093	.00124	< .02x Dia	.5x - 15x Dia
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502 **Tool Steels:** A, L, O, P, W series	225 - 250 250 - 275	500 500	Finishing (1.5x LOC)	.00017	.00034	.00052	.00068	.00086	.00102	.00138	.00206	.00275	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00015	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00011	.00023	.00035	.00047	.00059	.00070	.00094	.00140	.00188	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00016	.00024	.00032	.00041	.00048	.00065	.00097	.00130	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00028	.00035	.00042	.00056	.00084	.00113	< .02x Dia	.5x - 15x Dia
	275 - 300 300 - 350	500 500	Finishing (1.5x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00014	.00028	.00042	.00056	.00070	.00084	.00113	.00168	.00225	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00012	.00024	.00037	.00049	.00061	.00073	.00098	.00146	.00196	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00084	.00126	.00169	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00141	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	.00007	.00015	.00023	.00031	.00039	.00046	.00062	.00093	.00124	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00117	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00014	.00021	.00028	.00035	.00042	.00056	.00084	.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00025	.00032	.00038	.00051	.00076	.00101	< .02x Dia	.5x - 15x Dia

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square – Long Reach

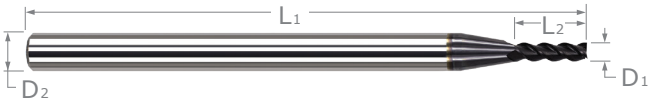


- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	ALTiN NANO COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.031 (1/32)	.093	**.156** (5x)	1/8	2-1/2	718231-C6	64.70
.047 (3/64)	.141	**.250** (5x)	1/8	2-1/2	718247-C6	64.70
.062 (1/16)	.186	**.312** (5x)	1/8	2-1/2	718262-C6	61.80
.078 (5/64)	.234	**.406** (5x)	1/8	2-1/2	718278-C6	61.80
.093 (3/32)	.279	**.500** (5x)	1/8	2-1/2	718293-C6	61.80
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	5 FL	USD$
.125 (1/8)	.375	**.625** (5x)	1/8	2-1/2	718308-C6	59.80
.187 (3/16)	.570	**1.000** (5x)	3/16	3	718312-C6	63.30
.250 (1/4)	.750	**1.250** (5x)	1/4	4	718316-C6	76.40

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

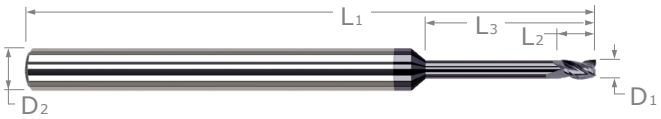
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	939815-C3	52.40
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	945715-C3	51.40
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	952411-C3	51.00
.020		.0200	**.060** (3x)	3	1/8	1-1/2	945720-C3	47.20
.025		.0250	**.075** (3x)	3	1/8	1-1/2	945725-C3	45.50
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	939831-C3	37.20
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	945731-C3	37.20
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	900531-C3	47.70
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	926022-C3	42.10
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	952422-C3	42.60
.040		.0400	**.120** (3x)	3	1/8	1-1/2	945740-C3	38.30
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	939847-C3	37.90
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	945747-C3	37.20
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	952433-C3	40.20
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	939862-C3	34.70
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	945762-C3	34.70
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	900562-C3	45.60
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	939878-C3	34.70
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	945778-C3	34.70
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	952445-C3	40.20
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	939893-C3	34.70
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	945793-C3	34.70
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	900593-C3	45.60
	3.0 mm	.1181	**4.50 mm** (1.5x)	3	4 mm	50 mm	926057-C3	39.90
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	952457-C3	39.90

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.187** (1.5x)	4	1/8	1-1/2	939908-C3	31.60
.125 (1/8)	.1250	**.375** (3x)	4	1/8	1-1/2	945808-C3	31.60
.125 (1/8)	.1250	**.625** (5x)	4	1/8	2-1/2	900608-C3	44.70
.156 (5/32)	.1562	**.235** (1.5x)	4	3/16	2	939910-C3	36.60
.156 (5/32)	.1562	**.470** (3x)	4	3/16	2	945810-C3	36.60
.187 (3/16)	.1875	**.285** (1.5x)	4	3/16	2	939912-C3	34.00
.187 (3/16)	.1875	**.562** (3x)	4	3/16	2	945812-C3	34.40
.250 (1/4)	.2500	**.375** (1.5x)	4	1/4	2-1/2	939916-C3	43.70
.250 (1/4)	.2500	**.750** (3x)	4	1/4	2-1/2	945816-C3	43.70

Please See Speeds & Feeds On Page 214

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute



- Optimized for free machining varieties of carbon steels and stainless steels
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)	.023	**.078** (5x)	3	1/8	2-1/2	915015-C3	68.10
.015 (1/64)	.023	**.125** (8x)	3	1/8	2-1/2	920215-C3	69.40
.020	.030	**.100** (5x)	3	1/8	2-1/2	915020-C3	64.30
.020	.030	**.160** (8x)	3	1/8	2-1/2	920220-C3	67.20
.025	.038	**.125** (5x)	3	1/8	2-1/2	915025-C3	63.80
.025	.038	**.203** (8x)	3	1/8	2-1/2	920225-C3	64.00
.031 (1/32)	.047	**.093** (3x)	3	1/8	1-1/2	927331-C3	58.50
.031 (1/32)	.047	**.156** (5x)	3	1/8	2-1/2	915031-C3	60.10
.031 (1/32)	.047	**.250** (8x)	3	1/8	2-1/2	920231-C3	61.70
.031 (1/32)	.047	**.312** (10x)	3	1/8	2-1/2	909531-C3	63.80
.047 (3/64)	.071	**.250** (5x)	3	1/8	2-1/2	915047-C3	60.10
.047 (3/64)	.071	**.375** (8x)	3	1/8	2-1/2	920247-C3	60.40
.062 (1/16)	.093	**.186** (3x)	3	1/8	1-1/2	927362-C3	59.70
.062 (1/16)	.093	**.312** (5x)	3	1/8	2-1/2	915062-C3	59.10
.062 (1/16)	.093	**.500** (8x)	3	1/8	2-1/2	920262-C3	60.10
.062 (1/16)	.093	**.625** (10x)	3	1/8	2-1/2	909562-C3	63.80
.078 (5/64)	.118	**.406** (5x)	3	1/8	2-1/2	915078-C3	59.10
.078 (5/64)	.118	**.625** (8x)	3	1/8	2-1/2	920278-C3	60.10
.093 (3/32)	.140	**.279** (3x)	3	1/8	1-1/2	927393-C3	58.50
.093 (3/32)	.140	**.500** (5x)	3	1/8	2-1/2	915093-C3	59.10
.093 (3/32)	.140	**.750** (8x)	3	1/8	2-1/2	920293-C3	60.10
.093 (3/32)	.140	**.950** (10x)	3	1/8	2-1/2	909593-C3	63.80

continued on next page

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.187	**.375** (3x)	4	1/8	1-1/2	927408-C3	59.70
.125 (1/8)	.187	**.625** (5x)	4	1/8	2-1/2	915108-C3	60.10
.125 (1/8)	.187	**1.000** (8x)	4	1/8	2-1/2	920308-C3	61.30
.125 (1/8)	.187	**1.250** (10x)	4	1/8	2-1/2	909608-C3	62.70
.156 (5/32)	.235	**.750** (5x)	4	3/16	3	915110-C3	63.80
.187 (3/16)	.285	**1.000** (5x)	4	3/16	3	915112-C3	63.80
.250 (1/4)	.375	**1.250** (5x)	4	1/4	4	915116-C3	71.70

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Free Machining Steels)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx **Stainless Steels**: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X,, 420 F, 420 F Se	100-125	500
	125-150	425
	150-175	400
	175-200	375
	200-225	350

Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00010	.00021	.00031	.00041	.00052	.00062	.00079	.00118	.00158	.00207	.00249	.00332
Roughing	.00012	.00025	.00038	.00050	.00063	.00075	.00096	.00144	.00192	.00252	.00302	.00403
Finishing	.00014	.00030	.00045	.00060	.00075	.00090	.00115	.00172	.00230	.00301	.00362	.00483
Max	.00019	.00039	.00058	.00077	.00097	.00116	.00148	.00221	.00296	.00388	.00466	.00622

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .35x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .35x Dia

Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

MACHINING ADVISOR PRO

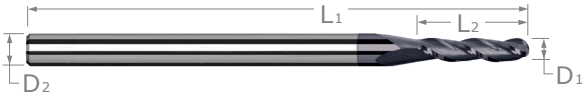
Customizable Running Parameters For Optimized Machining

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Ball



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)	**.045** (3x)	3	1/8	1-1/2	950015-C3	62.30
.031 (1/32)	**.047** (1.5x)	3	1/8	1-1/2	911531-C3	46.10
.031 (1/32)	**.093** (3x)	3	1/8	1-1/2	950031-C3	46.90
.047 (3/64)	**.141** (3x)	3	1/8	1-1/2	950047-C3	46.90
.062 (1/16)	**.093** (1.5x)	3	1/8	1-1/2	911562-C3	46.10
.062 (1/16)	**.186** (3x)	3	1/8	1-1/2	950062-C3	44.70
.078 (5/64)	**.234** (3x)	3	1/8	1-1/2	950078-C3	43.40
.093 (3/32)	**.140** (1.5x)	3	1/8	1-1/2	911593-C3	44.30
.093 (3/32)	**.279** (3x)	3	1/8	1-1/2	950093-C3	43.40
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	**.187** (1.5x)	4	1/8	1-1/2	911608-C3	39.40
.125 (1/8)	**.375** (3x)	4	1/8	1-1/2	950108-C3	39.40
.156 (5/32)	**.470** (3x)	4	3/16	2	950110-C3	47.20
.187 (3/16)	**.562** (3x)	4	3/16	2	950112-C3	42.50
.250 (1/4)	**.750** (3x)	4	1/4	2-1/2	950116-C3	51.90

Speeds & Feeds (Variable Helix For Free Machining Steels)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 112%). For longer lengths of cut, table values of IPT and DOC must be reduced (for 5x, reduce to 70%). For complete speeds and feeds charts, please see www.harveytool.com.

Material	Hardness (HBn)	SFM
Carbon Steels: 10xx - 1030, 10Lxx, 11xx - 1140, 11Lxx, 12xx - 1215, 12Lxx	100-125	500
	125-150	425
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se	150-175	400
	175-200	375
	200-225	350

	Chip Load Per Tooth (IPT) By Cutter Diameter											
	.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500
Slotting	.00013	.00026	.00040	.00053	.00067	.00079	.00099	.00148	.00198	.00259	.00311	.00415
Roughing	.00016	.00032	.00049	.00064	.00081	.00096	.00120	.00180	.00240	.00314	.00378	.00504
Finishing	.00019	.00039	.00058	.00077	.00097	.00116	.00144	.00215	.00288	.00377	.00453	.00604
Max	.00024	.00050	.00075	.00099	.00125	.00149	.00185	.00277	.00370	.00485	.00583	.00777

Radial Depth of Cut*:

Slotting: 1x Dia

Roughing: .5x Dia

Finishing: .1x Dia

Axial Depth of Cut*:

Slotting: .5x Dia

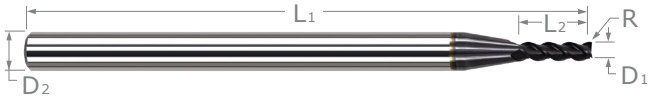
Roughing: .5x - 1x Dia

Finishing: .5x - 1x Dia

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 38°) reduces chatter and harmonics and increases material removal rates
- AlTiN coated for improved lubricity and heat resistance • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.25mm −.25mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.002**	.023 (1.5x)	3	1/8	1-1/2	969415-C3	54.10
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	971215-C3	54.10
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	980315-C3	65.70
.015 (1/64)		.0150	**.005**	.045 (3x)	3	1/8	1-1/2	859815-C3	54.10
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	971220-C3	47.70
.020		.0200	**.005**	.060 (3x)	3	1/8	1-1/2	859820-C3	47.20
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	971225-C3	46.20
.025		.0250	**.005**	.075 (3x)	3	1/8	1-1/2	859825-C3	46.20
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	969431-C3	38.10
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	971231-C3	38.10
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	980331-C3	47.70
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	859831-C3	38.70
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	856631-C3	41.50
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	901822-C3	43.00
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	971240-C3	39.00
.040		.0400	**.005**	.120 (3x)	3	1/8	1-1/2	859840-C3	38.90
.047 (3/64)		.0470	**.003**	.071 (1.5x)	3	1/8	1-1/2	969447-C3	38.10
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	971247-C3	38.10
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	980347-C3	47.70
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	859847-C3	38.70
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	856647-C3	38.70
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	857447-C3	41.50
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	971250-C3	38.90
.050		.0500	**.005**	.150 (3x)	3	1/8	1-1/2	859850-C3	38.90
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	971260-C3	38.90
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	856660-C3	38.90
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	969462-C3	35.30
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	971262-C3	35.30
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	980362-C3	46.10
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	856662-C3	36.00
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	858262-C3	38.80
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	969478-C3	35.30
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	971278-C3	35.30
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	980378-C3	46.90
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	856678-C3	35.30
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	858278-C3	38.10

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Corner Radius (cont.)

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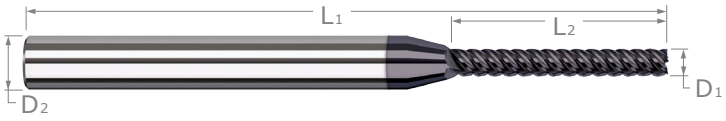
CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	CORNER RADIUS R +.001″ −.001″ +.25mm −.25mm	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	USD$
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	901845-C3	40.60
.093 (3/32)		.0930	**.005**	.140 (1.5x)	3	1/8	1-1/2	969493-C3	35.30
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	971293-C3	35.30
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	980393-C3	46.10
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	856693-C3	35.30
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	859093-C3	38.80
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	971300-C3	36.10
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	901857-C3	40.60

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.005**	.187 (1.5x)	4	1/8	1-1/2	969508-C3	32.10
.125 (1/8)	.1250	**.005**	.375 (3x)	4	1/8	1-1/2	971308-C3	32.10
.125 (1/8)	.1250	**.005**	.625 (5x)	4	1/8	2-1/2	980408-C3	46.10
.125 (1/8)	.1250	**.010**	.375 (3x)	4	1/8	1-1/2	856708-C3	36.00
.125 (1/8)	.1250	**.030**	.375 (3x)	4	1/8	1-1/2	859108-C3	38.80
.156 (5/32)	.1562	**.010**	.235 (1.5x)	4	3/16	2	969510-C3	38.30
.156 (5/32)	.1562	**.010**	.470 (3x)	4	3/16	2	971310-C3	39.00
.156 (5/32)	.1562	**.010**	.750 (5x)	4	3/16	3	980410-C3	50.80
.187 (3/16)	.1875	**.010**	.285 (1.5x)	4	3/16	2	969512-C3	34.90
.187 (3/16)	.1875	**.010**	.562 (3x)	4	3/16	2	971312-C3	35.20
.187 (3/16)	.1875	**.010**	1.000 (5x)	4	3/16	3	980412-C3	50.80
.250 (1/4)	.2500	**.010**	.375 (1.5x)	4	1/4	2-1/2	969516-C3	44.30
.250 (1/4)	.2500	**.010**	.750 (3x)	4	1/4	2-1/2	971316-C3	44.30
.250 (1/4)	.2500	**.010**	1.250 (5x)	4	1/4	4	980416-C3	63.00
.312 (5/16)	.3125	**.010**	.470 (1.5x)	4	5/16	2-1/2	969520-C3	66.40
.312 (5/16)	.3125	**.010**	1.000 (3x)	4	5/16	2-1/2	971320-C3	65.30
.375 (3/8)	.3750	**.010**	.570 (1.5x)	4	3/8	2-1/2	969524-C3	75.20
.375 (3/8)	.3750	**.010**	1.125 (3x)	4	3/8	2-1/2	971324-C3	75.20
.500 (1/2)	.5000	**.015**	.750 (1.5x)	4	1/2	3	969532-C3	98.10

Please See Speeds & Feeds On Page 214

VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$
.015 (1/64)		.0150	**.045** (3x)	4	1/8	1-1/2	967815-C3	53.00
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	972415-C3	65.10
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	983615-C3	66.60
.020		.0200	**.060** (3x)	4	1/8	1-1/2	967820-C3	52.10
.020		.0200	**.100** (5x)	4	1/8	2-1/2	972420-C3	65.50
.025		.0250	**.075** (3x)	4	1/8	1-1/2	967825-C3	49.00
.025		.0250	**.125** (5x)	4	1/8	2-1/2	972425-C3	62.60
.031 (1/32)		.0310	**.047** (1.5x)	5	1/8	1-1/2	935131-C3	43.10
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	967831-C3	43.10
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	972431-C3	60.20
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	983631-C3	61.30
	1.0 mm	.0393	**3.00 mm** (3x)	5	4 mm	50 mm	921922-C3	49.80
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	916422-C3	62.30
.040		.0400	**.120** (3x)	5	1/8	1-1/2	967840-C3	44.40
.040		.0400	**.203** (5x)	5	1/8	2-1/2	972440-C3	61.70
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	967847-C3	43.60
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	972447-C3	60.20
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	983647-C3	61.30
.050		.0500	**.150** (3x)	5	1/8	1-1/2	967850-C3	44.00
.050		.0500	**.250** (5x)	5	1/8	2-1/2	972450-C3	61.70
.060		.0600	**.180** (3x)	5	1/8	1-1/2	967860-C3	44.40
.060		.0600	**.312** (5x)	5	1/8	2-1/2	972460-C3	61.70
.062 (1/16)		.0620	**.093** (1.5x)	5	1/8	1-1/2	935162-C3	41.00
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	967862-C3	40.60
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	972462-C3	56.80
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	983662-C3	57.50
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	967878-C3	40.60
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	972478-C3	56.80
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	983678-C3	58.10
	2.0 mm	.0787	**6.00 mm** (3x)	5	4 mm	50 mm	921945-C3	47.60
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	916445-C3	60.40

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VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	LENGTH OF CUT L_2 +.010″ −.000″ +.25mm −.00mm	FLUTES	SHANK DIAMETER D_2 (h6)	OVERALL LENGTH L_1	AlTiN COATED TOOL #	USD$
.093 (3/32)		.0930	**.140** (1.5x)	5	1/8	1-1/2	935193-C3	40.60
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	967893-C3	40.60
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	972493-C3	56.80
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	983693-C3	57.50
.100		.1000	**.300** (3x)	5	1/8	1-1/2	967900-C3	41.60
.100		.1000	**.500** (5x)	5	1/8	2-1/2	972500-C3	57.30
	3.0 mm	.1181	**9.00 mm** (3x)	5	4 mm	50 mm	921957-C3	47.60
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	916457-C3	59.90

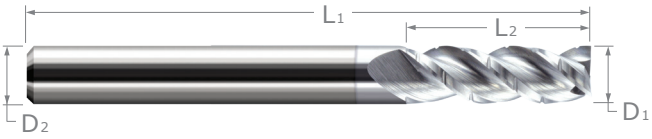
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	USD$
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	935208-C3	38.90
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	967908-C3	38.50
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	972508-C3	55.30
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	983708-C3	56.80
.156 (5/32)	.1562	**.470** (3x)	5	3/16	2	967910-C3	44.40
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	972510-C3	59.10
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	967912-C3	44.00
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	972512-C3	59.10
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	983712-C3	60.50
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	967916-C3	56.40
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	972516-C3	72.80
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	983716-C3	74.20

Speeds & Feeds (High-Helix Finishers For Free Machining Steels)

Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter	.015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Carbon Steels: 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx	100 - 125	500	Finishing (1.5x LOC)	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413	< .10x Dia	.5x - 1.5x Dia
	125 - 150	425	Finishing (3x LOC)	.00023	.00047	.00071	.00093	.00117	.00140	.00188	.00281	.00375	< .10x Dia	.5x - 3x Dia
	150 - 175	400												
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se	175 - 200	375	Finishing (5x LOC)	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00210	.00281	< .07x Dia	.5x - 5x Dia
	200 - 225	350	Finishing (8x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .05x Dia	.5x - 8x Dia

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Chipbreaker Roughers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Chipbreaker geometry to improve chip management
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
	.062 (1/16)	.186 (3x)	3	1/8	1-1/2	769062	33.00	769062-C8	41.90
NEW	.062 (1/16)	.312 (5x)	3	1/8	2-1/2	695962	34.00	695962-C8	42.20
	.078 (5/64)	.234 (3x)	3	1/8	1-1/2	769078	33.60	769078-C8	42.40
NEW	.078 (5/64)	.406 (5x)	3	1/8	2-1/2	695978	34.80	695978-C8	43.00
	.093 (3/32)	.279 (3x)	3	1/8	1-1/2	769093	33.60	769093-C8	42.40
NEW	.093 (3/32)	.500 (5x)	3	1/8	2-1/2	695993	34.80	695993-C8	43.00
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
	.125 (1/8)	.375 (3x)	3	1/8	1-1/2	769108	32.20	769108-C8	41.20
NEW	.125 (1/8)	.625 (5x)	3	1/8	2-1/2	696008	34.90	696008-C8	43.10
	.187 (3/16)	.562 (3x)	3	3/16	2	769112	35.90	769112-C8	44.50
NEW	.187 (3/16)	1.000 (5x)	3	3/16	3	696012	38.00	696012-C8	47.20
	.250 (1/4)	.750 (3x)	3	1/4	2-1/2	769116	44.80	769116-C8	55.10
NEW	.250 (1/4)	1.250 (5x)	3	1/4	4	696016	57.60	696016-C8	69.40
NEW	.375 (3/8)	2.000 (5x)	3	3/8	4	696024	71.10	696024-C8	88.10

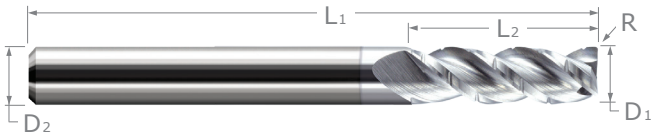
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NEW

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Chipbreaker Roughers – Corner Radius



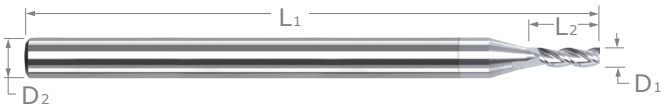
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Chipbreaker geometry to improve chip management
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED		
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	
.062 (1/16)	**.005**	.186 (3x)	3	1/8	1-1/2	695762	36.30	695762-C8	44.00	NEW
.062 (1/16)	**.005**	.312 (5x)	3	1/8	2-1/2	695562	39.40	695562-C8	47.10	NEW
.078 (5/64)	**.005**	.234 (3x)	3	1/8	1-1/2	695778	36.30	695778-C8	44.00	NEW
.078 (5/64)	**.005**	.406 (5x)	3	1/8	2-1/2	695578	39.40	695578-C8	47.10	NEW
.093 (3/32)	**.005**	.279 (3x)	3	1/8	1-1/2	695793	36.30	695793-C8	44.00	NEW
.093 (3/32)	**.005**	.500 (5x)	3	1/8	2-1/2	695593	39.40	695593-C8	47.10	NEW
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	
.125 (1/8)	**.005**	.375 (3x)	3	1/8	1-1/2	695808	43.60	695808-C8	51.30	NEW
.125 (1/8)	**.005**	.625 (5x)	3	1/8	2-1/2	695608	45.20	695608-C8	52.90	NEW
.187 (3/16)	**.005**	.562 (3x)	3	3/16	2	695812	50.90	695812-C8	58.60	NEW
.187 (3/16)	**.005**	1.000 (5x)	3	3/16	3	695612	53.50	695612-C8	61.20	NEW
.250 (1/4)	**.005**	.750 (3x)	3	1/4	2-1/2	695816	60.20	695816-C8	67.90	NEW
.250 (1/4)	**.005**	1.250 (5x)	3	1/4	4	695616	61.80	695616-C8	69.50	NEW
.375 (3/8)	**.005**	1.125 (3x)	3	3/8	2-1/2	695824	89.30	695824-C8	97.00	NEW
.375 (3/8)	**.005**	2.000 (5x)	3	3/8	4	695624	93.20	695624-C8	100.90	NEW

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders • Center cutting
- Solid carbide • CNC ground in the USA

	CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED	
	D_1			L_2		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	+.0005" −.0005"	+.00mm −.02mm	decimal equiv.	+.010" −.000" +.25mm −.00mm											
	.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	968710	58.00	968710-C8	65.70				
	.010		.0100	**.030** (3x)	3	1/8	1-1/2	942210	58.00	942210-C8	67.00				
	.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	968715	46.10	968715-C8	54.90				
	.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	942215	46.10	942215-C8	54.90	942215-C4	61.00		
	.015 (1/64)		.0150	**.078** (5x)	3	1/8	2-1/2	923015	59.20	923015-C8	68.00				
		0.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	900411	47.20	900411-C8	55.80				
	.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	968720	41.10	968720-C8	48.80	968720-C4	56.10		
	.020		.0200	**.060** (3x)	3	1/8	1-1/2	942220	41.10	942220-C8	48.80	942220-C4	56.10		
	.020		.0200	**.100** (5x)	3	1/8	2-1/2	923020	53.40	923020-C8	62.30				
	.025		.0250	**.038** (1.5x)	3	1/8	1-1/2	968725	41.10	968725-C8	48.80				
	.025		.0250	**.075** (3x)	3	1/8	1-1/2	942225	41.10	942225-C8	48.80	942225-C4	56.10		
	.025		.0250	**.125** (5x)	3	1/8	2-1/2	923025	53.40	923025-C8	62.30				
	.030		.0300	**.045** (1.5x)	3	1/8	1-1/2	968730	41.10	968730-C8	48.80				
	.030		.0300	**.090** (3x)	3	1/8	1-1/2	942230	41.10	942230-C8	48.80	942230-C4	56.10		
	.030		.0300	**.156** (5x)	3	1/8	2-1/2	923030	53.40	923030-C8	62.30				
	.031 (1/32)		.0310	**.025** (.8x)	3	1/8	1-1/2	873531	36.20	873531-C8	45.20				
	.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	968731	32.30	968731-C8	40.00	968731-C4	47.20		
	.031 (1/32)		.0310	**.093** (3x)	2	1/8	1-1/2	792131	32.30	792131-C8	41.10				
	.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	942231	32.30	942231-C8	40.00	942231-C4	47.20	942231-C7	40.00
	.031 (1/32)		.0310	**.125** (4x)	3	1/8	2-1/2	857231	45.00	857231-C8	54.00				
	.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	923031	45.00	923031-C8	53.00	923031-C4	60.40		
	.031 (1/32)		.0310	**.250** (8x)	3	1/8	2-1/2	746031	49.40	746031-C8	58.40				
		0.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	900418	36.80	900418-C8	45.50				
	.035		.0350	**.105** (3x)	3	1/8	1-1/2	942235	37.70	942235-C8	46.30				
		1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	858422	36.80	858422-C8	45.50				
		1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	900422	36.50	900422-C8	44.50	900422-C4	53.20		
		1.0 mm	.0393	**5.00 mm** (5x)	3	4 mm	50 mm	845922	38.70	845922-C8	48.10				
	.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	968740	33.00	968740-C8	40.70				
	.040		.0400	**.120** (3x)	3	1/8	1-1/2	942240	33.00	942240-C8	40.70	942240-C4	48.00		
	.040		.0400	**.160** (4x)	3	1/8	2-1/2	857240	45.00	857240-C8	54.00				
	.040		.0400	**.203** (5x)	3	1/8	2-1/2	923040	45.00	923040-C8	53.00	923040-C4	60.80		
NEW	.040		.0400	**.325** (8x)	3	1/8	2-1/2	746040	49.40	746040-C8	57.60				
	.045		.0450	**.135** (3x)	3	1/8	1-1/2	942245	33.00	942245-C8	41.90				
	.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	968747	32.30	968747-C8	40.00	968747-C4	47.20		
	.047 (3/64)		.0470	**.141** (3x)	2	1/8	1-1/2	792147	32.30	792147-C8	41.10				
	.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	942247	32.30	942247-C8	40.00	942247-C4	47.20	942247-C7	40.00
	.047 (3/64)		.0470	**.187** (4x)	3	1/8	2-1/2	857247	45.00	857247-C8	54.00				
	.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	923047	45.00	923047-C8	53.00	923047-C4	60.40		
NEW	.047 (3/64)		.0470	**.375** (8x)	3	1/8	2-1/2	746047	49.40	746047-C8	57.60				

continued on next page

NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED		
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equiv.	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.050		.0500	**.075** (1.5x)	3	1/8	1-1/2	968750	33.00	968750-C8	40.70					
.050		.0500	**.150** (3x)	3	1/8	1-1/2	942250	33.60	942250-C8	41.30	942250-C4	48.20			
.050		.0500	**.250** (5x)	3	1/8	2-1/2	923050	45.00	923050-C8	53.00					
.055		.0550	**.083** (1.5x)	3	1/8	1-1/2	968755	33.00	968755-C8	41.90					
.055		.0550	**.165** (3x)	3	1/8	1-1/2	942255	33.00	942255-C8	41.90	942255-C4	48.00			
.055		.0550	**.275** (5x)	3	1/8	2-1/2	923055	46.00	923055-C8	54.80					
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	900433	38.70	900433-C8	48.10					
.060		.0600	**.090** (1.5x)	3	1/8	1-1/2	968760	30.60	968760-C8	39.50					
.060		.0600	**.180** (3x)	3	1/8	1-1/2	942260	33.00	942260-C8	40.70	942260-C4	48.00			
.060		.0600	**.250** (4x)	3	1/8	2-1/2	857260	46.00	857260-C8	54.80					
.060		.0600	**.312** (5x)	3	1/8	2-1/2	923060	45.00	923060-C8	53.00					
.062 (1/16)		.0620	**.050** (.8x)	3	1/8	1-1/2	873562	32.80	873562-C8	41.70	873562-C4	55.40			
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	968762	30.00	968762-C8	37.40	968762-C4	44.50			
.062 (1/16)		.0620	**.186** (3x)	2	1/8	1-1/2	792162	30.00	792162-C8	37.70					
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	942262	30.00	942262-C8	37.40	942262-C4	44.50	942262-C7	37.30	
.062 (1/16)		.0620	**.250** (4x)	3	1/8	2-1/2	857262	42.60	857262-C8	51.50	857262-C4	57.90			
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	923062	42.60	923062-C8	50.30	923062-C4	57.90			
.062 (1/16)		.0620	**.500** (8x)	3	1/8	2-1/2	746062	46.10	746062-C8	54.90					
.070		.0700	**.105** (1.5x)	3	1/8	1-1/2	968770	30.60	968770-C8	39.50					
.070		.0700	**.210** (3x)	3	1/8	1-1/2	942270	30.60	942270-C8	37.90	942270-C4	45.20			
.070		.0700	**.375** (5x)	3	1/8	2-1/2	923070	42.60	923070-C8	50.30					
.075		.0750	**.225** (3x)	3	1/8	1-1/2	942275	30.60	942275-C8	38.30					
.078 (5/64)		.0780	**.117** (1.5x)	3	1/8	1-1/2	968778	30.00	968778-C8	37.40	968778-C4	44.90			
.078 (5/64)		.0780	**.234** (3x)	2	1/8	1-1/2	792178	30.00	792178-C8	37.70					
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	942278	30.00	942278-C8	37.40	942278-C4	44.50	942278-C7	37.30	
.078 (5/64)		.0780	**.312** (4x)	3	1/8	2-1/2	857278	42.60	857278-C8	51.50					
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	923078	42.60	923078-C8	50.30	923078-C4	58.30			
.078 (5/64)		.0780	**.625** (8x)	3	1/8	2-1/2	746078	46.10	746078-C8	54.30					NEW
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	858445	34.30	858445-C8	43.80					
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	900445	34.00	900445-C8	41.90	900445-C4	50.80			
	2.0 mm	.0787	**10.00 mm** (5x)	3	4 mm	50 mm	845945	36.20	845945-C8	45.70					
.080		.0800	**.120** (1.5x)	3	1/8	1-1/2	968780	30.60	968780-C8	38.30					
.080		.0800	**.240** (3x)	3	1/8	1-1/2	942280	30.60	942280-C8	37.90	942280-C4	45.60			
.080		.0800	**.406** (5x)	3	1/8	2-1/2	923080	42.60	923080-C8	50.30					
.090		.0900	**.135** (1.5x)	3	1/8	1-1/2	968790	30.60	968790-C8	39.50					
.090		.0900	**.270** (3x)	3	1/8	1-1/2	942290	30.60	942290-C8	37.90	942290-C4	45.60			
.090		.0900	**.450** (5x)	3	1/8	2-1/2	923090	42.60	923090-C8	50.30					
.093 (3/32)		.0930	**.074** (.8x)	3	1/8	1-1/2	873593	32.80	873593-C8	41.70					
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	968793	30.00	968793-C8	37.40	968793-C4	44.50			
.093 (3/32)		.0930	**.279** (3x)	2	1/8	1-1/2	792193	30.00	792193-C8	37.70					
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	942293	30.00	942293-C8	37.40	942293-C4	44.50	942293-C7	37.30	
.093 (3/32)		.0930	**.375** (4x)	3	1/8	2-1/2	857293	42.60	857293-C8	51.50	857293-C4	57.90			
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	923093	42.60	923093-C8	50.30	923093-C4	57.90			
.093 (3/32)		.0930	**.750** (8x)	3	1/8	2-1/2	746093	46.10	746093-C8	54.90					
	2.5 mm	.0984	**7.50 mm** (3x)	3	4 mm	50 mm	900451	36.60	900451-C8	46.00					

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equiv.	LENGTH OF CUT L_2 +.010" −.000"	+.25mm −.00mm	FLUTES	SHANK DIA. D_2 (h6)	OAL L_1	UNCOATED TOOL #	USD$	TiB_2 COATED TOOL #	USD$	AMORPHOUS DIAMOND TOOL #	USD$	ZrN COATED TOOL #	USD$
.100		.1000	**.150**	(1.5x)	3	1/8	1-1/2	968800	30.60	968800-C8	37.90				
.100		.1000	**.300**	(3x)	3	1/8	1-1/2	942300	30.60	942300-C8	37.90	942300-C4	45.20		
.100		.1000	**.500**	(5x)	3	1/8	2-1/2	923100	42.60	923100-C8	50.30				
.109 (7/64)		.1090	**.164**	(1.5x)	3	1/8	1-1/2	968802	30.60	968802-C8	37.90				
.109 (7/64)		.1090	**.327**	(3x)	3	1/8	1-1/2	942302	30.60	942302-C8	37.90	942302-C4	45.60		
.109 (7/64)		.1090	**.570**	(5x)	3	1/8	2-1/2	923102	42.60	923102-C8	50.30				
	3.0 mm	.1181	**4.50 mm**	(1.5x)	3	4 mm	50mm	858457	34.40	858457-C8	43.90				
	3.0 mm	.1181	**9.00 mm**	(3x)	3	4 mm	50 mm	900457	34.00	900457-C8	41.90	900457-C4	52.10		
	3.0 mm	.1181	**12.00 mm**	(4x)	3	4 mm	50 mm	770057	36.20	770057-C8	45.70				
	3.0 mm	.1181	**15.00 mm**	(5x)	3	4 mm	50 mm	845957	38.20	845957-C8	47.70				

	D_1 +.000" −.002"	+.00mm −.04mm	decimal equiv.	L_2 +.030" −.000"	+.75mm −.00mm	FLUTES	SHANK DIA. D_2 (h6)	OAL L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	.125 (1/8)		.1250	**.100**	(.8x)	3	1/8	1-1/2	873608	33.70	873608-C8	41.40	873608-C4	48.70		
	.125 (1/8)		.1250	**.187**	(1.5x)	3	1/8	1-1/2	968808	27.70	968808-C8	35.40	968808-C4	42.70		
	.125 (1/8)		.1250	**.375**	(3x)	2	1/8	1-1/2	792208	27.70	792208-C8	35.40				
	.125 (1/8)		.1250	**.375**	(3x)	3	1/8	1-1/2	942308	27.70	942308-C8	35.40	942308-C4	42.70	942308-C7	35.40
	.125 (1/8)		.1250	**.500**	(4x)	3	1/8	2-1/2	857308	41.60	857308-C8	50.30	857308-C4	56.50		
	.125 (1/8)		.1250	**.625**	(5x)	3	1/8	2-1/2	923108	41.60	923108-C8	49.60	923108-C4	56.50		
	.125 (1/8)		.1250	**1.000**	(8x)	3	1/8	2-1/2	746108	44.90	746108-C8	53.80				
	.140 (9/64)		.1406	**.220**	(1.5x)	3	3/16	2	968809	31.00	968809-C8	39.70				
NEW	.140 (9/64)		.1406	**.425**	(3x)	3	3/16	2	942309	31.00	942309-C8	39.70	942309-C4	47.70		
	.140 (9/64)		.1406	**.750**	(5x)	3	3/16	3	923109	43.10	923109-C8	51.80				
	.156 (5/32)		.1562	**.235**	(1.5x)	3	3/16	2	968810	31.20	968810-C8	39.90	968810-C4	49.10		
	.156 (5/32)		.1562	**.469**	(3x)	3	3/16	2	942310	31.20	942310-C8	39.90	942310-C4	49.10		
NEW	.156 (5/32)		.1562	**.625**	(4x)	3	3/16	3	857310	43.10	857310-C8	52.30				
	.156 (5/32)		.1562	**.750**	(5x)	3	3/16	3	923110	43.10	923110-C8	51.80	923110-C4	63.80		
NEW	.156 (5/32)		.1562	**1.250**	(8x)	3	3/16	3	746110	44.90	746110-C8	54.20				
		4.0 mm	.1574	**12.00 mm**	(3x)	3	6 mm	63 mm	900461	47.40	900461-C8	57.50				
	.187 (3/16)		.1875	**.150**	(.8x)	3	3/16	2	873612	35.10	873612-C8	43.70				
	.187 (3/16)		.1875	**.285**	(1.5x)	3	3/16	2	968812	29.80	968812-C8	38.40	968812-C4	46.50		
	.187 (3/16)		.1875	**.562**	(3x)	2	3/16	2	792212	29.80	792212-C8	38.40				
	.187 (3/16)		.1875	**.562**	(3x)	3	3/16	2	942312	29.80	942312-C8	38.40	942312-C4	46.50	942312-C7	38.90
	.187 (3/16)		.1875	**.750**	(4x)	3	3/16	3	857312	34.80	857312-C8	43.50				
	.187 (3/16)		.1875	**1.000**	(5x)	3	3/16	3	923112	43.10	923112-C8	51.80	923112-C4	63.80		
NEW	.187 (3/16)		.1875	**1.500**	(8x)	3	3/16	3	746112	44.90	746112-C8	54.20				
		5.0 mm	.1968	**15.00 mm**	(3x)	3	6 mm	63 mm	900464	47.40	900464-C8	57.50				
	.218 (7/32)		.2187	**.625**	(3x)	3	1/4	2-1/2	942314	45.30	942314-C8	55.50				
		6.0 mm	.2362	**18.00 mm**	(3x)	3	6 mm	63 mm	900466	47.00	900466-C8	57.00				
	.250 (1/4)		.2500	**.200**	(.8x)	3	1/4	2-1/2	873616	44.60	873616-C8	54.90				
	.250 (1/4)		.2500	**.375**	(1.5x)	3	1/4	2-1/2	968816	36.00	968816-C8	46.20	968816-C4	57.40		
	.250 (1/4)		.2500	**.750**	(3x)	3	1/4	2-1/2	942316	36.30	942316-C8	46.60	942316-C4	57.70	942316-C7	47.60
	.250 (1/4)		.2500	**1.000**	(4x)	3	1/4	4	857316	41.30	857316-C8	52.50				
	.250 (1/4)		.2500	**1.250**	(5x)	3	1/4	4	923116	51.10	923116-C8	62.30	923116-C4	74.60		

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NEW SIZES!

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square (cont.)

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CUTTER DIAMETER		LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND		ZrN COATED	
D_1 +.000″ −.002″	D_1 +.00mm −.04mm decimal equiv.	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.312 (5/16)	.3125	**1.000** (3x)	3	5/16	2-1/2	942320	45.60	942320-C8	62.30				
.375 (3/8)	.3750	**.570** (1.5x)	3	3/8	2-1/2	968824	49.60	968824-C8	70.20				
.375 (3/8)	.3750	**1.125** (3x)	3	3/8	2-1/2	942324	49.60	942324-C8	70.20	942324-C4	79.00	942324-C7	61.20
.375 (3/8)	.3750	**2.000** (5x)	3	3/8	4	923124	55.40	923124-C8	79.40				
.500 (1/2)	.5000	**.750** (1.5x)	3	1/2	3	968832	52.50	968832-C8	77.00				
.500 (1/2)	.5000	**1.500** (3x)	3	1/2	3	942332	51.90	942332-C8	76.30	942332-C4	88.40	942332-C7	69.90
.500 (1/2)	.5000	**2.625** (5x)	3	1/2	4	923132	57.40	923132-C8	77.00				

Speeds & Feeds (Variable Helix For Aluminum & Non-Ferrous Alloys)

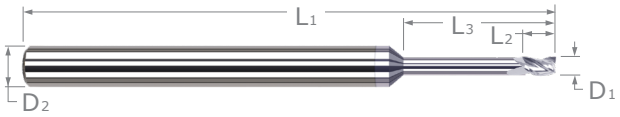
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For 2 flutes, table values of IPT must be increased to 110% before adjustments for different lengths of cut. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase to 125%; for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 85%; for 5x, reduce to 70%; for 8x, reduce to 58%). For complete speeds and feeds charts, please see www.harveytool.com

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Roughing	.00023	.00048	.00072	.00095	.00120	.00143	.00193	.00288	.00385
	Magnesium Alloys: All alloys	1500	Finishing	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413
	Zinc Alloys: All alloys	800	Max	.00026	.00055	.00083	.00109	.00137	.00164	.00220	.00329	.00440
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225	Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	500	Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500			**Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia			
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225											
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550											
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Roughing	.00030	.00062	.00094	.00124	.00156	.00186	.00250	.00374	.00501
	Magnesium Alloys: All alloys	2000	Finishing	.00032	.00066	.00101	.00133	.00167	.00199	.00268	.00401	.00536
	Zinc Alloys: All alloys	1100	Max	.00034	.00071	.00108	.00142	.00178	.00213	.00286	.00428	.00572
					Radial Depth of Cut*: Slotting: 1x Dia Roughing: .5x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: .5x - 1x Dia			
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500	Slotting	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000	Roughing	.00025	.00053	.00080	.00105	.00132	.00158	.00212	.00317	.00424
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500	Finishing	.00027	.00056	.00085	.00113	.00142	.00169	.00227	.00339	.00454
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000	Max	.00029	.00060	.00091	.00120	.00151	.00180	.00242	.00362	.00484
	Wrought - 5% - 8% Si (4xxx)	2200											
	Wrought - 8% - 12% Si (4xxx)	1700											
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800	Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	1500	Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800	Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000	Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000											
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800			**Radial Depth of Cut*:** Slotting: 1x Dia Roughing: .4x Dia Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia Roughing: .3x - .8x Dia Finishing: .5x - 1x Dia			
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150											
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750											

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities
- Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.015 (1/64)		.0150	.023	**.078** (5x)	3	1/8	2-1/2	930815	60.80	930815-C8	69.70		
.015 (1/64)		.0150	.023	**.125** (8x)	3	1/8	2-1/2	927115	62.20	927115-C8	71.20		
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	930820	58.10	930820-C8	67.10		
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	927120	59.80	927120-C8	68.80		
.020		.0200	.030	**.200** (10x)	3	1/8	2-1/2	919320	63.00	919320-C8	72.00		
.025		.0250	.038	**.125** (5x)	3	1/8	2-1/2	930825	56.90	930825-C8	65.70		
.025		.0250	.038	**.203** (8x)	3	1/8	2-1/2	927125	58.10	927125-C8	67.10		
.030		.0300	.045	**.250** (8x)	3	1/8	2-1/2	927130	58.10	927130-C8	67.10		
.031 (1/32)		.0310	.047	**.093** (3x)	3	1/8	1-1/2	924531	51.80	924531-C8	60.60		
.031 (1/32)		.0310	.047	**.125** (4x)	3	1/8	2-1/2	814331	53.10	814331-C8	62.00		
.031 (1/32)		.0310	.047	**.156** (5x)	3	1/8	2-1/2	930831	53.10	930831-C8	62.00	930831-C4	68.90
.031 (1/32)		.0310	.047	**.186** (6x)	3	1/8	2-1/2	814131	53.10	814131-C8	62.00		
.031 (1/32)		.0310	.047	**.218** (7x)	3	1/8	2-1/2	813931	54.50	813931-C8	63.30		
.031 (1/32)		.0310	.047	**.250** (8x)	3	1/8	2-1/2	927131	54.50	927131-C8	63.30	927131-C4	69.60
.031 (1/32)		.0310	.047	**.312** (10x)	3	1/8	2-1/2	919331	57.50	919331-C8	66.50		
.031 (1/32)		.0310	.047	**.375** (12x)	3	1/8	2-1/2	879231	59.70	879231-C8	68.60		
	1.0 mm	.0393	1.5 mm	**8 mm** (8x)	3	4 mm	50 mm	795322	59.90	795322-C8	69.30		
.040		.0400	.060	**.325** (8x)	3	1/8	2-1/2	927140	57.20	927140-C8	66.10		
.047 (3/64)		.0470	.071	**.250** (5x)	3	1/8	2-1/2	930847	53.10	930847-C8	62.00		
.047 (3/64)		.0470	.071	**.375** (8x)	3	1/8	2-1/2	927147	54.50	927147-C8	63.30		
.047 (3/64)		.0470	.071	**.480** (10x)	3	1/8	2-1/2	919347	57.90	919347-C8	66.90		
.050		.0500	.075	**.400** (8x)	3	1/8	2-1/2	927150	59.20	927150-C8	68.00		
.055		.0550	.083	**.450** (8x)	3	1/8	2-1/2	927155	59.20	927155-C8	68.00		
.060		.0600	.090	**.500** (8x)	3	1/8	2-1/2	927160	59.20	927160-C8	68.00		
.062 (1/16)		.0620	.093	**.186** (3x)	3	1/8	1-1/2	924562	51.80	924562-C8	60.60		
.062 (1/16)		.0620	.093	**.250** (4x)	3	1/8	2-1/2	814362	53.10	814362-C8	62.00		
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	930862	53.10	930862-C8	62.00	930862-C4	68.90
.062 (1/16)		.0620	.093	**.375** (6x)	3	1/8	2-1/2	814162	54.00	814162-C8	63.00		
.062 (1/16)		.0620	.093	**.437** (7x)	3	1/8	2-1/2	813962	54.00	813962-C8	63.00		
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	927162	54.00	927162-C8	63.00	927162-C4	69.30
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	919362	57.50	919362-C8	66.50		
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879262	59.70	879262-C8	68.60		
.070		.0700	.105	**.570** (8x)	3	1/8	2-1/2	927170	55.30	927170-C8	64.20		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Long Reach, Stub Flute (cont.)

continued from previous page

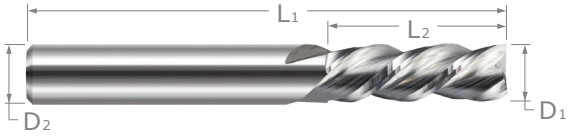
CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″	L_3 +.010″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.078 (5/64)		.0780	.118	**.406** (5x)	3	1/8	2-1/2	930878	53.10	930878-C8	62.00		
.078 (5/64)		.0780	.118	**.625** (8x)	3	1/8	2-1/2	927178	54.00	927178-C8	63.00		
.078 (5/64)		.0780	.118	**.800** (10x)	3	1/8	2-1/2	919378	57.90	919378-C8	66.90		
	2.0 mm	.0787	3 mm	**16 mm** (8x)	3	4 mm	50 mm	795345	59.90	795345-C8	69.30		
.080		.0800	.120	**.650** (8x)	3	1/8	2-1/2	927180	56.70	927180-C8	65.50		
.090		.0900	.135	**.750** (8x)	3	1/8	2-1/2	927190	56.70	927190-C8	64.90		
.093 (3/32)		.0930	.140	**.279** (3x)	3	1/8	1-1/2	924593	51.80	924593-C8	60.60		
.093 (3/32)		.0930	.140	**.375** (4x)	3	1/8	2-1/2	814393	53.10	814393-C8	62.00		
.093 (3/32)		.0930	.140	**.500** (5x)	3	1/8	2-1/2	930893	53.10	930893-C8	62.00	930893-C4	68.40
.093 (3/32)		.0930	.140	**.585** (6x)	3	1/8	2-1/2	814193	54.00	814193-C8	63.00		
.093 (3/32)		.0930	.140	**.670** (7x)	3	1/8	2-1/2	813993	54.00	813993-C8	63.00		
.093 (3/32)		.0930	.140	**.750** (8x)	3	1/8	2-1/2	927193	54.00	927193-C8	63.00	927193-C4	69.80
.093 (3/32)		.0930	.140	**.950** (10x)	3	1/8	2-1/2	919393	57.50	919393-C8	66.50		
.093 (3/32)		.0930	.140	**1.125** (12x)	3	1/8	2-1/2	879293	59.70	879293-C8	68.60		
.100		.1000	.150	**.800** (8x)	3	1/8	2-1/2	927200	59.20	927200-C8	68.00		
.109 (7/64)		.1090	.164	**.900** (8x)	3	1/8	2-1/2	927202	59.20	927202-C8	68.00		
	3.0 mm	.1181	4.50 mm	**24.0 mm** (8x)	3	4 mm	50 mm	795357	62.40	795357-C8	71.80		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	.187	**.375** (3x)	3	1/8	1-1/2	924608	51.80	924608-C8	60.60		
.125 (1/8)	.1250	.187	**.500** (4x)	3	1/8	2-1/2	814408	53.10	814408-C8	62.00		
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	930908	53.10	930908-C8	62.00	930908-C4	68.90
.125 (1/8)	.1250	.187	**.750** (6x)	3	1/8	2-1/2	814208	54.00	814208-C8	63.00		
.125 (1/8)	.1250	.187	**.875** (7x)	3	1/8	2-1/2	814008	54.00	814008-C8	63.00		
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	927208	54.00	927208-C8	63.00	927208-C4	69.30
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	919408	57.50	919408-C8	66.50		
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879308	59.70	879308-C8	68.60		
.140 (9/64)	.1406	.220	**1.125** (8x)	3	3/16	3	927209	62.70	927209-C8	71.60		
.156 (5/32)	.1562	.235	**.750** (5x)	3	3/16	3	930910	58.10	930910-C8	67.10		
.156 (5/32)	.1562	.235	**1.250** (8x)	3	3/16	3	927210	59.80	927210-C8	68.80		
.156 (5/32)	.1562	.235	**1.570** (10x)	3	3/16	3	919410	61.90	919410-C8	70.70		
.187 (3/16)	.1875	.285	**1.000** (5x)	3	3/16	3	930912	58.10	930912-C8	67.10	930912-C4	76.00
.187 (3/16)	.1875	.285	**1.156** (6x)	3	3/16	3	814212	58.10	814212-C8	67.10		
.187 (3/16)	.1875	.285	**1.312** (7x)	3	3/16	3	814012	59.80	814012-C8	68.80		
.187 (3/16)	.1875	.285	**1.500** (8x)	3	3/16	3	927212	59.80	927212-C8	68.80		
.187 (3/16)	.1875	.285	**1.875** (10x)	3	3/16	4	919412	61.90	919412-C8	71.50		
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	930916	62.10	930916-C8	73.60		
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	927216	63.50	927216-C8	75.00		
.250 (1/4)	.2500	.375	**2.500** (10x)	3	1/4	4	919416	65.70	919416-C8	77.20		
.375 (3/8)	.3750	.570	**2.000** (5x)	3	3/8	4	930924	74.20	930924-C8	97.50		
.500 (1/2)	.5000	.750	**2.500** (5x)	3	1/2	4	930932	90.00	930932-C8	110.20		

Please See Speeds & Feeds On Page 238

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Square – Downcut



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Prevents lifting of workpiece
- h6 shank tolerance for high precision tool holders
- 3 left hand spiral, right hand cut flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

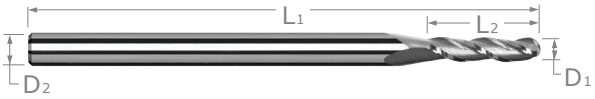
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
.015 (1/64)		.0150	.045 (3x)	3	1/8	1-1/2	896215	53.60	896215-C8	62.50
.031 (1/32)		.0310	.047 (1.5x)	3	1/8	1-1/2	858531	38.00	858531-C8	46.90
.031 (1/32)		.0310	.093 (3x)	3	1/8	1-1/2	896231	37.80	896231-C8	46.70
.047 (3/64)		.0470	.141 (3x)	3	1/8	1-1/2	896247	37.80	896247-C8	46.70
.062 (1/16)		.0620	.093 (1.5x)	3	1/8	1-1/2	858562	35.40	858562-C8	44.30
.062 (1/16)		.0620	.186 (3x)	3	1/8	1-1/2	896262	35.20	896262-C8	44.10
.078 (5/64)		.0780	.234 (3x)	3	1/8	1-1/2	896278	35.20	896278-C8	44.10
.093 (3/32)		.0930	.140 (1.5x)	3	1/8	1-1/2	858593	35.40	858593-C8	44.30
.093 (3/32)		.0930	.279 (3x)	3	1/8	1-1/2	896293	35.20	896293-C8	44.10
	3.00 mm	.1181	4.50 mm (1.5x)	3	4 mm	50 mm	756057	39.00	756057-C8	47.60
	3.00 mm	.1181	9.00 mm (3x)	3	4 mm	50 mm	754057	38.80	754057-C8	47.40

D_1 +.000″ −.002″	+.00mm −.04mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
.125 (1/8)		.1250	.187 (1.5x)	3	1/8	1-1/2	858608	35.10	858608-C8	44.00
.125 (1/8)		.1250	.375 (3x)	3	1/8	1-1/2	896308	34.90	896308-C8	43.80
.156 (5/32)		.1560	.235 (1.5x)	3	3/16	2	858610	39.80	858610-C8	48.40
.156 (5/32)		.1560	.469 (3x)	3	3/16	2	896310	39.50	896310-C8	48.20
.187 (3/16)		.1870	.285 (1.5x)	3	3/16	2	858612	36.60	858612-C8	45.30
.187 (3/16)		.1870	.562 (3x)	3	3/16	2	896312	36.30	896312-C8	44.90
	6.00 mm	.2362	9.00 mm (1.5x)	3	6 mm	63 mm	756066	49.40	756066-C8	60.50
	6.00 mm	.2362	18.00 mm (3x)	3	6 mm	63 mm	754066	49.00	754066-C8	59.00
.250 (1/4)		.2500	.375 (1.5x)	3	1/4	2-1/2	858616	45.90	858616-C8	55.90
.250 (1/4)		.2500	.750 (3x)	3	1/4	2-1/2	896316	45.40	896316-C8	55.40
.375 (3/8)		.3750	.570 (1.5x)	3	3/8	2-1/2	858624	61.30	858624-C8	77.10
.375 (3/8)		.3750	1.125 (3x)	3	3/8	2-1/2	896324	60.70	896324-C8	80.50
.500 (1/2)		.5000	.750 (1.5x)	3	1/2	3	858632	118.10	858632-C8	138.60
.500 (1/2)		.5000	1.500 (3x)	3	1/2	3	896332	120.40	896332-C8	140.80

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
	.2 mm	.0078	**.60 mm** (3x)	3	4 mm	50 mm	977504	69.50	977504-C8	78.20		
.010		.0100	**.015** (1.5x)	3	1/8	1-1/2	958110	69.40	958110-C8	77.10		
.010		.0100	**.030** (3x)	3	1/8	1-1/2	989710	68.30	989710-C8	76.00		
.015 (1/64)		.0150	**.023** (1.5x)	3	1/8	1-1/2	958115	55.00	958115-C8	63.90		
.015 (1/64)		.0150	**.045** (3x)	3	1/8	1-1/2	989715	55.00	989715-C8	63.90		
	.4 mm	.0157	**1.20 mm** (3x)	3	4 mm	50 mm	977509	56.20	977509-C8	64.80		
	.5 mm	.0196	**1.50 mm** (3x)	3	4 mm	50 mm	977511	50.30	977511-C8	59.60		
.020		.0200	**.030** (1.5x)	3	1/8	1-1/2	958120	48.20	958120-C8	57.00		
.020		.0200	**.060** (3x)	3	1/8	1-1/2	989720	48.20	989720-C8	55.80		
.020		.0200	**.100** (5x)	3	1/8	2-1/2	850020	49.80	850020-C8	58.00		
	.6 mm	.0236	**1.80 mm** (3x)	3	4 mm	50 mm	977513	47.20	977513-C8	56.60		
.025		.0250	**.075** (3x)	3	1/8	1-1/2	989725	46.40	989725-C8	54.10		
.030		.0300	**.090** (3x)	3	1/8	1-1/2	989730	40.70	989730-C8	49.50		
.031 (1/32)		.0310	**.047** (1.5x)	3	1/8	1-1/2	958131	40.30	958131-C8	49.00		
.031 (1/32)		.0310	**.093** (3x)	3	1/8	1-1/2	989731	39.80	989731-C8	48.60	989731-C4	54.70
.031 (1/32)		.0310	**.156** (5x)	3	1/8	2-1/2	850031	49.50	850031-C8	57.70		
	.8 mm	.0314	**2.40 mm** (3x)	3	4 mm	50 mm	977518	40.60	977518-C8	49.20		
	1.0 mm	.0393	**1.50 mm** (1.5x)	3	4 mm	50 mm	908322	41.00	908322-C8	49.60		
	1.0 mm	.0393	**3.00 mm** (3x)	3	4 mm	50 mm	977522	41.00	977522-C8	50.40		
.040		.0400	**.060** (1.5x)	3	1/8	1-1/2	958140	43.80	958140-C8	51.50		
.040		.0400	**.120** (3x)	3	1/8	1-1/2	989740	42.50	989740-C8	51.30		
.047 (3/64)		.0470	**.071** (1.5x)	3	1/8	1-1/2	958147	40.30	958147-C8	48.00		
.047 (3/64)		.0470	**.141** (3x)	3	1/8	1-1/2	989747	39.80	989747-C8	48.60		
.047 (3/64)		.0470	**.250** (5x)	3	1/8	2-1/2	850047	49.50	850047-C8	57.70		
	1.2 mm	.0472	**3.50 mm** (3x)	3	4 mm	50 mm	977527	41.00	977527-C8	49.60		
.050		.0500	**.150** (3x)	3	1/8	1-1/2	989750	41.50	989750-C8	50.40		
	1.4 mm	.0551	**4.00 mm** (3x)	3	4 mm	50 mm	977531	41.00	977531-C8	49.60		
	1.5 mm	.0590	**4.50 mm** (3x)	3	4 mm	50 mm	977533	38.00	977533-C8	47.50		
.060		.0600	**.180** (3x)	3	1/8	1-1/2	989760	40.60	989760-C8	49.60		
.062 (1/16)		.0620	**.093** (1.5x)	3	1/8	1-1/2	958162	37.70	958162-C8	46.30		
.062 (1/16)		.0620	**.186** (3x)	3	1/8	1-1/2	989762	37.70	989762-C8	46.30	989762-C4	52.60
.062 (1/16)		.0620	**.248** (4x)	3	1/8	2-1/2	791162	47.10	791162-C8	55.90		
.062 (1/16)		.0620	**.312** (5x)	3	1/8	2-1/2	850062	47.10	850062-C8	55.90		
	1.6 mm	.0629	**5.00 mm** (3x)	3	4 mm	50 mm	977536	38.30	977536-C8	46.90		
	1.8 mm	.0708	**5.50 mm** (3x)	3	4 mm	50 mm	977540	38.00	977540-C8	46.60		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball (cont.)

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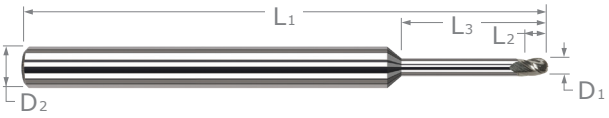
CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.078 (5/64)		.0780	**.118** (1.5x)	3	1/8	1-1/2	958178	37.70	958178-C8	46.30		
.078 (5/64)		.0780	**.234** (3x)	3	1/8	1-1/2	989778	37.70	989778-C8	46.30		
.078 (5/64)		.0780	**.406** (5x)	3	1/8	2-1/2	850078	47.10	850078-C8	55.90		
	2.0 mm	.0787	**3.00 mm** (1.5x)	3	4 mm	50 mm	908345	38.00	908345-C8	47.50		
	2.0 mm	.0787	**6.00 mm** (3x)	3	4 mm	50 mm	977545	38.00	977545-C8	47.50		
.093 (3/32)		.0930	**.140** (1.5x)	3	1/8	1-1/2	958193	37.70	958193-C8	46.30		
.093 (3/32)		.0930	**.279** (3x)	3	1/8	1-1/2	989793	37.70	989793-C8	46.30	989793-C4	52.60
.093 (3/32)		.0930	**.500** (5x)	3	1/8	2-1/2	850093	47.10	850093-C8	55.90		
.100		.1000	**.300** (3x)	3	1/8	1-1/2	989800	38.30	989800-C8	47.30		
.109 (7/64)		.1094	**.327** (3x)	3	1/8	1-1/2	989802	39.30	989802-C8	47.00		
	3.0 mm	.1181	**9.00 mm** (3x)	3	4 mm	50 mm	977557	39.20	977557-C8	48.50		

D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	**.187** (1.5x)	3	1/8	1-1/2	958208	34.90	958208-C8	42.60		
.125 (1/8)	.1250	**.375** (3x)	3	1/8	1-1/2	989808	34.90	989808-C8	42.60	989808-C4	49.80
.125 (1/8)	.1250	**.500** (4x)	3	1/8	2-1/2	791208	47.10	791208-C8	55.90		
.125 (1/8)	.1250	**.625** (5x)	3	1/8	2-1/2	850108	47.10	850108-C8	55.90		
.156 (5/32)	.1562	**.235** (1.5x)	3	3/16	2	958210	38.80	958210-C8	47.40		
.156 (5/32)	.1562	**.470** (3x)	3	3/16	2	989810	38.80	989810-C8	47.40		
.187 (3/16)	.1875	**.285** (1.5x)	3	3/16	2	958212	36.00	958212-C8	44.60		
.187 (3/16)	.1875	**.562** (3x)	3	3/16	2	989812	36.30	989812-C8	44.90	989812-C4	53.00
.187 (3/16)	.1875	**1.000** (5x)	3	3/16	3	850112	37.90	850112-C8	46.70		
.250 (1/4)	.2500	**.375** (1.5x)	3	1/4	2-1/2	958216	43.00	958216-C8	53.30		
.250 (1/4)	.2500	**.750** (3x)	3	1/4	2-1/2	989816	43.30	989816-C8	53.60	989816-C4	64.70
.250 (1/4)	.2500	**1.250** (5x)	3	1/4	4	850116	57.40	850116-C8	68.80		
.375 (3/8)	.3750	**.570** (1.5x)	3	3/8	2-1/2	958224	57.70	958224-C8	77.50		
.375 (3/8)	.3750	**1.125** (3x)	3	3/8	2-1/2	989824	57.70	989824-C8	77.50		
.500 (1/2)	.5000	**.750** (1.5x)	3	1/2	3	958232	60.60	958232-C8	84.20		
.500 (1/2)	.5000	**1.500** (3x)	3	1/2	3	989832	60.60	989832-C8	84.20		

Please See Speeds & Feeds On Page 224

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) improves performance in off-center contour milling applications
- Reduced neck diameter to avoid heeling • Ball end for profiling
- h6 shank tolerance for high precision tool holders • 3 flutes
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK FLUTES	SHANK DIA	OAL	UNCOATED		TiB2 COATED		AMORPHOUS DIAMOND	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.015 (1/64)		.0150	.022	**.078** (5x)	3	1/8	2-1/2	947015	62.10	947015-C8	70.30		
.015 (1/64)		.0150	.022	**.125** (8x)	3	1/8	2-1/2	54415	72.10	54415-C8	80.30		
.020		.0200	.030	**.100** (5x)	3	1/8	2-1/2	947020	66.70	947020-C8	74.90		
.020		.0200	.030	**.160** (8x)	3	1/8	2-1/2	54420	68.10	54420-C8	76.30		
.025		.0250	.037	**.125** (5x)	3	1/8	2-1/2	947025	65.70	947025-C8	73.90		
.025		.0250	.037	**.203** (8x)	3	1/8	2-1/2	54425	67.20	54425-C8	75.40		
.031 (1/32)		.0310	.046	**.156** (5x)	3	1/8	2-1/2	947031	61.30	947031-C8	70.20		
.031 (1/32)		.0310	.046	**.250** (8x)	3	1/8	2-1/2	54431	64.90	54431-C8	73.90	54431-C4	80.70
.031 (1/32)		.0310	.046	**.312** (10x)	3	1/8	2-1/2	925131	68.80	925131-C8	77.00		
.031 (1/32)		.0310	.046	**.375** (12x)	3	1/8	2-1/2	879431	70.80	879431-C8	79.80		
	1.0 mm	.0393	1.50 mm	**5.0 mm** (5x)	3	4 mm	50 mm	851322	68.80	851322-C8	78.30		
.047 (3/64)		.0470	.070	**.250** (5x)	3	1/8	2-1/2	947047	61.30	947047-C8	70.20		
.047 (3/64)		.0470	.070	**.375** (8x)	3	1/8	2-1/2	54447	62.10	54447-C8	71.10	54447-C4	77.90
.062 (1/16)		.0620	.093	**.312** (5x)	3	1/8	2-1/2	947062	61.30	947062-C8	70.20		
.062 (1/16)		.0620	.093	**.500** (8x)	3	1/8	2-1/2	54462	62.10	54462-C8	71.10	54462-C4	77.30
.062 (1/16)		.0620	.093	**.625** (10x)	3	1/8	2-1/2	925162	68.80	925162-C8	77.90		
.062 (1/16)		.0620	.093	**.750** (12x)	3	1/8	2-1/2	879462	72.50	879462-C8	81.40		
.078 (5/64)		.0780	.117	**.406** (5x)	3	1/8	2-1/2	947078	61.30	947078-C8	70.20		
.078 (5/64)		.0780	.117	**.625** (8x)	3	1/8	2-1/2	54478	62.10	54478-C8	71.10	54478-C4	77.90
	2.0 mm	.0787	3.00 mm	**10.0 mm** (5x)	3	4 mm	50 mm	851345	64.00	851345-C8	72.70		
.093 (3/32)		.0930	.139	**.500** (5x)	3	1/8	2-1/2	947093	61.30	947093-C8	70.20		
.093 (3/32)		.0930	.139	**.750** (8x)	3	1/8	2-1/2	54493	62.10	54493-C8	71.10	54493-C4	77.90
.093 (3/32)		.0930	.139	**.950** (10x)	3	1/8	2-1/2	925193	68.80	925193-C8	77.90		
.093 (3/32)		.0930	.139	**1.125** (12x)	3	1/8	2-1/2	879493	72.50	879493-C8	81.40		
	3.0 mm	.1181	4.50 mm	**15.0 mm** (5x)	3	4 mm	50 mm	851357	68.80	851357-C8	78.30		

D1 +.000″ −.002″	decimal equivalent	L2 +.030″ −.000″	L3 +.030″ −.000″		D2 (h6)	L1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	.187	**.625** (5x)	3	1/8	2-1/2	947108	60.00	947108-C8	69.00		
.125 (1/8)	.1250	.187	**1.000** (8x)	3	1/8	2-1/2	54508	61.30	54508-C8	70.20	54508-C4	76.70
.125 (1/8)	.1250	.187	**1.250** (10x)	3	1/8	2-1/2	925208	68.80	925208-C8	77.00		
.125 (1/8)	.1250	.187	**1.500** (12x)	3	1/8	3	879508	72.50	879508-C8	81.40		
.156 (5/32)	.1562	.234	**.750** (5x)	3	3/16	3	947110	67.90	947110-C8	76.80		
.156 (5/32)	.1562	.234	**1.250** (8x)	3	3/16	3	54510	68.10	54510-C8	77.00		
.187 (3/16)	.1875	.281	**1.000** (5x)	3	3/16	3	947112	67.90	947112-C8	76.80		
.187 (3/16)	.1875	.281	**1.500** (8x)	3	3/16	3	54512	68.40	54512-C8	77.30	54512-C4	86.30
.250 (1/4)	.2500	.375	**1.250** (5x)	3	1/4	4	947116	70.40	947116-C8	81.60		
.250 (1/4)	.2500	.375	**2.000** (8x)	3	1/4	4	54516	71.60	54516-C8	83.00	54516-C4	94.50

Please See Speeds & Feeds On Page 238

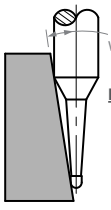
HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters)



Excellent in Aluminum & Other Non-Ferrous Materials

- Very short length of cut and solid tapered neck for maximum rigidity
- 1°, 1.5°, 3°, 5°, and 7° neck angles to address common draft angles for molds
- 45° helix, large flute valley, and sharper cutting edge for faster chip removal and better finish
- Offered with TiB_2 coating to minimize galling and enhance performance
- 2 flutes to center
- Solid carbide
- CNC ground in the USA

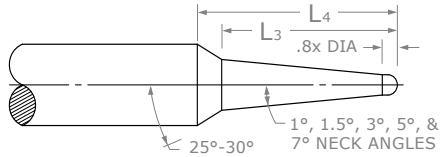


Effective Wall Angle
Minimum wall angle (measured from centerline of tool) that can be machined at overall reach.

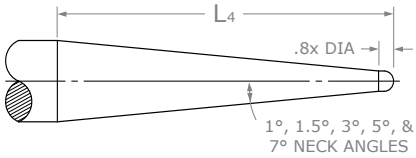
NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 +0°00′ −0°30′	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
1°	.062 (1/16)	.050	I	.500	**.595**	6.4°	3/16	2	925049	62.30	925049-C8	70.90
	.062 (1/16)	.050	I	1.000	**1.080**	3.5°	3/16	2-1/2	925056	62.30	925056-C8	71.30
	.093 (3/32)	.074	I	.750	**.811**	3.6°	3/16	2	925070	59.70	925070-C8	68.30
	.093 (3/32)	.074	I	1.125	**1.175**	2.4°	3/16	2-1/2	925072	62.30	925072-C8	71.30
	.125 (1/8)	.100	I	1.000	**1.027**	1.9°	3/16	2	925091	75.50	925091-C8	84.10
	.125 (1/8)	.100	II	1.890	**1.890**	1.0°	3/16	3	925077	78.00	925077-C8	86.90
	.187 (3/16)	.150	II	1.940	**1.940**	1.0°	1/4	4	925087	78.60	925087-C8	89.90
	.250 (1/4)	.200	II	1.990	**1.990**	1.0°	5/16	4	925092	84.20	925092-C8	98.40
1.5°	.015 (1/64)	.012	I	.125	**.269**	18.2°	3/16	2	997807	70.50	997807-C8	79.10
	.015 (1/64)	.012	I	.250	**.389**	12.8°	3/16	2	997814	69.90	997814-C8	78.50
	.031 (1/32)	.025	I	.250	**.375**	12.3°	3/16	2	997821	64.10	997821-C8	72.80
	.031 (1/32)	.025	I	.500	**.614**	7.5°	3/16	2	997828	64.10	997828-C8	72.80
	.047 (3/64)	.038	I	.375	**.481**	8.7°	3/16	2	997835	63.80	997835-C8	72.50
	.047 (3/64)	.038	I	.750	**.839**	5.0°	3/16	2	997842	63.80	997842-C8	72.50
	.062 (1/16)	.050	I	.500	**.588**	6.4°	3/16	2	997849	62.30	997849-C8	70.90
	.062 (1/16)	.050	I	1.000	**1.066**	3.5°	3/16	2-1/2	997856	62.30	997856-C8	71.30
	.078 (5/64)	.062	I	.625	**.694**	4.8°	3/16	2	997863	60.70	997863-C8	69.30
	.093 (3/32)	.074	I	.750	**.801**	3.6°	3/16	2	997870	59.70	997870-C8	68.30
	.125 (1/8)	.100	II	1.293	**1.293**	1.5°	3/16	2-1/2	997877	75.50	997877-C8	84.40
	.187 (3/16)	.150	II	1.343	**1.343**	1.5°	1/4	2-1/2	997887	76.40	997887-C8	87.50
	.250 (1/4)	.200	II	1.393	**1.393**	1.5°	5/16	2-1/2	997892	82.40	997892-C8	95.70

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TYPE I



TYPE II



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

Ball – Tapered Reach (Mold Cutters) (cont.)

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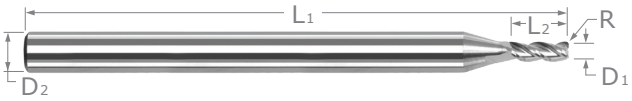
NECK ANGLE	CUTTER DIA.	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
A_1 $^{+0°00'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_2 $^{+.010"}_{-.000"}$		L_3	L_4		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
3°	.031 (1/32)	.025	I	.750	**.820**	5.6°	3/16	2-1/2	996607	66.30	996607-C8	75.60
	.031 (1/32)	.025	II	1.518	**1.518**	3.0°	3/16	2-1/2	996614	66.30	996614-C8	75.30
	.047 (3/64)	.038	I	.875	**.921**	4.5°	3/16	2-1/2	996621	62.10	996621-C8	71.10
	.047 (3/64)	.038	II	1.378	**1.378**	3.0°	3/16	2-1/2	996628	62.60	996628-C8	71.60
	.062 (1/16)	.050	I	.625	**.681**	5.5°	3/16	2-1/2	996635	62.60	996635-C8	71.60
	.062 (1/16)	.050	II	1.247	**1.247**	3.0°	3/16	2-1/2	996642	62.60	996642-C8	71.60
	.078 (5/64)	.062	II	1.107	**1.107**	3.0°	3/16	2-1/2	996649	60.70	996649-C8	70.00
	.093 (3/32)	.074	II	.976	**.976**	3.0°	3/16	2	996656	55.00	996656-C8	63.60
	.125 (1/8)	.100	II	1.293	**1.293**	2.9°	1/4	2-1/2	996663	75.50	996663-C8	85.60
	.187 (3/16)	.150	II	.746	**.746**	2.8°	1/4	2-1/2	996670	81.70	996670-C8	92.80
	.187 (3/16)	.150	II	1.939	**1.939**	2.9°	3/8	4	996674	85.10	996674-C8	107.40
	.250 (1/4)	.200	II	1.393	**1.393**	2.9°	3/8	2-1/2	996692	83.20	996692-C8	101.70
5°	.031 (1/32)	.025	II	.919	**.919**	5.0°	3/16	2	996007	60.40	996007-C8	69.00
	.047 (3/64)	.038	II	.841	**.841**	5.0°	3/16	2	996014	59.90	996014-C8	68.50
	.062 (1/16)	.050	II	.767	**.767**	4.9°	3/16	2	996021	56.30	996021-C8	64.90
	.078 (5/64)	.062	II	1.045	**1.045**	4.9°	1/4	2-1/2	996028	78.00	996028-C8	88.20
	.093 (3/32)	.074	II	.971	**.971**	4.9°	1/4	2-1/2	996035	78.70	996035-C8	88.90
	.125 (1/8)	.100	II	.814	**.814**	4.8°	1/4	2-1/2	996042	81.20	996042-C8	91.40
	.187 (3/16)	.150	II	1.222	**1.222**	4.8°	3/8	2-1/2	996087	84.00	996087-C8	99.80
	.250 (1/4)	.200	II	.914	**.914**	4.5°	3/8	2-1/2	996092	84.00	996092-C8	99.80
7°	.031 (1/32)	.025	II	.662	**.662**	6.9°	3/16	2	995607	59.90	995607-C8	68.50
	.047 (3/64)	.038	II	.610	**.610**	6.9°	3/16	2	995614	60.40	995614-C8	69.00
	.062 (1/16)	.050	II	.816	**.816**	6.9°	1/4	2-1/2	995621	78.00	995621-C8	88.20
	.078 (5/64)	.062	II	.762	**.762**	6.8°	1/4	2-1/2	995628	78.70	995628-C8	88.90
	.093 (3/32)	.074	II	.713	**.713**	6.7°	1/4	2-1/2	995635	74.10	995635-C8	85.20
	.125 (1/8)	.100	II	.609	**.609**	6.5°	1/4	2-1/2	995642	71.20	995642-C8	81.30
	.187 (3/16)	.150	II	.914	**.914**	6.5°	3/8	2-1/2	995687	84.00	995687-C8	99.80

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 42°) reduces chatter and harmonics, and increases material removal rates
- h6 shank tolerance for high precision tool holders
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

TiB_2 Titanium Diboride	**Best used in Non-Abrasive Aluminum Alloys and Magnesium Alloys!** Extremely low affinity to aluminum. Prevents build-up on cutting edge and chip packing, extending tool life.
Amorphous Diamond	**Outstanding performance in Copper, Brass, Bronze and High Silicon Aluminum!** Improves wear resistance and lubricity. Thin film coating maintains sharp edge, improving performance and finish.

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005" −.0005"	+.00mm −.02mm	decimal equivalent	R +.001" −.001" +.025mm −.025mm	L_2 +.010" −.000" +.25mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
	.2 mm	.0078	**.03 mm**	.30 mm (1.5x)	3	4 mm	50 mm	986204	63.00	986204-C8	71.60		
	.2 mm	.0078	**.03 mm**	.60 mm (3x)	3	4 mm	50 mm	973504	63.00	973504-C8	71.60		
.010		.0100	**.002**	.030 (3x)	3	1/8	1-1/2	50010	51.40	50010-C8	59.10		
	.3 mm	.0118	**.05 mm**	.90 mm (3x)	3	4 mm	50 mm	973506	61.30	973506-C8	70.00		
.015 (1/64)		.0150	**.002**	.022 (1.5x)	3	1/8	1-1/2	61715	49.00	61715-C8	58.00		
.015 (1/64)		.0150	**.002**	.045 (3x)	3	1/8	1-1/2	50015	48.20	50015-C8	55.80	50015-C4	63.10
.015 (1/64)		.0150	**.002**	.078 (5x)	3	1/8	2-1/2	53015	58.40	53015-C8	66.60	53015-C4	74.20
	.4 mm	.0157	**.05 mm**	.60 mm (1.5x)	3	4 mm	50 mm	986209	51.90	986209-C8	60.50		
	.4 mm	.0157	**.05 mm**	1.20 mm (3x)	3	4 mm	50 mm	973509	51.90	973509-C8	60.50		
	.5 mm	.0196	**.05 mm**	.75 mm (1.5x)	3	4 mm	50 mm	986211	45.80	986211-C8	54.40		
	.5 mm	.0196	**.05 mm**	1.50 mm (3x)	3	4 mm	50 mm	973511	45.80	973511-C8	54.40		
.020		.0200	**.002**	.030 (1.5x)	3	1/8	1-1/2	61720	41.10	61720-C8	50.10		
.020		.0200	**.002**	.060 (3x)	3	1/8	1-1/2	50020	41.10	50020-C8	48.80	50020-C4	56.10
.020		.0200	**.002**	.100 (5x)	3	1/8	2-1/2	53020	51.20	53020-C8	59.40	53020-C4	67.00
	.6 mm	.0236	**.05 mm**	.90 mm (1.5x)	3	4 mm	50 mm	986213	44.00	986213-C8	52.60		
	.6 mm	.0236	**.05 mm**	1.80 mm (3x)	3	4 mm	50 mm	973513	43.70	973513-C8	52.30		
.025		.0250	**.002**	.038 (1.5x)	3	1/8	1-1/2	61725	39.80	61725-C8	47.40		
.025		.0250	**.002**	.075 (3x)	3	1/8	1-1/2	50025	39.80	50025-C8	47.40	50025-C4	54.70
.025		.0250	**.002**	.125 (5x)	3	1/8	2-1/2	53025	49.50	53025-C8	58.50	53025-C4	65.30
	.7 mm	.0275	**.08 mm**	2.10 mm (3x)	3	4 mm	50 mm	973515	43.70	973515-C8	52.30		
.031 (1/32)		.0310	**.003**	.047 (1.5x)	3	1/8	1-1/2	61731	33.00	61731-C8	41.90		
.031 (1/32)		.0310	**.003**	.093 (3x)	3	1/8	1-1/2	50031	33.00	50031-C8	41.90	50031-C4	48.00
.031 (1/32)		.0310	**.003**	.156 (5x)	3	1/8	2-1/2	53031	42.10	53031-C8	51.10	53031-C4	57.90
.031 (1/32)		.0310	**.005**	.093 (3x)	3	1/8	1-1/2	901531	32.00	901531-C8	39.70		
.031 (1/32)		.0310	**.010**	.093 (3x)	3	1/8	1-1/2	904631	32.00	904631-C8	40.70		
	.8 mm	.0314	**.08 mm**	1.20 mm (1.5x)	3	4 mm	50 mm	986218	37.20	986218-C8	45.80		
	.8 mm	.0314	**.08 mm**	2.40 mm (3x)	3	4 mm	50 mm	973518	37.20	973518-C8	45.80		
.035		.0350	**.003**	.053 (1.5x)	3	1/8	1-1/2	61735	33.00	61735-C8	40.70		
.035		.0350	**.003**	.105 (3x)	3	1/8	1-1/2	50035	32.30	50035-C8	40.00		
	.9 mm	.0354	**.08 mm**	2.7 mm (3x)	3	4 mm	50 mm	973520	37.20	973520-C8	45.80		
	1.0 mm	.0393	**.08 mm**	1.50 mm (1.5x)	3	4 mm	50 mm	986222	37.20	986222-C8	45.80		
	1.0 mm	.0393	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973522	36.70	973522-C8	45.40		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1			R	L_2		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
+.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	+.001″ −.001″ +.025mm −.025mm	+.010″ −.000″ +.25mm −.00mm									
.040		.0400	**.003**	.060 (1.5x)	3	1/8	1-1/2	61740	33.00	61740-C8	41.90		
.040		.0400	**.003**	.120 (3x)	3	1/8	1-1/2	50040	33.00	50040-C8	40.70		
.040		.0400	**.003**	.203 (5x)	3	1/8	2-1/2	53040	42.10	53040-C8	51.10		
	1.1 mm	.0433	**.08 mm**	3.00 mm (3x)	3	4 mm	50 mm	973524	37.20	973524-C8	45.80		
.045		.0450	**.003**	.135 (3x)	3	1/8	1-1/2	50045	33.00	50045-C8	40.70		
.047 (3/64)		.0470	**.003**	.070 (1.5x)	3	1/8	1-1/2	61747	33.00	61747-C8	41.90		
.047 (3/64)		.0470	**.003**	.141 (3x)	3	1/8	1-1/2	50047	32.30	50047-C8	41.10	50047-C4	47.20
.047 (3/64)		.0470	**.003**	.250 (5x)	3	1/8	2-1/2	53047	42.10	53047-C8	51.10	53047-C4	57.90
.047 (3/64)		.0470	**.005**	.141 (3x)	3	1/8	1-1/2	901547	32.00	901547-C8	39.70		
.047 (3/64)		.0470	**.010**	.141 (3x)	3	1/8	1-1/2	904647	32.00	904647-C8	40.70	904647-C4	46.90
.047 (3/64)		.0470	**.010**	.250 (5x)	3	1/8	2-1/2	840747	42.40	840747-C8	50.60		
.047 (3/64)		.0470	**.015**	.141 (3x)	3	1/8	1-1/2	912347	32.00	912347-C8	40.70		
	1.2 mm	.0472	**.08 mm**	1.80 mm (1.5x)	3	4 mm	50 mm	986227	37.20	986227-C8	45.80		
	1.2 mm	.0472	**.08 mm**	3.50 mm (3x)	3	4 mm	50 mm	973527	37.20	973527-C8	45.80		
.050		.0500	**.003**	.075 (1.5x)	3	1/8	1-1/2	61750	32.80	61750-C8	40.50		
.050		.0500	**.003**	.150 (3x)	3	1/8	1-1/2	50050	32.80	50050-C8	40.50		
.050		.0500	**.003**	.250 (5x)	3	1/8	2-1/2	53050	42.10	53050-C8	50.30		
	1.3 mm	.0511	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973529	37.20	973529-C8	45.80		
.055		.0550	**.003**	.083 (1.5x)	3	1/8	1-1/2	61755	32.80	61755-C8	40.50		
.055		.0550	**.003**	.165 (3x)	3	1/8	1-1/2	50055	32.80	50055-C8	40.50		
.055		.0550	**.003**	.275 (5x)	3	1/8	2-1/2	53055	42.10	53055-C8	51.10		
	1.4 mm	.0551	**.08 mm**	2.10 mm (1.5x)	3	4 mm	50 mm	986231	36.70	986231-C8	46.10		
	1.4 mm	.0551	**.08 mm**	4.00 mm (3x)	3	4 mm	50 mm	973531	37.20	973531-C8	45.80		
	1.5 mm	.0590	**.10 mm**	2.20 mm (1.5x)	3	4 mm	50 mm	986233	34.30	986233-C8	42.90		
	1.5 mm	.0590	**.10 mm**	4.50 mm (3x)	3	4 mm	50 mm	973533	34.30	973533-C8	42.90		
.060		.0600	**.005**	.090 (1.5x)	3	1/8	1-1/2	61760	32.80	61760-C8	41.70		
.060		.0600	**.005**	.180 (3x)	3	1/8	1-1/2	50060	32.80	50060-C8	41.70		
.060		.0600	**.005**	.312 (5x)	3	1/8	2-1/2	53060	42.60	53060-C8	50.80		
.060		.0600	**.010**	.180 (3x)	3	1/8	1-1/2	904660	41.50	904660-C8	50.40		
.062 (1/16)		.0620	**.005**	.093 (1.5x)	3	1/8	1-1/2	61762	30.30	61762-C8	39.30	61762-C4	45.30
.062 (1/16)		.0620	**.005**	.186 (3x)	3	1/8	1-1/2	50062	29.80	50062-C8	37.50	50062-C4	44.70
.062 (1/16)		.0620	**.005**	.312 (5x)	3	1/8	2-1/2	53062	40.00	53062-C8	48.80	53062-C4	55.60
.062 (1/16)		.0620	**.010**	.093 (1.5x)	3	1/8	1-1/2	878562	30.30	878562-C8	39.30		
.062 (1/16)		.0620	**.010**	.186 (3x)	3	1/8	1-1/2	904662	29.80	904662-C8	37.50		
.062 (1/16)		.0620	**.010**	.312 (5x)	3	1/8	2-1/2	840762	40.00	840762-C8	48.80		
.062 (1/16)		.0620	**.015**	.186 (3x)	3	1/8	1-1/2	912362	29.80	912362-C8	37.50		
.062 (1/16)		.0620	**.020**	.186 (3x)	3	1/8	1-1/2	925862	29.80	925862-C8	37.50		
	1.6 mm	.0629	**.10 mm**	2.40 mm (1.5x)	3	4 mm	50 mm	986236	34.00	986236-C8	43.50		
	1.6 mm	.0629	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973536	34.30	973536-C8	42.90		
	1.7 mm	.0669	**.10 mm**	5.00 mm (3x)	3	4 mm	50 mm	973538	34.30	973538-C8	42.90		
.070		.0700	**.005**	.210 (3x)	3	1/8	1-1/2	50070	31.60	50070-C8	40.40		
	1.8 mm	.0708	**.10 mm**	2.70 mm (1.5x)	3	4 mm	50 mm	986240	34.00	986240-C8	43.50		
	1.8 mm	.0708	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973540	34.30	973540-C8	42.90		
	1.9 mm	.0748	**.10 mm**	5.50 mm (3x)	3	4 mm	50 mm	973542	34.00	973542-C8	43.50		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

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CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.078 (5/64)		.0780	**.005**	.118 (1.5x)	3	1/8	1-1/2	61778	30.30	61778-C8	39.30	61778-C4	45.30
.078 (5/64)		.0780	**.005**	.234 (3x)	3	1/8	1-1/2	50078	29.80	50078-C8	37.50	50078-C4	44.70
.078 (5/64)		.0780	**.005**	.406 (5x)	3	1/8	2-1/2	53078	40.00	53078-C8	48.80	53078-C4	55.60
.078 (5/64)		.0780	**.010**	.118 (1.5x)	3	1/8	1-1/2	878578	30.30	878578-C8	39.30		
.078 (5/64)		.0780	**.010**	.234 (3x)	3	1/8	1-1/2	904678	29.80	904678-C8	37.50		
.078 (5/64)		.0780	**.015**	.117 (1.5x)	3	1/8	1-1/2	831178	29.80	831178-C8	37.50		
.078 (5/64)		.0780	**.015**	.234 (3x)	3	1/8	1-1/2	912378	29.80	912378-C8	37.50	912378-C4	44.70
.078 (5/64)		.0780	**.020**	.118 (1.5x)	3	1/8	1-1/2	725878	29.80	725878-C8	37.50		
.078 (5/64)		.0780	**.020**	.234 (3x)	3	1/8	1-1/2	925878	29.80	925878-C8	37.50	925878-C4	44.70
.078 (5/64)		.0780	**.020**	.406 (5x)	3	1/8	2-1/2	838278	40.40	838278-C8	49.40		
	2.0 mm	.0787	**.10 mm**	3.00 mm (1.5x)	3	4 mm	50 mm	986245	34.00	986245-C8	43.50		
	2.0 mm	.0787	**.10 mm**	6.00 mm (3x)	3	4 mm	50 mm	973545	34.30	973545-C8	43.80		
.080		.0800	**.005**	.240 (3x)	3	1/8	1-1/2	50080	31.60	50080-C8	39.20		
.090		.0900	**.005**	.270 (3x)	3	1/8	1-1/2	50090	31.60	50090-C8	40.40		
.093 (3/32)		.0930	**.005**	.139 (1.5x)	3	1/8	1-1/2	61793	30.30	61793-C8	39.30	61793-C4	45.30
.093 (3/32)		.0930	**.005**	.279 (3x)	3	1/8	1-1/2	50093	29.80	50093-C8	37.50	50093-C4	44.70
.093 (3/32)		.0930	**.005**	.500 (5x)	3	1/8	2-1/2	53093	40.00	53093-C8	48.80	53093-C4	55.70
.093 (3/32)		.0930	**.010**	.139 (1.5x)	3	1/8	1-1/2	878593	30.30	878593-C8	39.30	878593-C4	45.30
.093 (3/32)		.0930	**.010**	.279 (3x)	3	1/8	1-1/2	904693	29.80	904693-C8	37.50	904693-C4	44.70
.093 (3/32)		.0930	**.010**	.500 (5x)	3	1/8	2-1/2	840793	40.00	840793-C8	48.80		
.093 (3/32)		.0930	**.015**	.279 (3x)	3	1/8	1-1/2	912393	29.80	912393-C8	37.50		
.093 (3/32)		.0930	**.020**	.139 (1.5x)	3	1/8	1-1/2	889493	30.90	889493-C8	39.80		
.093 (3/32)		.0930	**.020**	.279 (3x)	3	1/8	1-1/2	925893	29.80	925893-C8	37.50		
.093 (3/32)		.0930	**.030**	.139 (1.5x)	3	1/8	1-1/2	893893	30.30	893893-C8	39.30		
.093 (3/32)		.0930	**.030**	.279 (3x)	3	1/8	1-1/2	904193	29.80	904193-C8	37.50		
	2.5 mm	.0984	**.10 mm**	7.50 mm (3x)	3	4 mm	50 mm	973551	34.30	973551-C8	42.90		
.100		.1000	**.005**	.150 (1.5x)	3	1/8	1-1/2	61800	30.30	61800-C8	38.00		
.100		.1000	**.005**	.300 (3x)	3	1/8	1-1/2	50100	30.30	50100-C8	39.30		
.109 (7/64)		.1090	**.005**	.164 (1.5x)	3	1/8	1-1/2	61807	30.30	61807-C8	38.00		
.109 (7/64)		.1090	**.005**	.327 (3x)	3	1/8	1-1/2	50107	30.30	50107-C8	38.00		
	3.0 mm	.1181	**.10 mm**	9.00 mm (3x)	3	4 mm	50 mm	973557	34.00	973557-C8	43.50		

D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	**.005**	.187 (1.5x)	3	1/8	1-1/2	61808	29.80	61808-C8	37.50	61808-C4	44.70
.125 (1/8)	.1250	**.005**	.375 (3x)	3	1/8	1-1/2	50108	29.80	50108-C8	37.50	50108-C4	44.70
.125 (1/8)	.1250	**.005**	.625 (5x)	3	1/8	2-1/2	53108	40.00	53108-C8	48.80	53108-C4	55.60
.125 (1/8)	.1250	**.010**	.187 (1.5x)	3	1/8	1-1/2	878608	28.20	878608-C8	35.90		
.125 (1/8)	.1250	**.010**	.375 (3x)	3	1/8	1-1/2	904708	27.50	904708-C8	35.20	904708-C4	42.50
.125 (1/8)	.1250	**.010**	.625 (5x)	3	1/8	2-1/2	840808	39.40	840808-C8	48.30		
.125 (1/8)	.1250	**.015**	.187 (1.5x)	3	1/8	1-1/2	831208	27.70	831208-C8	35.40		
.125 (1/8)	.1250	**.015**	.375 (3x)	3	1/8	1-1/2	912408	27.50	912408-C8	35.20	912408-C4	42.50
.125 (1/8)	.1250	**.015**	.625 (5x)	3	1/8	2-1/2	852408	39.40	852408-C8	48.30		
.125 (1/8)	.1250	**.020**	.187 (1.5x)	3	1/8	1-1/2	889508	31.10	889508-C8	38.80		
.125 (1/8)	.1250	**.020**	.375 (3x)	3	1/8	1-1/2	925908	27.50	925908-C8	35.20	925908-C4	42.50
.125 (1/8)	.1250	**.020**	.625 (5x)	3	1/8	2-1/2	838308	39.00	838308-C8	48.00		

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius (cont.)

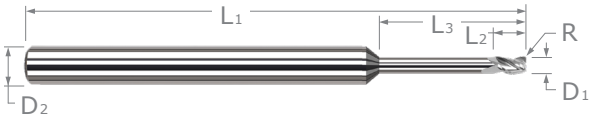
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CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	decimal equivalent	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	**.030**	.187 (1.5x)	3	1/8	1-1/2	893908	31.10	893908-C8	38.80		
.125 (1/8)	.1250	**.030**	.375 (3x)	3	1/8	1-1/2	904208	27.50	904208-C8	35.20	904208-C4	42.50
.125 (1/8)	.1250	**.030**	.625 (5x)	3	1/8	2-1/2	829708	39.00	829708-C8	48.00		
.125 (1/8)	.1250	**.040**	.375 (3x)	3	1/8	1-1/2	892808	33.60	892808-C8	42.50		
.140 (9/64)	.1406	**.015**	.425 (3x)	3	3/16	2	912409	31.00	912409-C8	39.70		
.156 (5/32)	.1562	**.005**	.235 (1.5x)	3	3/16	2	61810	31.00	61810-C8	39.70		
.156 (5/32)	.1562	**.005**	.470 (3x)	3	3/16	2	50110	31.00	50110-C8	39.70	50110-C4	47.70
.156 (5/32)	.1562	**.005**	.750 (5x)	3	3/16	3	53110	44.50	53110-C8	53.80		
.156 (5/32)	.1562	**.020**	.470 (3x)	3	3/16	2	925910	31.00	925910-C8	39.70		
.156 (5/32)	.1562	**.030**	.470 (3x)	3	3/16	2	904210	31.00	904210-C8	39.70		
.187 (3/16)	.1875	**.005**	.285 (1.5x)	3	3/16	2	61812	31.00	61812-C8	39.70	61812-C4	48.90
.187 (3/16)	.1875	**.005**	.562 (3x)	3	3/16	2	50112	31.00	50112-C8	39.70	50112-C4	48.90
.187 (3/16)	.1875	**.005**	1.000 (5x)	3	3/16	3	53112	44.50	53112-C8	53.80	53112-C4	62.50
.187 (3/16)	.1875	**.010**	.562 (3x)	3	3/16	2	904712	42.80	904712-C8	51.40		
.187 (3/16)	.1875	**.015**	.285 (1.5x)	3	3/16	2	831212	43.90	831212-C8	52.50		
.187 (3/16)	.1875	**.015**	.562 (3x)	3	3/16	2	912412	42.80	912412-C8	51.40		
.187 (3/16)	.1875	**.020**	.285 (1.5x)	3	3/16	2	889512	42.80	889512-C8	51.40		
.187 (3/16)	.1875	**.020**	.562 (3x)	3	3/16	2	925912	42.80	925912-C8	51.40		
.187 (3/16)	.1875	**.030**	.285 (1.5x)	3	3/16	2	893912	42.80	893912-C8	51.40		
.187 (3/16)	.1875	**.030**	.562 (3x)	3	3/16	2	904212	42.80	904212-C8	51.40	904212-C4	59.50
.187 (3/16)	.1875	**.030**	1.000 (5x)	3	3/16	3	829712	47.70	829712-C8	56.70		
.187 (3/16)	.1875	**.060**	.562 (3x)	3	3/16	2	834812	42.80	834812-C8	51.40		
.250 (1/4)	.2500	**.005**	.375 (1.5x)	3	1/4	2-1/2	726116	40.80	726116-C8	51.90		
.250 (1/4)	.2500	**.005**	.750 (3x)	3	1/4	2-1/2	901616	40.80	901616-C8	50.90		
.250 (1/4)	.2500	**.010**	.375 (1.5x)	3	1/4	2-1/2	61816	36.00	61816-C8	46.20	61816-C4	57.40
.250 (1/4)	.2500	**.010**	.750 (3x)	3	1/4	2-1/2	50116	36.00	50116-C8	46.20	50116-C4	57.40
.250 (1/4)	.2500	**.010**	1.250 (5x)	3	1/4	4	53116	54.50	53116-C8	65.70	53116-C4	77.30
.250 (1/4)	.2500	**.015**	.750 (3x)	3	1/4	2-1/2	912416	38.20	912416-C8	48.50		
.250 (1/4)	.2500	**.020**	.375 (1.5x)	3	1/4	2-1/2	889516	38.20	889516-C8	48.50		
.250 (1/4)	.2500	**.020**	.750 (3x)	3	1/4	2-1/2	925916	38.20	925916-C8	48.50	925916-C4	59.60
.250 (1/4)	.2500	**.030**	.375 (1.5x)	3	1/4	2-1/2	893916	38.20	893916-C8	48.50		
.250 (1/4)	.2500	**.030**	.750 (3x)	3	1/4	2-1/2	904216	38.20	904216-C8	48.50		
.250 (1/4)	.2500	**.060**	.750 (3x)	3	1/4	2-1/2	834816	38.20	834816-C8	48.50		
.375 (3/8)	.3750	**.015**	1.125 (3x)	3	3/8	2-1/2	912424	62.40	912424-C8	82.40		
.375 (3/8)	.3750	**.030**	1.125 (3x)	3	3/8	2-1/2	904224	62.40	904224-C8	82.40		
.375 (3/8)	.3750	**.060**	.570 (1.5x)	3	3/8	2-1/2	744960	62.40	744960-C8	82.40		
.500 (1/2)	.5000	**.015**	.750 (1.5x)	3	1/2	3	831232	91.00	831232-C8	109.40		
.500 (1/2)	.5000	**.030**	.750 (1.5x)	3	1/2	3	893932	91.00	893932-C8	109.40		

Please See Speeds & Feeds On Page 224

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Long reach design for deep cavities • Reduced neck diameter to avoid heeling
- Variable helix design (approx. 42°) reduces chatter and harmonics and increases material removal rates
- Small corner radius for improved strength • 3 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB2 COATED	
D1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	R +.001″ −.001″ +.025mm −.025mm	L2 +.010″ −.000″ +.25mm −.00mm	L3 +.010″ −.000″ +.25mm −.00mm		D2 (h6)	L1	3 FL	USD$	3 FL	USD$
.015 (1/64)		.0150	**.002**	.023	.078 (5x)	3	1/8	2-1/2	956515	63.60	956515-C8	71.80
.015 (1/64)		.0150	**.002**	.023	.125 (8x)	3	1/8	2-1/2	961315	65.70	961315-C8	73.90
.020		.0200	**.002**	.030	.100 (5x)	3	1/8	2-1/2	956520	60.20	956520-C8	69.20
.025		.0250	**.002**	.038	.125 (5x)	3	1/8	2-1/2	956525	59.30	956525-C8	67.50
.031 (1/32)		.0310	**.003**	.047	.156 (5x)	3	1/8	2-1/2	956531	54.80	956531-C8	63.70
.031 (1/32)		.0310	**.003**	.047	.250 (8x)	3	1/8	2-1/2	961331	56.30	961331-C8	65.20
.031 (1/32)		.0310	**.003**	.047	.312 (10x)	3	1/8	2-1/2	861031	61.40	861031-C8	69.60
.031 (1/32)		.0310	**.003**	.047	.375 (12x)	3	1/8	2-1/2	949631	62.30	949631-C8	70.50
.031 (1/32)		.0310	**.010**	.047	.250 (8x)	3	1/8	2-1/2	876231	56.80	876231-C8	65.00
	1.0 mm	.0393	**.08 mm**	1.50 mm	5.0 mm (5x)	3	4 mm	50 mm	907622	60.80	907622-C8	69.40
.040		.0400	**.003**	.060	.203 (5x)	3	1/8	2-1/2	956540	55.10	956540-C8	63.30
.040		.0400	**.003**	.060	.325 (8x)	3	1/8	2-1/2	961340	56.30	961340-C8	65.20
.047 (3/64)		.0470	**.003**	.071	.250 (5x)	3	1/8	2-1/2	956547	54.80	956547-C8	63.70
.047 (3/64)		.0470	**.003**	.071	.375 (8x)	3	1/8	2-1/2	961347	56.30	961347-C8	65.20
.047 (3/64)		.0470	**.003**	.071	.570 (12x)	3	1/8	2-1/2	949647	62.30	949647-C8	70.50
.047 (3/64)		.0470	**.010**	.071	.375 (8x)	3	1/8	2-1/2	876247	56.80	876247-C8	65.70
.062 (1/16)		.0620	**.005**	.093	.312 (5x)	3	1/8	2-1/2	956562	54.80	956562-C8	63.70
.062 (1/16)		.0620	**.005**	.093	.500 (8x)	3	1/8	2-1/2	961362	56.30	961362-C8	65.20
.062 (1/16)		.0620	**.005**	.093	.625 (10x)	3	1/8	2-1/2	861062	60.80	861062-C8	69.80
.062 (1/16)		.0620	**.005**	.093	.750 (12x)	3	1/8	2-1/2	949662	62.30	949662-C8	70.50
.062 (1/16)		.0620	**.005**	.093	.950 (15x)	3	1/8	2-1/2	886862	62.30	886862-C8	70.50
.062 (1/16)		.0620	**.010**	.093	.500 (8x)	3	1/8	2-1/2	876262	56.30	876262-C8	65.20
.078 (5/64)		.0780	**.005**	.118	.406 (5x)	3	1/8	2-1/2	956578	54.80	956578-C8	63.70
.078 (5/64)		.0780	**.005**	.118	.625 (8x)	3	1/8	2-1/2	961378	56.30	961378-C8	65.20
.078 (5/64)		.0780	**.005**	.118	.940 (12x)	3	1/8	2-1/2	949678	62.30	949678-C8	70.50
.078 (5/64)		.0780	**.010**	.118	.625 (8x)	3	1/8	2-1/2	876278	56.30	876278-C8	65.20
	2.0 mm	.0787	**.10 mm**	3.00 mm	10.0 mm (5x)	3	4 mm	50 mm	907645	60.80	907645-C8	69.40
.093 (3/32)		.0930	**.005**	.140	.500 (5x)	3	1/8	2-1/2	956593	54.80	956593-C8	63.70
.093 (3/32)		.0930	**.005**	.140	.750 (8x)	3	1/8	2-1/2	961393	56.30	961393-C8	65.20
.093 (3/32)		.0930	**.005**	.140	.950 (10x)	3	1/8	2-1/2	861093	60.80	861093-C8	69.80
.093 (3/32)		.0930	**.005**	.140	1.125 (12x)	3	1/8	2-1/2	949693	62.30	949693-C8	70.50
.093 (3/32)		.0930	**.005**	.140	1.400 (15x)	3	1/8	3	886893	65.50	886893-C8	73.70
.093 (3/32)		.0930	**.010**	.140	.750 (8x)	3	1/8	2-1/2	876293	56.30	876293-C8	64.50
.093 (3/32)		.0930	**.030**	.140	.500 (5x)	3	1/8	2-1/2	761093	54.80	761093-C8	63.00
.093 (3/32)		.0930	**.030**	.140	.750 (8x)	3	1/8	2-1/2	891893	56.30	891893-C8	64.50
	3.0 mm	.1181	**.10 mm**	4.50 mm	15.0 mm (5x)	3	4 mm	50 mm	907657	57.30	907657-C8	66.70
D1 +.000″ −.002″		decimal equivalent	R +.001″ −.001″	L2 +.030″ −.000″	L3 +.030″ −.000″		D2 (h6)	L1	3 FL	USD$	3 FL	USD$
.125 (1/8)		.1250	**.005**	.187	.625 (5x)	3	1/8	2-1/2	956608	53.10	956608-C8	62.00
.125 (1/8)		.1250	**.005**	.187	1.000 (8x)	3	1/8	2-1/2	961408	54.50	961408-C8	63.30

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Corner Radius – Long Reach, Stub Flute (cont.)

continued from previous page

CUTTER DIAMETER		CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	decimal equivalent	R +.001″ −.001″	L_2 +.030″ −.000″	L_3 +.030″ −.000″		D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
.125 (1/8)	.1250	**.005**	.187	1.250 (10x)	3	1/8	2-1/2	861108	58.20	861108-C8	67.20
.125 (1/8)	.1250	**.005**	.187	1.500 (12x)	3	1/8	3	949708	59.70	949708-C8	68.60
.125 (1/8)	.1250	**.005**	.187	1.875 (15x)	3	1/8	3	886908	63.50	886908-C8	72.40
.125 (1/8)	.1250	**.010**	.187	1.000 (8x)	3	1/8	2-1/2	876308	54.50	876308-C8	63.30
.125 (1/8)	.1250	**.030**	.187	1.000 (8x)	3	1/8	2-1/2	891908	54.50	891908-C8	63.30
.156 (5/32)	.1562	**.005**	.235	.750 (5x)	3	3/16	3	956610	59.80	956610-C8	68.80
.156 (5/32)	.1562	**.005**	.235	1.250 (8x)	3	3/16	3	961410	61.40	961410-C8	70.30
.187 (3/16)	.1875	**.005**	.285	1.000 (5x)	3	3/16	3	956612	59.80	956612-C8	68.80
.187 (3/16)	.1875	**.005**	.285	1.500 (8x)	3	3/16	3	961412	61.40	961412-C8	70.30
.187 (3/16)	.1875	**.005**	.285	2.250 (12x)	3	3/16	4	949712	77.70	949712-C8	87.30
.187 (3/16)	.1875	**.030**	.285	1.000 (5x)	3	3/16	3	761112	59.80	761112-C8	68.80
.187 (3/16)	.1875	**.030**	.285	1.500 (8x)	3	3/16	3	891912	61.40	891912-C8	70.30
.250 (1/4)	.2500	**.010**	.375	1.250 (5x)	3	1/4	4	956616	63.80	956616-C8	75.40
.250 (1/4)	.2500	**.010**	.375	2.000 (8x)	3	1/4	4	961416	65.10	961416-C8	76.70
.250 (1/4)	.2500	**.010**	.375	3.000 (12x)	3	1/4	6	949716	82.40	949716-C8	97.80
.250 (1/4)	.2500	**.030**	.375	1.250 (5x)	3	1/4	4	761116	63.80	761116-C8	75.40
.250 (1/4)	.2500	**.030**	.375	2.000 (8x)	3	1/4	4	891916	65.10	891916-C8	76.70

Speeds & Feeds (Variable Helix – Long Reach, Stub Flute For Aluminum Alloys)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 3x, increase to 135%; for 5x, increase to 125%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 90%; for 12x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

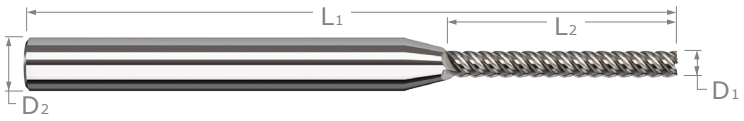
Cutter Series	Material	SFM
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000
	Magnesium Alloys: All alloys	1500
	Zinc Alloys: All alloys	800
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400
	Magnesium Alloys: All alloys	2000
	Zinc Alloys: All alloys	1100
Amorphous Diamond	**Aluminum (High Silicon):** Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000
	Wrought - 5% - 8% Si (4xxx)	2200
	Wrought - 8% - 12% Si (4xxx)	1700
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	800
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750

	Chip Load Per Tooth (IPT) By Cutter Diameter								
	.015	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
Roughing	.00018	.00038	.00058	.00076	.00096	.00115	.00154	.00230	.00308
Finishing	.00020	.00041	.00062	.00082	.00103	.00123	.00165	.00247	.00330
Max	.00021	.00044	.00066	.00087	.00110	.00131	.00176	.00263	.00352
Slotting	.00013	.00026	.00040	.00052	.00066	.00079	.00106	.00158	.00211
Roughing	.00015	.00031	.00046	.00061	.00077	.00092	.00123	.00184	.00246
Finishing	.00016	.00033	.00050	.00065	.00082	.00098	.00132	.00197	.00264
Max	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00211	.00282
			Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia			
Slotting	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343
Roughing	.00024	.00050	.00075	.00099	.00125	.00149	.00200	.00299	.00400
Finishing	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429
Max	.00027	.00057	.00086	.00113	.00143	.00170	.00229	.00342	.00458
			Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .4x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .4x Dia; Roughing: .5x - 1x Dia; Finishing: .5x - 1x Dia			
Slotting	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
Roughing	.00020	.00042	.00064	.00084	.00106	.00126	.00169	.00253	.00339
Finishing	.00022	.00045	.00068	.00090	.00113	.00135	.00182	.00272	.00363
Max	.00023	.00048	.00073	.00096	.00121	.00144	.00194	.00290	.00387
Slotting	.00014	.00029	.00044	.00058	.00072	.00086	.00116	.00174	.00232
Roughing	.00016	.00034	.00051	.00067	.00085	.00101	.00136	.00203	.00271
Finishing	.00017	.00036	.00055	.00072	.00091	.00108	.00145	.00217	.00290
Max	.00019	.00038	.00058	.00077	.00097	.00115	.00155	.00232	.00310
			Radial Depth of Cut*: Slotting: 1x Dia; Roughing: .3x Dia; Finishing: .1x Dia			**Axial Depth of Cut*:** Slotting: .3x Dia; Roughing: .3x - .8x Dia; Finishing: .5x - 1x Dia			

* If less than minimum Axial or Radial DOC values are used, increased feed rates are possible. If greater than maximum Axial and Radial DOC values are used, decreased feed rates may be needed.

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation • h6 shank tolerance for high precision tool holders
- End cutting (not center cutting) • Solid carbide • CNC ground in the USA

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.015 (1/64)		.0150	**.078** (5x)	4	1/8	2-1/2	66715	57.50	66715-C8	65.70
.015 (1/64)		.0150	**.125** (8x)	4	1/8	2-1/2	67115	57.20	67115-C8	65.40
.020		.0200	**.100** (5x)	4	1/8	2-1/2	66720	54.90	66720-C8	63.70
.020		.0200	**.160** (8x)	4	1/8	2-1/2	67120	57.80	67120-C8	66.00
.025		.0250	**.125** (5x)	4	1/8	2-1/2	66725	53.40	66725-C8	62.30
.025		.0250	**.203** (8x)	4	1/8	2-1/2	67125	54.70	67125-C8	62.90
.031 (1/32)		.0310	**.093** (3x)	5	1/8	1-1/2	948831	36.30	948831-C8	45.30
.031 (1/32)		.0310	**.156** (5x)	5	1/8	2-1/2	66731	51.00	66731-C8	59.80
.031 (1/32)		.0310	**.250** (8x)	5	1/8	2-1/2	67131	52.40	67131-C8	61.20
.031 (1/32)		.0310	**.312** (10x)	5	1/8	2-1/2	917631	66.80	917631-C8	75.70
	1.0 mm	.0393	**5.00 mm** (5x)	5	4 mm	50 mm	915522	53.00	915522-C8	61.70
	1.0 mm	.0393	**8.00 mm** (8x)	5	4 mm	50 mm	907122	55.30	907122-C8	63.90
.040		.0400	**.203** (5x)	5	1/8	2-1/2	66740	51.00	66740-C8	59.80
.040		.0400	**.325** (8x)	5	1/8	2-1/2	67140	52.40	67140-C8	61.20
.047 (3/64)		.0470	**.141** (3x)	5	1/8	1-1/2	948847	36.30	948847-C8	45.30
.047 (3/64)		.0470	**.250** (5x)	5	1/8	2-1/2	66747	51.00	66747-C8	59.80
.047 (3/64)		.0470	**.375** (8x)	5	1/8	2-1/2	67147	52.40	67147-C8	60.60
.050		.0500	**.250** (5x)	5	1/8	2-1/2	66750	51.00	66750-C8	59.80
.050		.0500	**.400** (8x)	5	1/8	2-1/2	67150	52.40	67150-C8	61.20
.060		.0600	**.312** (5x)	5	1/8	2-1/2	66760	47.20	66760-C8	56.20
.060		.0600	**.500** (8x)	5	1/8	2-1/2	67160	48.80	67160-C8	57.00
.062 (1/16)		.0620	**.186** (3x)	5	1/8	1-1/2	948862	33.90	948862-C8	42.80
.062 (1/16)		.0620	**.312** (5x)	5	1/8	2-1/2	66762	47.20	66762-C8	56.20
.062 (1/16)		.0620	**.500** (8x)	5	1/8	2-1/2	67162	48.80	67162-C8	57.70
.062 (1/16)		.0620	**.625** (10x)	5	1/8	2-1/2	917662	71.70	917662-C8	79.90
.078 (5/64)		.0780	**.234** (3x)	5	1/8	1-1/2	948878	33.90	948878-C8	42.80
.078 (5/64)		.0780	**.406** (5x)	5	1/8	2-1/2	66778	47.20	66778-C8	56.20
.078 (5/64)		.0780	**.625** (8x)	5	1/8	2-1/2	67178	48.80	67178-C8	57.70
	2.0 mm	.0787	**10.00 mm** (5x)	5	4 mm	50 mm	915545	51.90	915545-C8	60.50
	2.0 mm	.0787	**16.00 mm** (8x)	5	4 mm	50 mm	907145	53.00	907145-C8	61.70
.093 (3/32)		.0930	**.279** (3x)	5	1/8	1-1/2	948893	33.90	948893-C8	42.80
.093 (3/32)		.0930	**.375** (4x)	5	1/8	2-1/2	829493	46.70	829493-C8	55.60
.093 (3/32)		.0930	**.500** (5x)	5	1/8	2-1/2	66793	47.20	66793-C8	56.20
.093 (3/32)		.0930	**.750** (8x)	5	1/8	2-1/2	67193	48.80	67193-C8	57.70
.093 (3/32)		.0930	**.950** (10x)	5	1/8	2-1/2	917693	73.20	917693-C8	81.40

continued on next page

VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square (cont.)

continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	+.00mm −.02mm	decimal equivalent	L_2 +.010″ −.000″ +.25mm −.00mm		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.100		.1000	**.500** (5x)	5	1/8	2-1/2	66800	47.20	66800-C8	56.20
.100		.1000	**.800** (8x)	5	1/8	2-1/2	67200	48.80	67200-C8	57.70
.109 (7/64)		.1090	**.570** (5x)	5	1/8	2-1/2	66802	47.20	66802-C8	56.20
.109 (7/64)		.1090	**.900** (8x)	5	1/8	2-1/2	67202	48.80	67202-C8	57.70
	3.0 mm	.1181	**15.00 mm** (5x)	5	4 mm	50 mm	915557	51.40	915557-C8	60.90
	3.0 mm	.1181	**24.00 mm** (8x)	5	4 mm	50 mm	907157	53.00	907157-C8	62.40

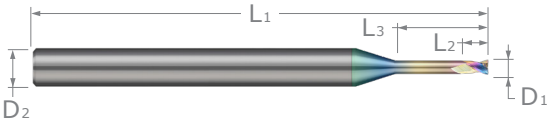
D_1 +.000″ −.002″	decimal equivalent	L_2 +.030″ −.000″	FLUTES	D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.1250	**.187** (1.5x)	5	1/8	1-1/2	856908	31.00	856908-C8	39.70
.125 (1/8)	.1250	**.375** (3x)	5	1/8	1-1/2	948908	31.00	948908-C8	39.70
.125 (1/8)	.1250	**.500** (4x)	5	1/8	2-1/2	829508	44.80	829508-C8	53.60
.125 (1/8)	.1250	**.625** (5x)	5	1/8	2-1/2	66808	45.50	66808-C8	54.20
.125 (1/8)	.1250	**1.000** (8x)	5	1/8	2-1/2	67208	47.70	67208-C8	56.70
.125 (1/8)	.1250	**1.125** (10x)	5	1/8	2-1/2	917708	71.90	917708-C8	80.80
.156 (5/32)	.1562	**.750** (5x)	5	3/16	3	66810	48.60	66810-C8	57.50
.156 (5/32)	.1562	**1.250** (8x)	5	3/16	3	67210	52.40	67210-C8	61.20
.187 (3/16)	.1875	**.285** (1.5x)	5	3/16	2	856912	36.40	856912-C8	45.00
.187 (3/16)	.1875	**.570** (3x)	5	3/16	2	948912	36.40	948912-C8	45.00
.187 (3/16)	.1875	**1.000** (5x)	5	3/16	3	66812	48.60	66812-C8	57.50
.187 (3/16)	.1875	**1.500** (8x)	5	3/16	3	67212	52.40	67212-C8	61.20
.187 (3/16)	.1875	**1.875** (10x)	5	3/16	4	917712	73.00	917712-C8	82.70
.250 (1/4)	.2500	**.375** (1.5x)	5	1/4	2-1/2	856916	48.20	856916-C8	58.30
.250 (1/4)	.2500	**.750** (3x)	5	1/4	2-1/2	948916	48.20	948916-C8	58.30
.250 (1/4)	.2500	**1.250** (5x)	5	1/4	4	66816	59.40	66816-C8	70.70
.250 (1/4)	.2500	**2.000** (8x)	5	1/4	4	67216	63.00	67216-C8	74.60
.375 (3/8)	.3750	**1.125** (3x)	5	3/8	2-1/2	948924	67.30	948924-C8	86.60
.500 (1/2)	.5000	**1.500** (3x)	5	1/2	3	948932	90.70	948932-C8	109.10

SPEEDS & FEEDS (High Helix Finishers for Aluminum & Non-Ferrous Alloys)

Cutter Series	Material	SFM		Chip Load Per Tooth (IPT) .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750												
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing (3x LOC)	.00027	.00056	.00085	.00112	.00140	.00167	.00225	.00337	.00450	.12x Dia	.5x - 3x Dia
	Magnesium Alloys: All alloys	1500												
	Zinc Alloys: All alloys	800												
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225												
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	Finishing (4x LOC)	00024	.00049	00074	.00098	.00123	00146	00197	00295	00394	.10x Dia	.5x - 4x Dia
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225												
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Finishing (5x LOC)	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.09x Dia	.5x - 5x Dia
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500												
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	Finishing (8x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	.07x Dia	.5x - 8x Dia
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing (10x LOC)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.05x Dia	.5x - 10x Dia
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Finishing (3x LOC)	.00035	.00073	.00110	.00145	.00183	.00218	.00293	.00438	.00585	.12x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00031	.00063	.00096	.00127	.00160	.00190	.00256	.00383	.00512	.10x Dia	.5x - 4x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Finishing (5x LOC)	.00026	.00054	.00082	.00109	.00137	.00163	.00219	.00328	.00439	.09x Dia	.5x - 5x Dia
	Magnesium Alloys: All alloys	2000	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia
	Zinc Alloys: All alloys	1100	Finishing (10x LOC)	.00018	.00038	.00057	.00075	.00095	.00113	.00152	.00228	.00304	.05x Dia	.5x - 10x Dia

END MILLS FOR ALUMINUM ALLOYS

Finishers – Tight Tolerance – Square

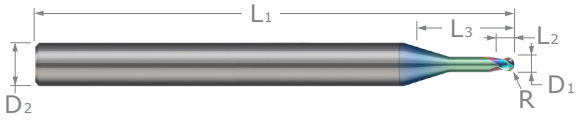


- Tight tolerance diameter offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling
- Manufactured to DIN 6535 Form HA
- 2 flute
- Center cutting
- CNC ground in Switzerland

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
D_1 $^{+.000mm}_{-.008mm}$	L_2 $^{+.10mm}_{-.10mm}$	L_3 $^{+.20mm}_{-.00mm}$	D_2 (h5)	L_1	2 FL	USD$
.20 mm	.30 mm	.50 mm (2x)	4 mm	50 mm	689504-C4	58.00
.50 mm	.75 mm	2.00 mm (4x)	4 mm	50 mm	689411-C4	55.40
.50 mm	.75 mm	3.00 mm (6x)	4 mm	50 mm	689211-C4	55.40
.80 mm	1.20 mm	2.00 mm (2x)	4 mm	50 mm	689518-C4	55.40
1.00 mm	1.50 mm	5.00 mm (5x)	4 mm	50 mm	689322-C4	55.40
1.00 mm	1.50 mm	6.00 mm (6x)	4 mm	50 mm	689222-C4	55.40
1.50 mm	2.25 mm	6.00 mm (4x)	4 mm	50 mm	689433-C4	55.40
2.00 mm	3.00 mm	4.00 mm (2x)	4 mm	50 mm	689545-C4	54.90
2.00 mm	3.00 mm	8.00 mm (4x)	4 mm	50 mm	689445-C4	54.90

END MILLS FOR ALUMINUM ALLOYS

Finishers – Tight Tolerance – Ball



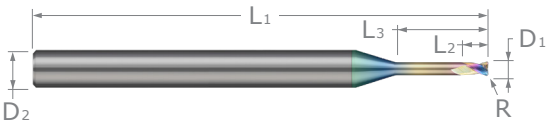
- Tightly-toleranced radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
D_1 $^{+.000mm}_{-.008mm}$	R $^{+.002mm}_{-.002mm}$	L_2 $^{+.10mm}_{-.10mm}$	L_3 $^{+.20mm}_{-.00mm}$	D_2 (h5)	L_1	2 FL	USD$
.30 mm	.15 mm	.25 mm	1.00 mm (3x)	4 mm	50 mm	690206-C4	60.80
.30 mm	.15 mm	.25 mm	1.50 mm (5x)	4 mm	50 mm	690006-C4	60.80
.30 mm	.15 mm	.25 mm	2.00 mm (6x)	4 mm	50 mm	689906-C4	60.80
.40 mm	.20 mm	.30 mm	2.00 mm (5x)	4 mm	50 mm	690009-C4	60.80
.40 mm	.20 mm	.30 mm	4.00 mm (10x)	4 mm	50 mm	689609-C4	60.80
.50 mm	.25 mm	.40 mm	2.00 mm (4x)	4 mm	50 mm	690111-C4	57.60
.50 mm	.25 mm	.40 mm	3.00 mm (6x)	4 mm	50 mm	689911-C4	57.60
.50 mm	.25 mm	.40 mm	4.00 mm (8x)	4 mm	50 mm	689711-C4	57.60
.60 mm	.30 mm	.50 mm	4.00 mm (6x)	4 mm	50 mm	689913-C4	57.60
.60 mm	.30 mm	.50 mm	6.00 mm (10x)	4 mm	50 mm	689613-C4	57.60
.60 mm	.30 mm	.50 mm	2.00 mm (3x)	4 mm	50 mm	690213-C4	57.60
.80 mm	.40 mm	.60 mm	4.00 mm (5x)	4 mm	50 mm	690018-C4	57.60
.80 mm	.40 mm	.60 mm	6.00 mm (7x)	4 mm	50 mm	689818-C4	57.60
1.00 mm	.50 mm	.80 mm	5.00 mm (5x)	4 mm	50 mm	690022-C4	57.60
1.00 mm	.50 mm	.80 mm	10.00 mm (10x)	4 mm	50 mm	689622-C4	57.60
1.00 mm	.50 mm	.80 mm	8.00 mm (8x)	4 mm	50 mm	689722-C4	57.60
1.00 mm	.50 mm	.80 mm	6.00 mm (6x)	4 mm	50 mm	689922-C4	57.60
1.50 mm	.75 mm	1.20 mm	8.00 mm (5x)	4 mm	50 mm	690033-C4	58.60
1.50 mm	.75 mm	1.20 mm	12.00 mm (8x)	4 mm	55 mm	689733-C4	58.60
1.50 mm	.75 mm	1.20 mm	10.00 mm (6x)	4 mm	50 mm	689933-C4	58.60
2.00 mm	1.00 mm	1.50 mm	10.00 mm (5x)	4 mm	50 mm	690045-C4	58.60
2.00 mm	1.00 mm	1.50 mm	20.00 mm (10x)	4 mm	60 mm	689645-C4	58.60
2.00 mm	1.00 mm	1.50 mm	15.00 mm (7x)	4 mm	55 mm	689845-C4	58.60
2.00 mm	1.00 mm	1.50 mm	6.00 mm (3x)	4 mm	50 mm	690245-C4	58.60
2.00 mm	1.00 mm	1.50 mm	12.00 mm (6x)	4 mm	55 mm	689945-C4	58.60
3.00 mm	1.50 mm	3.00 mm	10.00 mm (3x)	4 mm	65 mm	690257-C4	59.80
3.00 mm	1.50 mm	3.00 mm	15.00 mm (5x)	4 mm	65 mm	690057-C4	59.80
3.00 mm	1.50 mm	3.00 mm	20.00 mm (6x)	4 mm	65 mm	689957-C4	59.80
4.00 mm	2.00 mm	4.00 mm	20.00 mm (5x)	6 mm	65 mm	690061-C4	69.50

D_1 $^{-.006mm}_{-.014mm}$	R $^{+.002mm}_{-.002mm}$	L_2 $^{+.10mm}_{-.10mm}$	L_3 $^{+.20mm}_{-.00mm}$	D_2 (h5)	L_1	2 FL	USD$
6.00 mm	3.00 mm	6.00 mm	30.00 mm (5x)	6 mm	75 mm	690066-C4	72.90

END MILLS FOR ALUMINUM ALLOYS

Finishers – Tight Tolerance – Corner Radius



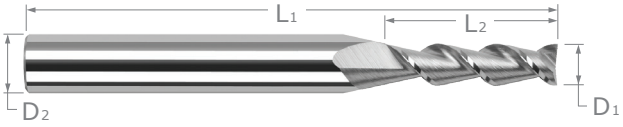
- Tightly-toleranced radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications
- h5 shank tolerance for high precision tool holders
- Thin amorphous diamond coating enhances sharpness and provides a better finish on parts while creating a distinctive rainbow sheen
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
D_1 $^{+.000mm}_{-.008mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.10mm}_{-.10mm}$	L_3 $^{+.20mm}_{-.00mm}$	D_2 (h5)	L_1	2 FL	USD$
.50 mm	.05 mm	.35 mm	2 mm (4x)	4 mm	50 mm	686611-C4	59.60
1.00 mm	.10 mm	.80 mm	3 mm (3x)	4 mm	50 mm	686822-C4	59.60
1.00 mm	.10 mm	.80 mm	5 mm (5x)	4 mm	50 mm	686422-C4	59.60
1.00 mm	.10 mm	.80 mm	7 mm (7x)	4 mm	50 mm	685822-C4	59.60
1.00 mm	.20 mm	.80 mm	8 mm (8x)	4 mm	50 mm	685622-C4	59.60
1.00 mm	.10 mm	.80 mm	10 mm (10x)	4 mm	50 mm	685422-C4	61.10
1.00 mm	.20 mm	.80 mm	10 mm (10x)	4 mm	50 mm	685322-C4	61.10
1.50 mm	.15 mm	1.35 mm	8 mm (5x)	4 mm	50 mm	686133-C4	59.10
1.50 mm	.15 mm	1.35 mm	12 mm (8x)	4 mm	55 mm	685533-C4	59.10
2.00 mm	.20 mm	1.70 mm	10 mm (5x)	4 mm	50 mm	686345-C4	59.10
2.00 mm	.20 mm	1.70 mm	12 mm (6x)	4 mm	55 mm	686045-C4	59.10
2.00 mm	.20 mm	1.70 mm	15 mm (7x)	4 mm	55 mm	685745-C4	59.10
2.00 mm	.20 mm	1.70 mm	20 mm (10x)	4 mm	60 mm	685345-C4	60.50
3.00 mm	.30 mm	3.00 mm	15 mm (5x)	4 mm	65 mm	686257-C4	61.30
3.00 mm	.30 mm	3.00 mm	20 mm (6x)	4 mm	65 mm	685957-C4	61.30
4.00 mm	.30 mm	4.00 mm	20 mm (5x)	6 mm	65 mm	686261-C4	71.70
5.00 mm	.30 mm	5.00 mm	20 mm (4x)	6 mm	65 mm	686564-C4	71.70

D_1 $^{-.006mm}_{-.014mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.10mm}_{-.10mm}$	L_3 $^{+.20mm}_{-.00mm}$	D_2 (h5)	L_1	2 FL	USD$
6.00 mm	.30 mm	6.00 mm	20 mm (3x)	6 mm	65 mm	686766-C4	71.70

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square



◀ **Down to .010"!**

- 2 flute and 3 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIA.	OVERALL LENGTH	UNCOATED			ZrN COATED		TiB_2 COATED		
D_1 +.0005" −.0005"	L_2 +.010" −.000"	D_2 (h6)	L_1	2 FL	3 FL	USD$	2 FL	USD$	2 FL	3 FL	USD$
.010	**.030** (3x)	1/8	1-1/2	24110		36.10			24110-C8		43.80
.015 (1/64)	**.045** (3x)	1/8	1-1/2	24115		35.30			24115-C8		43.00
.020	**.060** (3x)	1/8	1-1/2	24120		33.10			24120-C8		41.90
.025	**.075** (3x)	1/8	1-1/2	24125		30.70			24125-C8		39.50
.030	**.090** (3x)	1/8	1-1/2	24130		26.60			24130-C8		34.30
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	935531		26.60			935531-C8		34.30
.031 (1/32)	**.093** (3x)	1/8	1-1/2	24131	747431	26.60	24131-C7	33.90	24131-C8	747431-C8	34.30
.031 (1/32)	**.156** (5x)	1/8	2-1/2	932031		34.70			932031-C8		43.60
.039 (1 mm)	**.117** (3x)	1/8	1-1/2	24139		26.60			24139-C8		34.30
.040	**.120** (3x)	1/8	1-1/2	24140		26.60	24140-C7	33.90	24140-C8		34.30
.040	**.203** (5x)	1/8	2-1/2	932040		34.70			932040-C8		42.90
.047 (3/64)	**.071** (1.5x)	1/8	1-1/2	935547		26.60			935547-C8		34.30
.047 (3/64)	**.141** (3x)	1/8	1-1/2	24147	747447	26.60	24147-C7	33.90	24147-C8	747447-C8	34.30
.047 (3/64)	**.250** (5x)	1/8	2-1/2	932047		34.70			932047-C8		43.60
.050	**.150** (3x)	1/8	1-1/2	24150		26.60	24150-C7	33.90	24150-C8		34.30
.050	**.250** (5x)	1/8	2-1/2	932050		34.70			932050-C8		43.60
.060	**.180** (3x)	1/8	1-1/2	24160		26.60	24160-C7	33.90	24160-C8		34.30
.060	**.312** (5x)	1/8	2-1/2	932060		36.60			932060-C8		45.60
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	935562		23.30			935562-C8		30.90
.062 (1/16)	**.186** (3x)	1/8	1-1/2	24162	747462	23.30	24162-C7	30.50	24162-C8	747462-C8	30.90
.062 (1/16)	**.250** (4x)	1/8	2-1/2	789662		36.00			789662-C8		44.90
.062 (1/16)	**.312** (5x)	1/8	2-1/2	932062		36.00	932062-C7	43.10	932062-C8		44.90
.070	**.210** (3x)	1/8	1-1/2	24170		23.30	24170-C7	30.50	24170-C8		30.90
.078 (5/64)	**.117** (1.5x)	1/8	1-1/2	935578		23.30			935578-C8		30.90
.078 (5/64)	**.234** (3x)	1/8	1-1/2	24178	747478	23.30	24178-C7	30.50	24178-C8	747478-C8	30.90
.078 (5/64)	**.406** (5x)	1/8	2-1/2	932078		36.00			932078-C8		44.20
.080	**.240** (3x)	1/8	1-1/2	24180		23.30	24180-C7	30.90	24180-C8		30.90
.090	**.270** (3x)	1/8	1-1/2	24190		23.30	24190-C7	30.90	24190-C8		30.90
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	935593		23.30			935593-C8		30.90
.093 (3/32)	**.279** (3x)	1/8	1-1/2	24193	747493	23.30	24193-C7	30.50	24193-C8	747493-C8	30.90
.093 (3/32)	**.375** (4x)	1/8	2-1/2	789693		36.00			789693-C8		44.90
.093 (3/32)	**.500** (5x)	1/8	2-1/2	932093		36.00			932093-C8		44.90
.100	**.300** (3x)	1/8	1-1/2	24199		23.30	24199-C7	30.50	24199-C8		30.90
.109 (7/64)	**.327** (3x)	1/8	1-1/2	24202		35.30			24202-C8		43.00
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	24205		34.90			24205-C8		42.60

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HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIA.	OVERALL LENGTH	UNCOATED			ZrN COATED		TiB_2 COATED		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	2 FL	3 FL	USD$	2 FL	USD$	2 FL	3 FL	USD$
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	935608		20.70			935608-C8		29.30
.125 (1/8)	**.375** (3x)	1/8	1-1/2	752708	747508	20.90			752708-C8	747508-C8	28.50
.125 (1/8)	**.500** (4x)	1/8	1-1/2	24208		20.70	24208-C7	28.00	24208-C8		29.30
.125 (1/8)	**.625** (5x)	1/8	2-1/2	932108		29.50			932108-C8		38.40
.140 (9/64)	**.500** (3x)	3/16	2	24209		29.00			24209-C8		37.60
.156 (5/32)	**.235** (1.5x)	3/16	2	935610		23.60			935610-C8		32.20
.156 (5/32)	**.562** (3x)	3/16	2	24210		23.60	24210-C7	32.70	24210-C8		32.20
.156 (5/32)	**.750** (5x)	3/16	3	932110		29.50			932110-C8		38.70
.187 (3/16)	**.285** (1.5x)	3/16	2	935612		23.60			935612-C8		32.20
.187 (3/16)	**.625** (3x)	3/16	2	24212		23.40	24212-C7	31.30	24212-C8		32.00
.187 (3/16)	**1.000** (5x)	3/16	3	932112		29.50			932112-C8		38.70
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	935616		29.20			935616-C8		39.30
.250 (1/4)	**.750** (3x)	1/4	2-1/2	24216		29.20	24216-C7	40.30	24216-C8		39.30
.250 (1/4)	**1.250** (5x)	1/4	4	932116		36.80			932116-C8		48.70
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	752724		39.90			752724-C8		60.80

Speeds & Feeds (45° Helix)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

SERIES	MATERIAL	SFM	CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER
Uncoated	**Aluminum Alloys:**		
	Casting (2xx, 5xx, 7xx, 8xx)	750	
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	
	Copper Alloys:		
	High Coppers - 90%+ (C1xxxx)	225	
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500	
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	
	Magnesium Alloys	1500	
	Zinc Alloys	800	

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250
Roughing	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300
Finishing	.00025	.00038	.00050	.00062	.00074	.00100	.00150	.00200

Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

SERIES	MATERIAL	SFM
ZrN	**Aluminum Alloys (High Silicon):**	
	Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2500
	Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	2000
	Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1500
	Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	1000
	Wrought - 5% - 8% Si (4xxx)	2200
	Wrought - 8% - 12% Si (4xxx)	1700
	Copper Alloys:	
	High Coppers - 90%+ (C1xxxx)	800
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	1500
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	800
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	1000
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	1000
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	800
	Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300)	150
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	750
	Magnesium Alloys	2000
	Zinc Alloys	1100

	.031	.047	.062	.078	.093	.125	.187	.250
Slotting	.00039	.00059	.00078	.00098	.00116	.00156	.00234	.00313
Roughing	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
Finishing	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250

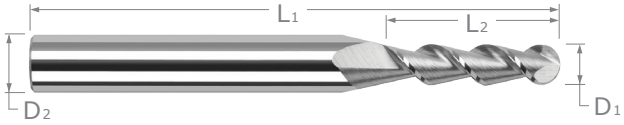
Radial Depth of Cut*:
Slotting: 1x Dia
Roughing: .5x Dia
Finishing: .1x Dia

Axial Depth of Cut*:
Slotting: .5x Dia
Roughing: .5x - 1x Dia
Finishing: 1x - 3x Dia

SERIES	MATERIAL	SFM
TiB_2	**Aluminum Alloys:**	
	Casting (2xx, 5xx, 7xx, 8xx)	1000
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400
	Magnesium Alloys	2000
	Zinc Alloys	1100

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Ball



- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

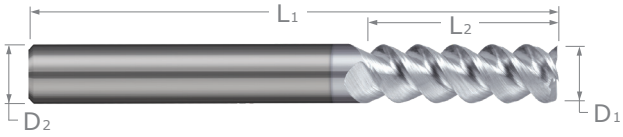
Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB_2 COATED	
D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
.015 (1/64)	**.045** (3x)	1/8	1-1/2	27815	40.60			27815-C8	48.30
.020	**.060** (3x)	1/8	1-1/2	27820	37.90			27820-C8	45.60
.031 (1/32)	**.047** (1.5x)	1/8	1-1/2	894831	30.70			894831-C8	38.40
.031 (1/32)	**.093** (3x)	1/8	1-1/2	27831	30.70	27831-C7	37.90	27831-C8	39.50
.031 (1/32)	**.156** (5x)	1/8	2-1/2	887631	38.50			887631-C8	46.70
.040	**.120** (3x)	1/8	1-1/2	27840	30.70	27840-C7	37.90	27840-C8	38.40
.047 (3/64)	**.141** (3x)	1/8	1-1/2	27847	30.70	27847-C7	37.90	27847-C8	39.50
.050	**.150** (3x)	1/8	1-1/2	27850	30.70	27850-C7	38.40	27850-C8	38.40
.060	**.180** (3x)	1/8	1-1/2	27860	30.70	27860-C7	37.90	27860-C8	38.40
.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	894862	29.10			894862-C8	36.70
.062 (1/16)	**.186** (3x)	1/8	1-1/2	27862	29.10	27862-C7	36.30	27862-C8	37.70
.062 (1/16)	**.312** (5x)	1/8	2-1/2	887662	38.50			887662-C8	46.70
.070	**.210** (3x)	1/8	1-1/2	27870	29.60	27870-C7	37.30	27870-C8	37.30
.078 (5/64)	**.234** (3x)	1/8	1-1/2	27878	29.10	27878-C7	36.30	27878-C8	36.70
.080	**.240** (3x)	1/8	1-1/2	27880	29.10	27880-C7	36.70	27880-C8	36.70
.090	**.270** (3x)	1/8	1-1/2	27890	29.60	27890-C7	37.30	27890-C8	37.30
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2	894893	29.10			894893-C8	36.70
.093 (3/32)	**.279** (3x)	1/8	1-1/2	27893	29.10	27893-C7	36.30	27893-C8	36.70
.093 (3/32)	**.500** (5x)	1/8	2-1/2	887693	39.30			887693-C8	47.50
.100	**.300** (3x)	1/8	1-1/2	27899	29.10	27899-C7	36.70	27899-C8	36.70
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	27905	39.50			27905-C8	47.20
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	894908	26.60			894908-C8	34.30
.125 (1/8)	**.500** (4x)	1/8	1-1/2	27908	25.80	27908-C7	33.20	27908-C8	33.50
.125 (1/8)	**.625** (5x)	1/8	2-1/2	887708	32.60			887708-C8	41.30
.156 (5/32)	**.562** (3x)	3/16	2	27910	28.00			27910-C8	36.60
.187 (3/16)	**.625** (3x)	3/16	2	27912	28.00	27912-C7	36.10	27912-C8	36.60
.250 (1/4)	**.750** (3x)	1/4	2-1/2	27916	32.10	27916-C7	43.20	27916-C8	42.30

Please See Speeds & Feeds On Page 245

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

60° Helix – Square



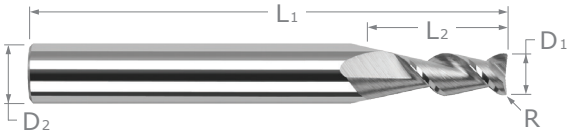
- 60° helix for excellent finishing operations in aluminum and other non-ferrous materials
- High helix design for faster chip removal
- h6 tolerance for high precision holders
- Center cutting
- Solid carbide
- CNC ground in the USA

Outstanding in Aluminum!

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2 +.010″ −.000″	D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	745231	28.50	745231-C8	36.20
	.062 (1/16)	**.186** (3x)	1/8	1-1/2	745262	25.10	745262-C8	34.10
	.093 (3/32)	**.279** (3x)	1/8	1-1/2	745293	25.10	745293-C8	32.80
	D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
	.125 (1/8)	**.375** (3x)	1/8	1-1/2	745308	22.70	745308-C8	31.70
NEW	.125 (1/8)	**.625** (5x)	1/8	2-1/2	695408	32.40	695408-C8	40.60
NEW	.140 (9/64)	**.425** (3x)	3/16	2	745309	31.90	745309-C8	40.50
NEW	.140 (9/64)	**.750** (5x)	3/16	3	695409	37.70	695409-C8	46.90
NEW	.156 (5/32)	**.469** (3x)	3/16	2	745310	25.60	745310-C8	34.30
NEW	.156 (5/32)	**.750** (5x)	3/16	3	695410	32.40	695410-C8	41.60
	.187 (3/16)	**.563** (3x)	3/16	2	745312	25.60	745312-C8	34.30
NEW	.187 (3/16)	**1.000** (5x)	3/16	3	695412	32.40	695412-C8	41.60
	.250 (1/4)	**.750** (3x)	1/4	2-1/2	745316	31.80	745316-C8	41.70
NEW	.250 (1/4)	**1.250** (5x)	1/4	4	695416	40.50	695416-C8	52.30
	.375 (3/8)	**1.125** (3x)	3/8	2-1/2	745324	43.30	745324-C8	59.10
NEW	.375 (3/8)	**2.000** (5x)	3/8	4	695424	47.00	695424-C8	64.00

HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Corner Radius



- Corner radius for improved strength
- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- TiB2 coating prevents built-up edge and extends tool life
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.031 (1/32)	.010	**.093** (3x)	1/8	1-1/2	718031	28.60	718031-C8	36.30
.047 (3/64)	.010	**.141** (3x)	1/8	1-1/2	718047	28.60	718047-C8	36.30
.062 (1/16)	.010	**.186** (3x)	1/8	1-1/2	718062	26.20	718062-C8	33.80
.078 (5/64)	.010	**.234** (3x)	1/8	1-1/2	718078	26.20	718078-C8	33.80
.093 (3/32)	.010	**.279** (3x)	1/8	1-1/2	718093	26.20	718093-C8	33.80
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.125 (1/8)	.010	**.375** (3x)	1/8	1-1/2	718108	23.50	718108-C8	31.10
.187 (3/16)	.010	**.570** (3x)	3/16	2	718112	25.80	718112-C8	34.50
.250 (1/4)	.010	**.750** (3x)	1/4	2-1/2	718116	30.70	718116-C8	41.80

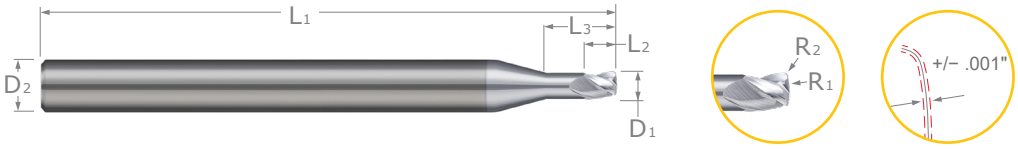
SPEEDS & FEEDS (High Helix for Aluminum & Non-Ferrous Alloys)

Important Note: : Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased. For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce to 90%; for 5x, reduce to 80%), For complete speeds and feeds charts, please see www.harveytool.com

Cutter Series	Material	SFM		Chip Load Per Tooth (IPT) .015	.031	.047	.062	.078	.093	.125	.187	.250	Depth of Cut Radial	Axial
Uncoated	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00014	.00028	.00043	.00049	.00062	.00074	.00099	.00148	.00198	1x Dia	.5x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000												
	Magnesium Alloys	1500												
	Zinc Alloys	800												
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Roughing	.00014	.00028	.00043	.00049	.00062	.00074	.00099	.00148	.00198	.5x Dia	.5x - 1x Dia
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500												
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	225	Finishing	.00017	.00036	.00054	.00062	.00078	.00093	.00125	.00187	.00250	.1x Dia	1x - 3x Dia
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	550												
TiB_2	**Aluminum:** Casting (2xx, 5xx, 7xx, 8xx)	1000	Slotting	.00018	.00037	.00056	.00064	.00080	.00096	.00129	.00193	.00257	.12x Dia	.5x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400												
	Magnesium Alloys	2000	Roughing	.00018	.00037	.00056	.00064	.00080	.00096	.00129	.001993	.00257	.05x Dia	.5x - 1x Dia
	Zinc Alloys	1100	Finishing	.00022	.00046	.00070	.00081	.00102	.00121	.00163	.00243	.00325	1x Dia	1x - 3x Dia

MULTI-AXIS FINISHERS FOR ALUMINUM ALLOYS

Lens Form



- Designed for massive reduction in cycle time with top quality results for finishing operations
- Lens form with two tangential radii for finishing floors
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- h6 shank tolerance for high precision tool holders
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

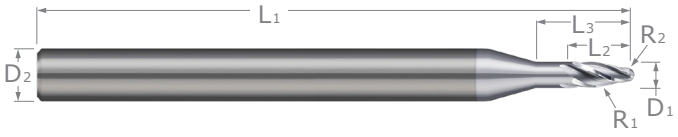
CUTTER DIAMETER	SKANK DIAMETER	MAJOR RADIUS	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	OVERALL LENGTH	BENEFIT MULTIPLE	TiB2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		3 FL	USD$
.062 (1/16)	1/8	.125 (1/8)	.004	.062 (1/16)	.163	1-1/2	2x	699862-C8	37.70
.078 (5/64)	1/8	.156 (5/32)	.005	.078 (5/64)	.178	1-1/2	2x	699878-C8	37.70
.093 (3/32)	1/8	.187 (3/16)	.006	.093 (3/32)	.194	1-1/2	2x	699893-C8	37.70

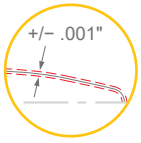
D_1 $^{+.000''}_{-.002''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		3 FL	USD$
.125 (1/8)	1/8	.250 (1/4)	.008	.125 (1/8)		1-1/2	2x	699908-C8	40.10
.156 (5/32)	3/16	.312 (5/16)	.010	.156 (5/32)	.356	2	2x	699910-C8	48.40
.187 (3/16)	3/16	.375 (3/8)	.012	.187 (3/16)		2	2x	699912-C8	57.10
.250 (1/4)	1/4	.500 (1/2)	.015	.250 (1/4)		2	2x	699916-C8	72.80
.312 (5/16)	5/16	.625 (5/8)	.018	.312 (5/16)		2-1/2	2x	699920-C8	80.70
.375 (3/8)	3/8	.750 (3/4)	.020	.375 (3/8)		2-1/2	2x	699924-C8	88.00
.500 (1/2)	1/2	1.000	.030	.500 (1/2)		3	2x	699932-C8	105.00

Technical information found on page 185.

MULTI-AXIS FINISHERS FOR ALUMINUM ALLOYS

Oval Form





- Designed for massive reduction in cycle time with top quality results for finishing operations
- Oval form with two tangential radii for versatility in angle of approach and clearance in tight spaces
- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	SKANK DIAMETER	MAJOR RADIUS	TIP RADIUS	LENGTH OF CUT	OVERALL REACH	OVERALL LENGTH	BENEFIT MULTIPLE	TiB2 COATED	
D_1 $^{+.0005''}_{-.0005''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.062 (1/16)	1/8	.500 (1/2)	.016	.138	.168	1-1/2	4x	699662-C8	38.70
.078 (5/64)	1/8	.625 (5/8)	.020	.172	.202	1-1/2	4x	699678-C8	38.70
.093 (3/32)	1/8	.750 (3/4)	.023	.206	.236	1-1/2	4x	699693-C8	38.70

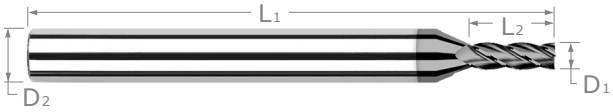
D_1 $^{+.000''}_{-.002''}$	D_2 (h6)	R_1	R_2	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_1		4 FL	USD$
.125 (1/8)	1/8	1.000	.031	.275		2	4x	699708-C8	41.00
.156 (5/32)	3/16	1.250	.039	.344	.374	2	4x	699710-C8	49.50
.187 (3/16)	3/16	1.500	.047	.413		2	4x	699712-C8	58.40
.250 (1/4)	1/4	2.000	.063	.551		2-1/2	4x	699716-C8	74.60
.312 (5/16)	5/16	2.500	.078	.688		2-1/2	4x	699720-C8	82.50
.375 (3/8)	3/8	3.000	.094	.826		2-1/2	4x	699724-C8	90.20
.500 (1/2)	1/2	4.000	.125	1.101		3	4x	699732-C8	107.60

Technical information found on page 185.

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.



CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
	.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			962715	106.00
	.015 (1/64)	**.045** (3x)	1/8	1-1/2	799715	90.90	995715	106.00
	.015 (1/64)	**.078** (5x)	1/8	2-1/2			936615	120.00
	.020	**.030** (1.5x)	1/8	1-1/2			962720	107.00
	.020	**.060** (3x)	1/8	1-1/2	799720	90.90	995720	106.00
	.020	**.100** (5x)	1/8	2-1/2			936620	120.00
NEW	.025	**.075** (3x)	1/8	1-1/2			995725	106.00
NEW	.025	**.125** (5x)	1/8	2-1/2			936625	120.00
	.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			962731	106.00
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	799731	90.90	995731	106.00
	.031 (1/32)	**.156** (5x)	1/8	2-1/2			936631	120.00
	.031 (1/32)	**.250** (8x)	1/8	2-1/2			891531	107.00
	.039 (1 mm)	**.117** (3x)	1/8	1-1/2			995739	106.00
	.040	**.120** (3x)	1/8	1-1/2			995740	106.00
	.040	**.203** (5x)	1/8	2-1/2			936640	120.00
	.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			962747	106.00
	.047 (3/64)	**.141** (3x)	1/8	1-1/2	799747	90.90	995747	106.00
	.047 (3/64)	**.250** (5x)	1/8	2-1/2			936647	120.00
	.050	**.150** (3x)	1/8	1-1/2			995750	106.00
	.050	**.250** (5x)	1/8	2-1/2			936650	120.00
NEW	.055	**.165** (3x)	1/8	1-1/2			995755	106.00
NEW	.055	**.275** (5x)	1/8	2-1/2			936655	120.00
	.060	**.090** (1.5x)	1/8	1-1/2			962760	107.00
	.060	**.180** (3x)	1/8	1-1/2			995760	106.00
	.060	**.312** (5x)	1/8	2-1/2			936660	120.00
	.062 (1/16)	**.050** (0.8x)	1/8	1-1/2			700462	106.80
NEW	.062 (1/16)	**.093** (1.5x)	1/8	1-1/2	699462	89.20	962762	105.00
	.062 (1/16)	**.186** (3x)	1/8	1-1/2	799762	89.20	995762	105.00
	.062 (1/16)	**.250** (4x)	1/8	2-1/2			871262	118.20
	.062 (1/16)	**.312** (5x)	1/8	2-1/2			936662	119.40
	.062 (1/16)	**.500** (8x)	1/8	2-1/2			891562	122.80
	.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			962778	106.10
	.078 (5/64)	**.234** (3x)	1/8	1-1/2			995778	105.00
	.078 (5/64)	**.406** (5x)	1/8	2-1/2			936678	119.40

continued on next page

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$	
.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			962793	105.00	
.093 (3/32)	**.279** (3x)	1/8	1-1/2	799793	90.10	995793	105.00	
.093 (3/32)	**.375** (4x)	1/8	2-1/2			871293	118.20	
.093 (3/32)	**.500** (5x)	1/8	2-1/2			936693	119.40	
.093 (3/32)	**.750** (8x)	1/8	2-1/2			891593	122.80	
.100	**.300** (3x)	1/8	1-1/2			995800	106.10	
.109 (7/64)	**.327** (3x)	1/8	1-1/2			995802	105.00	
.118 (3 mm)	**.354** (3x)	1/8	1-1/2			995805	105.00	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$	
.125 (1/8)	**.100** (0.8x)	1/8	1-1/2			700508	108.70	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2	699508	90.80	962808	107.00	NEW
.125 (1/8)	**.375** (3x)	1/8	1-1/2	799808	90.80	995808	107.00	
.125 (1/8)	**.500** (4x)	1/8	2-1/2			871308	118.50	
.125 (1/8)	**.625** (5x)	1/8	2-1/2	699208	101.80	936708	120.00	NEW
.125 (1/8)	**1.000** (8x)	1/8	2-1/2			891608	123.30	
.140 (9/64)	**.425** (3x)	3/16	2			995809	135.70	
.156 (5/32)	**.235** (1.5x)	3/16	2			962810	134.30	
.156 (5/32)	**.470** (3x)	3/16	2			995810	134.30	
.187 (3/16)	**.285** (1.5x)	3/16	2			962812	134.30	
.187 (3/16)	**.570** (3x)	3/16	2	799812	114.20	995812	134.30	
.187 (3/16)	**.750** (4x)	3/16	3			871312	154.10	
.187 (3/16)	**1.000** (5x)	3/16	3	741912	144.90	936712	171.00	
.187 (3/16)	**1.500** (8x)	3/16	3			891612	190.30	
.250 (1/4)	**.200** (0.8x)	1/4	2-1/2			700516	180.90	
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2	699516	152.20	962816	179.20	NEW
.250 (1/4)	**.750** (3x)	1/4	2-1/2	799816	152.20	995816	179.20	
.250 (1/4)	**1.000** (4x)	1/4	4			871316	189.70	
.250 (1/4)	**1.250** (5x)	1/4	4			936716	192.70	
.312 (5/16)	**.470** (1.5x)	5/16	2-1/2			962820	201.10	
.312 (5/16)	**1.000** (3x)	5/16	2-1/2			995820	201.10	
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2	699524	182.20	962824	215.10	NEW
.375 (3/8)	**1.125** (3x)	3/8	2-1/2	741924	192.20	995824	226.90	
.375 (3/8)	**2.000** (5x)	3/8	4			936724	237.10	
.500 (1/2)	**.750** (1.5x)	1/2	3			962832	346.90	
.500 (1/2)	**1.500** (3x)	1/2	3	741932	302.40	995832	357.10	
.500 (1/2)	**2.625** (5x)	1/2	6			936732	368.90	

In The Loupe TV

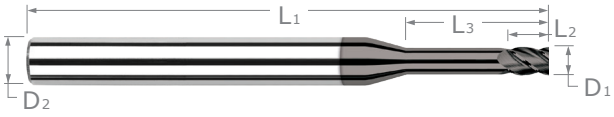
Check Out Our New CNC Show!

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

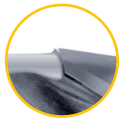
youtube.com/intheloupetv

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Stub Flute



Outstanding in Graphite!



Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

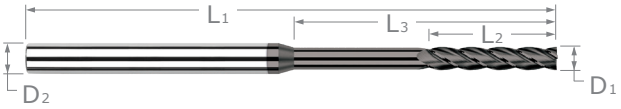
CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	943015	160.00
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	960215	160.00
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	974615	163.90
.020	.030	**.100** (5x)	1/8	2-1/2	943020	160.00
.020	.030	**.160** (8x)	1/8	2-1/2	960220	160.00
.020	.030	**.250** (12x)	1/8	2-1/2	974620	163.90
.025	.038	**.125** (5x)	1/8	2-1/2	943025	160.00
.025	.038	**.203** (8x)	1/8	2-1/2	960225	160.00
.025	.038	**.312** (12x)	1/8	2-1/2	974625	163.90
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	943031	160.00
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	960231	160.00
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	974631	163.90
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	943039	160.00
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	960239	160.00
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	943047	160.00
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	960247	160.00
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	974647	163.90
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	943062	145.80
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	960262	145.80
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	974662	150.10
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	943078	145.80
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	960278	145.80
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	974678	150.10
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	943093	145.80
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	960293	145.80
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	974693	150.10
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	943105	145.80
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	960305	145.80

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	943108	148.70
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	960308	148.70
.125 (1/8)	.187	**1.500** (12x)	1/8	3	974708	153.00
.187 (3/16)	.285	**1.000** (5x)	3/16	3	943112	203.90
.187 (3/16)	.285	**1.500** (8x)	3/16	3	960312	203.90
.250 (1/4)	.375	**1.250** (5x)	1/4	4	943116	226.80
.250 (1/4)	.375	**2.000** (8x)	1/4	4	960316	226.80
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	977924	278.70
.375 (3/8)	.570	**2.000** (5x)	3/8	4	943124	307.80
.500 (1/2)	.750	**1.500** (3x)	1/2	3	977932	417.90
.500 (1/2)	.750	**2.625** (5x)	1/2	4	943132	437.10

NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Square – Long Reach, Long Flute



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	
.015 (1/64)	.078	**.156** (10x)	1/8	2-1/2	36315	183.40	
.020	.100	**.200** (10x)	1/8	2-1/2	36320	183.40	
.025	.125	**.250** (10x)	1/8	2-1/2	36325	183.40	
.031 (1/32)	.156	**.250** (8x)	1/8	2-1/2	746231	179.30	
.031 (1/32)	.156	**.312** (10x)	1/8	2-1/2	36331	183.40	
.031 (1/32)	.156	**.375** (12x)	1/8	2-1/2	695131	185.50	NEW
.047 (3/64)	.250	**.480** (10x)	1/8	2-1/2	36347	183.40	
.047 (3/64)	.250	**.570** (12x)	1/8	2-1/2	695147	185.50	NEW
.062 (1/16)	.312	**.500** (8x)	1/8	2-1/2	746262	163.70	
.062 (1/16)	.312	**.625** (10x)	1/8	2-1/2	36362	167.80	
.062 (1/16)	.312	**.750** (12x)	1/8	2-1/2	695162	169.90	NEW
.078 (5/64)	.406	**.800** (10x)	1/8	2-1/2	36378	167.80	
.093 (3/32)	.500	**.750** (8x)	1/8	2-1/2	746293	163.70	
.093 (3/32)	.500	**.950** (10x)	1/8	2-1/2	36393	167.80	

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.625	**1.00** (8x)	1/8	2-1/2	746308	174.80
.125 (1/8)	.625	**1.250** (10x)	1/8	2-1/2	36408	179.30
.187 (3/16)	1.000	**1.875** (10x)	3/16	3	36412	236.50
.250 (1/4)	1.250	**2.500** (10x)	1/4	4	36416	262.60

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- 4 µm CVD diamond coating yields a sharper cutting edge and therefore leaves a smoother finish on non-ferrous alloys and composites
- 9 µm CVD diamond coating offers increased tool life for non-ferrous alloys and composites, especially higher abrasive materials such as graphite, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- 4 flutes • h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



CVD diamond (4 µm) layer for a balance between wear resistance and edge sharpness.



CVD diamond (9 µm) layer for increased tool life, especially in abrasive materials.

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)	
	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
	.015 (1/64)	**.023** (1.5x)	1/8	1-1/2			914415	115.50
	.015 (1/64)	**.045** (3x)	1/8	1-1/2	799515	99.00	999315	115.50
	.015 (1/64)	**.078** (5x)	1/8	2-1/2			940915	129.20
	.020	**.030** (1.5x)	1/8	1-1/2			914420	115.50
	.020	**.060** (3x)	1/8	1-1/2	799520	99.00	999320	115.50
	.020	**.100** (5x)	1/8	2-1/2			940920	129.20
	.031 (1/32)	**.047** (1.5x)	1/8	1-1/2			914431	115.50
	.031 (1/32)	**.093** (3x)	1/8	1-1/2	799531	99.00	999331	115.50
	.031 (1/32)	**.125** (4x)	1/8	2-1/2			818631	128.00
NEW	.031 (1/32)	**.156** (5x)	1/8	2-1/2	699031	110.80	940931	129.20
	.031 (1/32)	**.250** (8x)	1/8	2-1/2			704731	136.80
	.039 (1 mm)	**.117** (3x)	1/8	1-1/2			999339	115.50
	.040	**.120** (3x)	1/8	1-1/2			999340	116.60
NEW	.040	**.203** (5x)	1/8	2-1/2			940940	129.20
	.047 (3/64)	**.071** (1.5x)	1/8	1-1/2			914447	116.60
	.047 (3/64)	**.141** (3x)	1/8	1-1/2	799547	99.00	999347	115.50
	.047 (3/64)	**.250** (5x)	1/8	2-1/2			940947	129.20
	.050	**.150** (3x)	1/8	1-1/2			999350	116.60
	.060	**.180** (3x)	1/8	1-1/2			999360	115.50
NEW	.060	**.312** (5x)	1/8	2-1/2			940960	125.80
	.062 (1/16)	**.093** (1.5x)	1/8	1-1/2			914462	111.80
	.062 (1/16)	**.186** (3x)	1/8	1-1/2	799562	95.00	999362	111.80
	.062 (1/16)	**.250** (4x)	1/8	2-1/2			818662	124.80
	.062 (1/16)	**.312** (5x)	1/8	2-1/2			940962	125.80
	.062 (1/16)	**.500** (8x)	1/8	2-1/2			704762	133.50
	.078 (5/64)	**.118** (1.5x)	1/8	1-1/2			914478	111.80
	.078 (5/64)	**.234** (3x)	1/8	1-1/2			999378	111.80
	.078 (5/64)	**.406** (5x)	1/8	2-1/2			940978	125.80
	.093 (3/32)	**.140** (1.5x)	1/8	1-1/2			914493	112.70
	.093 (3/32)	**.279** (3x)	1/8	1-1/2	799593	95.90	999393	111.80
	.093 (3/32)	**.500** (5x)	1/8	2-1/2			940993	125.80
	.100	**.300** (3x)	1/8	1-1/2			999400	112.70
	.118 (3 mm)	**.354** (3x)	1/8	1-1/2			999405	111.80

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NEW SIZES!

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball (cont.)

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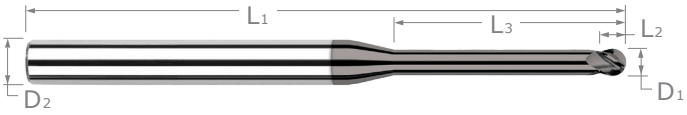
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (4 µm)		CVD DIAMOND (9 µm)		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$	
.125 (1/8)	**.187** (1.5x)	1/8	1-1/2			914508	113.50	
.125 (1/8)	**.375** (3x)	1/8	1-1/2	799608	96.40	999408	113.50	
.125 (1/8)	**.500** (4x)	1/8	2-1/2			818708	127.70	
.125 (1/8)	**.625** (5x)	1/8	2-1/2			941008	129.00	
.125 (1/8)	**1.000** (8x)	1/8	2-1/2			704808	136.60	
.140	**.425** (3x)	3/16	2			999409	140.90	NEW
.156 (5/32)	**.235** (1.5x)	3/16	2			914510	142.10	
.156 (5/32)	**.470** (3x)	3/16	2			999410	140.90	
.156 (5/32)	**.750** (5x)	3/16	3			941010	144.10	NEW
.187 (3/16)	**.285** (1.5x)	3/16	2			914512	142.10	
.187 (3/16)	**.570** (3x)	3/16	2	799612	120.80	999412	140.90	
.250 (1/4)	**.375** (1.5x)	1/4	2-1/2			914516	186.20	
.250 (1/4)	**.750** (3x)	1/4	2-1/2	799616	158.30	999416	186.20	
.250 (1/4)	**1.250** (5x)	1/4	4			941016	199.70	
.375 (3/8)	**.570** (1.5x)	3/8	2-1/2			914524	232.30	
.500 (1/2)	**.750** (1.5x)	1/2	3			914532	365.00	
.500 (1/2)	**1.500** (3x)	1/2	3			999432	368.50	

Your Free Guide to Increasing Shop Productivity With High Efficiency Milling

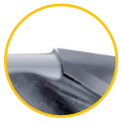
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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute



Outstanding in Graphite!



Reduced Neck Diameter to Avoid Heeling

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity • 4 flutes
- h6 shank tolerance for high precision tool holders • Center cutting • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)	.023	**.078** (5x)	1/8	2-1/2	61015	167.20
.015 (1/64)	.023	**.125** (8x)	1/8	2-1/2	62015	167.20
.015 (1/64)	.023	**.156** (10x)	1/8	2-1/2	939515	171.50
.015 (1/64)	.023	**.187** (12x)	1/8	2-1/2	65215	171.50
.015 (1/64)	.023	**.225** (15x)	1/8	2-1/2	76015	180.20
.015 (1/64)	.023	**.270** (18x)	1/8	2-1/2	841815	188.70
.020	.030	**.100** (5x)	1/8	2-1/2	61020	167.20
.020	.030	**.160** (8x)	1/8	2-1/2	62020	167.20
.020	.030	**.200** (10x)	1/8	2-1/2	939520	171.50
.020	.030	**.250** (12x)	1/8	2-1/2	65220	171.50
.020	.030	**.300** (15x)	1/8	2-1/2	76020	180.20
.020	.030	**.360** (18x)	1/8	2-1/2	841820	188.70
.025	.038	**.125** (5x)	1/8	2-1/2	61025	167.20
.025	.038	**.203** (8x)	1/8	2-1/2	62025	167.20
.025	.038	**.312** (12x)	1/8	2-1/2	65225	171.50
.025	.038	**.375** (15x)	1/8	2-1/2	76025	180.20
.030	.045	**.250** (8x)	1/8	2-1/2	62030	167.20
.031 (1/32)	.047	**.093** (3x)	1/8	1-1/2	922231	150.50
.031 (1/32)	.047	**.156** (5x)	1/8	2-1/2	61031	167.20
.031 (1/32)	.047	**.187** (6x)	1/8	2-1/2	795131	167.20
.031 (1/32)	.047	**.218** (7x)	1/8	2-1/2	794931	167.20
.031 (1/32)	.047	**.250** (8x)	1/8	2-1/2	62031	167.20
.031 (1/32)	.047	**.312** (10x)	1/8	2-1/2	939531	171.50
.031 (1/32)	.047	**.375** (12x)	1/8	2-1/2	65231	171.50
.031 (1/32)	.047	**.470** (15x)	1/8	2-1/2	76031	180.20
.031 (1/32)	.047	**.565** (18x)	1/8	2-1/2	841831	188.70
.039 (1 mm)	.059	**.203** (5x)	1/8	2-1/2	61039	167.20
.039 (1 mm)	.059	**.325** (8x)	1/8	2-1/2	62039	167.20
.040	.060	**.203** (5x)	1/8	2-1/2	61040	167.20
.040	.060	**.325** (8x)	1/8	2-1/2	62040	167.20
.047 (3/64)	.071	**.250** (5x)	1/8	2-1/2	61047	167.20
.047 (3/64)	.071	**.375** (8x)	1/8	2-1/2	62047	167.20
.047 (3/64)	.071	**.480** (10x)	1/8	2-1/2	939547	171.50
.047 (3/64)	.071	**.570** (12x)	1/8	2-1/2	65247	171.50
.047 (3/64)	.071	**.710** (15x)	1/8	2-1/2	76047	180.20
.047 (3/64)	.071	**.850** (18x)	1/8	2-1/2	841847	188.70
.050	.075	**.250** (5x)	1/8	2-1/2	61050	167.20
.050	.075	**.400** (8x)	1/8	2-1/2	62050	167.20
.060	.090	**.312** (5x)	1/8	2-1/2	61060	167.20
.060	.090	**.500** (8x)	1/8	2-1/2	62060	167.20

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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Stub Flute (cont.)

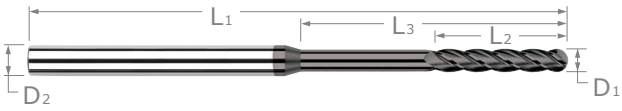
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CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.010″}_{-.000″}$	L_3 $^{+.010″}_{-.000″}$	D_2 (h6)	L_1	4 FL	USD$
.062 (1/16)	.093	**.186** (3x)	1/8	1-1/2	922262	132.80
.062 (1/16)	.093	**.312** (5x)	1/8	2-1/2	61062	150.10
.062 (1/16)	.093	**.375** (6x)	1/8	2-1/2	795162	150.10
.062 (1/16)	.093	**.437** (7x)	1/8	2-1/2	794962	150.10
.062 (1/16)	.093	**.500** (8x)	1/8	2-1/2	62062	150.10
.062 (1/16)	.093	**.625** (10x)	1/8	2-1/2	939562	154.60
.062 (1/16)	.093	**.750** (12x)	1/8	2-1/2	65262	154.60
.062 (1/16)	.093	**.950** (15x)	1/8	2-1/2	76062	162.60
.062 (1/16)	.093	**1.125** (18x)	1/8	2-1/2	841862	170.60
.078 (5/64)	.117	**.406** (5x)	1/8	2-1/2	61078	150.10
.078 (5/64)	.117	**.625** (8x)	1/8	2-1/2	62078	150.10
.078 (5/64)	.117	**.800** (10x)	1/8	2-1/2	939578	154.60
.078 (5/64)	.117	**.940** (12x)	1/8	2-1/2	65278	154.60
.078 (5/64)	.117	**1.187** (15x)	1/8	2-1/2	76078	162.60
.078 (5/64)	.117	**1.400** (18x)	1/8	2-1/2	841878	170.60
.093 (3/32)	.140	**.279** (3x)	1/8	1-1/2	922293	132.80
.093 (3/32)	.140	**.500** (5x)	1/8	2-1/2	61093	150.10
.093 (3/32)	.140	**.585** (6x)	1/8	2-1/2	795193	150.10
.093 (3/32)	.140	**.670** (7x)	1/8	2-1/2	794993	150.10
.093 (3/32)	.140	**.750** (8x)	1/8	2-1/2	62093	150.10
.093 (3/32)	.140	**.950** (10x)	1/8	2-1/2	939593	154.60
.093 (3/32)	.140	**1.125** (12x)	1/8	2-1/2	65293	154.60
.093 (3/32)	.140	**1.400** (15x)	1/8	2-1/2	76093	162.60
.093 (3/32)	.140	**1.675** (18x)	1/8	3	841893	170.60
.100	.150	**.800** (8x)	1/8	2-1/2	62100	150.10
.109 (7/64)	.164	**.900** (8x)	1/8	2-1/2	62102	150.10
.118 (3 mm)	.177	**.625** (5x)	1/8	2-1/2	61105	150.10
.118 (3 mm)	.177	**.950** (8x)	1/8	2-1/2	62105	150.10

D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.030″}_{-.000″}$	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	.187	**.375** (3x)	1/8	1-1/2	64008	146.80
.125 (1/8)	.187	**.625** (5x)	1/8	2-1/2	61108	163.70
.125 (1/8)	.187	**.750** (6x)	1/8	2-1/2	795208	163.70
.125 (1/8)	.187	**.875** (7x)	1/8	2-1/2	795008	163.70
.125 (1/8)	.187	**1.000** (8x)	1/8	2-1/2	62108	163.70
.125 (1/8)	.187	**1.250** (10x)	1/8	2-1/2	939608	168.50
.125 (1/8)	.187	**1.500** (12x)	1/8	3	65308	168.50
.125 (1/8)	.187	**1.875** (15x)	1/8	3	944108	177.30
.125 (1/8)	.187	**2.250** (18x)	1/8	4	841908	187.90
.140 (9/64)	.220	**1.125** (8x)	3/16	3	62109	211.20
.156 (5/32)	.235	**.750** (5x)	3/16	3	61110	211.20
.156 (5/32)	.235	**1.250** (8x)	3/16	3	62110	211.20
.187 (3/16)	.285	**1.000** (5x)	3/16	3	61112	211.20
.187 (3/16)	.285	**1.500** (8x)	3/16	3	62112	211.20
.187 (3/16)	.285	**2.250** (12x)	3/16	4	65312	222.50
.250 (1/4)	.375	**1.250** (5x)	1/4	4	61116	234.70
.250 (1/4)	.375	**2.000** (8x)	1/4	4	62116	234.70
.250 (1/4)	.375	**3.000** (12x)	1/4	6	65316	245.10
.312 (5/16)	.470	**2.500** (8x)	5/16	4	62120	255.90
.375 (3/8)	.570	**1.250** (3x)	3/8	2-1/2	64024	294.90
.500 (1/2)	.750	**1.500** (3x)	1/2	3	64032	438.20

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Ball – Long Reach, Long Flute



Outstanding in Graphite!

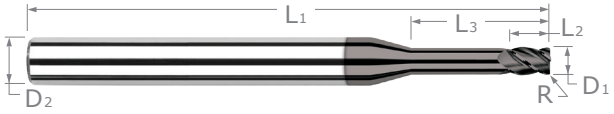
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- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- h6 shank tolerance for high precision tool holders
- 4 flutes
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)	**.078**	**.156** (10x)	1/8	2-1/2	36515	196.20
.020	**.100**	**.200** (10x)	1/8	2-1/2	36520	196.20
.025	**.125**	**.250** (10x)	1/8	2-1/2	36525	196.20
.031 (1/32)	**.156**	**.250** (8x)	1/8	2-1/2	745831	191.90
.031 (1/32)	**.156**	**.312** (10x)	1/8	2-1/2	36531	196.20
.031 (1/32)	**.156**	**.375** (12x)	1/8	2-1/2	717831	200.50
.047 (3/64)	**.250**	**.480** (10x)	1/8	2-1/2	36547	196.20
.062 (1/16)	**.312**	**.500** (8x)	1/8	2-1/2	745862	171.80
.062 (1/16)	**.312**	**.625** (10x)	1/8	2-1/2	36562	175.90
.062 (1/16)	**.312**	**.750** (12x)	1/8	2-1/2	717862	200.50
.078 (5/64)	**.406**	**.800** (10x)	1/8	2-1/2	36578	175.90
.093 (3/32)	**.500**	**.750** (8x)	1/8	2-1/2	745893	171.80
.093 (3/32)	**.500**	**.950** (10x)	1/8	2-1/2	36593	175.90
.093 (3/32)	**.500**	**1.125** (12x)	1/8	2-1/2	717893	200.50
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.125 (1/8)	**.625**	**1.000** (8x)	1/8	2-1/2	745908	182.80
.125 (1/8)	**.625**	**1.250** (10x)	1/8	2-1/2	36608	187.20
.187 (3/16)	**1.000**	**1.875** (10x)	3/16	3	36612	247.40
.250 (1/4)	**1.250**	**2.500** (10x)	1/4	4	36616	274.70

NEW SIZES!

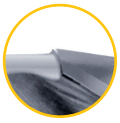
DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius – Long Reach, Stub Flute



Outstanding in Graphite!

- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Reduced neck for clearance and maximum rigidity
- Corner radius for improved strength
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting • CNC ground in the USA



Reduced Neck Diameter to Avoid Heeling

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)		
D_1 +.000″ −.001″	R +.001″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	USD$	
.015 (1/64)	**.003**	.023	**.078** (5x)	1/8	2-1/2	61615	167.20	
.015 (1/64)	**.003**	.023	**.125** (8x)	1/8	2-1/2	61915	167.20	
.015 (1/64)	**.003**	.023	**.187** (12x)	1/8	2-1/2	62215	171.50	
.020	**.005**	.030	**.100** (5x)	1/8	2-1/2	62920	167.20	
.020	**.005**	.030	**.160** (8x)	1/8	2-1/2	63220	167.20	
.020	**.005**	.030	**.250** (12x)	1/8	2-1/2	64120	171.50	
.025	**.005**	.038	**.125** (5x)	1/8	2-1/2	62925	167.20	
.025	**.005**	.038	**.203** (8x)	1/8	2-1/2	63225	167.20	
.025	**.005**	.038	**.312** (12x)	1/8	2-1/2	64125	171.50	
.031 (1/32)	**.005**	.047	**.156** (5x)	1/8	2-1/2	62931	167.20	
.031 (1/32)	**.005**	.047	**.250** (8x)	1/8	2-1/2	63231	167.20	
.031 (1/32)	**.005**	.047	**.375** (12x)	1/8	2-1/2	64131	171.50	
.039 (1 mm)	**.005**	.059	**.203** (5x)	1/8	2-1/2	62939	167.20	
.039 (1 mm)	**.005**	.059	**.325** (8x)	1/8	2-1/2	63239	167.20	
.047 (3/64)	**.005**	.071	**.250** (5x)	1/8	2-1/2	62947	167.20	
.047 (3/64)	**.005**	.071	**.375** (8x)	1/8	2-1/2	63247	167.20	
.047 (3/64)	**.005**	.071	**.570** (12x)	1/8	2-1/2	64147	171.50	
.062 (1/16)	**.005**	.093	**.312** (5x)	1/8	2-1/2	62962	150.10	
.062 (1/16)	**.005**	.093	**.500** (8x)	1/8	2-1/2	63262	150.10	
.062 (1/16)	**.010**	.093	**.312** (5x)	1/8	2-1/2	65062	150.10	
.062 (1/16)	**.010**	.093	**.500** (8x)	1/8	2-1/2	66562	150.10	
.062 (1/16)	**.010**	.093	**.625** (10x)	1/8	2-1/2	717462	152.30	
.062 (1/16)	**.010**	.093	**.750** (12x)	1/8	2-1/2	65962	154.60	
.062 (1/16)	**.015**	.093	**.312** (5x)	1/8	2-1/2	695062	150.10	NEW
.062 (1/16)	**.015**	.093	**.500** (8x)	1/8	2-1/2	694962	150.10	NEW
.078 (5/64)	**.010**	.117	**.406** (5x)	1/8	2-1/2	65078	150.10	
.078 (5/64)	**.010**	.117	**.625** (8x)	1/8	2-1/2	66578	150.10	
.078 (5/64)	**.010**	.117	**.940** (12x)	1/8	2-1/2	65978	154.60	
.093 (3/32)	**.010**	.140	**.500** (5x)	1/8	2-1/2	65093	150.10	
.093 (3/32)	**.010**	.140	**.750** (8x)	1/8	2-1/2	66593	150.10	
.093 (3/32)	**.010**	.140	**.950** (10x)	1/8	2-1/2	717493	152.30	
.093 (3/32)	**.010**	.140	**1.125** (12x)	1/8	2-1/2	65993	154.60	
.118 (3 mm)	**.010**	.177	**.625** (5x)	1/8	2-1/2	916305	150.10	
.118 (3 mm)	**.010**	.177	**.950** (8x)	1/8	2-1/2	914705	150.10	

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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius – Long Reach, Stub Flute (cont.)

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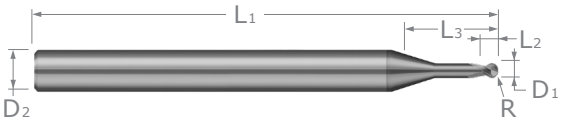
	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
	.125 (1/8)	**.010**	.187	**.625** (5x)	1/8	2-1/2	916308	163.70
	.125 (1/8)	**.010**	.187	**1.000** (8x)	1/8	2-1/2	914708	163.70
	.125 (1/8)	**.015**	.187	**.625** (5x)	1/8	2-1/2	66208	163.70
	.125 (1/8)	**.015**	.187	**1.000** (8x)	1/8	2-1/2	64708	163.70
	.125 (1/8)	**.015**	.187	**1.250** (10x)	1/8	3	717308	166.10
	.125 (1/8)	**.015**	.187	**1.500** (12x)	1/8	3	66408	168.50
	.187 (3/16)	**.030**	.285	**1.000** (5x)	3/16	3	63312	211.20
	.187 (3/16)	**.030**	.285	**1.500** (8x)	3/16	3	65612	211.20
	.250 (1/4)	**.030**	.375	**1.250** (5x)	1/4	4	63316	234.70
	.250 (1/4)	**.030**	.375	**2.000** (8x)	1/4	4	65616	234.70
	.250 (1/4)	**.030**	.375	**2.500** (10x)	1/4	4	717116	237.10
NEW	.375 (3/8)	**.030**	.570	**2.000** (5x)	3/8	4	63324	288.60
NEW	.375 (3/8)	**.030**	.570	**3.000** (8x)	3/8	6	65624	318.70

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DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Finishers – Tight Tolerance – Ball



DIAMETER (mm)	THICKNESS (Microns)
0.20 - 0.59	4 µm +2 µm / -0 µm
0.60 - 0.99	6 µm +2 µm / -0 µm
1.00 - 5.99	8 µm +2 µm / -0 µm
6.00+	10 µm +3µm / -0 µm

- Tight tolerance radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications.
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (Variable µm)	
D_1 +.000mm −.001mm	R +.002mm −.002mm	L_2 +.010mm −.010mm	L_3 +.020mm −.000mm	D_2	L_1	2 FL	USD$
.20 mm	.10 mm	.30 mm	1 mm (5x)	3 mm	55 mm	689004	94.60
.30 mm	.15 mm	.40 mm	3 mm (10x)	3 mm	55 mm	688706	94.60
.40 mm	.20 mm	.50 mm	4 mm (10x)	3 mm	55 mm	688709	94.60
.50 mm	.25 mm	.60 mm	10 mm (20x)	3 mm	55 mm	688411	91.80
.50 mm	.25 mm	.60 mm	5 mm (10x)	3 mm	55 mm	688711	91.80
.60 mm	.30 mm	.80 mm	6 mm (10x)	3 mm	55 mm	688713	95.70
.60 mm	.30 mm	.80 mm	9 mm (15x)	3 mm	55 mm	688513	95.70
.60 mm	.30 mm	.80 mm	12 mm (20x)	3 mm	55 mm	688413	95.70
.80 mm	.40 mm	1.00 mm	8 mm (10x)	3 mm	55 mm	688718	95.70
1.00 mm	.50 mm	1.20 mm	5 mm (5x)	3 mm	55 mm	689022	99.90
1.00 mm	.50 mm	1.20 mm	10 mm (10x)	3 mm	55 mm	688722	99.90
1.00 mm	.50 mm	1.20 mm	15 mm (15x)	3 mm	55 mm	688522	99.90
1.00 mm	.50 mm	1.20 mm	20 mm (20x)	3 mm	55 mm	688422	99.90
1.50 mm	.75 mm	1.80 mm	10 mm (6x)	3 mm	55 mm	688933	99.20
1.50 mm	.75 mm	1.80 mm	15 mm (10x)	3 mm	55 mm	688733	99.20
2.00 mm	1.00 mm	2.00 mm	10 mm (5x)	3 mm	65 mm	689045	102.10
2.00 mm	1.00 mm	2.00 mm	15 mm (7x)	3 mm	65 mm	688845	102.10
2.00 mm	1.00 mm	2.00 mm	20 mm (10x)	3 mm	65 mm	688745	102.10
2.00 mm	1.00 mm	2.00 mm	25 mm (12x)	3 mm	65 mm	688645	102.10
3.00 mm	1.50 mm	3.00 mm	10 mm (3x)	4 mm	65 mm	689157	122.50
3.00 mm	1.50 mm	3.00 mm	15 mm (5x)	4 mm	65 mm	689057	122.50
3.00 mm	1.50 mm	3.00 mm	20 mm (6x)	4 mm	65 mm	688957	122.50
3.00 mm	1.50 mm	3.00 mm	30 mm (10x)	4 mm	75 mm	688757	125.00
4.00 mm	2.00 mm	4.00 mm	20 mm (5x)	6 mm	65 mm	689061	144.40
4.00 mm	2.00 mm	4.00 mm	30 mm (7x)	6 mm	75 mm	688861	147.90
4.00 mm	2.00 mm	4.00 mm	40 mm (10x)	6 mm	90 mm	688761	167.60
6.00 mm	3.00 mm	6.00 mm	30 mm (5x)	6 mm	75 mm	689066	195.90

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Corner Radius



Outstanding in Graphite!

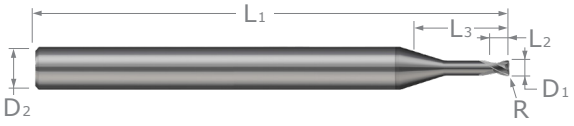
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- Corner radius for improved strength
- 4 flutes
- h6 shank tolerance for high precision tool holders
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (9 µm)	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
.015 (1/64)	**.003**	**.023** (1.5x)	1/8	1-1/2	717615	116.60
.015 (1/64)	**.003**	**.045** (3x)	1/8	1-1/2	942015	115.50
.020	**.005**	**.060** (3x)	1/8	1-1/2	955420	116.60
.031 (1/32)	**.005**	**.047** (1.5x)	1/8	1-1/2	746831	116.60
.031 (1/32)	**.005**	**.093** (3x)	1/8	1-1/2	955431	115.50
.031 (1/32)	**.005**	**.156** (5x)	1/8	2-1/2	819331	129.20
.031 (1/32)	**.010**	**.093** (3x)	1/8	1-1/2	977131	116.60
.047 (3/64)	**.005**	**.141** (3x)	1/8	1-1/2	955447	115.50
.062 (1/16)	**.005**	**.186** (3x)	1/8	1-1/2	955462	111.80
.062 (1/16)	**.010**	**.093** (1.5x)	1/8	1-1/2	745062	112.70
.062 (1/16)	**.010**	**.186** (3x)	1/8	1-1/2	977162	111.80
.062 (1/16)	**.010**	**.312** (5x)	1/8	2-1/2	820462	125.80
.062 (1/16)	**.020**	**.186** (3x)	1/8	1-1/2	768262	112.70
.078 (5/64)	**.010**	**.234** (3x)	1/8	1-1/2	977178	112.70
.093 (3/32)	**.005**	**.140** (1.5x)	1/8	1-1/2	746893	112.70
.093 (3/32)	**.005**	**.279** (3x)	1/8	1-1/2	955493	111.80
.093 (3/32)	**.010**	**.279** (3x)	1/8	1-1/2	977193	111.80
.093 (3/32)	**.015**	**.279** (3x)	1/8	1-1/2	938593	111.80
.093 (3/32)	**.030**	**.279** (3x)	1/8	1-1/2	906293	112.70

	D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
	.125 (1/8)	**.005**	**.187** (1.5x)	1/8	1-1/2	746908	114.60
	.125 (1/8)	**.005**	**.375** (3x)	1/8	1-1/2	955508	113.50
	.125 (1/8)	**.010**	**.375** (3x)	1/8	1-1/2	977208	113.50
	.125 (1/8)	**.015**	**.187** (1.5x)	1/8	1-1/2	748408	114.60
	.125 (1/8)	**.015**	**.375** (3x)	1/8	1-1/2	938608	113.50
	.125 (1/8)	**.015**	**.625** (5x)	1/8	2-1/2	855208	126.60
	.125 (1/8)	**.030**	**.375** (3x)	1/8	1-1/2	906308	113.50
	.156 (5/32)	**.015**	**.470** (3x)	3/16	2	938610	142.10
	.187 (3/16)	**.015**	**.570** (3x)	3/16	2	938612	140.90
	.187 (3/16)	**.030**	**.570** (3x)	3/16	2	906312	140.90
	.250 (1/4)	**.010**	**.750** (3x)	1/4	2-1/2	977216	186.20
NEW	.250 (1/4)	**.015**	**.750** (3x)	1/4	2-1/2	938616	186.20
NEW	.250 (1/4)	**.015**	**1.250** (5x)	1/4	4	855216	201.60
	.250 (1/4)	**.030**	**.375** (1.5x)	1/4	2-1/2	747716	188.10
	.250 (1/4)	**.030**	**.750** (3x)	1/4	2-1/2	906316	186.20
	.250 (1/4)	**.030**	**1.250** (5x)	1/4	4	862116	201.60
NEW	.375 (3/8)	**.015**	**1.125** (3x)	3/8	2-1/2	938624	221.70
	.375 (3/8)	**.030**	**1.125** (3x)	3/8	2-1/2	906324	221.70

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

CVD Diamond – Finishers – Tight Tolerance – Corner Radius



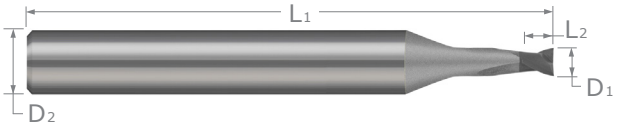
DIAMETER (mm)	THICKNESS (Microns)
1.00 - 5.99	8 µm +2 µm / -0 µm
6.00+	10 µm +3 µm / -0 µm

- Tight tolerance radii offers unparalleled precision and consistency, ensuring a perfect fit for high-precision applications.
- True crystalline CVD diamond on solid carbide substrate
- Ideal for machining graphite and composites, green carbide, and green ceramics
- Maximum abrasion resistance increases tool life
- h5 shank tolerance for high precision tool holders
- Reduced neck diameter to avoid heeling • Manufactured to DIN 6535 Form HA
- 2 flute • Center cutting • CNC ground in Switzerland

CUTTER DIAMETER	RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	CVD DIAMOND (Variable µm)	
D_1 $^{+.000mm}_{-.010mm}$	R $^{+.000mm}_{-.004mm}$	L_2 $^{+.010mm}_{-.010mm}$	L_3 $^{+.020mm}_{-.000mm}$	D_2	L_1	2 FL	USD$
1.00 mm	.10 mm	1.20 mm	10 mm (10x)	3 mm	55 mm	684422	103.00
1.00 mm	.10 mm	1.20 mm	15 mm (15x)	3 mm	55 mm	684022	103.00
1.50 mm	.15 mm	1.80 mm	15 mm (10x)	3 mm	55 mm	684333	102.50
2.00 mm	.20 mm	2.00 mm	10 mm (5x)	3 mm	65 mm	685245	105.40
2.00 mm	.50 mm	2.00 mm	15 mm (7x)	3 mm	65 mm	684745	105.40
2.00 mm	.20 mm	2.00 mm	15 mm (7x)	3 mm	65 mm	684845	105.40
2.00 mm	.20 mm	2.00 mm	20 mm (10x)	3 mm	65 mm	684245	105.40
3.00 mm	.30 mm	3.00 mm	15 mm (5x)	4 mm	65 mm	685157	126.20
3.00 mm	.50 mm	3.00 mm	20 mm (6x)	4 mm	65 mm	684957	126.20
3.00 mm	.30 mm	3.00 mm	25 mm (8x)	4 mm	75 mm	684657	128.90
3.00 mm	.50 mm	3.00 mm	30 mm (10x)	4 mm	75 mm	684157	128.90
4.00 mm	.50 mm	4.00 mm	20 mm (5x)	6 mm	65 mm	685061	148.80
4.00 mm	.50 mm	4.00 mm	30 mm (7x)	6 mm	75 mm	684761	152.60
4.00 mm	.50 mm	4.00 mm	40 mm (10x)	6 mm	90 mm	684161	172.90
6.00 mm	.50 mm	6.00 mm	30 mm (5x)	6 mm	75 mm	685066	202.00
6.00 mm	.50 mm	6.00 mm	40 mm (6x)	6 mm	90 mm	684966	222.40
6.00 mm	.50 mm	6.00 mm	50 mm (8x)	6 mm	90 mm	684566	222.40

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Full Nib Square



- Traditional end mill design ground into a full PCD diamond nib allows for improved edge retention and cutting speeds when compared to PCD diamond wafer tools
- PCD diamond allows for significant tool life improvement over carbide
- Diameter sizes smaller than traditional PCD diamond wafer tools – down to .040”
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- 2 flute • Center cutting
- h6 tolerance for high precision tool holders

	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
	D_1 $^{+.0008''}_{-.0008''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	2 FL	USD$
NEW	.040	.068	1/8	1-1/2	822840	376.80
NEW	.062 (1/16)	.135	1/8	1-1/2	822862	414.20
NEW	.078 (5/64)	.135	1/8	1-1/2	822878	464.00
NEW	.093 (3/32)	.135	1/8	1-1/2	822893	476.40
NEW	.125 (1/8)	.135	1/8	1-1/2	822808	495.10

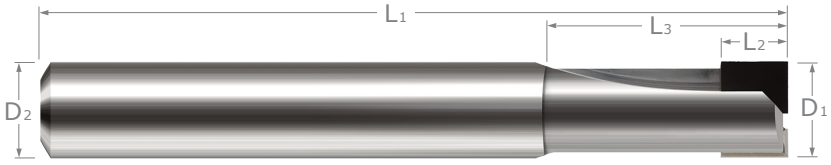
SPEEDS & FEEDS (Square PCD Diamond Full Nib End Mills)

Important Note: Values in table are in inches and are based on advertised length of cut end mills. For complete speeds and feeds charts, please see www.harveytool.com

Material	SFM		Chip Load Per Tooth (IPT) .040	.062	.078	.093	.125	Depth of Cut Radial	Axial
Aluminum Alloys: 0% - 5% Silicon (2xx, 3xx, 4xx, 5xx, 7xx, 8xx, A3xx, A4xx, B4xx, C3xx, 1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1500 - 3000	Roughing	.00067	.00091	.00114	.00136	.00183	.60 x Dia	1 x Dia
		Finishing	.00058	.00079	.00099	.00118	.00159	.25 x Dia	1 x Dia
5%-8% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx, 4xxx)	1500 - 3000	Roughing	.00060	.00081	.00103	.00122	.00164	.60 x Dia	1 x Dia
		Finishing	.00053	.00089	.00089	.00106	.00143	.25 x Dia	1 x Dia
8%-12% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx, 4xxx)	1100 - 2200	Roughing	.00050	.00068	.00085	.00102	.00137	.60 x Dia	1 x Dia
		Finishing	.00044	.00059	.00074	.00089	.00119	.25 x Dia	1 x Dia
12%-16% Silicon (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750 - 1500	Roughing	.00040	.00054	.00068	.00081	.00110	.60 x Dia	1 x Dia
		Finishing	.00035	.00047	.00059	.00071	.00095	.25 x Dia	1 x Dia
PLASTICS: Unfilled	750 - 1500	Roughing	.00071	.00095	.00120	.00143	.00192	.60 x Dia	1 x Dia
		Finishing	.00061	.00083	.00104	.00124	.00167	.25 x Dia	1 x Dia
5% - 20% Filled or Fiber Reinforced	550 - 1100	Roughing	.00064	.00086	.00108	.00129	.00173	.60 x Dia	1 x Dia
		Finishing	.00055	.00075	.00094	.00112	.00151	.25 x Dia	1 x Dia
21% - 40% Filled or Fiber Reinforced	400 - 750	Roughing	.00057	.00077	.00097	.00115	.00155	.60 x Dia	1 x Dia
		Finishing	.00050	.00067	.00084	.00100	.00135	.25 x Dia	1 x Dia
GRAPHITE: POCO 3	600 - 1200	Roughing	.00077	.00104	.00131	.00156	.00210	.75 x Dia	Max LoC
		Finishing	.00067	.00091	.00114	.00136	.00183	.30 x Dia	1 x Dia
GREEN CARBIDE & GREEN CERAMICS:	100 - 750	Roughing	.00071	.00095	.00120	.00143	.00192	.75 x Dia	Max LoC
		Finishing	.00061	.00083	.00104	.00124	.00167	.30 x Dia	1 x Dia

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Square



- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting for 1 and 2 flutes
- End cutting (not center cutting) for 4 flutes

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$
3/32	3/16	**3/8**	1	1/8	1-1/2	12106	310.50
3 mm	1/4	**1/2**	1	1/8	1-1/2	1213M	310.50
1/8	1/16	**1/4**	1	1/8	1-1/2	709608	266.50
1/8	1/8	**5/16**	1	1/8	1-1/2	760008	282.10
1/8	1/4	**1/2**	1	1/8	1-1/2	12108	310.50
1/8	3/8	**5/8**	1	1/8	1-1/2	709508	314.80
5/32	1/4	**1/2**	1	3/16	2	12110	346.90
3/16	3/16	**3/8**	2	3/16	2	709412	338.00
3/16	1/4	**5/8**	2	3/16	2	12112	346.90
3/16	1/2	**7/8**	2	3/16	2-1/2	739212	355.80
1/4	1/4	**3/4**	2	1/4	2-1/2	12116	376.70
1/4	1/4	**3/4**	4	1/4	2-1/2	708816	531.60
1/4	1/2	**1**	2	1/4	2-1/2	739216	457.90
1/4	1/2	**1**	4	1/4	2-1/2	914116	606.60
5/16	1/4	**13/16**	2	5/16	2-1/2	12120	412.20
5/16	1/2	**1-1/16**	4	5/16	2-1/2	914120	670.40
3/8	1/4	**15/16**	2	3/8	2-1/2	12124	442.00
3/8	1/2	**1-3/16**	2	3/8	2-1/2	739224	457.80
3/8	3/4	**1-7/16**	2	3/8	3	708324	692.60
3/8	3/4	**1-7/16**	4	3/8	3	914124	766.70
1/2	1/4	**1**	2	1/2	3	12132	563.50
1/2	1/2	**1-1/4**	4	1/2	3	708732	638.10
1/2	3/4	**1-1/2**	2	1/2	3	709332	667.20
1/2	1	**1-3/4**	2	1/2	3	739232	690.80
1/2	1	**1-3/4**	4	1/2	3	914132	904.30
5/8	3/8	**1**	2	5/8	3-1/2	12140	696.10
5/8	5/8	**1-1/4**	2	5/8	3-1/2	739240	812.40
5/8	1	**1-3/4**	4	5/8	3-1/2	914140	1059.70
3/4	3/8	**1-1/8**	2	3/4	4	12148	847.70
3/4	1-1/4	**2**	4	3/4	4	914148	1238.50

* End cutting (not center cutting) for 4 flutes

Single Flute designed for smaller diameters



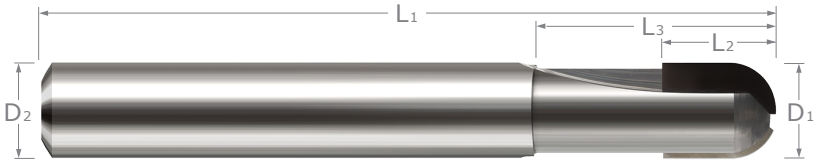
4 Flute ideal for finishing operations

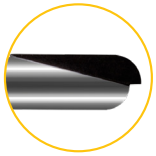


For PCD High Performance Drills, see page 509

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Ball





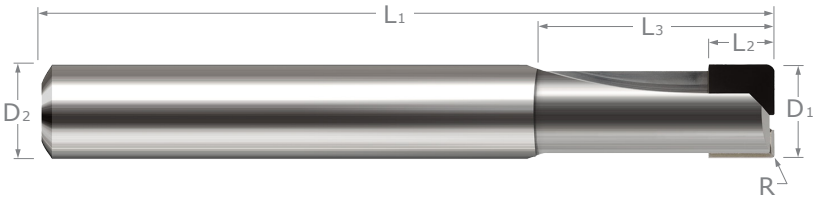
Also Stocked in Single Flute Style

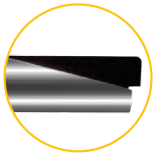
- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	USD$
3/32	3/16	**3/8**	1	1/8	1-1/2	12006	376.70
1/8	1/8	**5/16**	1	1/8	1-1/2	709208	348.40
1/8	1/4	**1/2**	1	1/8	1-1/2	12008	376.70
1/8	1/2	**3/4**	1	1/8	2	714108	401.60
3/16	1/4	**5/8**	2	3/16	2	12012	403.40
1/4	1/4	**3/4**	2	1/4	2-1/2	708416	409.20
1/4	5/16	**3/4**	2	1/4	2-1/2	12016	423.20
1/4	1/2	**1**	2	1/4	2-1/2	714116	480.00
3/8	7/16	**15/16**	2	3/8	2-1/2	12024	522.80
1/2	1/2	**1**	2	1/2	3	12032	606.40
1/2	1/2	**1-1/4**	2	1/2	3	714132	637.50
1/2	1	**1-1/4**	2	1/2	3	708932	713.80
5/8	1/2	**1**	2	5/8	3-1/2	12040	738.30
3/4	5/8	**1-1/8**	2	3/4	4	12048	889.90

DIAMOND END MILLS FOR NON-FERROUS MATERIALS

PCD Diamond – Corner Radius





Also Stocked in Single Flute Style

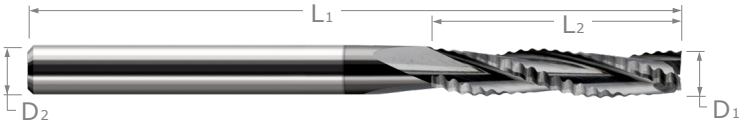
- PCD diamond brazed wafer on solid carbide body allows for significant tool life improvement over carbide.
- Recommended work piece material: aluminum, copper, brass, bronze, plastics, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- Center cutting

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	CORNER RADIUS	FLUTES	SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
D_1 +.000″ −.002″	L_2 +.020″ −.000″	L_3 +.020″ −.000″	R +.001″ −.001″		D_2	L_1	TOOL #	USD$
3/32	3/16	**3/8**	**.010**	1	1/8	1-1/2	12206	376.70
1/8	1/4	**1/2**	**.010**	1	1/8	1-1/2	858908	376.70
1/8	1/4	**1/2**	**.015**	1	1/8	1-1/2	12208	376.70
3/16	1/4	**5/8**	**.015**	2	3/16	2	12212	403.40
1/4	1/8	**5/16**	**.010**	2	1/4	2-1/2	709116	330.80
1/4	1/4	**3/4**	**.010**	2	1/4	2-1/2	858916	423.20
1/4	1/8	**5/16**	**.030**	2	1/4	2-1/2	708616	330.80
1/4	1/4	**3/4**	**.030**	2	1/4	2-1/2	12216	423.20
1/4	1/8	**5/16**	**.060**	2	1/4	2-1/2	709016	330.80
1/4	1/4	**3/4**	**.060**	2	1/4	2-1/2	847316	423.20
3/8	1/4	**15/16**	**.030**	2	3/8	2-1/2	12224	522.80
1/2	1/4	**1**	**.010**	2	1/2	3	858932	606.40
1/2	1/4	**1**	**.030**	2	1/2	3	12232	606.40
1/2	1/2	**1-1/4**	**.030**	2	1/2	3	708532	645.20
1/2	1/4	**1**	**.060**	2	1/2	3	847332	606.40

For PCD High Performance Drills, see page 509

END MILLS FOR PLASTICS

Rougher – Square Upcut – 3 Flute (Slow Helix)

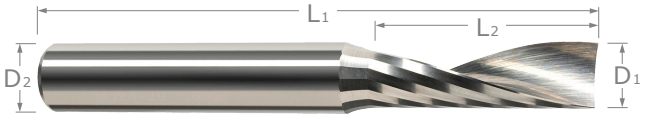


- Optimized for roughing applications in plastics
- Engineered with irregular edge geometry for chip control and minimized cutting forces
- 3 flute design strengthens rigidity of tool
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	USD$	3 FL	USD$
1/16	**.186** (3x)	1/8	1-1/2	798662	38.30	798662-C4	53.20
1/16	**5/16** (5x)	1/8	2	770662	45.00	770662-C4	60.00
3/32	**.279** (3x)	1/8	1-1/2	798693	38.30	798693-C4	53.20
3/32	**1/2** (5x)	1/8	2	770693	45.00	770693-C4	60.00
1/8	**3/8** (3x)	1/8	1-1/2	798708	38.30	798708-C4	53.20
1/8	**5/8** (5x)	1/8	2	770708	45.00	770708-C4	63.70
3/16	**.570** (3x)	3/16	2	798712	59.70	798712-C4	76.40
3/16	**1** (5x)	3/16	3	770712	62.30	770712-C4	80.10
1/4	**3/4** (3x)	1/4	2-1/2	798716	62.30	798716-C4	86.30
1/4	**1-1/4** (5x)	1/4	3	770716	70.50	770716-C4	94.40

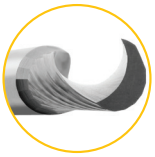
END MILLS FOR PLASTICS

Square Upcut – Single Flute



2x the Material Removal with Improved Finish Over Standard End Mills!

- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Select sizes available with oversized, router-style shanks
- High flute finish resists chip welding • Will ramp or plunge if required
- Right hand spiral, right hand cut • Solid carbide • CNC ground in the USA



Single Spiral Upcut Flute

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	1 FL	USD$	1 FL	USD$	1 FL	USD$
.020	**.060** (3x)	1/8	1-1/2			51420	41.20		
.020	**.100** (5x)	1/8	1-1/2			52420	43.70		
1/32	**3/32** (3x)	1/8	1-1/2			51431	41.20	51431-C4	56.20
1/32	**5/32** (5x)	1/8	1-1/2			52431	50.60		
.039	**.117** (3x)	1/8	1-1/2			51439	39.80		
.040	**.120** (3x)	1/8	1-1/2			51440	39.80		
3/64	**9/64** (3x)	1/8	1-1/2			51447	36.60	51447-C4	51.60
3/64	**1/4** (5x)	1/8	1-1/2			52447	42.60		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	USD$	1 FL	USD$	1 FL	USD$
1/16	**3/16** (3x)	1/8	1-1/2	51162	30.00	51462	30.00	51462-C4	44.90
1/16	**1/4** (4x)	1/8	1-1/2	878262	30.00	897362	30.00		
1/16*	**1/4** (4x)	1/4*	2	14104-20	42.80	14204-20	42.80		
1/16	**5/16** (5x)	1/8	2	51862	35.50	52462	35.50	52462-C4	54.50
1/16	**1/2** (8x)	1/8	2			722762	38.00		
5/64	**15/64** (3x)	1/8	1-1/2	51178	30.50	51478	30.00	51478-C4	44.90
5/64*	**5/16** (4x)	1/4*	2	14105-20	43.70	14205-20	43.70		
5/64	**13/32** (5x)	1/8	2	51878	35.50	52478	36.10	52478-C4	51.10
3/32	**9/32** (3x)	1/8	1-1/2	51193	30.00	51493	30.00	51493-C4	44.90
3/32	**3/8** (4x)	1/8	1-1/2	878293	30.00	897393	30.00		
3/32*	**3/8** (4x)	1/4*	2	14106-20	42.80	14206-20	42.80		
3/32	**1/2** (5x)	1/8	2	51893	35.50	52493	35.50	52493-C4	50.40
3/32	**3/4** (8x)	1/8	2			722793	38.00		
.118	**.354** (3x)	1/4	2	51205	40.70	51505	40.70		
1/8*	**1/4** (2x)	1/4*	2	14108-10	40.70	14208-10	40.70	892026-C4	58.90
1/8	**3/8** (3x)	1/8	1-1/2	51208	30.00	51508	30.00	51508-C4	44.90
1/8	**1/2** (4x)	1/8	2	878308	30.00	897408	30.00		
1/8*	**1/2** (4x)	1/4*	2	14108-20	40.70	14208-20	40.70	892028-C4	58.90
1/8	**5/8** (5x)	1/8	2	51908	35.50	52508	35.50	52508-C4	51.70
1/8	**1** (8x)	1/8	2			722808	38.00		

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

continued on next page

END MILLS FOR PLASTICS

Square Upcut – Single Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	1 FL	USD$	1 FL	USD$	1 FL	USD$
9/64	**.422** (3x)	1/4	2	51209	40.70	51509	40.70		
5/32*	**5/8** (4x)	1/4*	2	14110-20	40.70	14210-20	40.70		
5/32	**3/4** (5x)	3/16	3	51910	47.50	52510	47.50		
3/16*	**3/8** (2x)	1/4*	2	14112-10	40.70	14212-10	40.70		
3/16	**9/16** (3x)	3/16	2	51212	38.50	51512	38.50	51512-C4	56.10
3/16*	**5/8** (3x)	1/4*	2	14112-20	40.70	14212-20	40.70	892012-C4	60.70
3/16	**1** (5x)	3/16	3	51912	47.50	52512	47.50	52512-C4	68.10
1/4	**3/8** (1.5x)	1/4	2-1/2	883116	40.70	883816	40.70		
1/4	**3/4** (3x)	1/4	2-1/2	51216	40.70	51516	40.70	51516-C4	62.10
1/4	**1** (4x)	1/4	3	878316	52.70	897416	52.70		
1/4	**1-1/4** (5x)	1/4	3	51916	52.70	52516	52.70	52516-C4	74.10
1/4	**2** (8x)	1/4	4			722816	58.30		
5/16	**1** (3x)	5/16	2-1/2			51520	67.80		
3/8	**9/16** (1.5x)	3/8	2-1/2	883124	83.00	883824	83.00		
3/8	**1-1/8** (3x)	3/8	2-1/2	51224	83.00	51524	83.00	51524-C4	112.60
3/8	**1-1/2** (4x)	3/8	4	878324	93.70	897424	93.70		
3/8	**2** (5x)	3/8	4	51924	92.00	52524	92.00		
1/2	**3/4** (1.5x)	1/2	3	883132	141.50	883832	141.50		
1/2	**1-1/2** (3x)	1/2	3	51232	141.50	51532	141.50	51532-C4	177.50
1/2	**2-5/8** (5x)	1/2	5	51932	233.80	52532	233.80		

*Cutter diameter tolerance is +.000"/-.004". Tools are ground on oversized, router-style shank.

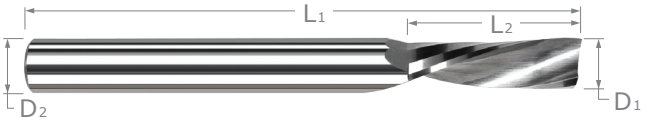
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END MILLS FOR PLASTICS

Square Downcut – Single Flute



Prevents Fraying, Chip-Out, and Lifting

- **Prevents fraying and chip-out of top edge of work piece**
- Prevents lifting on vacuum tables
- Left hand spiral, right hand cut
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Resists chip welding • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	SOFT PLASTICS		HARD PLASTICS		HARD PLASTICS AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	1 FL	USD$	1 FL	USD$	1 FL	USD$
1/32	**3/32** (3x)	1/8	1-1/2			929731	42.90		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	USD$	1 FL	USD$	1 FL	USD$
1/16	**3/16** (3x)	1/8	1-1/2			929762	42.90		
1/16	**1/4** (4x)	1/4	2	855862	46.00	44862	45.10		
1/16	**5/16** (5x)	1/8	2			935362	44.00		
5/64	**5/16** (4x)	1/4	2			44878	45.10		
3/32	**9/32** (3x)	1/8	1/2			929793	46.00		
3/32	**3/8** (4x)	1/4	2	855893	46.00	44893	45.10	44893-C4	64.40
3/32	**1/2** (5x)	1/8	2			935393	46.00		
1/8	**3/8** (3x)	1/8	1-1/2			929808	41.00		
1/8	**1/2** (4x)	1/4	2	855908	43.10	44908	43.10	44908-C4	65.75
1/8	**5/8** (5x)	1/8	2			935408	42.30		
5/32	**5/8** (4x)	1/4	2			44910	43.10		
3/16	**9/16** (3x)	3/16	2			929812	41.00		
3/16	**5/8** (3x)	1/4	2			44912	43.10	44912-C4	65.75
3/16	**3/4** (4x)	1/4	2.5	855912	43.10				
3/16	**1** (5x)	3/16	3			935412	43.10		
1/4	**3/4** (3x)	1/4	2-1/2	855916	43.10	44916	43.10	44916-C4	63.70
1/4	**1-1/4** (5x)	1/4	3			935416	79.10		
3/8	**1-1/8** (3x)	3/8	3			44924	74.20		
3/8	**1-1/8** (4x)	3/8	4	855924	88.40				
3/8	**2** (5x)	3/8	4			935424	129.50		
1/2	**1-1/2** (3x)	1/2	4			44932	174.50		
1/2	**2-5/8** (5x)	1/2	5			935432	273.20		

Please See Speeds & Feeds On Page 273

END MILLS FOR PLASTICS

Ball Upcut – Single Flute



- Design allows for maximum stock removal while maintaining excellent finish
- High rake, high relief design produces sharper edge for improved shearing action while transferring heat into the chip
- Large flute valley creates room for the chip and aids in chip evacuation
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- High flute finish resists chip welding
- Will ramp or plunge if required
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	1 FL	USD$
1/16	**.186** (3x)	1/8	1-1/2	869562	36.10
1/16	**5/16** (5x)	1/8	2	842262	44.10
3/32	**.279** (3x)	1/8	1-1/2	869593	36.10
3/32	**1/2** (5x)	1/8	2	842293	44.10
1/8	**3/8** (3x)	1/8	1-1/2	869608	36.10
1/8	**5/8** (5x)	1/8	2	842308	44.10
3/16	**.570** (3x)	3/16	2	869612	46.60
1/4	**3/4** (3x)	1/4	2-1/2	869616	51.10
1/4	**1-1/4** (5x)	1/4	3	842316	62.60
3/8	**1-1/8** (3x)	3/8	2-1/2	869624	96.80
3/8	**2** (5x)	3/8	4	842324	107.20
1/2	**1-1/2** (3x)	1/2	3	869632	155.00

SPEEDS & FEEDS (Single Flute Plastic Cutting End Mills)

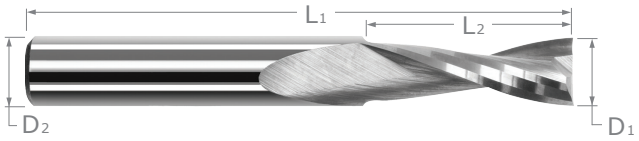
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 115%). For longer lengths of cut, table values of IPT must be reduced (for 4x, reduce 95%, for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/ Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/ Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/ Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping • Solid carbide • CNC ground in the USA

CUTTER DIAMETER		LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	decimal equivalent	L_2 +.010″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
.008	.0080	**.024** (3x)	1/8	1-1/2	48608	74.60		
.008	.0080	**.040** (5x)	1/8	1-1/2	49808	76.70		
.010	.0010	**.030** (3x)	1/8	1-1/2	48610	71.10		
.010	.0010	**.050** (5x)	1/8	1-1/2	49810	81.00		
1/64	.0156	**.023** (1.5x)	1/8	1-1/2	957615	60.80		
1/64	.0156	**3/64** (3x)	1/8	1-1/2	48615	60.80		
1/64	.0156	**5/64** (5x)	1/8	1-1/2	49815	72.00		
1/64	.0156	**1/8** (8x)	1/8	1-1/2	60215	79.40		
.020	.0200	**.030** (1.5x)	1/8	1-1/2	957620	46.40		
.020	.0200	**.060** (3x)	1/8	1-1/2	48620	46.40	48620-C4	61.30
.020	.0200	**.100** (5x)	1/8	1-1/2	49820	56.40		
.020	.0200	**.160** (8x)	1/8	1-1/2	60220	66.30		
.020	.0200	**.200** (10x)	1/8	1-1/2	938920	66.30		
.025	.0250	**.038** (1.5x)	1/8	1-1/2	957625	47.20		
.025	.0250	**.075** (3x)	1/8	1-1/2	48625	46.40		
.025	.0250	**1/8** (5x)	1/8	1-1/2	49825	56.10	49825-C4	71.00
.025	.0250	**13/64** (8x)	1/8	1-1/2	60225	65.10		
.030	.0300	**.090** (3x)	1/8	1-1/2	48630	46.40		
.030	.0300	**.156** (5x)	1/8	1-1/2	49830	57.50		
1/32	.0312	**3/64** (1.5x)	1/8	1-1/2	957631	46.10		
1/32	.0312	**3/32** (3x)	1/8	1-1/2	48631	46.10	48631-C4	61.00
1/32	.0312	**3/32** (3x)	1/4	2	878731	57.10		
1/32	.0312	**5/32** (5x)	1/8	1-1/2	49831	56.10	49831-C4	71.00
1/32	.0312	**1/4** (8x)	1/8	1-1/2	60231	64.30	60231-C4	79.20
1/32	.0312	**5/16** (10x)	1/8	1-1/2	938931	64.30		
.035	.0350	**.105** (3x)	1/8	1-1/2	48635	46.40		
.039 (1 mm)	.0394	**.118** (3x)	1/8	1-1/2	48639	46.60		
.039 (1 mm)	.0394	**13/64** (5x)	1/8	1-1/2	49839	46.60		
.040	.0400	**.060** (1.5x)	1/8	1-1/2	957640	47.20		
.040	.0400	**.120** (3x)	1/8	1-1/2	48640	46.40		
.040	.0400	**13/64** (5x)	1/8	1-1/2	49840	56.40		
.040	.0400	**.325** (8x)	1/8	2	60240	65.10		
.045	.0450	**.135** (3x)	1/8	1-1/2	48645	46.40		
3/64	.0469	**.071** (1.5x)	1/8	1-1/2	957647	38.90		
3/64	.0469	**9/64** (3x)	1/8	1-1/2	48647	38.90	48647-C4	53.90
3/64	.0469	**1/4** (5x)	1/8	1-1/2	49847	45.30	49847-C4	60.20
3/64	.0469	**3/8** (8x)	1/8	2	60247	54.50		
.050	.0500	**.150** (3x)	1/8	1-1/2	48650	39.30		
.050	.0500	**.250** (5x)	1/8	1-1/2	49850	45.60		
.055	.0550	**.165** (3x)	1/8	1-1/2	48655	40.10		
.060	.0600	**.180** (3x)	1/8	1-1/2	48660	39.30		
.060	.0600	**5/16** (5x)	1/8	1-1/2	49860	45.60		

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END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

	CUTTER DIAMETER			LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	+.00mm −.05mm	decimal equivalent	L_2 +.030″ −.000″ +.75mm −.00mm	D_2	L_1	2 FL	USD$	2 FL	USD$
	1/16		.0625	**3/32** (1.5x)	1/8	1-1/2	957662	33.60		
	1/16		.0625	**3/16** (3x)	1/8	1-1/2	48662	33.60	48662-C4	48.60
NEW	1/16		.0625	**3/16** (3x)	1/4	2	878762	44.50	878762-C4	64.60
	1/16		.0625	**1/4** (4x)	1/8	2	874862	39.80		
	1/16		.0625	**5/16** (5x)	1/8	2	49862	39.80	49862-C4	56.00
	1/16		.0625	**3/8** (6x)	1/8	2	745662	43.70		
	1/16		.0625	**1/2** (8x)	1/8	2	60262	49.00	60262-C4	63.90
	1/16		.0625	**5/8** (10x)	1/8	2	938962	49.00	938962-C4	67.40
	5/64		.0781	**.117** (1.5x)	1/8	1-1/2	957678	33.60		
	5/64		.0781	**15/64** (3x)	1/8	1-1/2	48678	33.60	48678-C4	48.60
	5/64		.0781	**13/32** (5x)	1/8	2	49878	39.80	49878-C4	54.70
	5/64		.0781	**5/8** (8x)	1/8	2	60278	49.00		
	5/64		.0781	**.800** (10x)	1/8	2	938978	49.00		
	3/32		.0937	**9/64** (1.5x)	1/8	1-1/2	957693	33.60	957693-C4	48.60
	3/32		.0937	**9/32** (3x)	1/8	1-1/2	48693	33.60	48693-C4	48.60
	3/32		.0937	**9/32** (3x)	1/4	2	878793	44.50		
	3/32		.0937	**3/8** (4x)	1/8	2	874893	39.80		
	3/32		.0937	**1/2** (5x)	1/8	2	49893	39.80	49893-C4	56.00
	3/32		.0937	**9/16** (6x)	1/8	2	745693	43.70		
	3/32		.0937	**3/4** (8x)	1/8	2	60293	49.00	60293-C4	63.90
	3/32		.0937	**.950** (10x)	1/8	2	938993	49.00		
	.100		.1000	**.150** (1.5x)	1/8	1-1/2	957700	34.30		
	.100		.1000	**.300** (3x)	1/8	1-1/2	48700	35.00		
	.100		.1000	**1/2** (5x)	1/8	2	49900	40.90		
	.100		.1000	**.800** (8x)	1/8	2-1/2	60300	51.40		
	7/64		.1090	**21/64** (3x)	1/8	1-1/2	48707	34.30		
	.118 (3 mm)		.1181	**.177** (1.5x)	1/8	1-1/2	957706	35.00		
	.118 (3 mm)		.1181	**.354** (3x)	1/8	1-1/2	48706	34.30		
	.118 (3 mm)		.1181	**.625** (5x)	1/8	2	49906	41.80		
	.118 (3 mm)		.1181	**.950** (8x)	1/8	2-1/2	60306	51.40		
	1/8		.1250	**.100** (0.8x)	1/8	1-1/2	793208	34.40		
	1/8		.1250	**3/16** (1.5x)	1/8	1-1/2	957708	33.60	957708-C4	48.60
	1/8		.1250	**3/8** (3x)	1/8	1-1/2	48708	33.60	48708-C4	48.60
	1/8		.1250	**3/8** (3x)	1/4	2	878808	44.50		
NEW	1/8		.1250	**1/2** (4x)	1/8	2	874908	39.80	874908-C4	54.70
	1/8		.1250	**5/8** (5x)	1/8	2	49908	39.80	49908-C4	56.00
	1/8		.1250	**3/4** (6x)	1/8	2-1/2	745708	43.70		
	1/8		.1250	**1** (8x)	1/8	2-1/2	60308	49.00	60308-C4	64.10
	1/8		.1250	**1-1/4** (10x)	1/8	2-1/2	939008	49.00	939008-C4	64.10
	9/64		.1406	**27/64** (3x)	3/16	2	48709	45.30		
	9/64		.1406	**3/4** (5x)	3/16	3	49909	45.20		
	5/32		.1562	**15/64** (1.5x)	3/16	2	957710	44.50		
	5/32		.1562	**15/32** (3x)	3/16	2	48710	44.50	48710-C4	61.80
	5/32		.1562	**3/4** (5x)	3/16	3	49910	54.80	49910-C4	75.60
	5/32		.1562	**1-1/4** (8x)	3/16	3	60310	60.30		
	3/16		.1875	**9/32** (1.5x)	3/16	2	957712	44.50	957712-C4	61.20
	3/16		.1875	**9/16** (3x)	3/16	2	48712	44.50	48712-C4	61.80
	3/16		.1875	**9/16** (3x)	1/4	2	878812	55.30		

continued on next page

NEW SIZES!

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER D_1 +.000″ −.002″	+.00mm −.05mm		LENGTH OF CUT L_2 +.030″ −.000″ +.75mm −.00mm		SHANK DIAMETER D_2	OVERALL LENGTH L_1	UNCOATED 2 FL	USD$	AMORPHOUS DIAMOND 2 FL	USD$	
3/16		.1875	**3/4**	(4x)	3/16	3	874912	54.80			
3/16		.1875	**1**	(5x)	3/16	3	49912	54.80	49912-C4	75.60	
3/16		.1875	**1-1/2**	(8x)	3/16	3	60312	60.30			
3/16		.1875	**1-7/8**	(10x)	3/16	3	939012	60.30			
	6.0 mm	.2362	**18.00 mm**	(3x)	6 mm	63 mm	886566	91.10			
1/4		.2500	**.200**	(0.8x)	1/4	2-1/2	793216	54.80			
1/4		.2500	**3/8**	(1.5x)	1/4	2-1/2	957716	54.80	957716-C4	76.20	
1/4		.2500	**3/4**	(3x)	1/4	2-1/2	48716	54.80	48716-C4	76.20	
1/4		.2500	**1**	(4x)	1/4	3	874916	62.90	874916-C4	84.30	
1/4		.2500	**1-1/4**	(5x)	1/4	3	49916	62.90	49916-C4	86.40	
1/4		.2500	**2**	(8x)	1/4	4	60316	78.70	60316-C4	101.50	
1/4		.2500	**2-1/2**	(10x)	1/4	4	939016	78.70			
5/16		.3125	**15/32**	(1.5x)	5/16	2-1/2	957720	81.70			
5/16		.3125	**1**	(3x)	5/16	2-1/2	48720	81.70			
5/16		.3125	**1-5/8**	(5x)	5/16	4	49920	105.70			
	8.0 mm	.3149	**24.00 mm**	(3x)	8 mm	63 mm	886570	122.20			
3/8		.3750	**9/16**	(1.5x)	3/8	3	957724	94.40	957724-C4	124.00	
3/8		.3750	**1-1/8**	(3x)	3/8	3	48724	94.40	48724-C4	124.00	
3/8		.3750	**1-1/2**	(4x)	3/8	4	874924	108.90	874924-C4	141.60	NEW
3/8		.3750	**2**	(5x)	3/8	4	49924	108.90			
3/8		.3750	**3**	(8x)	3/8	6	60324	122.90			
	10.0 mm	.3937	**30.00 mm**	(3x)	10 mm	75 mm	886573	109.40			
	12.0 mm	.4724	**36.00 mm**	(3x)	12 mm	100 mm	886576	113.80			
1/2		.5000	**3/4**	(1.5x)	1/2	4	957732	166.30	957732-C4	202.50	
1/2		.5000	**1-1/2**	(3x)	1/2	4	48732	166.30	48732-C4	202.50	
1/2		.5000	**2**	(4x)	1/2	4	874932	179.90			
1/2		.5000	**2-5/8**	(5x)	1/2	5	49932	198.10	49932-C4	235.10	
1/2		.5000	**4**	(8x)	1/2	7	60332	227.90			
5/8		.6250	**15/16**	(1.5x)	5/8	4	957740	245.00			
3/4		.7500	**1-1/8**	(1.5x)	3/4	4	957748	313.00	957748-C4	374.30	
3/4		.7500	**2-1/4**	(3x)	3/4	4	48748	313.00			

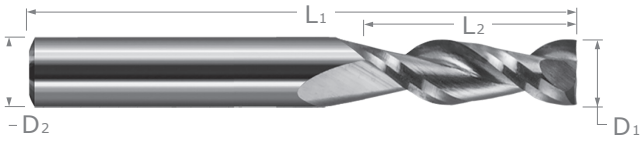
SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - Slow Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 0.8x, increase 120%,for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 4x, reduce to 95%; for 5x, reduce to 90%; for 6x, reduce to 80%; for 8x, reduce to 54%; for 10x, reduce to 40%).

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0005	.0010	.0015	.0020	.0025	.0030	.0040	.0060	.0080	.0085	.0103	.0137	.0171	.0205	1 x Dia	1 x Dia
			Profile	.0006	.0011	.0017	.0023	.0029	.0034	.0046	.0069	.0093	.0098	.0118	.0157	.0197	.0236	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0004	.0008	.0012	.0016	.0021	.0024	.0033	.0049	.0066	.0070	.0084	.0112	.0140	.0168	1 x Dia	1 x Dia
			Profile	.0005	.0009	.0014	.0019	.0024	.0028	.0038	.0057	.0076	.0080	.0096	.0129	.0161	.0193	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Upcut – 2 Flute (High Helix)



2 Flute Design Improves Bottom Finish and Accuracy

- High rake, high relief design with large flute valley maximizes chip removal performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Higher helix (approx. 40°) for faster chip removal and better finish
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/32	**3/32** (3x)	1/8	1-1/2	898131	60.10		
3/64	**9/64** (3x)	1/8	1-1/2	898147	43.80		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**3/32** (1.5x)	1/8	1-1/2	827662	44.10		
1/16	**3/16** (3x)	1/8	1-1/2	898162	43.80	898162-C4	58.80
1/16	**5/16** (5x)	1/8	2	866262	46.60	866262-C4	61.60
1/16	**1/2** (8x)	1/8	2	732362	47.70		
5/64	**15/64** (3x)	1/8	1-1/2	898178	44.10	898178-C4	59.10
3/32	**9/32** (3x)	1/8	1-1/2	898193	43.80	898193-C4	58.80
1/8	**3/16** (1.5x)	1/8	1-1/2	827708	44.10		
1/8	**3/8** (3x)	1/8	1-1/2	898208	43.80	898208-C4	58.80
1/8	**5/8** (5x)	1/8	2	866308	46.60	866308-C4	61.60
1/8	**1** (8x)	1/8	2-1/2	732408	49.30		
5/32	**15/32** (3x)	3/16	2	898210	62.60	898210-C4	79.30
3/16	**9/16** (3x)	3/16	2	898212	60.20	898212-C4	76.90
3/16	**1** (5x)	3/16	3	866312	64.50		
1/4	**3/8** (1.5x)	1/4	2-1/2	827716	67.90		
1/4	**3/4** (3x)	1/4	2-1/2	898216	67.90	898216-C4	91.80
1/4	**1-1/4** (5x)	1/4	3	866316	72.30		
3/8	**9/16** (1.5x)	3/8	3	827724	103.70		
3/8	**1-1/8** (3x)	3/8	3	898224	102.90	898224-C4	133.30
3/8	**2** (5x)	3/8	4	866324	110.00		
1/2	**3/4** (1.5x)	1/2	4	827732	179.20		
1/2	**1-1/2** (3x)	1/2	4	898232	177.50	898232-C4	221.90
1/2	**2-5/8** (5x)	1/2	5	866332	191.40		

SPEEDS & FEEDS (2 Flute Plastic Cutting End Mills - High Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0006	.0013	.0020	.0027	.0033	.0040	.0054	.0080	.0107	.0114	.0137	.0182	.0228	.0273	1 x Dia	1 x Dia
			Profile	.0007	.0015	.0023	.0031	.0038	.0046	.0062	.0092	.0123	.0131	.0157	.0210	.0262	.0315	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0005	.0011	.0016	.0022	.0027	.0033	.0044	.0066	.0088	.0093	.0112	.0149	.0186	.0224	1 x Dia	1 x Dia
			Profile	.0006	.0013	.0019	.0025	.0031	.0038	.0050	.0075	.0101	.0107	.0129	.0172	.0214	.0257	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix)



- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- 2 flute design improves rigidity for better accuracy, less deflection, and longer tool life
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
.010	**.030** (3x)	1/8	1-1/2	998510	74.50		
1/64	**.023** (1.5x)	1/8	1-1/2	966215	68.10		
1/64	**3/64** (3x)	1/8	1-1/2	998515	68.10	998515-C4	83.00
1/64	**5/64** (5x)	1/8	1-1/2	999815	78.80		
.020	**.030** (1.5x)	1/8	1-1/2	966220	53.60		
.020	**.060** (3x)	1/8	1-1/2	998520	53.00	998520-C4	68.00
.025	**.075** (3x)	1/8	1-1/2	998525	53.00		
1/32	**3/64** (1.5x)	1/8	1-1/2	966231	53.00		
1/32	**3/32** (3x)	1/8	1-1/2	998531	53.00	998531-C4	68.00
1/32	**5/32** (5x)	1/8	1-1/2	999831	63.80		
.040	**.120** (3x)	1/8	1-1/2	998540	53.00	998540-C4	68.00
.040	**.203** (5x)	1/8	1-1/2	999840	63.80		
3/64	**.071** (1.5x)	1/8	1-1/2	966247	46.20		
3/64	**9/64** (3x)	1/8	1-1/2	998547	45.60		
3/64	**1/4** (5x)	1/8	1-1/2	999847	53.00		
.050	**.150** (3x)	1/8	1-1/2	998550	53.60		
.060	**.180** (3x)	1/8	1-1/2	998560	53.60		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**3/32** (1.5x)	1/8	1-1/2	966262	40.90	966262-C4	55.80
1/16	**3/16** (3x)	1/8	1-1/2	998562	40.90	998562-C4	55.80
1/16	**1/4** (4x)	1/8	2	827462	54.80		
1/16	**5/16** (5x)	1/8	2	999862	54.80	999862-C4	69.80
1/16	**1/2** (8x)	1/8	2	978962	91.70		
5/64	**.117** (1.5x)	1/8	1-1/2	966278	40.90		
5/64	**15/64** (3x)	1/8	1-1/2	998578	40.90		
5/64	**13/32** (5x)	1/8	2	999878	54.80		
5/64	**5/8** (8x)	1/8	2	978978	91.70		

continued on next page



Check Out All of Our Plastic Cutting Solutions!

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (Slow Helix) (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
3/32	**9/64** (1.5x)	1/8	1-1/2	966293	40.90		
3/32	**9/32** (3x)	1/8	1-1/2	998593	40.90	998593-C4	55.80
3/32	**3/8** (4x)	1/8	2	827493	55.30		
3/32	**1/2** (5x)	1/8	2	999893	54.80		
3/32	**3/4** (8x)	1/8	2	978993	92.60		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	998606	40.90		
1/8	**3/16** (1.5x)	1/8	1-1/2	966308	40.90	966308-C4	55.80
1/8	**3/8** (3x)	1/8	1-1/2	998608	40.90	998608-C4	55.80
1/8	**1/2** (4x)	1/8	2	827508	54.80		
1/8	**5/8** (5x)	1/8	2	999908	54.80		
1/8	**1** (8x)	1/8	2-1/2	979008	91.70		
9/64	**.425** (3x)	3/16	2	998609	56.20		
5/32	**15/64** (1.5x)	3/16	2	966310	56.20		
5/32	**15/32** (3x)	3/16	2	998610	55.60	998610-C4	76.80
5/32	**3/4** (5x)	3/16	3	999910	66.10		
3/16	**9/32** (1.5x)	3/16	2	966312	55.60	966312-C4	72.30
3/16	**9/16** (3x)	3/16	2	998612	55.60	998612-C4	76.80
3/16	**1** (5x)	3/16	3	999912	66.10		
3/16	**1-1/2** (8x)	3/16	3	979012	98.30		
1/4	**3/8** (1.5x)	1/4	2-1/2	966316	66.10	966316-C4	90.00
1/4	**3/4** (3x)	1/4	2-1/2	998616	66.10	998616-C4	90.00
1/4	**1** (4x)	1/4	3	827516	72.10		
1/4	**1-1/4** (5x)	1/4	3	999916	72.10	999916-C4	93.50
1/4	**2** (8x)	1/4	4	979016	106.30		
5/16	**1** (3x)	5/16	2-1/2	998620	98.80		
3/8	**9/16** (1.5x)	3/8	3	966324	112.40		
3/8	**1-1/8** (3x)	3/8	3	998624	112.40	998624-C4	142.20
3/8	**2** (5x)	3/8	4	999924	131.80		
1/2	**3/4** (1.5x)	1/2	4	966332	202.70	966332-C4	247.10
1/2	**1-1/2** (3x)	1/2	4	998632	202.70	998632-C4	238.90
1/2	**2-5/8** (5x)	1/2	5	999932	224.60		

Please See Speeds & Feeds On Page 276

Plastic Cutting End Mills vs. Metal Cutting End Mills

Improved Finish - Sharper edge provides for cleaner cut and less plowing action. Chips curl faster, transferring heat to the chip, not the part.
Increased Stock Removal - Large flute opening gives more chip clearance, avoids chip welding, and improves chip evacuation.

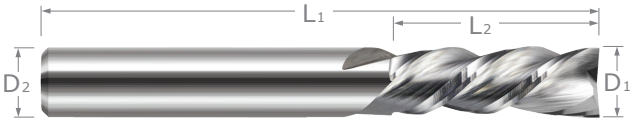
Feature	Typical Metal Working End Mills	Plastic Cutting End Mills
Flute Rake	8° – 12°	25° – 32°
Axial/End Gash Rake	2° – 4°	8° – 12°
OD Primary Relief	12° – 18°	18° – 26°
OD Secondary Relief	18° – 26°	35° – 45°
Core Diameter	56% – 60%	40% – 44%
Typical Cross Section	 2 FLUTE STANDARD	 SINGLE FLUTE  2 FLUTE  2 STRAIGHT FLUTE

Data presented is intended to be general guidelines for understanding how plastic end mill geometry compares to metal working tools. Actual values will change based on diameter, application and specific tool.

NEW SIZES!

END MILLS FOR PLASTICS

Square Downcut – 2 Flute (High Helix)



- **Prevents fraying and chip-out on the top of the workpiece**
- Prevents lifing on vacuum tables
- 2 left hand spiral, right hand cut flutes
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Higher helix (approx. 40°) for faster chip removal and better finish
- Solid carbide
- CNC ground in the USA

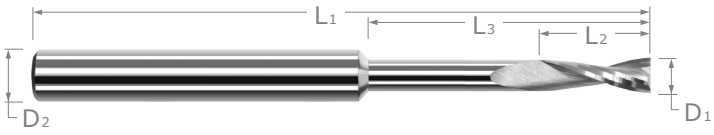
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$	
1/32	**3/32** (3x)	1/8	1-1/2	775831	51.60			
1/32	**5/32** (5x)	1/8	1-1/2	826331	52.80			
3/64	**9/64** (3x)	1/8	1-1/2	775847	53.00			
3/64	**1/4** (5x)	1/8	1-1/2	826347	54.10			

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$	
1/16	**.186** (3x)	1/8	1-1/2	775862	49.00			
1/16	**5/16** (5x)	1/8	2	826362	54.80	826362-C4	69.80	NEW
5/64	**15/64** (3x)	1/8	1-1/2	775878	49.00			
5/64	**13/32** (5x)	1/8	2	826378	54.80			
3/32	**.273** (3x)	1/8	1-1/2	775893	49.00			
3/32	**1/2** (5x)	1/8	2	826393	54.80			
1/8	**3/16** (1.5x)	1/8	1-1/2	694808	49.00			NEW
1/8	**3/8** (3x)	1/8	1-1/2	775908	49.00	775908-C4	63.90	NEW
1/8	**5/8** (5x)	1/8	2	826408	54.80			
5/32	**.470** (3x)	3/16	2	775910	59.20			
5/32	**3/4** (5x)	3/16	3	826410	66.10			
3/16	**.570** (3x)	3/16	2	775912	59.20			
3/16	**1** (5x)	3/16	3	826412	66.10			
1/4	**3/8** (1.5x)	1/4	2-1/2	694816	65.10			NEW
1/4	**3/4** (3x)	1/4	2-1/2	775916	65.10	775916-C4	80.50	NEW
1/4	**1-1/4** (5x)	1/4	3	826416	72.10			
3/8	**1-1/8** (3x)	3/8	3	775924	120.10	775924-C4	150.50	NEW
3/8	**2** (5x)	3/8	4	826424	133.20			
1/2	**1-1/2** (3x)	1/2	4	775932	204.40	775932-C4	248.80	NEW
1/2	**2-5/8** (5x)	1/2	5	826432	224.60			

Please See Speeds & Feeds On Page 277

END MILLS FOR PLASTICS

Square Upcut – Long Reach – 2 Flute



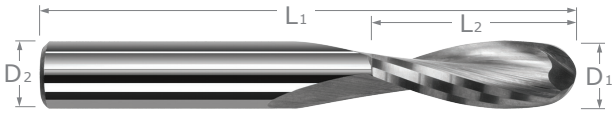
- High rake, high relief design with large flute valley maximizes chip removal and performance
- Center cutting design improves plunging and ramping
- Reduced neck diameter to avoid heeling
- Length of cut = 3x diameter
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/64	3/64	**1/8** (8x)	1/8	1-1/2	989015	79.10		
1/64	3/64	**3/16** (12x)	1/8	1-1/2	994115	83.10		
.020	.060	**.160** (8x)	1/8	1-1/2	989020	64.10		
.020	.060	**1/4** (12x)	1/8	1-1/2	994120	67.90		
1/32	3/32	**5/32** (5x)	1/8	1-1/2	961531	62.30		
1/32	3/32	**1/4** (8x)	1/8	1-1/2	989031	64.10		
1/32	3/32	**3/8** (12x)	1/8	1-1/2	994131	67.90		
1/32	3/32	**.470** (15x)	1/8	1-1/2	979731	71.90		
.040	.120	**.325** (8x)	1/8	1-1/2	989040	64.10		
.040	.120	**.480** (12x)	1/8	1-1/2	994140	67.90		
3/64	9/64	**3/8** (8x)	1/8	1-1/2	989047	57.00		
3/64	9/64	**.570** (12x)	1/8	1-1/2	994147	60.60		
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	3/16	**5/16** (5x)	1/8	1-1/2	961562	51.00		
1/16	3/16	**1/2** (8x)	1/8	1-1/2	989062	52.30	989062-C4	67.30
1/16	3/16	**5/8** (10x)	1/8	2	748162	54.60		
1/16	3/16	**3/4** (12x)	1/8	2	994162	55.90		
1/16	3/16	**15/16** (15x)	1/8	2	979762	60.00		
5/64	15/64	**5/8** (8x)	1/8	2	989078	52.70		
5/64	15/64	**15/16** (12x)	1/8	2	994178	56.40		
3/32	9/32	**1/2** (5x)	1/8	1-1/2	961593	51.00		
3/32	9/32	**3/4** (8x)	1/8	2	989093	52.30		
3/32	9/32	**15/16** (10x)	1/8	2	748193	54.60		
3/32	9/32	**1-1/8** (12x)	1/8	2	994193	55.90		
3/32	9/32	**1-13/32** (15x)	1/8	2-1/2	979793	60.00		
1/8	3/8	**5/8** (5x)	1/8	1-1/2	961608	51.00		
1/8	3/8	**1** (8x)	1/8	2	989108	52.30	989108-C4	67.30
1/8	3/8	**1-1/4** (10x)	1/8	3	748108	54.60		
1/8	3/8	**1-1/2** (12x)	1/8	2-1/2	994208	55.90		
1/8	3/8	**1-7/8** (15x)	1/8	3	979808	60.00		
5/32	15/32	**1-1/4** (8x)	3/16	2-1/2	989110	63.00		
5/32	15/32	**1-7/8** (12x)	3/16	4	994210	73.50		
3/16	9/16	**1-1/2** (8x)	3/16	2-1/2	989112	63.00		
3/16	9/16	**2-1/4** (12x)	3/16	4	994212	73.50		
1/4	3/4	**2** (8x)	1/4	4	989116	74.80	989116-C4	97.70
1/4	3/4	**3** (12x)	1/4	6	994216	89.50		
3/8	1-1/8	**3** (8x)	3/8	6	989124	137.80		
1/2	1-1/2	**4** (8x)	1/2	7	989132	251.10		

Please See Speeds & Feeds On Page 284

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute



- Ball end for profiling complex shapes
- Ball end has increased rake and relief for improved cutting action at tip of ball
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/64	**3/64** (3x)	1/8	1-1/2	49515	68.80		
1/64	**5/64** (5x)	1/8	1-1/2	71315	81.20		
.020	**.060** (3x)	1/8	1-1/2	49520	54.00		
.020	**.100** (5x)	1/8	1-1/2	71320	66.10		
.025	**.075** (3x)	1/8	1-1/2	49525	54.50		
.025	**1/8** (5x)	1/8	1-1/2	71325	66.10		
1/32	**3/64** (1.5x)	1/8	1-1/2	962331	54.00		
1/32	**3/32** (3x)	1/8	1-1/2	49531	54.00	49531-C4	68.90
1/32	**5/32** (5x)	1/8	1-1/2	71331	65.10	71331-C4	80.00
1/32	**1/4** (8x)	1/8	1-1/2	955731	77.30		
.039 (1 mm)	**.118** (3x)	1/8	1-1/2	49539	54.60		
3/64	**9/64** (3x)	1/8	1-1/2	49547	46.20		
3/64	**1/4** (5x)	1/8	1-1/2	71347	56.80		

D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**3/32** (1.5x)	1/8	1-1/2	962362	39.80		
1/16	**3/16** (3x)	1/8	1-1/2	49562	39.80	49562-C4	54.70
1/16	**1/4** (4x)	1/8	1-1/2	784662	44.00		
1/16	**5/16** (5x)	1/8	2	71362	48.50	71362-C4	67.10
1/16	**1/2** (8x)	1/8	2	955762	72.50		
5/64	**15/64** (3x)	1/8	1-1/2	49578	39.80		
5/64	**13/32** (5x)	1/8	2	71378	48.50		
3/32	**9/32** (3x)	1/8	1-1/2	49593	39.80	49593-C4	54.70
3/32	**1/2** (5x)	1/8	2	71393	48.50		
.118 (3 mm)	**.354** (3x)	1/8	1-1/2	49605	40.10		
1/8	**3/16** (1.5x)	1/8	1-1/2	962408	39.80		
1/8	**3/8** (3x)	1/8	1-1/2	49608	39.80	49608-C4	54.70
1/8	**1/2** (4x)	1/8	2	784708	44.00		
1/8	**5/8** (5x)	1/8	2	71408	48.50	71408-C4	67.10
1/8	**1** (8x)	1/8	2-1/2	955808	72.50		
9/64	**.425** (3x)	3/16	2	49609	53.00		
5/32	**15/32** (3x)	3/16	2	49610	52.40		
5/32	**3/4** (5x)	3/16	3	71410	64.50		
3/16	**9/32** (1.5x)	3/16	2	962412	52.40		
3/16	**9/16** (3x)	3/16	2	49612	52.40	49612-C4	69.50
3/16	**1** (5x)	3/16	3	71412	64.80		

continued on next page

END MILLS FOR PLASTICS

Ball Upcut – 2 Flute (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/4	**3/8** (1.5x)	1/4	2-1/2	962416	67.10		
1/4	**3/4** (3x)	1/4	2-1/2	49616	67.10	49616-C4	90.90
1/4	**1-1/4** (5x)	1/4	3	71416	76.80	71416-C4	98.20
3/8	**9/16** (1.5x)	3/8	3	962424	107.50		
3/8	**1-1/8** (3x)	3/8	3	49624	107.50	49624-C4	138.00
3/8	**2** (5x)	3/8	4	71424	122.60		
1/2	**3/4** (1.5x)	1/2	4	962432	185.50		
1/2	**1-1/2** (3x)	1/2	4	49632	185.50	49632-C4	222.40
1/2	**2-5/8** (5x)	1/2	5	71432	224.30		

Please See Speeds & Feeds On Page 276

In The Loupe TV

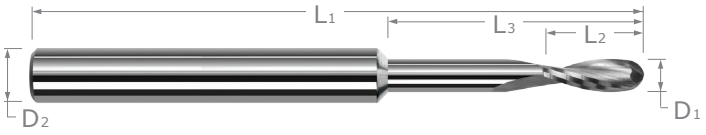
Check Out Our New CNC Show!

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

END MILLS FOR PLASTICS

Ball Upcut – Long Reach – 2 Flute



- Ball end has increased rake and relief for improved cutting action at tip of ball
- Reduced neck diameter to avoid heeling
- Ball end for profiling complex shapes
- Length of cut = 3x diameter
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	L_3 +.010″ −.000″	D_2	L_1	2 FL	USD$
1/32	3/32	**5/32** (5x)	1/8	1-1/2	964531	69.00
1/32	3/32	**1/4** (8x)	1/8	1-1/2	976231	71.30
3/64	9/64	**1/4** (5x)	1/8	1-1/2	964547	61.30
3/64	9/64	**3/8** (8x)	1/8	1-1/2	976247	62.70
D_1 +.000″ −.002″	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	2 FL	USD$
1/16	3/16	**5/16** (5x)	1/8	1-1/2	964562	55.60
1/16	3/16	**1/2** (8x)	1/8	1-1/2	976262	57.70
5/64	15/64	**13/32** (5x)	1/8	1-1/2	964578	56.20
5/64	15/64	**5/8** (8x)	1/8	2	976278	57.70
3/32	9/32	**1/2** (5x)	1/8	1-1/2	964593	56.20
3/32	9/32	**3/4** (8x)	1/8	2	976293	57.70
1/8	3/8	**5/8** (5x)	1/8	1-1/2	964608	55.60
1/8	3/8	**1** (8x)	1/8	2	976308	57.70
3/16	9/16	**1** (5x)	3/16	2	964612	68.70
1/4	3/4	**1-1/4** (5x)	1/4	2-1/2	964616	83.40

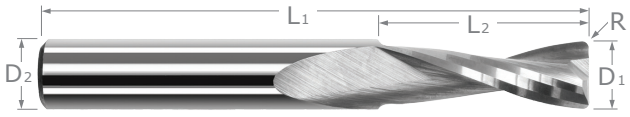
SPEEDS & FEEDS (Square & Ball – Long Reach Plastic Cutting End Mills)

Important Note: Values in table are in inches and are based on reached (8x Dia) end mills. For shorter reaches, table values of IPT must be increased (for 5x, increase to 130%). For longer reaches, table values of IPT and DOC must be reduced (for 10x, reduce to 89%; for 12x, reduce to 80%; for 15x, reduce to 67%). For complete speed and feed charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0003	.0006	.0010	.0013	.0016	.0019	.0026	.0039	.0051	.0055	.0066	.0088	.0109	.0131	1 x Dia	1 x Dia
			Profile	.0004	.0007	.0011	.0015	.0018	.0022	.0030	.0044	.0059	.0063	.0075	.0101	.0126	.0151	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0005	.0008	.0010	.0013	.0016	.0021	.0032	.0042	.0045	.0054	.0072	.0090	.0107	1 x Dia	1 x Dia
			Profile	.0003	.0006	.0009	.0012	.0015	.0018	.0024	.0036	.0048	.0051	.0062	.0082	.0103	.0124	.35 x Dia	1 x Dia

END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute



- High rake, high relief design with large flute valley maximizes chip removal and performance
- Slower helix reduces lifting forces, making design preferable for fiber-reinforced applications and vacuum table setups
- Center cutting design improves plunging and ramping
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.001″	R +.001″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
	1/32	.005	**3/32** (3x)	1/8	1-1/2	54031	40.40		
	D_1 +.000″ −.002″	R +.001″ −.001″	L_2 +.030″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
	1/16	.005	**3/16** (3x)	1/8	1-1/2	54062	39.80		
	1/16	.010	**3/16** (3x)	1/8	1-1/2	55462	39.80		
	1/16	.010	**5/16** (5x)	1/8	2	861862	49.50		
	1/16	.015	**3/16** (3x)	1/8	1-1/2	69362	39.80		
NEW	1/16	.015	**5/16** (5x)	1/8	2	862462	49.50	862462-C4	64.50
	3/32	.005	**9/32** (3x)	1/8	1-1/2	54093	39.80		
	3/32	.010	**9/32** (3x)	1/8	1-1/2	55493	39.80		
	3/32	.010	**1/2** (5x)	1/8	2	861893	49.50		
	3/32	.015	**9/32** (3x)	1/8	1-1/2	69393	40.40		
	3/32	.015	**1/2** (5x)	1/8	2	862493	50.10		
	3/32	.020	**9/32** (3x)	1/8	1-1/2	69893	39.80		
	3/32	.030	**9/32** (3x)	1/8	1-1/2	70693	39.80		
	1/8	.005	**3/16** (1.5x)	1/8	1-1/2	767508	40.40		
NEW	1/8	.005	**3/8** (3x)	1/8	1-1/2	54108	39.80	54108-C4	54.70
	1/8	.005	**5/8** (5x)	1/8	2	768908	49.70		
	1/8	.010	**3/8** (3x)	1/8	1-1/2	55508	39.80		
	1/8	.010	**5/8** (5x)	1/8	2	861908	50.10		
	1/8	.015	**3/8** (3x)	1/8	1-1/2	56408	39.80		
NEW	1/8	.015	**5/8** (5x)	1/8	2	862508	49.50	862508-C4	64.50
	1/8	.020	**3/8** (3x)	1/8	1-1/2	69908	39.80		
	1/8	.030	**3/16** (1.5x)	1/8	1-1/2	768708	40.40		
NEW	1/8	.030	**3/8** (3x)	1/8	1-1/2	70708	39.80	70708-C4	54.70
	1/8	.030	**5/8** (5x)	1/8	2	863108	49.50		
	3/16	.005	**9/16** (3x)	3/16	2	54112	52.40		
	3/16	.010	**9/16** (3x)	3/16	2	55512	52.40		
	3/16	.015	**9/16** (3x)	3/16	2	56412	53.40		
	3/16	.020	**9/16** (3x)	3/16	2	69912	52.40		
	3/16	.030	**9/16** (3x)	3/16	2	70712	53.40		
	3/16	.030	**1** (5x)	3/16	3	863112	65.70		

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NEW SIZES!

END MILLS FOR PLASTICS

Corner Radius Upcut – 2 Flute (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$	
1/4	.010	**3/4** (3x)	1/4	2-1/2	55516	67.10			
1/4	.015	**3/4** (3x)	1/4	2-1/2	56416	67.10	56416-C4	88.40	NEW
1/4	.020	**3/8** (1.5x)	1/4	2-1/2	767116	67.10			
1/4	.020	**3/4** (3x)	1/4	2-1/2	69916	67.10			
1/4	.020	**1-1/4** (5x)	1/4	4	767716	79.10			
1/4	.030	**3/4** (3x)	1/4	2-1/2	70716	67.10			
1/4	.030	**1-1/4** (5x)	1/4	4	863116	78.30			
3/8	.015	**1-1/8** (3x)	3/8	3	56424	105.50	56424-C4	135.90	NEW
3/8	.030	**1-1/8** (3x)	3/8	3	70724	105.50			
3/8	.060	**1-1/8** (3x)	3/8	3	739124	107.00			
1/2	.015	**1-1/2** (3x)	1/2	4	56432	182.30			
1/2	.030	**1-1/2** (3x)	1/2	4	70732	182.30			
1/2	.060	**1-1/2** (3x)	1/2	4	739132	184.90			

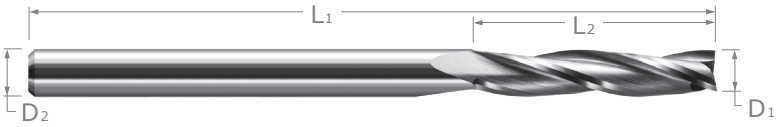
Please See Speeds & Feeds On Page 276

Access Simulation Files in DXF Format for Every Harvey Tool Product

harveytool.com/resources/simulation-files

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix)



Wiper Flat Option for an Improved Finish

- 3 flute design strengthens rigidity and improves wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		D_2	L_1	3 FL	USD$	3 FL	USD$
1/32	**3/32** (3x)	II	1/8	1-1/2	915631	60.70		
1/32	**5/32** (5x)	II	1/8	1-1/2	986431	60.20		
1/32	**1/4** (8x)	II	1/8	1-1/2	992331	66.40		
3/64	**1/4** (5x)	II	1/8	1-1/2	986447	46.40		
3/64	**3/8** (8x)	II	1/8	2	992347	51.30		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	USD$	3 FL	USD$
1/16	**3/16** (3x)	I	1/8	1-1/2	770262	38.30		
1/16	**3/16** (3x)	II	1/8	1-1/2	915662	38.30		
1/16	**5/16** (5x)	I	1/8	2	769662	45.00		
1/16	**5/16** (5x)	II	1/8	2	986462	44.60	986462-C4	59.60
1/16	**1/2** (8x)	II	1/8	2	992362	49.70		
1/16	**5/8** (10x)	II	1/8	2	871662	63.00		
5/64	**13/32** (5x)	II	1/8	2	986478	45.00		
5/64	**5/8** (8x)	II	1/8	2	992378	49.70		
3/32	**9/32** (3x)	I	1/8	1-1/2	770293	38.30		
3/32	**9/32** (3x)	II	1/8	1-1/2	915693	38.00		
3/32	**1/2** (5x)	I	1/8	2	769693	45.00		
3/32	**1/2** (5x)	II	1/8	2	986493	44.60	986493-C4	63.30
3/32	**3/4** (8x)	II	1/8	2	992393	49.70		
1/8	**3/8** (3x)	I	1/8	1-1/2	770308	38.30		
1/8	**3/8** (3x)	II	1/8	1-1/2	915708	38.00		
1/8	**5/8** (5x)	I	1/8	2	769708	45.00		
1/8	**5/8** (5x)	II	1/8	2	986508	44.60	986508-C4	59.60
1/8	**1** (8x)	II	1/8	2	992408	49.70		
1/8	**1-1/4** (10x)	II	1/8	2-1/2	871708	63.00		

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TYPE I - WITHOUT WIPER



TYPE II - WITH WIPER FLAT



END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (Slow Helix) (cont.)

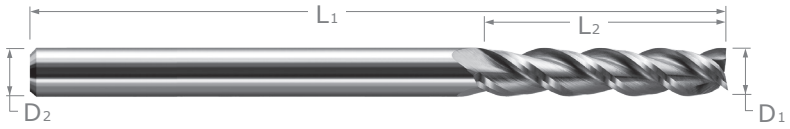
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CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$		D_2	L_1	3 FL	USD$	3 FL	USD$
5/32	**15/32** (3x)	II	3/16	2	915710	59.70		
5/32	**3/4** (5x)	II	3/16	3	986510	61.80		
3/16	**9/16** (3x)	I	3/16	2	770312	59.70		
3/16	**9/16** (3x)	II	3/16	2	915712	59.10		
3/16	**1** (5x)	I	3/16	3	769712	62.30		
3/16	**1** (5x)	II	3/16	3	986512	61.80	986512-C4	79.60
3/16	**1-1/2** (8x)	II	3/16	3	992412	74.90		
1/4	**3/8** (1.5x)	II	1/4	2-1/2	869316	59.00		
1/4	**3/4** (3x)	I	1/4	2-1/2	770316	62.30		
1/4	**3/4** (3x)	II	1/4	2-1/2	915716	61.80		
1/4	**1-1/4** (5x)	I	1/4	3	769716	70.50		
1/4	**1-1/4** (5x)	II	1/4	3	986516	69.90	986516-C4	93.80
1/4	**2** (8x)	II	1/4	4	992416	93.20		
3/8	**9/16** (1.5x)	II	3/8	3	869324	100.40		
3/8	**1-1/8** (3x)	II	3/8	3	915724	103.10		
3/8	**2** (5x)	II	3/8	4	986524	111.50		
1/2	**3/4** (1.5x)	II	1/2	4	869332	172.60		
1/2	**1-1/2** (3x)	II	1/2	4	915732	179.20		
1/2	**2-5/8** (5x)	II	1/2	5	986532	189.20		

Please See Speeds & Feeds On Page 291

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix)



Wiper Flat Option for an Improved Finish

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Choose from two types:
  - Without Wiper Flat (Type I): Standard end geometry designed with a dish angle to a sharp corner
  - With Wiper Flat (Type II): Wiper flat end geometry that enhances bottom finish by reducing traditional circular marks; with a slight chamfer to protect corners
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		D_2	L_1	3 FL	USD$	3 FL	USD$
1/32	**3/32** (3x)	II	1/8	1-1/2	902131	59.70		
1/32	**5/32** (5x)	II	1/8	1-1/2	941231	62.10		
1/32	**1/4** (8x)	II	1/8	1-1/2	900731	68.40		
3/64	**1/4** (5x)	II	1/8	1-1/2	941247	48.20		

	D_1 +.000″ −.002″	L_2 +.030″ −.000″		D_2	L_1	3 FL	USD$	3 FL	USD$
	1/16	**3/16** (3x)	I	1/8	1-1/2	736762	44.40		
NEW	1/16	**3/16** (3x)	II	1/8	1-1/2	902162	44.00	902162-C4	59.00
	1/16	**5/16** (5x)	I	1/8	2	769862	46.70		
	1/16	**5/16** (5x)	II	1/8	2	941262	46.40	941262-C4	64.90
	1/16	**1/2** (8x)	II	1/8	2	900762	51.30		
	1/16	**5/8** (10x)	II	1/8	2	854662	54.30		
	5/64	**13/32** (5x)	II	1/8	2	941278	46.40		
	3/32	**9/32** (3x)	I	1/8	1-1/2	736793	44.40		
	3/32	**9/32** (3x)	II	1/8	1-1/2	902193	44.00		
	3/32	**1/2** (5x)	I	1/8	2	769893	46.70		
	3/32	**1/2** (5x)	II	1/8	2	941293	46.40	941293-C4	64.90
	3/32	**3/4** (8x)	II	1/8	2	900793	51.30		
	1/8	**3/8** (3x)	I	1/8	1-1/2	736808	44.40		
	1/8	**3/8** (3x)	II	1/8	1-1/2	902208	44.00		
	1/8	**5/8** (5x)	I	1/8	2	769908	46.40		
	1/8	**5/8** (5x)	II	1/8	2	941308	46.40	941308-C4	64.90
	1/8	**1** (8x)	II	1/8	2	900808	51.30		
NEW	1/8	**1-1/4** (10x)	II	1/8	2-1/2	854708	54.30	854708-C4	70.10

continued on next page

TYPE I - WITHOUT WIPER



TYPE II - WITH WIPER FLAT



NEW SIZES!

END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix) (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT		TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	3 FL	USD$	3 FL	USD$	
5/32	**15/32**	(3x)	II	3/16	2	902210	59.40			
5/32	**3/4**	(5x)	II	3/16	3	941310	61.80			
3/16	**9/16**	(3x)	I	3/16	2	736812	60.00			
3/16	**9/16**	(3x)	II	3/16	2	902212	59.40			
3/16	**1**	(5x)	I	3/16	3	769912	62.30			
3/16	**1**	(5x)	II	3/16	3	941312	61.80	941312-C4	79.60	
3/16	**1-1/2**	(8x)	II	3/16	3	900812	68.10	900812-C4	85.90	NEW
1/4	**3/8**	(1.5x)	II	1/4	2-1/2	852016	65.10			
1/4	**3/4**	(3x)	I	1/4	2-1/2	736816	68.40			
1/4	**3/4**	(3x)	II	1/4	2-1/2	902216	67.90	902216-C4	89.30	NEW
1/4	**1-1/4**	(5x)	I	1/4	3	769916	70.50			
1/4	**1-1/4**	(5x)	II	1/4	3	941316	69.90	941316-C4	93.80	
1/4	**2**	(8x)	II	1/4	4	900816	93.20			
3/8	**9/16**	(1.5x)	II	3/8	3	852024	100.60			
3/8	**1-1/8**	(3x)	II	3/8	3	902224	103.10			
3/8	**2**	(5x)	II	3/8	4	941324	112.50			
1/2	**3/4**	(1.5x)	II	1/2	4	852032	171.20			
1/2	**1-1/2**	(3x)	II	1/2	4	902232	177.60			
1/2	**2-5/8**	(5x)	II	1/2	5	941332	187.60			

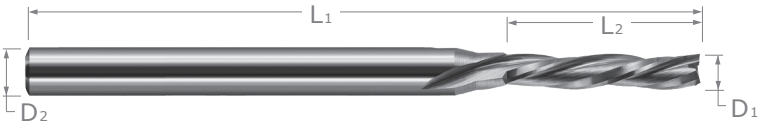
Please See Speeds & Feeds On Page 292

Download Speeds & Feeds Charts For Every Harvey Tool End Mill

harveytool.com/resources/speeds-feeds

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (Slow Helix)



- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	USD$
1/32	**5/32** (5x)	1/8	1-1/2	880431	60.70

D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	USD$
1/16	**5/16** (5x)	1/8	2	880462	48.70
3/32	**1/2** (5x)	1/8	2	880493	48.70
1/8	**5/8** (5x)	1/8	2	880508	48.70
3/16	**1** (5x)	3/16	3	880512	64.00
1/4	**1-1/4** (5x)	1/4	3	880516	72.20
3/8	**1-1/8** (3x)	3/8	3	878124	105.50
1/2	**1-1/2** (3x)	1/2	4	878132	178.70

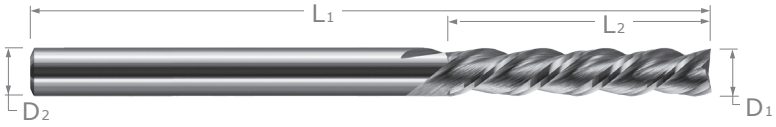
SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia

END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (High Helix)



- 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Design is ideally suited for thin-walled applications
- Solid carbide
- Center cutting
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.001''}$	D_1 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	USD$
1/32	**5/32** (5x)	1/8	1-1/2	864331	68.10
D_1 $^{+.000''}_{-.002''}$	D_1 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	USD$
1/16	**5/16** (5x)	1/8	2	864362	55.10
3/32	**9/32** (3x)	1/8	1-1/2	873793	50.80
3/32	**1/2** (5x)	1/8	2	864393	53.40
3/32	**3/4** (8x)	1/8	2	722593	55.60
1/8	**3/8** (3x)	1/8	1-1/2	873808	42.60
1/8	**5/8** (5x)	1/8	2	864408	46.90
1/8	**1** (8x)	1/8	2	722608	49.20
3/16	**9/16** (3x)	3/16	2	873812	57.40
3/16	**1** (5x)	3/16	3	864412	64.60
1/4	**3/4** (3x)	1/4	2-1/2	873816	65.50
1/4	**1-1/4** (5x)	1/4	3	864416	72.20
1/4	**2** (8x)	1/4	4	722616	95.10
3/8	**1-1/8** (3x)	3/8	3	873824	105.50
1/2	**1-1/2** (3x)	1/2	4	873832	180.10

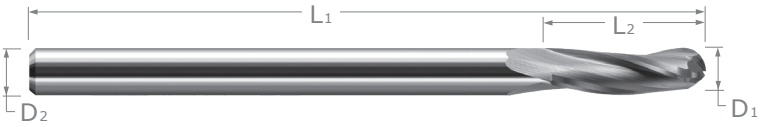
SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter													Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Unfilled	Unfilled	800-1200	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia	1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia	3 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia	1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia	3 x Dia

END MILLS FOR PLASTICS

Finishers – Ball Upcut – 3 Flute (Slow Helix)



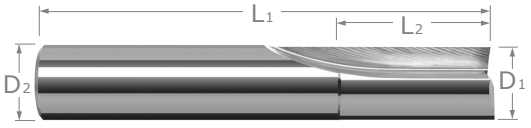
- Ball end has increased rake and relief for improved cutting action at the tip
- 3 flute design strengthens rigidity and improves wall finish
- Slower helix reduces lifting forces for fiber-reinforced applications and vacuum table set ups
- Center cutting
- Ultrafine grain carbide to create a sharp cutting edge
- CNC ground in the USA

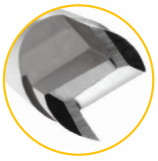
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	USD$
1/16	**.186** (3x)	1/8	1-1/2	808762	44.00
3/32	**.279** (3x)	1/8	1-1/2	808793	44.00
1/8	**3/8** (3x)	1/8	1-1/2	808808	43.70
3/16	**.570** (3x)	3/16	2	808812	67.00
1/4	**3/4** (3x)	1/4	2-1/2	808816	70.50
3/8	**1-1/8** (3x)	3/8	3	808824	112.30
1/2	**1-1/2** (3x)	1/2	4	808832	191.40

Please See Speeds & Feeds On Page 291

END MILLS FOR COMPOSITES

Square – 2 Straight Flutes





2 Straight Flutes
(End View)

- Designed to mill abrasive, glass-filled plastics with reinforcing fiber and other additives
- Straight flute design improves finish and minimizes fraying of fiber-reinforced and layered materials by not "pulling" fibers
- Behind center design with high positive rake for smoother cuts
- Eccentric relief for improved edge life
- Allows shallow ramping, not suited for plunge cutting
- Select sizes available with oversized, router-style shanks
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/32	**3/32** (3x)	1/8	1-1/2	69531	61.10	69531-C4	76.10
D_1 +.000″ −.002″	L_2 +.030″ −.000″	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**3/32** (1.5x)	1/8	1-1/2	825162	41.00	825162-C4	55.90
1/16	**1/8** (2x)	1/4*	2	14604	45.60	14604-C4	69.50
1/16	**3/16** (3x)	1/8	1-1/2	69562	40.80	69562-C4	55.70
1/16	**5/16** (5x)	1/8	2	70462	47.00	70462-C4	63.80
5/64*	**5/32** (2x)	1/4*	2	14605	46.50	14605-C4	66.50
5/64	**1/4** (3x)	1/8	1-1/2	69578	41.20	69578-C4	56.20
5/64	**13/32** (5x)	1/8	2	70478	47.40	70478-C4	62.40
3/32	**9/64** (1.5x)	1/8	1-1/2	825193	41.00	825193-C4	55.90
3/32*	**3/16** (2x)	1/4*	2	14606	45.60	14606-C4	65.60
3/32	**5/16** (3x)	1/8	1-1/2	69593	40.80	69593-C4	55.70
3/32	**1/2** (5x)	1/8	2	70493	47.00	70493-C4	63.80
1/8	**3/16** (1.5x)	1/8	1-1/2	825208	40.30	825208-C4	55.20
1/8*	**1/4** (2x)	1/4*	2	14608	45.60	14608-C4	69.50
1/8	**3/8** (3x)	1/8	1-1/2	69608	40.80	69608-C4	55.70
1/8	**5/8** (5x)	1/8	2	70508	47.00	70508-C4	63.80
5/32	**1/2** (3x)	3/16	2	69610	43.30	69610-C4	60.00
3/16	**5/8** (3x)	3/16	2	69612	43.30	69612-C4	60.80
3/16*	**5/8** (3x)	1/4*	2	14612	45.60	14612-C4	65.60
3/16	**1** (5x)	3/16	3	70512	51.20	70512-C4	69.00
1/4	**3/8** (1.5x)	1/4	2-1/2	825216	42.40	825216-C4	66.20
1/4*	**3/4** (3x)	1/4	2-1/2	14616	41.50	14616-C4	65.30
1/4	**1-1/4** (5x)	1/4	3	70516	57.80	70516-C4	81.60
5/16	**5/8** (2x)	5/16	2-1/2	14620	79.70	14620-C4	105.30
3/8*	**7/8** (2x)	3/8	2-1/2	14624	79.00	14624-C4	108.40
3/8	**2** (5x)	3/8	4	70524	97.20	70524-C4	126.80
1/2*	**1** (2x)	1/2	3	14632	125.40	14632-C4	161.10
1/2	**2-1/2** (5x)	1/2	4	70532	154.80		

*Cutter diameter tolerance is +.000/-.004". Tools are ground on oversized, router-style shank.

SPEEDS & FEEDS (2 Straight Flutes)

Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM		Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	Radial	Axial
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Slot - Rough	.0004	.0008	.0012	.0016	.0020	.0024	.0032	.0048	.0064	.0068	.0082	.0109	.0137	.0164	1 x Dia	1 x Dia
			Profile	.0004	.0009	.0014	.0018	.0023	.0028	.0037	.0055	.0074	.0079	.0094	.0126	.0157	.0189	.35 x Dia	1 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Slot - Rough	.0003	.0007	.0010	.0013	.0016	.0020	.0026	.0039	.0053	.0056	.0067	.0090	.0112	.0134	1 x Dia	1 x Dia
			Profile	.0004	.0008	.0011	.0015	.0019	.0023	.0030	.0045	.0061	.0064	.0077	.0103	.0129	.0154	.35 x Dia	1 x Dia

END MILLS FOR COMPOSITES

Compression Cutter



Prevents Burrs & Delamination!

- Counteracting flute geometries compress material inwardly to avoid burrs, tear out, and delamination
- Produces enhanced edge finish on top and bottom of workpiece
- Offered in two diamond coatings for increased tool life in a variety of abrasive composite materials
- Stocked in 2, 4, and 6 flute configurations for rough and finish machining
- Center cutting
- Solid carbide
- CNC ground in the USA

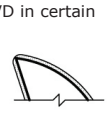
CUTTER DIAMETER	LENGTH OF CUT	OVERLAP CENTER	OVERLAP LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	L_3 $^{+.001″}_{-.001″}$	L_4		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/32	3/32	**1/32**	.006	2	1/8	1-1/2	994331	64.70	994331-C4	79.30	995031	146.60
3/64	9/64	**3/64**	.009	2	1/8	1-1/2	994347	64.70	994347-C4	80.00	995047	145.10
1/16	3/16	**1/16**	.013	2	1/8	1-1/2	994362	61.60	994362-C4	76.30	995062	141.80
5/64	1/4	**5/64**	.016	2	1/8	1-1/2	994378	61.60	994378-C4	77.00	995078	143.00
3/32	9/32	**3/32**	.019	2	1/8	1-1/2	994393	61.60	994393-C4	76.30	995093	143.00
1/8	3/8	**1/8**	.025	2	1/8	1-1/2	994408	59.20	994408-C4	74.30	995108	138.50
1/8	3/8	**1/8**	.028	4	1/8	1-1/2	993708	62.90	993708-C4	78.20	997708	144.70
3/16	9/16	**3/16**	.038	2	3/16	2	994412	65.90	994412-C4	86.90	995112	161.00
3/16	9/16	**3/16**	.041	4	3/16	2	993712	70.70	993712-C4	91.60	997712	169.70
1/4	3/4	**1/4**	.050	2	1/4	2-1/2	994416	78.90	994416-C4	102.60	995116	190.50
1/4	3/4	**1/4**	.055	4	1/4	2-1/2	993716	84.00	993716-C4	107.60	997716	199.00
5/16	1	**5/16**	.075	6	5/16	2-1/2	920120	101.30	920120-C4	130.40	918820	233.30
3/8	1-1/8	**3/8**	.090	6	3/8	2-1/2	920124	125.40	920124-C4	154.00	918824	309.00
1/2	1-1/2	**1/2**	.120	6	1/2	3	920132	226.50	920132-C4	259.10	918832	445.60

Choosing the Right Diamond

AMORPHOUS DIAMOND

A PVD amorphous diamond coating which improves lubricity and wear resistance. Coating is thin relative to CVD diamond, preventing edge rounding. Sharp edges improve results (performance and finish) over CVD in certain abrasive materials.

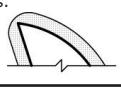
Thin coating maintains sharper edge.

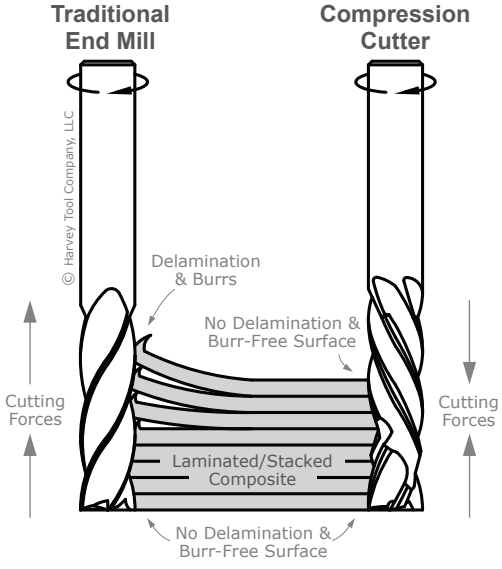


CVD DIAMOND

True Crystalline CVD diamond is grown directly into a carbide end mill. This dramatically improves hardness, which improves abrasion resistance and extends tool life up to 50x, allowing higher feed rates than uncoated carbide. Ideal for machining abrasive composite materials with high fiber or fill concentration (G10, FR4, etc.) Diamond layer is approximately 5 times thicker than Amorphous Diamond, improving wear resistance. Well suited for high production environments.

Thicker diamond layer for increased wear resistance.





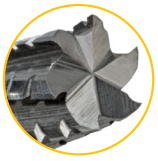
Traditional End Mills: Upward lifting force causes burrs and delamination at the top of the part.

Compression Cutters: Counteracting cutting forces compress the material and stabilize the workpiece, creating a superior finish on the top and bottom of the part.

END MILLS FOR COMPOSITES

Chipbreaker Cutter





Type I
Bur-Style End



Type II
Center Cutting

- Optimized geometry with chipbreakers efficiently shears fibers and shortens chips for improved chip removal
- Suited for roughing and profiling in composite materials with high fiber or fill concentration (G10, FR4, etc.)
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)	
D_1 +.000″ −.001″	L_2 +.010″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/32	**3/32** (3x)	4	I	1/8	1-1/2	969231	62.20	969231-C4	77.10		
3/64	**9/64** (3x)	4	I	1/8	1-1/2	969247	61.70	969247-C4	76.60		
1/16	**.186** (3x)	3	II	1/8	1-1/2	801962	61.60			803762	141.80
1/16	**.186** (3x)	4	I	1/8	1-1/2	969262	59.20	969262-C4	74.10		
5/64	**15/64** (3x)	4	I	1/8	1-1/2	969278	59.70	969278-C4	74.60		
3/32	**.279** (3x)	3	II	1/8	1-1/2	801993	61.60			803793	141.80
3/32	**.279** (3x)	4	I	1/8	1-1/2	969293	59.20	969293-C4	74.10	791593	143.00
D_1 +.000″ −.002″	L_2 +.030″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/8	**3/8** (3x)	5	II	1/8	1-1/2	802008	58.60	802008-C4	73.60	803808	138.20
1/8	**3/8** (3x)	6	I	1/8	1-1/2	969308	57.00	969308-C4	71.90	791608	139.60
1/8	**5/8** (5x)	5	II	1/8	1-1/2	818508	62.90	818508-C4	77.90	803008	141.80
1/8	**5/8** (5x)	6	I	1/8	1-1/2	884908	61.10	884908-C4	76.10		
3/16	**9/16** (3x)	5	II	3/16	2	802012	65.60			803812	160.00
3/16	**9/16** (3x)	6	I	3/16	2	969312	62.90	969312-C4	84.10		
3/16	**1** (3x)	5	II	3/16	2	818512	68.90			803012	165.00
3/16	**1** (5x)	6	I	3/16	2	884912	67.00	884912-C4	88.10		
1/4	**3/4** (3x)	5	II	1/4	2-1/2	802016	77.60	802016-C4	101.80	803816	189.30
1/4	**3/4** (3x)	6	I	1/4	2-1/2	969316	75.50	969316-C4	99.60	791616	189.30
1/4	**1-1/4** (5x)	5	II	1/4	2-1/2	818516	82.20	818516-C4	103.60	803016	198.50
1/4	**1-1/4** (5x)	6	I	1/4	2-1/2	884916	79.80	884916-C4	104.00		
3/8	**1-1/8** (3x)	5	II	3/8	3	802024	128.90			803824	308.40
3/8	**1-1/8** (3x)	8	I	3/8	3	969324	123.80	969324-C4	153.10	791624	311.30
1/2	**1-1/2** (3x)	5	II	1/2	4	802032	225.20			803832	442.10
1/2	**1-1/2** (3x)	8	I	1/2	4	969332	218.60	969332-C4	253.70		

END MILLS FOR COMPOSITES

Diamond Cut – Bur Style





Bur-Style End

- Diamond cut style and high flute count allows for effective deburring with the outer diameter in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Total flute count on the bur-style end is equal to the amount of right hand teeth
- Downcut geometry on the OD
- Solid carbide
- CNC ground in the USA

	CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.020''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	798462	49.50	798462-C4	64.50
	.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	798478	49.50	798478-C4	64.50
	.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	798493	49.50	798493-C4	64.50
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	798508	49.50	798508-C4	64.50
	.187 (3/16)	**.563** (3x)	9	11	3/16	2	798512	59.20	798512-C4	80.30
	.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	798516	81.70	798516-C4	105.70
NEW	.375 (3/8)	**1.125** (3x)	11	13	3/8	2-1/2	798524	128.40	798524-C4	158.80
NEW	.500 (1/2)	**1.500** (3x)	12	14	1/2	3	798532	217.70	798532-C4	259.10

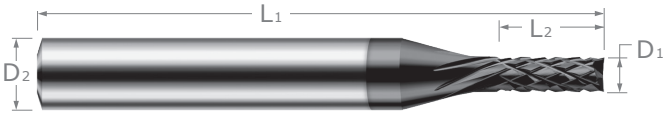
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NEW SIZES!

END MILLS FOR COMPOSITES

Diamond Cut – End Mill Style





End Mill Style

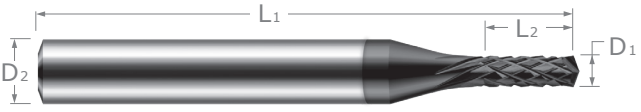
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Center cutting (two flutes to center) on end with downcut geometry on OD
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (4 µm)		
D_1 $^{+.000″}_{-.001″}$	L_2 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.062 (1/16)	**.186** (3x)	6	8	1/8	1-1/2	920962	49.50	920962-C4	64.50	799062	141.80	NEW
.078 (5/64)	**.234** (3x)	7	9	1/8	1-1/2	920978	49.50	920978-C4	64.50			
.093 (3/32)	**.279** (3x)	7	9	1/8	1-1/2	920993	49.50	920993-C4	64.50	799093	141.80	NEW
.109 (7/64)	**.327** (3x)	8	10	1/8	1-1/2	921002	53.60	921002-C4	68.50			

D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.125 (1/8)	**.187** (1.5x)	8	10	1/8	1-1/2	716908	49.00	716908-C4	63.90			
.125 (1/8)	**.375** (3x)	8	10	1/8	1-1/2	921008	49.50	921008-C4	64.50	799008	110.30	
.125 (1/8)	**.625** (5x)	8	10	1/8	1-1/2	894508	53.60	894508-C4	68.50	737308	114.40	
.125 (1/8)	**1.000** (8x)	8	10	1/8	2-1/2	785208	56.50	785208-C4	71.90	698908	141.80	NEW
.156 (5/32)	**.469** (3x)	9	11	3/16	2	921010	59.20	921010-C4	80.30			
.187 (3/16)	**.285** (1.5x)	9	11	3/16	2	716912	58.50	716912-C4	75.30			
.187 (3/16)	**.563** (3x)	9	11	3/16	2	921012	59.20	921012-C4	80.30	799012	131.70	
.187 (3/16)	**1.000** (5x)	9	11	3/16	2	894512	64.50	894512-C4	85.60	737312	151.00	NEW
.250 (1/4)	**.375** (1.5x)	10	12	1/4	2-1/2	716916	81.20	716916-C4	102.60			
.250 (1/4)	**.750** (3x)	10	12	1/4	2-1/2	921016	81.70	921016-C4	105.70	799016	165.00	
.250 (1/4)	**1.250** (5x)	10	12	1/4	2-1/2	894516	88.70	894516-C4	112.90			
.250 (1/4)	**2.000** (8x)	10	12	1/4	4	785216	110.20	785216-C4	134.40			
.312 (5/16)	**1.000** (3x)	10	12	5/16	2-1/2	921020	106.00	921020-C4	131.50			
.375 (3/8)	**1.125** (3x)	11	13	3/8	2-1/2	921024	128.40	921024-C4	157.40			
.375 (3/8)	**2.000** (5x)	11	13	3/8	4	894524	147.10	894524-C4	176.10			
.500 (1/2)	**1.500** (3x)	12	14	1/2	3	921032	217.70	921032-C4	252.70	799132	444.00	NEW
.500 (1/2)	**2.625** (5x)	12	14	1/2	4	894532	242.10	894532-C4	276.80			

END MILLS FOR COMPOSITES

Diamond Cut – Drill Mill Style





Drill Point

- 140° point angle allows for efficient plunging through composite sheet material
- Diamond cut style and high flute count allows for effective roughing and profiling in abrasive composites
- Ideally suited for Carbon and Glass Fiber composites and other composites with high fiber reinforcement
- Downcut geometry on OD
- Solid carbide
- CNC ground in the USA

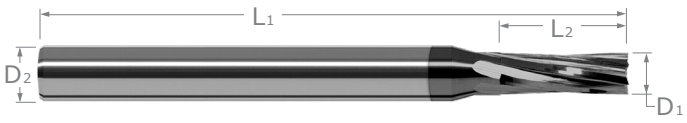
	CUTTER DIAMETER	LENGTH OF CUT		RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (4 µm)	
	D_1 +.000″ −.001″	L_2 +.020″ −.000″				D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
NEW	.062 (1/16)	**.186**	(3x)	6	8	1/8	1-1/2	908062	52.80	908062-C4	67.80	698662	141.80
	.078 (5/64)	**.234**	(3x)	7	9	1/8	1-1/2	908078	52.80	908078-C4	67.80		
	.093 (3/32)	**.279**	(3x)	7	9	1/8	1-1/2	908093	52.80	908093-C4	67.80		

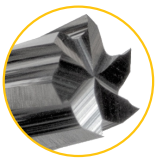
	D_1 +.000″ −.002″	L_2 +.030″ −.000″				D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
NEW	.125 (1/8)	**.375**	(3x)	8	10	1/8	1-1/2	908108	52.80	908108-C4	67.80	698708	138.20
	.187 (3/16)	**.563**	(3x)	9	11	3/16	2	908112	62.30	908112-C4	83.50		
NEW	.250 (1/4)	**.750**	(3x)	10	12	1/4	2-1/2	908116	85.80	908116-C4	109.90	698716	176.90
	.375 (3/8)	**1.125**	(3x)	11	13	3/8	2-1/2	908124	101.80	908124-C4	130.80		
	.500 (1/2)	**1.500**	(3x)	12	14	1/2	3	908132	208.50	908132-C4	250.00		

NEW SIZES!

END MILLS FOR COMPOSITES

Finisher





Type I
Bur-Style End



Type II
Center Cutting

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Choose from two types:
  - -Type I: Bur-style end allows for shallow ramping (not suited for plunge cutting)
  - -Type II: Center cutting end allows for plunge cutting, reduced flute count prevents chip packing, designed specifically for CFRP
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT		TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND		CVD DIAMOND (9 µm)		
D_1 +.000″ −.001″	L_2 +.010″ −.000″				D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
1/32	**3/32**	(3x)	I	4	1/8	1-1/2	944731	62.30	944731-C4	77.20			
3/64	**9/64**	(3x)	I	4	1/8	1-1/2	944747	62.30	944747-C4	77.20			
1/16	**.186**	(3x)	I	6	1/8	1-1/2	944762	59.50	944762-C4	74.40	798862	141.80	
1/16	**5/16**	(5x)	I	6	1/8	1-1/2	889262	62.30	889262-C4	77.20			
5/64	**15/64**	(3x)	I	6	1/8	1-1/2	944778	59.50	944778-C4	74.40			
3/32	**9/64**	(1.5x)	I	6	1/8	1-1/2	794793	60.00	794793-C4	74.90			
3/32	**.279**	(3x)	I	6	1/8	1-1/2	944793	59.50	944793-C4	74.40	798893	141.80	
3/32	**1/2**	(5x)	I	6	1/8	1-1/2	889293	62.30	889293-C4	77.20			
3/32	**3/4**	(8x)	I	6	1/8	2	751693	67.10	751693-C4	82.00			
D_1 +.000″ −.002″	L_2 +.030″ −.000″				D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
1/8	**3/16**	(1.5x)	I	8	1/8	1-1/2	794808	57.90	794808-C4	72.90			
1/8	**3/8**	(3x)	I	8	1/8	1-1/2	944808	57.40	944808-C4	72.30	798908	138.20	
1/8	**3/8**	(3x)	II	5	1/8	1-1/2	756808	54.00	756808-C4	68.90	731208	128.70	NEW
1/8	**5/8**	(5x)	I	8	1/8	2	889208	60.20	889208-C4	75.80			
1/8	**1**	(8x)	I	8	1/8	2-1/2	751708	63.80	751708-C4	79.40			
3/16	**9/16**	(3x)	I	8	3/16	2	944812	63.40	944812-C4	84.50	798912	159.60	
3/16	**9/16**	(3x)	II	5	3/16	2	756812	59.60	756812-C4	76.30	731212	148.80	NEW
3/16	**1**	(5x)	I	8	3/16	2-1/2	889212	66.40	889212-C4	87.60			
3/16	**1-1/2**	(8x)	I	8	3/16	3	751712	70.00	751712-C4	87.80			
1/4	**3/8**	(1.5x)	I	8	1/4	2-1/2	794816	76.00	794816-C4	100.10			
1/4	**3/4**	(3x)	I	8	1/4	2-1/2	944816	76.00	944816-C4	100.10	798916	176.90	
1/4	**3/4**	(3x)	II	5	1/4	2-1/2	756816	71.50	756816-C4	92.90	731216	164.70	NEW
1/4	**1-1/4**	(5x)	I	8	1/4	2-1/2	889216	92.60	889216-C4	116.60			
3/8	**1-1/8**	(3x)	I	10	3/8	3	944824	125.10	944824-C4	154.30			
3/8	**1-1/8**	(3x)	II	5	3/8	3	756824	117.40	756824-C4	147.80	731224	234.80	NEW
1/2	**1-1/2**	(3x)	I	10	1/2	4	944832	220.20	944832-C4	255.30	798932	444.00	
1/2	**1-1/2**	(3x)	II	5	1/2	4	756832	206.80	756832-C4	251.20	731232	413.40	NEW

END MILLS FOR WOOD

Square Upcut



Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- 2-flute style with deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**.186** (3x)	1/4	2	809562	44.50	809562-C4	64.60
1/16	**.312** (5x)	1/4	2-1/2	809362	48.80	809362-C4	70.20
5/64	**.234** (3x)	1/4	2	809578	44.50	809578-C4	64.60
5/64	**.406** (5x)	1/4	2-1/2	809378	48.80	809378-C4	70.20
3/32	**.279** (3x)	1/4	2	809593	44.50	809593-C4	64.60
3/32	**.500** (5x)	1/4	2-1/2	809393	48.80	809393-C4	70.20
1/8	**.375** (3x)	1/4	2	809608	44.50	809608-C4	64.60
1/8	**.625** (5x)	1/4	2-1/2	809408	48.80	809408-C4	70.20
3/16	**.563** (3x)	1/4	2	809612	44.50	809612-C4	64.60
3/16	**1.000** (5x)	1/4	3	809412	52.50	809412-C4	73.90
1/4	**.750** (3x)	1/4	2-1/2	809616	54.80	809616-C4	76.20
1/4	**1.250** (5x)	1/4	3	809416	62.90	809416-C4	84.30
3/8	**1.125** (3x)	3/8	3	809624	94.40	809624-C4	124.00
3/8	**1.875** (5x)	3/8	4	809424	111.00	809424-C4	143.70
1/2	**1.500** (3x)	1/2	4	809632	169.50	809632-C4	205.70
1/2	**2.500** (5x)	1/2	5	809432	194.80	809432-C4	242.60

Please See Speeds & Feeds On Page 302

END MILLS FOR WOOD

Square Downcut



Outstanding in MDF and Plywood!

- Designed for milling natural and engineered woods
- Wedge angle optimized for shearing wood fiber materials without causing tear-out or leaving a fuzzy grain finish
- Prevents tear-outs and splintering on the top of the workpiece
- Prevents lifting on vacuum tables
- 2 left hand spiral, right hand cut flutes
- Deep flute valleys to maximize space for chip evacuation
- Center cutting
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
1/16	**.186** (3x)	1/4	2	809162	52.40	809162-C4	72.50
1/16	**.312** (5x)	1/4	2-1/2	808962	57.50	808962-C4	78.90
5/64	**.234** (3x)	1/4	2	809178	52.40	809178-C4	72.50
5/64	**.406** (5x)	1/4	2-1/2	808978	58.80	808978-C4	80.10
3/32	**.279** (3x)	1/4	2	809193	52.40	809193-C4	72.50
3/32	**.500** (5x)	1/4	2-1/2	808993	58.80	808993-C4	80.10
1/8	**.375** (3x)	1/4	2	809208	52.40	809208-C4	75.90
1/8	**.625** (5x)	1/4	2-1/2	809008	57.50	809008-C4	78.90
3/16	**.563** (3x)	1/4	2	809212	52.40	809212-C4	72.50
3/16	**1.000** (5x)	1/4	3	809012	62.00	809012-C4	83.40
1/4	**.750** (3x)	1/4	2-1/2	809216	64.10	809216-C4	85.50
1/4	**1.250** (5x)	1/4	3	809016	70.10	809016-C4	93.50
3/8	**1.125** (3x)	3/8	3	809224	109.30	809224-C4	139.00
3/8	**1.875** (5x)	3/8	4	809024	128.10	809024-C4	160.80
1/2	**1.500** (3x)	1/2	4	809232	196.90	809232-C4	233.40
1/2	**2.500** (5x)	1/2	5	809032	222.50	809032-C4	270.30

SPEEDS & FEEDS (Square – End Mills for Wood)

Important Note: Values in table are in inches and are based on (3x Dia) length of cut end mills. For longer length of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material	Janka Hardness	SFM		Chip Load Per Tooth (IPT) By Cutter Diameter															Depth of Cut	
				.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750	1.000	Radial	Axial
Softer Woods White Pine, Sugar Pine, Western Red Cedar, Douglas Fir, Redwood	< 1200	400 - 2000	Slot - Rough	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0088	.0118	.0125	.0150	.0200	.0250	.0300	.0400	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0011	.0017	.0022	.0028	.0033	.0045	.0067	.0090	.0097	.0116	.0155	.0194	.0233	.0310	.1 x Dia	3 x Dia
Harder Woods Red Oak, Maple, Ash, Hickory, Black Walnut, Cherry, Beech	> 1200	400 - 2000	Slot - Rough	.0006	.0013	.0020	.0026	.0033	.0039	.0053	.0079	.0106	.0112	.0135	.0180	.0225	.0270	.0360	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0005	.0010	.0015	.0020	.0025	.0030	.0041	.0061	.0081	.0087	.0105	.0140	.0174	.0209	.0279	.1 x Dia	3 x Dia
Engineered Woods Medium Density Fiberboard (MDF), Particle Board, Laminated Board	Varies	400 - 2000	Slot - Rough	.0008	.0016	.0024	.0032	.0040	.0048	.0065	.0097	.0129	.0137	.0165	.0220	.0275	.0330	.0440	1 x Dia	1 x Dia
		800 - 2400	Finishing	.0006	.0012	.0019	.0025	.0031	.0037	.0050	.0074	.0099	.0106	.0128	.0171	.0213	.0256	.0341	.1 x Dia	3 x Dia
Phenolic Wood	Varies	400 - 1200	Slot - Rough	.0003	.0006	.0009	.0012	.0015	.0017	.0024	.0035	.0047	.0050	.0060	.0080	.0100	.0120	.0160	1 x Dia	1 x Dia
		800 - 1600	Finishing	.0002	.0004	.0007	.0009	.0011	.0013	.0018	.0027	.0036	.0039	.0047	.0062	.0078	.0093	.0124	.1 x Dia	3 x Dia

SPECIALTY PROFILES

At Harvey Tool, we know the details are critical to your machining processes. With that in mind, we offer a broad range of Specialty Profiles to help you make those difficult cuts. For printer-friendly **Speeds & Feeds** and downloadable **Simulation Files** for all products, visit **www.harveytool.com/technical**.

Undercutting End Mills New Sizes! 304

Drill/End Mills New Sizes! 321

Chamfer Cutters mm & in New Sizes! 333

Picatinny Form Cutters 355

Runner Cutters New Sizes! 357

Hexalobe Cutters 360

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Back Deburring Mills 396

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Slitting Saws mm & in New Style! 428

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Corner Rounding End Mills New Sizes! 434

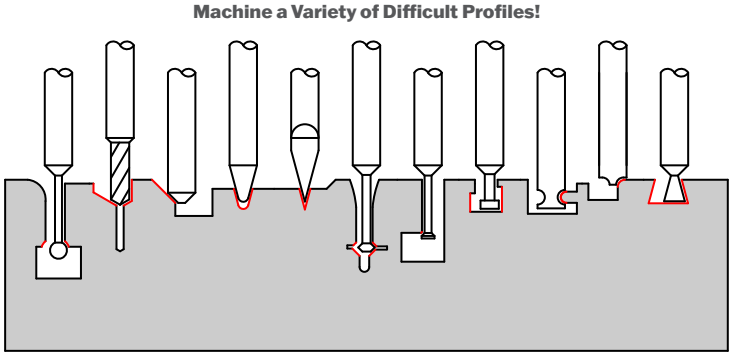
Boring Bars 447

BackDraft Cutters 448

Dovetail Cutters 450

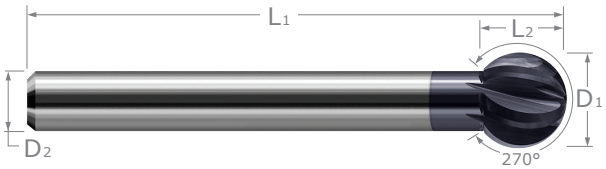
Burs 462

Machine a Variety of Difficult Profiles!



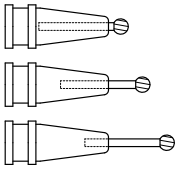
UNDERCUTTING END MILLS

270° Reduced Shank



- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

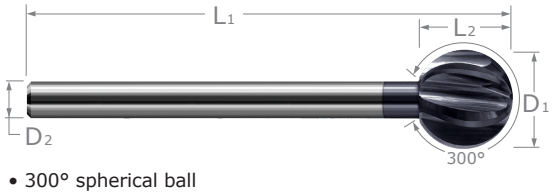
Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	USD$	6 FL	USD$
1/4	.217	6	4 mm	3-1/2	956116	297.00	956116-C3	307.40
5/16	.273	6	3/16	3-1/2	956120	302.70	956120-C3	313.10
3/8	.324	6	6 mm	3-1/2	956124	305.80	956124-C3	318.00
1/2	.432	6	5/16	4	956132	321.40	956132-C3	339.10
5/8	.546	6	3/8	4	956140	368.50	956140-C3	387.80
3/4	.645	6	1/2	5	956148	530.10	956148-C3	539.60
1	.873	6	5/8	5	956164	750.20	956164-C3	782.10

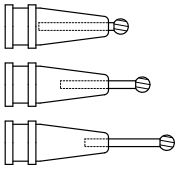
UNDERCUTTING END MILLS

300° Reduced Shank



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Reduced straight shank allows any chucking depth
- Center cutting
- Solid carbide construction for maximum rigidity
- 6 flutes
- CNC ground in the USA

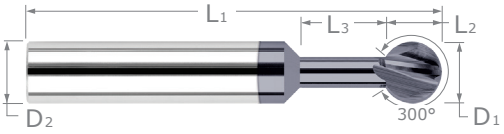
Chuck at Any Depth!



CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		D_2	L_1	6 FL	USD$	6 FL	USD$
1/4	.232	6	3 mm	3-1/2	947416	318.30	947416-C3	328.70
5/16	.293	6	9/64	3-1/2	947420	322.00	947420-C3	332.40
3/8	.355	6	4 mm	3-1/2	947424	325.80	947424-C3	338.10
1/2	.472	6	3/16	4	947432	341.30	947432-C3	359.10
5/8	.589	6	1/4	4	947440	388.30	947440-C3	407.60
3/4	.706	6	5/16	5	947448	549.90	947448-C3	570.40
1	.939	6	7/16	5	947464	769.00	947464-C3	800.80

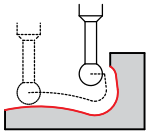
UNDERCUTTING END MILLS

300°



- 300° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide
- CNC ground in the USA

Ideal for Undercutting, Deburring, and Profiling



Stocked in Multiple Reach Lengths



	CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$
	1/32	.028	.010	**.031**	2	1/8	1-1/2	983931	84.30	983931-C3	90.20
	1/32	.028	.010	**.062**	2	1/8	1-1/2	979131	84.30	979131-C3	90.20
	.0394 (1 mm)	.036	.014	**.047**	2	1/8	1-1/2	98391M	84.30	98391M-C3	90.20
	.0394 (1 mm)	.036	.014	**.078**	2	1/8	1-1/2	97911M	84.30	97911M-C3	90.20
	3/64	.043	.018	**.062**	2	1/8	1-1/2	983947	84.30	983947-C3	90.20
	3/64	.043	.018	**.093**	2	1/8	1-1/2	979147	84.30	979147-C3	90.20
	3/64	.043	.018	**.125**	2	1/8	1-1/2	940047	84.30	940047-C3	90.20
	3/64	.043	.018	**.187**	2	1/8	1-1/2	911803	84.30	911803-C3	90.20
	1/16	.057	.024	**.031**	2	1/8	1-1/2	989562	59.80	989562-C3	65.70
	1/16	.057	.024	**.062**	2	1/8	1-1/2	875762	59.80	875762-C3	65.70
	1/16	.057	.024	**.078**	2	1/8	1-1/2	983962	59.80	983962-C3	65.70
	1/16	.057	.024	**.093**	2	1/8	1-1/2	926862	59.80	926862-C3	65.70
	1/16	.057	.024	**.125**	2	1/8	1-1/2	979162	59.80	979162-C3	65.70
	1/16	.057	.024	**.187**	2	1/8	1-1/2	940062	59.80	940062-C3	65.70
	1/16	.057	.024	**.250**	2	1/8	1-1/2	767862	59.80	767862-C3	65.70
	1/16	.057	.024	**.312**	2	1/8	1-1/2	877804	59.80	877804-C3	65.70
	5/64	.072	.031	**.047**	2	1/8	1-1/2	989578	59.80	989578-C3	65.70
	5/64	.072	.031	**.093**	2	1/8	1-1/2	983978	59.80	983978-C3	65.70
	5/64	.072	.031	**.125**	2	1/8	1-1/2	926878	59.80	926878-C3	65.70
	5/64	.072	.031	**.156**	2	1/8	1-1/2	979178	59.80	979178-C3	65.70
	5/64	.072	.031	**.218**	2	1/8	1-1/2	940078	59.80	940078-C3	65.70
NEW	5/64	.072	.031	**.250**	2	1/8	1-1/2	738905	59.80	738905-C3	65.70
	3/32	.086	.038	**.062**	2	1/8	1-1/2	989593	59.80	989593-C3	65.70
	3/32	.086	.038	**.093**	2	1/8	1-1/2	875793	59.80	875793-C3	65.70
	3/32	.086	.038	**.125**	2	1/8	1-1/2	983993	59.80	983993-C3	65.70
	3/32	.086	.038	**.156**	2	1/8	1-1/2	926893	59.80	926893-C3	65.70
	3/32	.086	.038	**.218**	2	1/8	1-1/2	979193	59.80	979193-C3	65.70
	3/32	.086	.038	**.250**	2	1/8	1-1/2	794506	59.80	794506-C3	65.70
	3/32	.086	.038	**.281**	2	1/8	1-1/2	940093	59.80	940093-C3	65.70
	3/32	.086	.038	**.375**	2	1/8	1-1/2	766693	59.80	766693-C3	65.70
NEW	3/32	.086	.038	**.500**	2	1/8	2	877806	60.70	877806-C3	66.60
	7/64	.101	.047	**.156**	2	1/8	1-1/2	984007	60.40	984007-C3	66.30
	7/64	.101	.047	**.250**	2	1/8	1-1/2	979207	60.40	979207-C3	66.30
	.1181 (3 mm)	.110	.051	**.078**	2	1/8	1-1/2	98953M	59.80	98953M-C3	65.70
	.1181 (3 mm)	.110	.051	**.156**	2	1/8	1-1/2	98393M	59.80	98393M-C3	65.70
	.1181 (3 mm)	.110	.051	**.218**	2	1/8	1-1/2	92683M	59.80	92683M-C3	65.70

continued on next page

NEW SIZES!

UNDERCUTTING END MILLS

300° (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/8	.116	.053	**.047**	4	1/8	1-1/2	943608	44.30	943608-C3	50.20
1/8	.116	.053	**.062**	4	1/8	1-1/2	716608	46.60	716608-C3	52.50
1/8	.116	.053	**.093**	4	1/8	1-1/2	990608	48.80	990608-C3	54.70
1/8	.116	.053	**.125**	4	1/8	1-1/2	933008	52.50	933008-C3	58.40
1/8	.116	.053	**.156**	4	1/8	1-1/2	875808	57.00	875808-C3	62.90
1/8	.116	.053	**.187**	4	1/8	1-1/2	984008	57.00	984008-C3	62.90
1/8	.116	.053	**.250**	4	1/8	1-1/2	843208	63.60	843208-C3	69.50
1/8	.116	.053	**.281**	4	1/8	1-1/2	979208	63.60	979208-C3	69.50
1/8	.116	.053	**.312**	4	1/8	1-1/2	794608	66.10	794608-C3	72.00
1/8	.116	.053	**.375**	4	1/8	1-1/2	940108	70.20	940108-C3	76.10
1/8	.116	.053	**.437**	4	1/8	1-1/2	739008	72.70	739008-C3	78.60
1/8	.116	.053	**.500**	4	1/8	1-1/2	952308	75.20	952308-C3	81.10
1/8	.116	.053	**.625**	4	1/8	2	911908	101.30	911908-C3	107.20
1/8	.116	.053	**.750**	4	1/8	3	877908	104.70	877908-C3	110.70
9/64	.130	.062	**.125**	4	3/16	2	933009	66.00	933009-C3	72.60
9/64	.130	.062	**.218**	4	3/16	2	984009	68.60	984009-C3	75.30
9/64	.130	.062	**.312**	4	3/16	2	979209	76.80	979209-C3	83.40
5/32	.145	.071	**.047**	4	3/16	2	943610	61.60	943610-C3	68.10
5/32	.145	.071	**.125**	4	3/16	2	990610	61.60	990610-C3	68.10
5/32	.145	.071	**.187**	4	3/16	2	738810	65.70	738810-C3	71.90
5/32	.145	.071	**.250**	4	3/16	2	984010	69.90	984010-C3	76.40
5/32	.145	.071	**.375**	4	3/16	2	979210	80.80	979210-C3	87.30
5/32	.145	.071	**.500**	4	3/16	2	940110	85.30	940110-C3	91.90
5/32	.145	.071	**.625**	4	3/16	2	952310	87.00	952310-C3	93.70
5/32	.145	.071	**.750**	4	3/16	2	911910	87.00	911910-C3	93.20
3/16	.174	.082	**.062**	4	3/16	2	943612	61.60	943612-C3	68.10
3/16	.174	.082	**.125**	4	3/16	2	990612	61.60	990612-C3	68.10
3/16	.174	.082	**.187**	4	3/16	2	933012	65.70	933012-C3	71.90
3/16	.174	.082	**.250**	4	3/16	2	984012	69.90	984012-C3	76.40
3/16	.174	.082	**.281**	4	3/16	2	738612	72.60	738612-C3	78.80
3/16	.174	.082	**.312**	4	3/16	2	926912	75.20	926912-C3	81.80
3/16	.174	.082	**.375**	4	3/16	2	843212	77.70	843212-C3	84.50
3/16	.174	.082	**.437**	4	3/16	2	979212	80.80	979212-C3	87.30
3/16	.174	.082	**.500**	4	3/16	2	794612	82.20	794612-C3	88.90
3/16	.174	.082	**.625**	4	3/16	2	940112	83.70	940112-C3	90.30
3/16	.174	.082	**.750**	4	3/16	2	952312	87.70	952312-C3	94.30
3/16	.174	.082	**.875**	4	3/16	2-1/2	834612	91.30	834612-C3	98.00
3/16	.174	.082	**1.000**	4	3/16	2-1/2	911912	93.20	911912-C3	100.00
3/16	.174	.082	**1.250**	4	3/16	3	877912	97.20	877912-C3	103.80
.1969 (5 mm)	.182	.086	**.156**	4	1/4	2-1/2	99065M	85.20	99065M-C3	94.10
.1969 (5 mm)	.182	.086	**.250**	4	1/4	2-1/2	98405M	89.20	98405M-C3	98.20
7/32	.203	.098	**.156**	4	1/4	2-1/2	990614	85.20	990614-C3	94.10
7/32	.203	.098	**.312**	4	1/4	2-1/2	984014	94.70	984014-C3	103.70
.2362 (6 mm)	.220	.106	**.156**	4	1/4	2-1/2	99066M	84.00	99066M-C3	93.10
.2362 (6 mm)	.220	.106	**.312**	4	1/4	2-1/2	98406M	94.70	98406M-C3	102.80
.2362 (6 mm)	.220	.106	**.437**	4	1/4	2-1/2	92696M	97.90	92696M-C3	107.00
.2362 (6 mm)	.220	.106	**.562**	4	1/4	2-1/2	97926M	103.20	97926M-C3	112.20

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UNDERCUTTING END MILLS

300° (cont.)

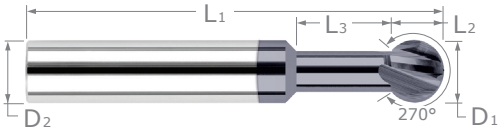
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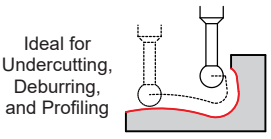
	CUTTER DIAMETER D_1 +.000″ −.002″	LENGTH OF CUT L_2 +.020″ −.000″	NECK DIA.	NECK LENGTH L_3 +.030″ −.000″	FLUTES	SHANK DIAMETER D_2	OVERALL LENGTH L_1	UNCOATED TOOL #	UNCOATED USD$	AlTiN COATED TOOL #	AlTiN COATED USD$
	1/4	.233	.112	**.093**	4	1/4	2-1/2	943616	82.40	943616-C3	91.50
	1/4	.233	.112	**.187**	4	1/4	2-1/2	990616	82.40	990616-C3	91.50
	1/4	.233	.112	**.250**	4	1/4	2-1/2	933016	87.00	933016-C3	96.00
	1/4	.233	.112	**.375**	4	1/4	2-1/2	984016	90.80	984016-C3	99.80
	1/4	.233	.112	**.437**	4	1/4	2-1/2	738616	95.60	738616-C3	103.70
	1/4	.233	.112	**.500**	4	1/4	2-1/2	926916	100.30	926916-C3	109.20
	1/4	.233	.112	**.625**	4	1/4	2-1/2	979216	110.00	979216-C3	119.10
	1/4	.233	.112	**.750**	4	1/4	2-1/2	940116	117.20	940116-C3	126.30
	1/4	.233	.112	**1.000**	4	1/4	2-1/2	952316	125.70	952316-C3	134.80
	1/4	.233	.112	**1.250**	4	1/4	3	911916	135.90	911916-C3	144.70
	1/4	.233	.112	**1.500**	4	1/4	4	877916	145.80	877916-C3	156.40
	9/32	.262	.127	**.187**	4	5/16	2-1/2	990618	116.50	990618-C3	126.10
	9/32	.262	.127	**.375**	4	5/16	2-1/2	984018	136.60	984018-C3	146.30
	5/16	.291	.143	**.250**	4	5/16	2-1/2	990620	112.50	990620-C3	123.10
	5/16	.291	.143	**.437**	4	5/16	2-1/2	984020	133.90	984020-C3	144.30
	5/16	.291	.143	**.687**	4	5/16	2-1/2	843220	133.90	843220-C3	143.60
	5/16	.291	.143	**.750**	4	5/16	2-1/2	979220	150.50	979220-C3	161.00
	5/16	.291	.143	**1.000**	4	5/16	2-1/2	940120	167.30	940120-C3	177.90
	5/16	.291	.143	**1.250**	4	5/16	3	952320	168.90	952320-C3	178.50
	3/8	.349	.172	**.156**	4	3/8	2-1/2	943624	118.20	943624-C3	129.60
	3/8	.349	.172	**.250**	4	3/8	2-1/2	990624	120.20	990624-C3	131.60
	3/8	.349	.172	**.375**	4	3/8	2-1/2	933024	130.60	933024-C3	142.00
	3/8	.349	.172	**.500**	4	3/8	2-1/2	984024	141.10	984024-C3	152.50
	3/8	.349	.172	**.687**	4	3/8	2-1/2	926924	152.30	926924-C3	163.70
	3/8	.349	.172	**.750**	4	3/8	2-1/2	843224	156.60	843224-C3	168.10
	3/8	.349	.172	**1.000**	4	3/8	3	979224	163.90	979224-C3	175.30
	3/8	.349	.172	**1.250**	4	3/8	3	940124	171.50	940124-C3	182.90
	3/8	.349	.172	**1.500**	4	3/8	4	952324	199.20	952324-C3	215.40
NEW	3/8	.349	.172	**1.625**	4	3/8	4	767924	199.20	767924-C3	211.40
	.3937 (10 mm)	.366	.181	**.312**	4	7/16	2-3/4	990625	148.30	990625-C3	161.60
	.3937 (10 mm)	.366	.181	**.562**	4	7/16	2-3/4	984025	176.40	984025-C3	189.60
	1/2	.466	.230	**.187**	4	1/2	3	943632	182.00	943632-C3	197.50
	1/2	.466	.230	**.312**	4	1/2	3	990632	183.40	990632-C3	201.10
	1/2	.466	.230	**.750**	4	1/2	3	984032	208.30	984032-C3	226.00
	1/2	.466	.230	**1.000**	4	1/2	3	926932	225.30	926932-C3	243.20
	1/2	.466	.230	**1.250**	4	1/2	4	979232	253.10	979232-C3	270.80
	1/2	.466	.230	**1.625**	4	1/2	4	940132	248.60	940132-C3	266.20
	1/2	.466	.230	**2.000**	4	1/2	4	952332	277.90	952332-C3	295.60
	5/8	.583	.292	**1.000**	4	5/8	3-1/2	984040	309.90	984040-C3	329.30
	5/8	.583	.292	**1.625**	4	5/8	4	979240	316.80	979240-C3	336.10
	3/4	.699	.355	**1.500**	4	3/4	4	926948	365.50	926948-C3	388.50
	3/4	.699	.355	**2.000**	4	3/4	6	979248	399.70	979248-C3	426.50
NEW	3/4	.699	.355	**2.500**	4	3/4	6	940148	403.80	940148-C3	430.60

NEW SIZES!

UNDERCUTTING END MILLS

270°





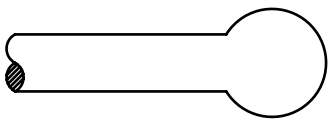


- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Choose from two types:
  - Type I: Straight neck
  - Type II: Tapered neck (1.5° per side)
- Solid carbide • CNC ground in the USA

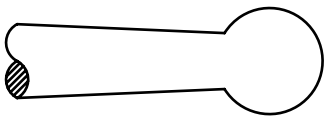
CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
.0200	.017	.012	**.016**	I	2	1/8	1-1/2	974220	86.90	974220-C3	92.80			
.0200	.017	.012	**.031**	I	2	1/8	1-1/2	52820	86.90	52820-C3	92.80			
.0200	.017	.012	**.047**	I	2	1/8	1-1/2	23200	92.60	23200-C3	98.50			
.0200	.017	.012	**.062**	I	2	1/8	1-1/2	54620	95.40	54620-C3	101.30			
.0250	.021	.014	**.031**	I	2	1/8	1-1/2	974225	76.60	974225-C3	82.50			
.0250	.021	.014	**.047**	I	2	1/8	1-1/2	52825	76.60	52825-C3	82.50			
.0250	.021	.014	**.062**	I	2	1/8	1-1/2	23201	82.30	23201-C3	88.20			
.0250	.021	.014	**.078**	I	2	1/8	1-1/2	54625	85.30	54625-C3	91.20			
1/32	.027	.016	**.015**	I	2	1/8	1-1/2	931502	70.30	931502-C3	76.20			
1/32	.027	.016	**.031**	I	2	1/8	1-1/2	23102	70.30	23102-C3	76.20			
1/32	.027	.016	**.047**	I	2	1/8	1-1/2	974231	70.30	974231-C3	76.20			
1/32	.027	.016	**.047**	II	2	1/8	1-1/2	758431	71.60	758431-C3	77.50			
1/32	.027	.016	**.062**	I	2	1/8	1-1/2	52831	70.30	52831-C3	76.20	52831-C4	85.20	NEW
1/32	.027	.016	**.078**	I	2	1/8	1-1/2	39731	70.30	39731-C3	76.20			
1/32	.027	.016	**.093**	I	2	1/8	1-1/2	23202	72.10	23202-C3	78.10			
1/32	.027	.016	**.125**	I	2	1/8	1-1/2	54631	82.30	54631-C3	88.20			
1/32	.027	.016	**.187**	I	2	1/8	1-1/2	55202	82.30	55202-C3	88.20			
1/32	.027	.016	**.218**	I	2	1/8	1-1/2	867731	70.30	867731-C3	76.20			
.0394 (1 mm)	.033	.024	**.047**	I	2	1/8	1-1/2	2311M	70.30	2311M-C3	76.20			
.0394 (1 mm)	.033	.024	**.062**	I	2	1/8	1-1/2	97421M	70.30	97421M-C3	76.20			
.0394 (1 mm)	.033	.024	**.078**	I	2	1/8	1-1/2	5281M	70.80	5281M-C3	76.70			
.0394 (1 mm)	.033	.024	**.093**	I	2	1/8	1-1/2	3971M	70.30	3971M-C3	76.20			
.0394 (1 mm)	.033	.024	**.125**	I	2	1/8	1-1/2	2321M	80.20	2321M-C3	86.20			
.0394 (1 mm)	.033	.024	**.187**	I	2	1/8	1-1/2	54639	82.30	54639-C3	88.20			
.0394 (1 mm)	.033	.024	**.250**	I	2	1/8	1-1/2	5521M	91.00	5521M-C3	96.90			
.0394 (1 mm)	.033	.024	**.281**	I	2	1/8	1-1/2	86771M	91.00	86771M-C3	96.90			NEW
.0400	.034	.024	**.093**	I	2	1/8	1-1/2	39771	70.30	39771-C3	76.20			
.0400	.034	.024	**.125**	I	2	1/8	1-1/2	23271	70.80	23271-C3	76.70			
3/64	.040	.029	**.047**	I	2	1/8	1-1/2	23103	70.30	23103-C3	76.20			
3/64	.040	.029	**.062**	I	2	1/8	1-1/2	974247	70.30	974247-C3	76.20			
3/64	.040	.029	**.062**	II	2	1/8	1-1/2	758447	71.60	758447-C3	77.50			
3/64	.040	.029	**.093**	I	2	1/8	1-1/2	52847	70.30	52847-C3	76.20	52847-C4	85.20	

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Type I - Straight Neck



Type II - Tapered Neck



UNDERCUTTING END MILLS

270° (cont.)

continued from previous page

	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	3/64	.040	.029	**.125**	I	2	1/8	1-1/2	39703	70.30	39703-C3	76.20		
	3/64	.040	.029	**.156**	I	2	1/8	1-1/2	23203	82.30	23203-C3	88.20	23203-C4	97.30
	3/64	.040	.029	**.187**	I	2	1/8	1-1/2	41303	82.30	41303-C3	88.20		
	3/64	.040	.029	**.250**	I	2	1/8	1-1/2	54647	82.30	54647-C3	88.20		
	3/64	.040	.029	**.312**	I	2	1/8	1-1/2	909047	87.40	909047-C3	93.30		
	3/64	.040	.029	**.375**	I	2	1/8	1-1/2	55203	86.60	55203-C3	92.50		
	3/64	.040	.029	**.437**	I	2	1/8	2	867747	95.20	867747-C3	101.10		
	.0500	.042	.030	**.093**	I	2	1/8	1-1/2	52850	58.40	52850-C3	64.40		
	.0500	.042	.030	**.125**	I	2	1/8	1-1/2	39750	58.40	39750-C3	64.40		
	.0500	.042	.030	**.156**	I	2	1/8	1-1/2	23250	70.60	23250-C3	76.50		
	1/16	.053	.037	**.031**	I	2	1/8	1-1/2	931504	46.70	931504-C3	52.60		
	1/16	.053	.037	**.047**	I	2	1/8	1-1/2	774262	47.10	774262-C3	53.00		
	1/16	.053	.037	**.062**	I	2	1/8	1-1/2	23104	46.70	23104-C3	52.60		
	1/16	.053	.037	**.078**	I	2	1/8	1-1/2	974262	47.10	974262-C3	53.00		
	1/16	.053	.037	**.078**	II	2	1/8	1-1/2	758462	47.50	758462-C3	53.50		
	1/16	.053	.037	**.093**	I	2	1/8	1-1/2	52862	46.70	52862-C3	52.60	52862-C4	61.70
	1/16	.053	.037	**.125**	I	2	1/8	1-1/2	39704	48.70	39704-C3	54.60		
	1/16	.053	.037	**.156**	I	2	1/8	1-1/2	794362	48.70	794362-C3	54.60		
	1/16	.053	.037	**.187**	I	2	1/8	1-1/2	23204	48.70	23204-C3	54.60	23204-C4	63.60
	1/16	.053	.037	**.218**	I	2	1/8	1-1/2	41304	55.30	41304-C3	61.20		
	1/16	.053	.037	**.250**	I	2	1/8	1-1/2	54662	60.10	54662-C3	66.00		
	1/16	.053	.037	**.312**	I	2	1/8	1-1/2	909062	60.10	909062-C3	66.00		
	1/16	.053	.037	**.375**	I	2	1/8	1-1/2	55204	60.10	55204-C3	66.00		
	1/16	.053	.037	**.437**	I	2	1/8	2	867762	68.80	867762-C3	74.70		
	1/16	.053	.037	**.500**	I	2	1/8	2	775462	68.80	775462-C3	74.70		
	5/64	.067	.045	**.031**	I	2	1/8	1-1/2	931505	48.00	931505-C3	53.90		
	5/64	.067	.045	**.062**	I	2	1/8	1-1/2	23105	47.40	23105-C3	53.40		
	5/64	.067	.045	**.093**	I	2	1/8	1-1/2	974278	48.00	974278-C3	53.90		
	5/64	.067	.045	**.093**	II	2	1/8	1-1/2	758478	48.60	758478-C3	54.50		
	5/64	.067	.045	**.125**	I	2	1/8	1-1/2	52878	47.40	52878-C3	53.40	52878-C4	62.40
	5/64	.067	.045	**.187**	I	2	1/8	1-1/2	39705	50.20	39705-C3	56.20		
	5/64	.067	.045	**.250**	I	2	1/8	1-1/2	23205	51.10	23205-C3	57.00	23205-C4	66.00
	5/64	.067	.045	**.312**	I	2	1/8	1-1/2	41305	51.10	41305-C3	57.00		
	5/64	.067	.045	**.375**	I	2	1/8	2	54678	61.10	54678-C3	67.10		
	5/64	.067	.045	**.500**	I	2	1/8	2	55205	61.10	55205-C3	67.10		
	5/64	.067	.045	**.625**	I	2	1/8	2	867778	61.10	867778-C3	67.10		
	3/32	.079	.054	**.031**	I	2	1/8	1-1/2	931506	47.40	931506-C3	53.40		
NEW	3/32	.079	.054	**.062**	I	2	1/8	1-1/2	23106	47.40	23106-C3	53.40	23106-C4	62.40
	3/32	.079	.054	**.093**	I	2	1/8	1-1/2	789893	48.00	789893-C3	53.90		
	3/32	.079	.054	**.125**	I	2	1/8	1-1/2	974293	47.40	974293-C3	53.40		
	3/32	.079	.054	**.125**	II	2	1/8	1-1/2	758493	48.60	758493-C3	54.50		
	3/32	.079	.054	**.187**	I	2	1/8	1-1/2	905106	47.40	905106-C3	53.40		
	3/32	.079	.054	**.250**	I	2	1/8	1-1/2	52893	47.40	52893-C3	53.40	52893-C4	62.40
	3/32	.079	.054	**.312**	I	2	1/8	1-1/2	39706	52.40	39706-C3	58.30		
	3/32	.079	.054	**.375**	I	2	1/8	1-1/2	23206	51.90	23206-C3	57.80	23206-C4	66.80
	3/32	.079	.054	**.437**	I	2	1/8	2	41306	61.10	41306-C3	67.10		
	3/32	.079	.054	**.500**	I	2	1/8	2	54693	61.10	54693-C3	67.10		
	3/32	.079	.054	**.625**	I	2	1/8	2	55206	70.30	55206-C3	76.20		
	3/32	.079	.054	**.750**	I	2	1/8	2	867793	70.80	867793-C3	76.70		
	.1000	.085	.060	**.312**	I	2	1/8	1-1/2	39783	52.40	39783-C3	58.30		
	.1000	.085	.060	**.375**	I	2	1/8	1-1/2	23283	52.40	23283-C3	58.30		

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NEW SIZES!

UNDERCUTTING END MILLS

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
7/64	.093	.064	**.187**	I	2	1/8	1-1/2	905107	47.10	905107-C3	53.00		
7/64	.093	.064	**.250**	I	2	1/8	1-1/2	52907	47.10	52907-C3	53.00		
7/64	.093	.064	**.375**	I	2	1/8	1-1/2	39707	51.50	39707-C3	57.40		
7/64	.093	.064	**.500**	I	2	1/8	2	23207	60.10	23207-C3	66.00		
7/64	.093	.064	**1.000**	I	2	1/8	3	29507	68.80	29507-C3	74.70		
.1181 (3 mm)	.100	.070	**.093**	I	2	1/8	1-1/2	2313M	47.10	2313M-C3	53.00		
.1181 (3 mm)	.100	.070	**.156**	II	2	1/8	1-1/2	75843M	47.50	75843M-C3	53.50		
.1181 (3 mm)	.100	.070	**.187**	I	2	1/8	1-1/2	90513M	47.10	90513M-C3	53.00		
.1181 (3 mm)	.100	.070	**.250**	I	2	1/8	1-1/2	5283M	47.10	5283M-C3	53.00		
.1181 (3 mm)	.100	.070	**.375**	I	2	1/8	1-1/2	3973M	51.50	3973M-C3	57.40		
.1181 (3 mm)	.100	.070	**.500**	I	2	1/8	2	2323M	60.10	2323M-C3	66.00		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/8	.107	.076	**.062**	I	4	1/8	1-1/2	931508	41.10	931508-C3	47.00		
1/8	.107	.076	**.093**	I	4	1/8	1-1/2	787908	41.50	787908-C3	47.40		
1/8	.107	.076	**.125**	I	4	1/8	1-1/2	23108	41.10	23108-C3	47.00	23108-C4	56.10 NEW
1/8	.107	.076	**.187**	I	4	1/8	1-1/2	974308	42.10	974308-C3	48.10		
1/8	.107	.076	**.187**	II	4	1/8	1-1/2	758508	43.00	758508-C3	48.90		
1/8	.107	.076	**.250**	I	4	1/8	1-1/2	52908	43.60	52908-C3	49.50	52908-C4	58.50
1/8	.107	.076	**.312**	I	4	1/8	1-1/2	828408	44.00	828408-C3	49.90		
1/8	.107	.076	**.375**	I	4	1/8	1-1/2	39708	44.40	39708-C3	50.30		
1/8	.107	.076	**.437**	I	4	1/8	1-1/2	794408	48.00	794408-C3	53.90		
1/8	.107	.076	**.500**	I	4	1/8	1-1/2	23208	47.40	23208-C3	53.40	23208-C4	62.40
1/8	.107	.076	**.625**	I	4	1/8	2	922908	50.90	922908-C3	56.80		
1/8	.107	.076	**.750**	I	4	1/8	2	41308	50.90	41308-C3	56.80	41308-C4	65.80 NEW
1/8	.107	.076	**.875**	I	4	1/8	3	846608	52.90	846608-C3	58.90		
1/8	.107	.076	**1.000**	I	4	1/8	3	29508	55.10	29508-C3	61.00		
1/8	.107	.076	**1.125**	I	4	1/8	3	769508	57.70	769508-C3	63.60		
1/8	.107	.076	**1.250**	I	4	1/8	3	960608	59.10	960608-C3	65.00		
1/8	.107	.076	**1.500**	I	4	1/8	3	55208	62.90	55208-C3	68.80		
1/8	.107	.076	**1.750**	I	4	1/8	3	929608	66.20	929608-C3	72.10		
9/64	.119	.084	**.125**	I	4	3/16	2	23109	49.00	23109-C3	55.60		
9/64	.119	.084	**.250**	I	4	3/16	2	52909	53.00	52909-C3	59.30		
9/64	.119	.084	**.375**	I	4	3/16	2	39709	57.10	39709-C3	63.30		
9/64	.119	.084	**.500**	I	4	3/16	2	23209	59.90	23209-C3	66.50		
9/64	.119	.084	**.750**	I	4	3/16	2	41309	64.30	41309-C3	70.90		
5/32	.133	.098	**.078**	I	4	3/16	2	931510	49.00	931510-C3	55.60		
5/32	.133	.098	**.125**	I	4	3/16	2	23110	49.00	23110-C3	55.60		
5/32	.133	.098	**.187**	I	4	3/16	2	974310	49.80	974310-C3	56.10		
5/32	.133	.098	**.250**	I	4	3/16	2	52910	53.00	52910-C3	59.60		
5/32	.133	.098	**.375**	I	4	3/16	2	39710	55.90	39710-C3	62.50		
5/32	.133	.098	**.500**	I	4	3/16	2	23210	59.90	23210-C3	66.50		
5/32	.133	.098	**.750**	I	4	3/16	2	41310	64.30	41310-C3	70.90		
5/32	.133	.098	**1.000**	I	4	3/16	3	29510	69.40	29510-C3	76.10		
5/32	.133	.098	**1.500**	I	4	3/16	3	55210	73.00	55210-C3	79.60		

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UNDERCUTTING END MILLS

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	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		ALTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	3/16	.160	.117	**.078**	I	4	3/16	2	931512	49.00	931512-C3	55.20		
	3/16	.160	.117	**.093**	I	4	3/16	2	787912	49.40	787912-C3	55.60		
	3/16	.160	.117	**.125**	I	4	3/16	2	23112	49.00	23112-C3	55.60		
	3/16	.160	.117	**.187**	I	4	3/16	2	974312	53.00	974312-C3	59.30		
	3/16	.160	.117	**.187**	II	4	3/16	2	758512	54.20	758512-C3	60.40		
	3/16	.160	.117	**.250**	I	4	3/16	2	52912	53.00	52912-C3	59.60	52912-C4	69.80
	3/16	.160	.117	**.375**	I	4	3/16	2	39712	55.90	39712-C3	62.50		
	3/16	.160	.117	**.437**	I	4	3/16	2	794412	58.40	794412-C3	64.70		
	3/16	.160	.117	**.500**	I	4	3/16	2	23212	57.90	23212-C3	64.50	23212-C4	74.60
	3/16	.160	.117	**.625**	I	4	3/16	2	922912	61.20	922912-C3	67.80		
	3/16	.160	.117	**.750**	I	4	3/16	2	41312	64.30	41312-C3	70.90		
	3/16	.160	.117	**.875**	I	4	3/16	3	846612	66.80	846612-C3	73.50		
NEW	3/16	.160	.117	**1.000**	I	4	3/16	3	29512	69.40	29512-C3	76.10	29512-C4	87.30
	3/16	.160	.117	**1.250**	I	4	3/16	3	960612	72.20	960612-C3	78.90		
	3/16	.160	.117	**1.500**	I	4	3/16	3	55212	74.80	55212-C3	81.50		
	3/16	.160	.117	**1.750**	I	4	3/16	3	929612	88.50	929612-C3	95.20		
	.1969 (5 mm)	.167	.119	**.250**	I	4	1/4	2-1/2	5295M	68.60	5295M-C3	77.60		
	.1969 (5 mm)	.167	.119	**.500**	I	4	1/4	2-1/2	2325M	70.30	2325M-C3	79.10		
	.1969 (5 mm)	.167	.119	**1.000**	I	4	1/4	4	2955M	80.40	2955M-C3	91.00		
	7/32	.186	.138	**.250**	I	4	1/4	2-1/2	52914	73.70	52914-C3	82.70		
	7/32	.186	.138	**.500**	I	4	1/4	2-1/2	23214	76.60	23214-C3	85.50		
	7/32	.186	.138	**.750**	I	4	1/4	2-1/2	41314	80.90	41314-C3	89.70		
	.2362 (6 mm)	.201	.148	**.250**	I	4	1/4	2-1/2	97436M	68.10	97436M-C3	76.20		
	.2362 (6 mm)	.201	.148	**.375**	I	4	1/4	2-1/2	5296M	68.10	5296M-C3	76.20		
	.2362 (6 mm)	.201	.148	**.500**	I	4	1/4	2-1/2	3976M	71.60	3976M-C3	80.60		
	.2362 (6 mm)	.201	.148	**.750**	I	4	1/4	2-1/2	2326M	76.00	2326M-C3	85.00		
	.2362 (6 mm)	.201	.148	**1.250**	I	4	1/4	4	2956M	86.60	2956M-C3	96.90		
	.2362 (6 mm)	.201	.148	**2.000**	I	4	1/4	4	96066M	101.00	96066M-C3	109.60		
	1/4	.213	.158	**.078**	I	4	1/4	2-1/2	931516	66.00	931516-C3	74.10		
	1/4	.213	.158	**.125**	I	4	1/4	2-1/2	23116	65.50	23116-C3	74.40		
	1/4	.213	.158	**.187**	I	4	1/4	2-1/2	789916	66.00	789916-C3	74.10		
	1/4	.213	.158	**.250**	I	4	1/4	2-1/2	974316	68.60	974316-C3	77.60		
	1/4	.213	.158	**.250**	II	4	1/4	2-1/2	758516	70.60	758516-C3	78.70		
	1/4	.213	.158	**.312**	I	4	1/4	2-1/2	905116	69.30	905116-C3	78.30		
	1/4	.213	.158	**.375**	I	4	1/4	2-1/2	52916	69.40	52916-C3	78.40	52916-C4	90.80
	1/4	.213	.158	**.437**	I	4	1/4	2-1/2	828416	70.80	828416-C3	79.80		
	1/4	.213	.158	**.500**	I	4	1/4	2-1/2	39716	71.60	39716-C3	80.60		
	1/4	.213	.158	**.625**	I	4	1/4	2-1/2	927616	72.20	927616-C3	81.10		
	1/4	.213	.158	**.750**	I	4	1/4	2-1/2	23216	76.00	23216-C3	85.00	23216-C4	97.40
	1/4	.213	.158	**.875**	I	4	1/4	2-1/2	786916	76.70	786916-C3	85.60		
	1/4	.213	.158	**1.000**	I	4	1/4	2-1/2	922916	77.10	922916-C3	86.00		
	1/4	.213	.158	**1.125**	I	4	1/4	2-1/2	41316	80.00	41316-C3	89.00		
	1/4	.213	.158	**1.250**	I	4	1/4	4	846616	85.90	846616-C3	96.40		
NEW	1/4	.213	.158	**1.500**	I	4	1/4	4	29516	88.00	29516-C3	98.50	29516-C4	110.90
	1/4	.213	.158	**2.000**	I	4	1/4	4	960616	93.40	960616-C3	104.00		
	1/4	.213	.158	**2.250**	I	4	1/4	4	55216	99.10	55216-C3	109.60		
	1/4	.213	.158	**2.500**	I	4	1/4	4	929616	130.50	929616-C3	141.00		

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NEW SIZES!

UNDERCUTTING END MILLS

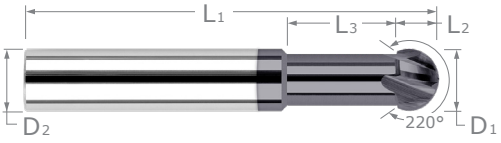
270° (cont.)

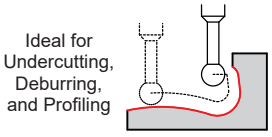
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CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
9/32	.240	.180	**.375**	I	4	5/16	2-1/2	52918	92.60	52918-C3	102.90			
9/32	.240	.180	**.750**	I	4	5/16	2-1/2	23218	95.20	23218-C3	104.80			
5/16	.266	.201	**.187**	I	4	5/16	2-1/2	23120	87.60	23120-C3	98.00			
5/16	.266	.201	**.375**	I	4	5/16	2-1/2	52920	91.00	52920-C3	101.60			
5/16	.266	.201	**.500**	I	4	5/16	2-1/2	39720	93.20	39720-C3	103.70			
5/16	.266	.201	**.750**	I	4	5/16	2-1/2	23220	98.30	23220-C3	108.60	23220-C4	123.80	NEW
5/16	.266	.201	**1.125**	I	4	5/16	4	41320	111.50	41320-C3	124.00			
5/16	.266	.201	**1.500**	I	4	5/16	4	29520	119.20	29520-C3	131.70			
5/16	.266	.201	**2.000**	I	4	5/16	4	960620	126.50	960620-C3	139.00			
5/16	.266	.201	**2.250**	I	4	5/16	4	55220	128.60	55220-C3	139.00			
5/16	.266	.201	**2.500**	I	4	5/16	4	929620	128.60	929620-C3	141.10			
3/8	.320	.241	**.093**	I	4	3/8	2-1/2	931524	94.60	931524-C3	106.00			
3/8	.320	.241	**.187**	I	4	3/8	2-1/2	23124	94.60	23124-C3	106.00			
3/8	.320	.241	**.250**	II	4	3/8	2-1/2	758524	96.40	758524-C3	107.80			
3/8	.320	.241	**.375**	I	4	3/8	2-1/2	52924	96.70	52924-C3	108.20	52924-C4	126.40	
3/8	.320	.241	**.500**	I	4	3/8	2-1/2	39724	96.70	39724-C3	108.20			
3/8	.320	.241	**.750**	I	4	3/8	2-1/2	23224	98.30	23224-C3	109.70	23224-C4	128.70	
3/8	.320	.241	**1.000**	I	4	3/8	2-1/2	922924	111.00	922924-C3	122.40			
3/8	.320	.241	**1.125**	I	4	3/8	4	41324	121.70	41324-C3	137.80			
3/8	.320	.241	**1.500**	I	4	3/8	4	29524	125.00	29524-C3	141.10			
3/8	.320	.241	**2.000**	I	4	3/8	4	960624	129.40	960624-C3	145.60			
3/8	.320	.241	**2.250**	I	4	3/8	4	55224	134.10	55224-C3	150.30			
3/8	.320	.241	**2.500**	I	4	3/8	4	929624	138.40	929624-C3	154.50			
3/8	.320	.241	**2.750**	I	4	3/8	6	775524	143.80	775524-C3	158.10			NEW
.3937 (10 mm)	.335	.252	**.375**	I	4	7/16	2-3/4	52925	136.70	52925-C3	150.00			
.3937 (10 mm)	.335	.252	**.750**	I	4	7/16	2-3/4	23225	137.10	23225-C3	151.90			
7/16	.373	.285	**.500**	I	4	7/16	2-3/4	52928	132.60	52928-C3	147.40			
7/16	.373	.285	**1.000**	I	4	7/16	2-3/4	23228	137.10	23228-C3	151.90			
.4724 (12 mm)	.403	.308	**.500**	I	4	1/2	3	52931	172.70	52931-C3	190.30			
.4724 (12 mm)	.403	.308	**1.000**	I	4	1/2	3	23231	182.50	23231-C3	198.10			
1/2	.427	.323	**.187**	I	4	1/2	3	23132	135.70	23132-C3	151.20			
1/2	.427	.323	**.312**	II	4	1/2	3	758532	138.30	758532-C3	153.80			
1/2	.427	.323	**.500**	I	4	1/2	3	52932	136.90	52932-C3	154.50	52932-C4	178.30	
1/2	.427	.323	**.750**	I	4	1/2	3	39732	140.50	39732-C3	158.10			
1/2	.427	.323	**1.000**	I	4	1/2	3	23232	141.40	23232-C3	159.10	23232-C4	182.80	
1/2	.427	.323	**1.250**	I	4	1/2	3	922932	147.10	922932-C3	162.70			
1/2	.427	.323	**1.500**	I	4	1/2	6	41332	240.90	41332-C3	258.50			
1/2	.427	.323	**2.000**	I	4	1/2	6	29532	246.30	29532-C3	263.90			
1/2	.427	.323	**2.500**	I	4	1/2	6	960632	246.60	960632-C3	264.10			
1/2	.427	.323	**3.000**	I	4	1/2	6	55232	263.20	55232-C3	280.90			
1/2	.427	.323	**3.500**	I	4	1/2	6	929632	277.40	929632-C3	294.80			
5/8	.533	.412	**1.000**	I	4	5/8	3-1/2	39740	284.30	39740-C3	302.00			
5/8	.533	.412	**1.500**	I	4	5/8	3-1/2	23240	284.30	23240-C3	303.60			
3/4	.640	.500	**1.000**	I	4	3/4	4	39748	290.00	39748-C3	313.10			
3/4	.640	.500	**1.500**	I	4	3/4	4	23248	391.50	23248-C3	414.60			

UNDERCUTTING END MILLS

220°







- 220° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$
.0200	.013	.016	**.031**	2	1/8	1-1/2	722467	70.90	722467-C3	76.80
1/32	.021	.023	**.093**	2	1/8	1-1/2	22802	70.90	22802-C3	76.80
NEW 1/32	.021	.023	**.187**	2	1/8	1-1/2	971602	73.00	971602-C3	78.90
.0394 (1 mm)	.026	.030	**.093**	2	1/8	1-1/2	785839	71.60	785839-C3	77.50
.0394 (1 mm)	.026	.030	**.125**	2	1/8	1-1/2	2281M	79.30	2281M-C3	85.20
3/64	.031	.035	**.156**	2	1/8	1-1/2	22803	70.90	22803-C3	76.80
1/16	.042	.047	**.062**	2	1/8	1-1/2	22704	48.30	22704-C3	54.20
1/16	.042	.047	**.125**	2	1/8	1-1/2	785862	50.30	785862-C3	56.30
1/16	.042	.047	**.187**	2	1/8	1-1/2	22804	50.30	22804-C3	56.30
1/16	.042	.047	**.250**	2	1/8	1-1/2	22904	50.30	22904-C3	56.30
5/64	.052	.059	**.062**	2	1/8	1-1/2	22705	48.30	22705-C3	54.20
5/64	.052	.059	**.250**	2	1/8	1-1/2	22805	50.30	22805-C3	56.30
.0930	.062	.070	**.250**	2	1/8	1-1/2	722406	48.30	722406-C3	54.20
.0930	.062	.070	**.500**	2	1/8	2	22905	52.40	22905-C3	58.30
3/32	.063	.070	**.062**	2	1/8	1-1/2	22706	48.30	22706-C3	54.20
3/32	.063	.070	**.375**	2	1/8	1-1/2	22806	51.10	22806-C3	57.00
.1181 (3 mm)	.079	.090	**.500**	2	1/8	2	2283M	52.40	2283M-C3	58.30

D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/8	.084	.094	**.125**	4	1/8	1-1/2	22708	41.60	22708-C3	47.50
1/8	.084	.094	**.250**	4	1/8	1-1/2	826708	43.60	826708-C3	49.50
1/8	.084	.094	**.500**	4	1/8	1-1/2	22808	46.90	22808-C3	52.80
1/8	.084	.094	**.750**	4	1/8	2	833808	50.60	833808-C3	56.50
1/8	.084	.094	**1.000**	4	1/8	3	22908	54.20	22908-C3	60.10
1/8	.084	.094	**1.500**	4	1/8	3	971608	66.70	971608-C3	72.70
5/32	.105	.125	**.500**	4	3/16	2	22810	58.90	22810-C3	65.40
3/16	.126	.141	**.125**	4	3/16	2	22712	49.40	22712-C3	56.10
3/16	.126	.141	**.250**	4	3/16	2	826712	52.50	826712-C3	59.10
3/16	.126	.141	**.500**	4	3/16	2	22812	58.90	22812-C3	65.40
3/16	.126	.141	**.750**	4	3/16	2	833812	63.30	833812-C3	69.90
3/16	.126	.141	**1.000**	4	3/16	3	22912	68.10	22912-C3	74.70
NEW 3/16	.126	.141	**1.500**	4	3/16	3	971612	72.60	971612-C3	79.20
.2362 (6 mm)	.158	.172	**.750**	4	1/4	2-1/2	2286M	74.40	2286M-C3	83.30

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NEW SIZES!

UNDERCUTTING END MILLS

220° (cont.)

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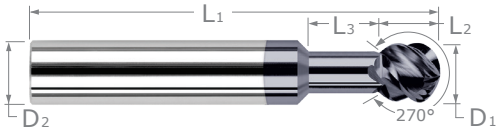
CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	
1/4	.168	.188	**.125**	4	1/4	2-1/2	22716	66.40	22716-C3	75.40	
1/4	.168	.188	**.375**	4	1/4	2-1/2	826716	68.90	826716-C3	77.90	
1/4	.168	.188	**.750**	4	1/4	2-1/2	22816	74.40	22816-C3	83.30	
1/4	.168	.188	**1.000**	4	1/4	2-1/2	833816	78.50	833816-C3	87.30	
1/4	.168	.188	**1.500**	4	1/4	4	22916	86.60	22916-C3	96.90	
1/4	.168	.188	**2.250**	4	1/4	4	971616	112.90	971616-C3	123.50	
5/16	.210	.235	**.187**	4	5/16	2-1/2	22720	88.50	22720-C3	98.20	
5/16	.210	.235	**.750**	4	5/16	2-1/2	22820	96.70	22820-C3	107.20	
5/16	.210	.235	**1.500**	4	5/16	4	22920	116.80	22920-C3	129.30	
3/8	.252	.281	**.187**	4	3/8	2-1/2	22724	95.20	22724-C3	106.60	
3/8	.252	.281	**.750**	4	3/8	2-1/2	22824	101.30	22824-C3	112.70	
3/8	.252	.281	**1.500**	4	3/8	4	22924	122.70	22924-C3	138.80	
3/8	.252	.281	**2.250**	4	3/8	4	971624	170.30	971624-C3	182.60	
1/2	.336	.375	**.187**	4	1/2	3	22732	137.50	22732-C3	153.10	
1/2	.336	.375	**1.000**	4	1/2	3	22832	146.20	22832-C3	163.70	
1/2	.336	.375	**2.000**	4	1/2	6	22932	242.20	22932-C3	259.80	
3/4	.503	.625	**1.000**	4	3/4	4	785948	293.20	785948-C3	316.30	NEW
3/4	.503	.625	**1.500**	4	3/4	4	694648	303.60	694648-C3	326.70	NEW

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UNDERCUTTING END MILLS

270° High Helix



High Helix for Improved Performance!



270° Spherical Ball

- 45° helix for faster chip removal and better finish
- 270° spherical ball • Center cutting
- Designed for undercutting, deburring, and multi-axis machining
- Solid carbide • CNC ground in the USA

CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB2 COATED	
D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/32	.027	.016	**.062**	2	1/8	1-1/2	951131	81.60	951131-C3	87.50		
1/32	.027	.016	**.093**	2	1/8	1-1/2	966531	81.60	966531-C3	87.50		
.0394 (1 mm)	.033	.024	**.078**	2	1/8	1-1/2	95111M	81.60	95111M-C3	87.50		
.0394 (1 mm)	.033	.024	**.125**	2	1/8	1-1/2	96651M	81.60	96651M-C3	87.50		
3/64	.040	.029	**.093**	2	1/8	1-1/2	951147	81.60	951147-C3	87.50		
3/64	.040	.029	**.156**	2	1/8	1-1/2	966547	81.60	966547-C3	87.50		
1/16	.053	.037	**.093**	2	1/8	1-1/2	951162	59.10	951162-C3	65.00	951162-C8	66.70
1/16	.053	.037	**.125**	2	1/8	1-1/2	773762	61.00	773762-C3	67.00		
1/16	.053	.037	**.187**	2	1/8	1-1/2	966562	61.00	966562-C3	67.00	966562-C8	68.70
1/16	.053	.037	**.250**	2	1/8	1-1/2	970462	74.60	970462-C3	80.50	970462-C8	82.30
1/16	.053	.037	**.375**	2	1/8	1-1/2	722304	80.10	722304-C3	86.10		
5/64	.067	.045	**.125**	2	1/8	1-1/2	951178	59.10	951178-C3	65.00	951178-C8	66.70
5/64	.067	.045	**.250**	2	1/8	1-1/2	966578	61.00	966578-C3	67.00	966578-C8	68.70
5/64	.067	.045	**.375**	2	1/8	2	970478	74.60	970478-C3	80.50	970478-C8	83.50
3/32	.079	.054	**.062**	2	1/8	1-1/2	774493	56.30	774493-C3	62.20		
3/32	.079	.054	**.125**	2	1/8	1-1/2	837393	56.30	837393-C3	62.20	837393-C8	63.90
3/32	.079	.054	**.250**	2	1/8	1-1/2	951193	59.10	951193-C3	65.00	951193-C8	66.70
3/32	.079	.054	**.375**	2	1/8	1-1/2	966593	64.60	966593-C3	70.50	966593-C8	72.20
3/32	.079	.054	**.500**	2	1/8	2	970493	74.60	970493-C3	80.50	970493-C8	82.30
D_1 +.000″ −.002″	L_2 +.020″ −.000″		L_3 +.030″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/8	.107	.076	**.125**	4	1/8	1-1/2	934108	51.60	934108-C3	57.50	934108-C8	59.30
1/8	.107	.076	**.187**	4	1/8	1-1/2	808608	52.70	808608-C3	58.60	808608-C8	60.40
1/8	.107	.076	**.250**	4	1/8	1-1/2	951208	53.90	951208-C3	59.80	951208-C8	62.90
1/8	.107	.076	**.375**	4	1/8	1-1/2	863708	56.50	863708-C3	62.40	863708-C8	64.10
1/8	.107	.076	**.500**	4	1/8	1-1/2	994708	59.10	994708-C3	65.00	994708-C8	67.90
1/8	.107	.076	**.750**	4	1/8	2	897708	66.70	897708-C3	72.70		
1/8	.107	.076	**1.000**	4	1/8	3	997108	66.70	997108-C3	72.70	997108-C8	75.80
1/8	.107	.076	**1.500**	4	1/8	3	928808	71.20	928808-C3	77.10	928808-C8	79.40
5/32	.133	.098	**.250**	4	3/16	2	951210	70.00	951210-C3	76.60	951210-C8	78.60
5/32	.133	.098	**.500**	4	3/16	2	994710	75.20	994710-C3	81.80	994710-C8	83.80
5/32	.133	.098	**1.000**	4	3/16	3	997110	85.80	997110-C3	92.50	997110-C8	95.10
3/16	.160	.117	**.125**	4	3/16	2	934112	64.60	934112-C3	71.30	934112-C8	73.20
3/16	.160	.117	**.250**	4	3/16	2	951212	66.40	951212-C3	73.00	951212-C8	75.00
3/16	.160	.117	**.500**	4	3/16	2	994712	71.90	994712-C3	78.50	994712-C8	80.50
3/16	.160	.117	**.750**	4	3/16	2	897712	75.20	897712-C3	81.80	897712-C8	83.80

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UNDERCUTTING END MILLS

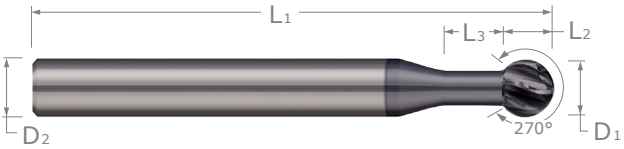
270° High Helix (cont.)

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CUTTER DIA.	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
3/16	.160	.117	**1.000**	4	3/16	3	997112	85.80	997112-C3	92.50	997112-C8	95.10
3/16	.160	.117	**1.250**	4	3/16	3	893512	90.40	893512-C3	97.10	893512-C8	99.60
1/4	.213	.158	**.125**	4	1/4	2-1/2	934116	92.50	934116-C3	101.50	934116-C8	102.20
1/4	.213	.158	**.250**	4	1/4	2-1/2	808616	94.60	808616-C3	102.70	808616-C8	105.70
1/4	.213	.158	**.375**	4	1/4	2-1/2	951216	96.70	951216-C3	105.70	951216-C8	107.80
1/4	.213	.158	**.500**	4	1/4	2-1/2	863716	99.80	863716-C3	108.80	863716-C8	109.50
1/4	.213	.158	**.750**	4	1/4	2-1/2	994716	106.00	994716-C3	115.00	994716-C8	115.70
1/4	.213	.158	**1.000**	4	1/4	2-1/2	808516	107.60	808516-C3	116.50	808516-C8	118.70
1/4	.213	.158	**1.125**	4	1/4	2-1/2	897716	109.10	897716-C3	118.10	897716-C8	120.20
1/4	.213	.158	**1.500**	4	1/4	4	997116	116.70	997116-C3	127.10	997116-C8	127.40
1/4	.213	.158	**2.250**	4	1/4	4	928816	129.10	928816-C3	139.60	928816-C8	141.00
5/16	.266	.201	**.750**	4	5/16	2-1/2	994720	123.30	994720-C3	133.70	994720-C8	143.70
5/16	.266	.201	**1.500**	4	5/16	4	997120	146.50	997120-C3	159.10	997120-C8	160.70
3/8	.320	.241	**.375**	4	3/8	2-1/2	951224	138.30	951224-C3	149.70	951224-C8	163.00
3/8	.320	.241	**.750**	4	3/8	2-1/2	994724	139.90	994724-C3	151.30	994724-C8	164.70
3/8	.320	.241	**1.125**	4	3/8	4	897724	150.20	897724-C3	166.40	897724-C8	167.20
3/8	.320	.241	**1.500**	4	3/8	4	997124	154.00	997124-C3	170.30	997124-C8	183.10
1/2	.427	.323	**.500**	4	1/2	3	951232	197.40	951232-C3	215.20	951232-C8	215.80
1/2	.427	.323	**1.000**	4	1/2	3	994732	202.40	994732-C3	220.20	994732-C8	220.80
1/2	.427	.323	**1.500**	4	1/2	6	897732	291.30	897732-C3	309.10	897732-C8	314.10
1/2	.427	.323	**2.000**	4	1/2	6	997132	299.20	997132-C3	316.80	997132-C8	322.00
1/2	.427	.323	**3.000**	4	1/2	6	928832	333.70	928832-C3	351.30	928832-C8	356.60

UNDERCUTTING END MILLS

270° for Hardened Steels



- Optimized for hardened steels 45-68 Rc
- Increased flute count for added strength and tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- 270° spherical ball
- Designed for undercutting, deburring, and multi-axis machining
- Center cutting
- Solid carbide • CNC ground in the USA

Stocked in Multiple Reach Lengths



	CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.000″ −.001″	L_2 +.010″ −.000″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$
	1/32	.027	.016	**.062**	4	1/8	1-1/2	823231-C6	79.90
	1/32	.027	.016	**.078**	4	1/8	1-1/2	819831-C6	79.90
	1/32	.027	.016	**.125**	4	1/8	1-1/2	745431-C6	80.70
	3/64	.040	.029	**.093**	4	1/8	1-1/2	823247-C6	79.90
	3/64	.040	.029	**.125**	4	1/8	1-1/2	819847-C6	79.90
NEW	1/16	.053	.037	**.031**	4	1/8	1-1/2	694304-C6	55.00
	1/16	.053	.037	**.062**	4	1/8	1-1/2	831562-C6	55.00
	1/16	.053	.037	**.093**	4	1/8	1-1/2	823262-C6	55.00
	1/16	.053	.037	**.125**	4	1/8	1-1/2	819862-C6	57.20
	1/16	.053	.037	**.250**	4	1/8	1-1/2	745462-C6	57.80
NEW	1/16	.053	.037	**.312**	4	1/8	1-1/2	694104-C6	57.80
NEW	5/64	.067	.045	**.093**	4	1/8	1-1/2	746405-C6	56.20
	5/64	.067	.045	**.125**	4	1/8	1-1/2	823278-C6	56.20
	5/64	.067	.045	**.187**	4	1/8	1-1/2	819878-C6	58.20
	5/64	.067	.045	**.250**	4	1/8	1-1/2	748878-C6	60.30
	3/32	.080	.054	**.062**	4	1/8	1-1/2	831593-C6	56.20
	3/32	.080	.054	**.125**	4	1/8	1-1/2	746493-C6	56.70
	3/32	.080	.054	**.187**	4	1/8	1-1/2	704506-C6	58.50
	3/32	.080	.054	**.250**	4	1/8	1-1/2	823293-C6	56.20
	3/32	.080	.054	**.312**	4	1/8	1-1/2	819893-C6	60.60
	3/32	.080	.054	**.375**	4	1/8	1-1/2	748893-C6	61.20

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NEW SIZES!

UNDERCUTTING END MILLS

270° for Hardened Steels (cont.)

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CUTTER DIAMETER	LENGTH OF CUT	NECK DIA.	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$		L_3 $^{+.020''}_{-.000''}$		D_2	L_1	TOOL #	USD$	
1/8	.107	.076	**.062**	6	1/8	1-1/2	694408-C6	48.70	NEW
1/8	.107	.076	**.125**	6	1/8	1-1/2	831608-C6	49.20	
1/8	.107	.076	**.250**	6	1/8	1-1/2	823308-C6	51.70	
1/8	.107	.076	**.375**	6	1/8	1-1/2	819908-C6	52.70	
1/8	.107	.076	**.500**	6	1/8	2	748908-C6	55.30	
1/8	.107	.076	**.750**	6	1/8	2	725708-C6	56.30	
1/8	.107	.076	**1.000**	6	1/8	3	704608-C6	57.30	
5/32	.133	.098	**.250**	6	3/16	2	823310-C6	62.40	
3/16	.160	.117	**.125**	6	3/16	2	831612-C6	58.10	
3/16	.160	.117	**.187**	6	3/16	2	746512-C6	50.40	NEW
3/16	.160	.117	**.250**	6	3/16	2	823312-C6	62.40	
3/16	.160	.117	**.375**	6	3/16	2	819912-C6	65.50	
3/16	.160	.117	**.500**	6	3/16	2	748912-C6	68.60	
1/4	.213	.158	**.125**	8	1/4	2-1/2	831616-C6	77.90	
1/4	.213	.158	**.375**	6	1/4	2-1/2	823316-C6	82.90	
1/4	.213	.158	**.500**	6	1/4	2-1/2	819916-C6	84.30	
1/4	.213	.158	**.750**	6	1/4	2-1/2	748916-C6	87.90	
1/4	.213	.158	**1.125**	6	1/4	3	725716-C6	88.70	NEW
3/8	.320	.241	**.250**	8	3/8	2-1/2	746524-C6	112.30	NEW
3/8	.320	.241	**.375**	8	3/8	2-1/2	823324-C6	113.70	
3/8	.320	.241	**.500**	8	3/8	2-1/2	819924-C6	113.70	
1/2	.427	.323	**.500**	8	1/2	3	823332-C6	161.70	
1/2	.427	.323	**.750**	8	1/2	3	819932-C6	165.80	

Your Free Guide to Increasing Shop Productivity With High Efficiency Milling

Download our HEM Guidebook on harveytool.com

UNDERCUTTING END MILLS

270° Deburring Undercut





High Number of Flutes

Stocked in Multiple Reach Lengths



- 270° spherical ball is ideal for deburring complex shapes and multi-axis machining
- Deburr in your CNC machine with these high-precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling-type cutters
- Double cut style flute pattern • Center cutting
- Solid carbide • CNC ground in the USA

	CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
	D_1	L_2 +.010″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.031 (1/32)	.026	.014	**.031**	12	10	1/8	1-1/2	899631	83.10	899631-C3	89.10
	.031 (1/32)	.026	.014	**.062**	12	10	1/8	1-1/2	980531	82.30	980531-C3	88.20
	.031 (1/32)	.026	.014	**.093**	12	10	1/8	1-1/2	926431	85.00	926431-C3	90.90
	.031 (1/32)	.026	.014	**.125**	12	10	1/8	1-1/2	883231	87.70	883231-C3	93.60
	.039 (1 mm)	.033	.019	**.047**	12	10	1/8	1-1/2	89961M	82.30	89961M-C3	88.20
	.039 (1 mm)	.033	.019	**.125**	12	10	1/8	1/1/2	92641M	87.70	92641M-C3	93.60
	.047 (3/64)	.040	.024	**.062**	12	10	1/8	1-1/2	895347	80.00	895347-C3	85.90
	.047 (3/64)	.040	.024	**.093**	12	10	1/8	1-1/2	980547	82.30	980547-C3	88.20
	.047 (3/64)	.040	.024	**.125**	12	10	1/8	1-1/2	890847	85.00	890847-C3	90.90
	.047 (3/64)	.040	.024	**.156**	12	10	1/8	1-1/2	926447	85.00	926447-C3	90.90
	.047 (3/64)	.040	.024	**.250**	12	10	1/8	1-1/2	883247	87.70	883247-C3	93.60
NEW	.062 (1/16)	.053	.032	**.031**	15	12	1/8	1-1/2	693904	61.90	693904-C3	67.80
	.062 (1/16)	.053	.032	**.062**	15	12	1/8	1-1/2	899662	61.90	899662-C3	67.80
	.062 (1/16)	.053	.032	**.093**	15	12	1/8	1-1/2	980562	61.90	980562-C3	67.80
	.062 (1/16)	.053	.032	**.125**	15	12	1/8	1-1/2	890862	63.90	890862-C3	69.90
	.062 (1/16)	.053	.032	**.187**	15	12	1/8	1-1/2	926462	63.90	926462-C3	69.90
	.062 (1/16)	.053	.032	**.250**	15	12	1/8	1-1/2	883262	66.20	883262-C3	72.10
	.062 (1/16)	.053	.032	**.312**	15	12	1/8	1-1/2	808362	66.20	808362-C3	72.10
NEW	.062 (1/16)	.053	.032	**.375**	15	12	1/8	1-1/2	693704	66.20	693704-C3	72.10
	.078 (5/64)	.067	.035	**.062**	15	12	1/8	1-1/2	899678	61.90	899678-C3	67.80
	.078 (5/64)	.067	.035	**.125**	15	12	1/8	1-1/2	980578	61.90	980578-C3	67.80
	.078 (5/64)	.067	.035	**.250**	15	12	1/8	1-1/2	926478	63.90	926478-C3	69.90
	.078 (5/64)	.067	.035	**.375**	15	12	1/8	2	883278	64.80	883278-C3	70.70
NEW	.078 (5/64)	.067	.035	**.500**	15	12	1/8	2	693705	64.80	693705-C3	70.70
	.093 (3/32)	.079	.038	**.062**	15	12	1/8	1-1/2	899693	65.70	899693-C3	71.60
	.093 (3/32)	.079	.038	**.125**	15	12	1/8	1-1/2	895393	65.70	895393-C3	71.60
	.093 (3/32)	.079	.038	**.187**	15	12	1/8	1-1/2	809693	65.70	809693-C3	71.60
	.093 (3/32)	.079	.038	**.250**	15	12	1/8	1-1/2	980593	65.70	980593-C3	71.60
	.093 (3/32)	.079	.038	**.312**	15	12	1/8	1-1/2	890893	68.10	890893-C3	74.00
	.093 (3/32)	.079	.038	**.375**	15	12	1/8	1-1/2	926493	67.40	926493-C3	73.30
	.093 (3/32)	.079	.038	**.500**	15	12	1/8	2	883293	74.60	883293-C3	80.50
NEW	.118 (3 mm)	.101	.056	**.187**	15	12	1/8	1-1/2	80963M	68.40	80963M-C3	74.30
	.118 (3 mm)	.101	.056	**.250**	15	12	1/8	1-1/2	98053M	68.40	98053M-C3	74.30
	.118 (3 mm)	.101	.056	**.375**	15	12	1/8	1-1/2	89083M	70.80	89083M-C3	76.70
	.118 (3 mm)	.101	.056	**.500**	15	12	1/8	2	92643M	72.70	92643M-C3	78.60
NEW	.118 (3 mm)	.101	.056	**.625**	15	12	1/8	2	73263M	72.70	73263M-C3	78.60

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NEW SIZES!

UNDERCUTTING END MILLS

270° Deburring Undercut (cont.)

continued from previous page

CUTTER DIA.	LOC	NECK DIA.	NECK LENGTH	RIGHT HAND TEETH	LEFT HAND TEETH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1	L_2 $^{+.020''}_{-.000''}$		L_3 $^{+.030''}_{-.000''}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
.125 (1/8)	.107	.059	**.125**	16	13	1/8	1-1/2	899708	63.30	899708-C3	69.20
.125 (1/8)	.107	.059	**.187**	16	13	1/8	1-1/2	809908	63.60	809908-C3	69.50
.125 (1/8)	.107	.059	**.250**	16	13	1/8	1-1/2	980608	65.70	980608-C3	71.60
.125 (1/8)	.107	.059	**.375**	16	13	1/8	1-1/2	890908	66.60	890908-C3	72.60
.125 (1/8)	.107	.059	**.437**	16	13	1/8	2	737108	67.40	737108-C3	73.30
.125 (1/8)	.107	.059	**.500**	16	13	1/8	2	926508	68.10	926508-C3	74.00
.125 (1/8)	.107	.059	**.750**	16	13	1/8	2	886108	71.30	886108-C3	77.20
.125 (1/8)	.107	.059	**1.000**	16	13	1/8	3	883308	75.50	883308-C3	81.40
.156 (5/32)	.133	.078	**.250**	16	13	3/16	2	980610	72.00	980610-C3	78.60
.156 (5/32)	.133	.078	**.500**	16	13	3/16	2	926510	77.50	926510-C3	84.20
.187 (3/16)	.160	.097	**.125**	16	13	3/16	2	899712	67.40	899712-C3	74.00
.187 (3/16)	.160	.097	**.250**	16	13	3/16	2	980612	71.30	980612-C3	77.90
.187 (3/16)	.160	.097	**.375**	16	13	3/16	2	890912	73.70	890912-C3	80.40
.187 (3/16)	.160	.097	**.500**	16	13	3/16	2	926512	77.50	926512-C3	84.20
.187 (3/16)	.160	.097	**.625**	16	13	3/16	2	732612	80.40	732612-C3	86.70
.187 (3/16)	.160	.097	**.750**	16	13	3/16	2	886112	83.70	886112-C3	90.30
.187 (3/16)	.160	.097	**1.000**	16	13	3/16	3	883312	88.00	883312-C3	94.70
.250 (1/4)	.213	.136	**.125**	16	13	1/4	2-1/2	899716	84.30	899716-C3	93.30
.250 (1/4)	.213	.136	**.375**	16	13	1/4	2-1/2	980616	85.30	980616-C3	94.20
.250 (1/4)	.213	.136	**.500**	16	13	1/4	2-1/2	890916	87.60	890916-C3	96.50
.250 (1/4)	.213	.136	**.750**	16	13	1/4	2-1/2	926516	91.70	926516-C3	100.50
.250 (1/4)	.213	.136	**1.000**	16	13	1/4	2-1/2	722216	93.10	722216-C3	101.20
.250 (1/4)	.213	.136	**1.125**	16	13	1/4	2-1/2	886116	94.70	886116-C3	103.60
.375 (3/8)	.320	.200	**.375**	16	13	3/8	2-1/2	980624	113.80	980624-C3	125.20
.375 (3/8)	.320	.200	**.750**	16	13	3/8	3	926524	120.40	926524-C3	131.80

DRILL / END MILLS

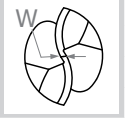
Helical Tip – 2 Flute

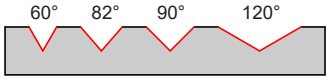


- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 2 flutes
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials.
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum.
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

HELICAL TIP

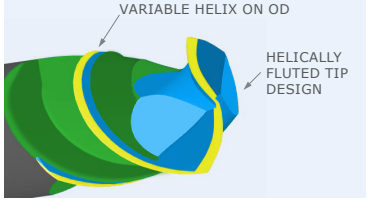
Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty





Stocked in Four Included Angles!

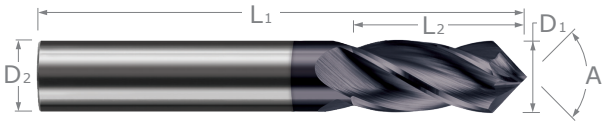
INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		TiB2 COATED	
A +1° −1°	D_1 +.000″ −.002″	L_2 +.030″ −.000″	W	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
60°	1/32	3/32	.003	1/8	1-1/2	872502-C6	61.30	872502-C8	58.50
	1/16	3/16	.005	1/8	1-1/2	872504-C6	60.70	872504-C8	59.20
	1/8	1/2	.008	1/8	1-1/2	872508-C6	60.70	872508-C8	61.30
	3/16	5/8	.009	3/16	2	872512-C6	67.10	872512-C8	67.90
	1/4	3/4	.009	1/4	2-1/2	872516-C6	85.50	872516-C8	86.30
	3/8	7/8	.012	3/8	2-1/2	872524-C6	105.70	872524-C8	105.70
	1/2	1	.012	1/2	3	872532-C6	136.40	872532-C8	136.40
82°	1/8	1/2	.008	1/8	1-1/2	738408-C6	64.00		
	3/16	5/8	.009	3/16	2	738412-C6	64.00		
	1/4	3/4	.009	1/4	2-1/2	738416-C6	64.00		
	3/8	7/8	.012	3/8	2-1/2	738424-C6	64.00		
90°	1/32	3/32	.003	1/8	1-1/2	859602-C6	55.10	859602-C8	53.00
	3/64	9/64	.004	1/8	1-1/2	859603-C6	55.10		
	1/16	3/16	.005	1/8	1-1/2	859604-C6	55.10	859604-C8	53.60
	5/64	1/4	.006	1/8	1-1/2	859605-C6	57.80	859605-C8	56.20
	3/32	3/8	.007	1/8	1-1/2	859606-C6	57.80	859606-C8	56.20
	1/8	1/2	.008	1/8	1-1/2	859608-C6	60.70	859608-C8	60.70
	3/16	5/8	.009	3/16	2	859612-C6	67.10	859612-C8	67.10
	1/4	3/4	.009	1/4	2-1/2	859616-C6	85.50	859616-C8	85.50
	3/8	7/8	.012	3/8	2-1/2	859624-C6	105.70	859624-C8	106.80
	1/2	1	.012	1/2	3	859632-C6	135.30	859632-C8	136.40
120°	1/8	1/2	.008	1/8	1-1/2	847708-C6	61.30	847708-C8	61.30
	3/16	5/8	.009	3/16	2	847712-C6	67.90	847712-C8	67.90
	1/4	3/4	.009	1/4	2-1/2	847716-C6	85.50	847716-C8	86.30
	3/8	7/8	.012	3/8	2-1/2	847724-C6	106.80	847724-C8	106.80
	1/2	1	.012	1/2	3	847732-C6	136.40	847732-C8	136.40

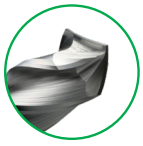


NEW SIZES!

DRILL / END MILLS

Helical Tip – 4 Flute





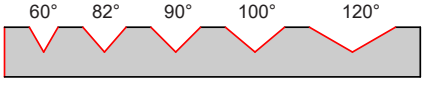
Specialized Helically Fluted Tip Design

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 4 flutes (two flutes to center, two flutes cut back)
- Specialized helically fluted tip design for superior performance, surface finish and chip evacuation
- Variable helix design on OD (approx. 35°) reduces chatter and harmonics and increases material removal rates
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

HELICAL TIP

Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty

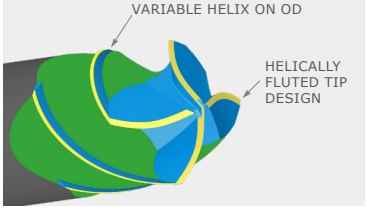




Stocked in Five Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2 (h6)	L1	4 FL	USD$
60°	1/16	3/16	.005	1/8	1-1/2	899204-C6	64.60
	3/32	3/8	.007	1/8	1-1/2	899206-C6	64.60
	1/8	1/2	.008	1/8	1-1/2	899208-C6	64.00
	3/16	5/8	.009	3/16	2	899212-C6	70.80
	1/4	3/4	.009	1/4	2-1/2	899216-C6	90.00
	5/16	13/16	.010	5/16	2-1/2	899220-C6	100.30
	3/8	7/8	.012	3/8	2-1/2	899224-C6	111.20
	1/2	1	.012	1/2	3	899232-C6	142.20
82°	1/8	1/2	.008	1/8	1-1/2	788208-C6	64.00
	3/16	5/8	.009	3/16	2	788212-C6	70.80
	1/4	3/4	.009	1/4	2-1/2	788216-C6	90.00
90°	1/32	3/32	.003	1/8	1-1/2	881102-C6	58.40
	.039	1/8	.003	1/8	1-1/2	88111M-C6	59.00
	3/64	9/64	.004	1/8	1-1/2	881103-C6	59.00
	1/16	3/16	.005	1/8	1-1/2	881104-C6	58.40
	5/64	1/4	.006	1/8	1-1/2	881105-C6	61.10
	3/32	3/8	.007	1/8	1-1/2	881106-C6	61.10
	.118	3/8	.008	1/8	1-1/2	88113M-C6	64.00
	1/8	1/2	.008	1/8	1-1/2	881108-C6	64.00
	9/64	9/16	.009	3/16	2	881109-C6	71.50
	5/32	9/16	.009	3/16	2	881110-C6	70.80
	3/16	5/8	.009	3/16	2	881112-C6	70.80
	1/4	3/4	.009	1/4	2-1/2	881116-C6	90.00
	5/16	13/16	.010	5/16	2-1/2	881120-C6	99.10
	3/8	7/8	.012	3/8	2-1/2	881124-C6	111.20
	1/2	1	.012	1/2	3	881132-C6	142.20
	5/8	1-1/4	.014	5/8	3-1/2	881140-C6	189.10
	3/4	1-1/2	.015	3/4	4	881148-C6	236.40

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DRILL / END MILLS

Helical Tip – 4 Flute (cont.)

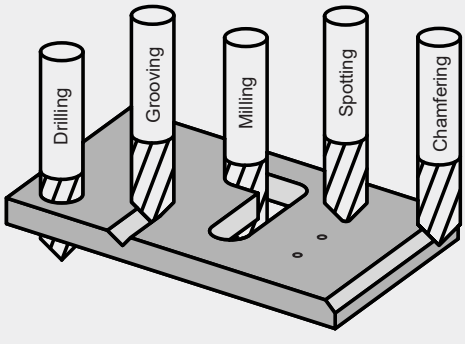
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	INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2 (h6)	L_1	4 FL	USD$
	100°	1/8	1/2	.008	1/8	1-1/2	826208-C6	64.00
		1/4	3/4	.009	1/4	2-1/2	826216-C6	90.00
		3/8	7/8	.012	3/8	2-1/2	826224-C6	111.20
		1/2	1	.012	1/2	3	826232-C6	142.20
NEW	120°	3/64	9/64	.004	1/8	1-1/2	865403-C6	59.00
NEW		1/16	3/16	.005	1/8	1-1/2	865404-C6	58.40
NEW		5/64	1/4	.006	1/8	1-1/2	865405-C6	61.10
NEW		3/32	3/8	.007	1/8	1-1/2	865406-C6	61.10
		1/8	1/2	.008	1/8	1-1/2	865408-C6	64.00
		3/16	5/8	.009	3/16	2	865412-C6	70.80
		1/4	3/4	.009	1/4	2-1/2	865416-C6	90.00
		3/8	7/8	.012	3/8	2-1/2	865424-C6	111.20
		1/2	1	.012	1/2	3	865432-C6	142.20

Drill / End Mills

Our extensive offering of Drill / End Mills are available in multiple point angles. They allow you to...

- Perform multiple operations with a single tool
- Free up space on your tool carousel
- Improve cycle time with fewer tool changes



DRILL / END MILLS

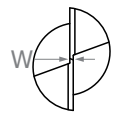
Mill Style – 2 Flute



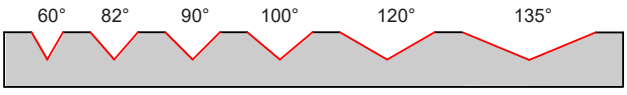
MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°	82°, 90°,100°, 120°, 135°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty



- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 2 flutes • Solid carbide
- CNC ground in the USA



Stocked in Six Included Angles!

Outstanding in Aluminum!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB2 COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	2 FL	USD$	2 FL	USD$	2 FL	USD$
60°	.020	1/16	.0020	1/8	1-1/2	991767	37.50	991767-C3	43.40		
	1/32	3/32	.0030	1/8	1-1/2	991702	36.60	991702-C3	42.60		
	3/64	9/64	.0040	1/8	1-1/2	991703	37.50	991703-C3	43.40		
	1/16	3/16	.0050	1/8	1-1/2	991704	36.60	991704-C3	42.60		
	5/64	1/4	.0050	1/8	1-1/2	991705	37.50	991705-C3	43.40		
	3/32	3/8	.0050	1/8	1-1/2	991706	36.60	991706-C3	42.60		
	1/8	1/2	.0050	1/8	1-1/2	991708	36.60	991708-C3	42.60	991708-C8	45.50
	5/32	9/16	.0060	3/16	2	991710	38.20	991710-C3	44.80		
	3/16	5/8	.0060	3/16	2	991712	38.20	991712-C3	44.80	991712-C8	46.80
	1/4	3/4	.0060	1/4	2-1/2	991716	54.00	991716-C3	62.60	991716-C8	64.10
	5/16	13/16	.0070	5/16	2-1/2	991720	56.80	991720-C3	67.10		
	3/8	7/8	.0080	3/8	2-1/2	991724	68.10	991724-C3	79.50	991724-C8	87.20
	1/2	1	.0080	1/2	3	991732	107.80	991732-C3	125.10	991732-C8	126.20
	5/8	1-1/4	.0090	5/8	3-1/2	991740	164.90	991740-C3	182.10		
	3/4	1-1/2	.0100	3/4	4	991748	250.10	991748-C3	271.80		
82°	1/16	3/16	.0050	1/8	1-1/2	949404	40.20	949404-C3	46.10		
	3/32	3/8	.0050	1/8	1-1/2	949406	40.20	949406-C3	46.10		
	1/8	1/2	.0050	1/8	1-1/2	949408	40.20	949408-C3	46.10	949408-C8	47.90
	5/32	9/16	.0060	3/16	2	949410	41.40	949410-C3	47.60		
	3/16	5/8	.0060	3/16	2	949412	41.40	949412-C3	48.00		
	1/4	3/4	.0060	1/4	2-1/2	949416	58.90	949416-C3	67.70	949416-C8	70.00
	5/16	13/16	.0070	5/16	2-1/2	949420	62.00	949420-C3	72.40		
	3/8	7/8	.0080	3/8	2-1/2	949424	74.10	949424-C3	85.50		
	1/2	1	.0080	1/2	3	949432	118.30	949432-C3	135.90		
90°	1/64	3/64	.0015	1/8	1-1/2	15301-2	36.60	72201-C3	42.60		
	.020	1/16	.0020	1/8	1-1/2	15367-2	36.60	72220-C3	42.60		
	1/32	3/32	.0030	1/8	1-1/2	15302-2	36.60	72231-C3	42.60	72231-C8	44.30
	1 mm	1/8	.0030	1/8	1-1/2	1531M-2	36.60	72239-C3	42.60		
	.040	1/8	.0030	1/8	1-1/2	15371-2	36.60	72240-C3	42.60		
	3/64	9/64	.0030	1/8	1-1/2	15303-2	36.60	72247-C3	42.60		
	1/16	3/16	.0050	1/8	1-1/2	15304-2	34.00	72262-C3	40.00	72262-C8	42.70

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DRILL / END MILLS

Mill Style – 2 Flute (cont.)

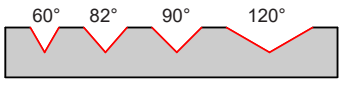
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INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB2 COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
90°	5/64	1/4	.0050	1/8	1-1/2	15305-2	34.00	72278-C3	40.00	72278-C8	41.70
	3/32	3/8	.0050	1/8	1-1/2	15306-2	34.00	72293-C3	40.00	72293-C8	42.70
	7/64	3/8	.0050	1/8	1-1/2	15307-2	36.60	72302-C3	42.60		
	3 mm	3/8	.0050	1/8	1-1/2	1533M-2	36.60	72305-C3	42.60		
	1/8	1/2	.0050	1/8	1-1/2	15308-2	34.00	72308-C3	40.00	72308-C8	42.70
	9/64	9/16	.0060	3/16	2	15309-2	38.20	72309-C3	44.40		
	5/32	9/16	.0060	3/16	2	15310-2	38.20	72310-C3	44.80		
	3/16	5/8	.0060	3/16	2	15312-2	35.30	72312-C3	41.80	72312-C8	43.90
	1/4	3/4	.0060	1/4	2-1/2	15316-2	50.10	72316-C3	58.70	72316-C8	60.70
	5/16	13/16	.0070	5/16	2-1/2	15320-2	52.40	72320-C3	62.50	72320-C8	65.70
	3/8	7/8	.0080	3/8	2-1/2	15324-2	62.80	72324-C3	74.20	72324-C8	82.80
	1/2	1	.0080	1/2	3	15332-2	99.90	72332-C3	116.80	72332-C8	122.10
	5/8	1-1/4	.0090	5/8	3-1/2	15340-2	152.40	72340-C3	171.70		
	3/4	1-1/2	.0100	3/4	4	15348-2	231.40	72348-C3	249.80		
100°	1/16	3/16	.0050	1/8	1-1/2	928562	38.10	928562-C3	44.00		
	3/32	3/8	.0050	1/8	1-1/2	928593	38.10	928593-C3	44.00		
	1/8	1/2	.0050	1/8	1-1/2	928508	40.20	928508-C3	46.10	928508-C8	47.90
	3/16	5/8	.0060	3/16	2	928512	41.40	928512-C3	48.00		
	1/4	3/4	.0060	1/4	2-1/2	928516	58.90	928516-C3	67.70	928516-C8	69.00
	5/16	13/16	.0070	5/16	2-1/2	928520	62.00	928520-C3	72.40		
	3/8	7/8	.0080	3/8	2-1/2	928524	74.70	928524-C3	86.20		
	1/2	1	.0080	1/2	3	928532	118.30	928532-C3	135.90		
120°	1/16	3/16	.0050	1/8	1-1/2	985504	39.80	985504-C3	45.70		
	3/32	3/8	.0050	1/8	1-1/2	985506	39.10	985506-C3	45.00		
	1/8	1/2	.0050	1/8	1-1/2	985508	39.10	985508-C3	45.00	985508-C8	46.80
	5/32	9/16	.0060	3/16	2	985510	41.00	985510-C3	47.50		
	3/16	5/8	.0060	3/16	2	985512	40.30	985512-C3	46.80		
	1/4	3/4	.0060	1/4	2-1/2	985516	56.60	985516-C3	65.30	985516-C8	67.70
	5/16	13/16	.0070	5/16	2-1/2	985520	59.00	985520-C3	69.30		
	3/8	7/8	.0080	3/8	2-1/2	985524	70.20	985524-C3	81.60	985524-C8	89.30
	1/2	1	.0080	1/2	3	985532	109.80	985532-C3	127.10		
135°	1/8	1/2	.0050	1/8	1-1/2	756408	40.20	756408-C3	46.10		
	3/16	5/8	.0060	3/16	2	756412	41.40	756412-C3	47.60		
	1/4	3/4	.0060	1/4	2-1/2	756416	58.90	756416-C3	67.00		
	3/8	7/8	.0080	3/8	2-1/2	756424	74.70	756424-C3	86.20		
	1/2	1	.0080	1/2	3	756432	118.30	756432-C3	133.90		

DRILL / END MILLS

Mill Style – 3 Flute





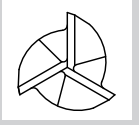
Stocked in Four Included Angles!

- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling
- 3 flutes to center
- Solid carbide
- CNC ground in the USA

MILL STYLE

Flat relief with end mill style and 3 flutes to center.

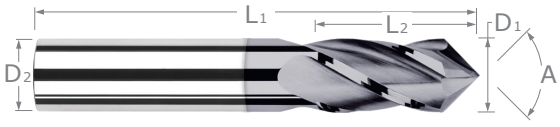
Recommended For	Included Angle
	60°, 82°, 90°, 120°
Chamfering	Yes
O.D. Milling	Yes
Drilling	No
Spotting	Light Duty



INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	D_2	L_1	3 FL	USD$	3 FL	USD$
60°	1/8	1/2	1/8	1-1/2	784808	34.00	784808-C3	40.00
	3/16	5/8	3/16	2	784812	35.30	784812-C3	41.50
	1/4	3/4	1/4	2-1/2	784816	50.10	784816-C3	58.70
	3/8	7/8	3/8	2-1/2	784824	63.30	784824-C3	74.70
	1/2	1	1/2	3	784832	95.80	784832-C3	111.40
82°	1/8	1/2	1/8	1-1/2	725508	34.00	725508-C3	40.00
	1/4	3/4	1/4	2-1/2	725516	50.10	725516-C3	58.20
	3/8	7/8	3/8	2-1/2	725524	62.80	725524-C3	74.20
	1/2	1	1/2	3	725532	95.80	725532-C3	111.40
90°	1/16	3/16	1/8	1-1/2	823762	35.10	823762-C3	41.00
	3/32	3/8	1/8	1-1/2	823793	34.00	823793-C3	40.00
	1/8	1/2	1/8	1-1/2	823808	34.00	823808-C3	40.50
	5/32	9/16	3/16	2	823810	35.70	823810-C3	42.10
	3/16	5/8	3/16	2	823812	35.30	823812-C3	41.80
	1/4	3/4	1/4	2-1/2	823816	50.10	823816-C3	57.60
	5/16	13/16	5/16	2-1/2	823820	58.30	823820-C3	68.00
	3/8	7/8	3/8	2-1/2	823824	62.80	823824-C3	74.20
	1/2	1	1/2	3	823832	95.80	823832-C3	112.90
120°	1/8	1/2	1/8	1-1/2	784508	34.00	784508-C3	40.00
	1/4	3/4	1/4	2-1/2	784516	50.10	784516-C3	58.70
	3/8	7/8	3/8	2-1/2	784524	64.70	784524-C3	76.10

DRILL / END MILLS

Mill Style – 4 Flute



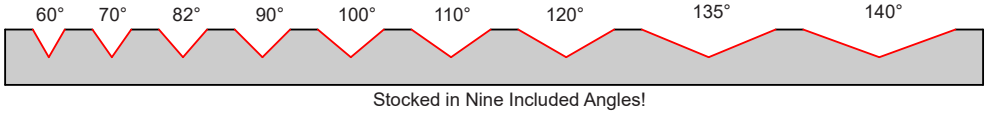
- Designed for chamfering, milling, and some spotting applications
- Not recommended for drilling steel
- 4 flutes (two flutes to center, two flutes cut back)
- Solid carbide • CNC ground in the USA

MILL STYLE

Flat relief with end mill style gash to thin web.

Recommended For	Included Angle	
	60°, 70°	82°, 90°, 100°, 110°, 120°, 135°, 140°
Chamfering	Yes	Yes
O.D. Milling	Yes	Yes
Drilling	No	Non-Ferrous Only
Spotting	No	Light Duty





Stocked in Nine Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″	W	D2	L1	4 FL	USD$	4 FL	USD$	4 FL	USD$
60°	1/32	3/32	.003	1/8	1-1/2	15402	36.60			15402-C3	42.60
	3/64	9/64	.004	1/8	1-1/2	15403	36.60			15403-C3	42.60
	1/16	3/16	.005	1/8	1-1/2	15404	36.60			15404-C3	42.60
	5/64	1/4	.005	1/8	1-1/2	15405	36.60			15405-C3	42.60
	3/32	3/8	.005	1/8	1-1/2	15406	36.60			15406-C3	42.60
	7/64	3/8	.005	1/8	1-1/2	15407	38.80			15407-C3	44.70
	3 mm	3/8	.005	1/8	1-1/2	1543M	39.80			1543M-C3	45.70
	1/8	1/2	.005	1/8	1-1/2	15408	36.60			15408-C3	42.60
	9/64	9/16	.006	3/16	2	15409	38.20			15409-C3	44.80
	5/32	9/16	.006	3/16	2	15410	38.20			15410-C3	44.80
	3/16	5/8	.006	3/16	2	15412	38.20			15412-C3	44.80
	1/4	3/4	.006	1/4	2-1/2	15416	54.00			15416-C3	62.60
	5/16	13/16	.007	5/16	2-1/2	15420	56.80			15420-C3	67.10
	3/8	7/8	.008	3/8	2-1/2	15424	68.10			15424-C3	79.50
	7/16	1	.008	7/16	2-3/4	15428	107.40			15428-C3	120.70
	1/2	1	.008	1/2	3	15432	107.80			15432-C3	125.10
	5/8	1-1/4	.009	5/8	3-1/2	15440	164.90			15440-C3	182.10
	3/4	1-1/2	.010	3/4	4	15448	250.10			15448-C3	271.80
	1	2	.010	1	4	15464	376.70			15464-C3	405.10
70°	1/8	1/2	.005	1/8	1-1/2	824608	42.40			824608-C3	48.30
	1/4	3/4	.006	1/4	2-1/2	824616	61.20			824616-C3	70.10
	3/8	7/8	.008	3/8	2-1/2	824624	76.50			824624-C3	87.90
	1/2	1	.008	1/2	3	824632	120.70			824632-C3	136.30

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DRILL / END MILLS

Mill Style – 4 Flute (cont.)

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INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		TiN COATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1		4 FL	USD$	4 FL	USD$	4 FL	USD$
	1/32	3/32	.003	1/8	1-1/2		26502	42.80			26502-C3	48.70
	1/16	3/16	.005	1/8	1-1/2		26504	42.40			26504-C3	48.30
	5/64	1/4	.005	1/8	1-1/2		26505	42.80			26505-C3	48.70
	3/32	3/8	.005	1/8	1-1/2		26506	42.40			26506-C3	48.30
	1/8	1/2	.005	1/8	1-1/2		26508	42.40			26508-C3	48.30
	5/32	9/16	.006	3/16	2		26510	43.90			26510-C3	50.10
82°	3/16	5/8	.006	3/16	2		26512	43.90			26512-C3	50.50
	1/4	3/4	.006	1/4	2-1/2		26516	61.20			26516-C3	70.10
	5/16	13/16	.007	5/16	2-1/2		26520	63.90			26520-C3	74.40
	3/8	7/8	.008	3/8	2-1/2		26524	76.50			26524-C3	87.90
	1/2	1	.008	1/2	3		26532	119.60			26532-C3	137.20
	5/8	1-1/4	.009	5/8	3-1/2		26540	182.70			26540-C3	200.40
	3/4	1-1/2	.010	3/4	4		26548	276.40			26548-C3	297.30
	1/64	3/64	.0015	1/8	1-1/2		15301	36.60			15301-C3	42.60
	.020	1/16	.002	1/8	1-1/2		15367	36.60			15367-C3	42.60
	1/32	3/32	.003	1/8	1-1/2		15302	36.60			15302-C3	42.60
	1 mm	1/8	.003	1/8	1-1/2		1531M	39.80			1531M-C3	45.70
	3/64	9/64	.004	1/8	1-1/2		15303	36.60			15303-C3	42.60
	1/16	3/16	.005	1/8	1-1/2		15304	34.00	15304-C1	38.00	15304-C3	40.00
	1/16	5/16	.005	1/8	2-1/2		823904	37.90			823904-C3	43.80
	5/64	1/4	.005	1/8	1-1/2		15305	34.00	15305-C1	38.00	15305-C3	40.00
	3/32	3/8	.005	1/8	1-1/2		15306	34.00	15306-C1	38.00	15306-C3	40.00
	3/32	1/2	.005	1/8	2-1/2		823993	37.90			823993-C3	43.80
	7/64	3/8	.005	1/8	1-1/2		15307	36.60			15307-C3	42.60
	3 mm	3/8	.005	1/8	1-1/2		1533M	36.60			1533M-C3	42.60
	1/8	1/2	.005	1/8	1-1/2		15308	34.00	15308-C1	38.00	15308-C3	40.00
	1/8	1/2	.005	1/8	3	LONG	824208	39.20			824208-C3	45.40
	1/8	5/8	.005	1/8	2-1/2		824008	37.90			824008-C3	43.80
	9/64	9/16	.006	3/16	2		15309	38.20			15309-C3	44.80
	5/32	9/16	.006	3/16	2		15310	38.20			15310-C3	44.80
	11/64	5/8	.006	3/16	2		15311	38.20			15311-C3	44.80
90°	3/16	5/8	.006	3/16	2		15312	35.30	15312-C1	39.80	15312-C3	41.80
	3/16	1	.006	3/16	3		824012	39.80			824012-C3	46.20
	13/64	3/4	.006	1/4	2-1/2		15313	56.40			15313-C3	65.10
	7/32	3/4	.006	1/4	2-1/2		15314	57.30			15314-C3	66.20
	6 mm	3/4	.006	1/4	2-1/2		1536M	57.00			1536M-C3	65.80
	1/4	3/4	.006	1/4	2-1/2		15316	50.10	15316-C1	54.80	15316-C3	58.70
	1/4	3/4	.006	1/4	4		824216	56.60			824216-C3	63.70
	1/4	1-1/4	.006	1/4	4		824016	59.30			824016-C3	69.60
	5/16	13/16	.007	5/16	2-1/2		15320	52.40	15320-C1	59.30	15320-C3	62.50
	3/8	7/8	.008	3/8	2-1/2		15324	62.80	15324-C1	69.70	15324-C3	74.20
	3/8	2	.008	3/8	4		824024	68.30			824024-C3	84.00
	7/16	1	.008	7/16	2-3/4		15328	105.40			15328-C3	119.70
	1/2	1	.008	1/2	3		15332	99.90	15332-C1	109.80	15332-C3	116.80
	1/2	1	.008	1/2	6	LONG	824032	126.60			824032-C3	145.50
	1/2	2-5/8	.008	1/2	4		739332	112.30			739332-C3	128.90
	5/8	1-1/4	.009	5/8	3-1/2		15340	154.00	15340-C1	164.10	15340-C3	171.00
	3/4	1-1/2	.010	3/4	4		15348	233.70	15348-C1	245.10	15348-C3	252.00
	7/8	2	.010	7/8	4		15356	384.10			15356-C3	411.80
	1	2	.010	1	4		15364	376.70			15364-C3	405.10

continued on next page

DRILL / END MILLS

Mill Style – 4 Flute (cont.)

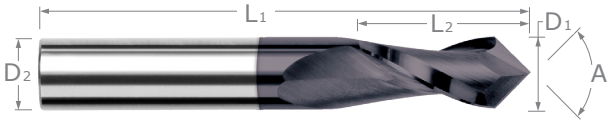
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INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiN COATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$
100°	1/32	3/32	.003	1/8	1-1/2	27402	42.80			27402-C3	48.70
	1/16	3/16	.005	1/8	1-1/2	27404	42.40			27404-C3	48.30
	5/64	1/4	.005	1/8	1-1/2	27405	42.80			27405-C3	48.70
	3/32	3/8	.005	1/8	1-1/2	27406	42.40			27406-C3	48.30
	1/8	1/2	.005	1/8	1-1/2	27408	42.40			27408-C3	48.30
	5/32	9/16	.006	3/16	2	27410	43.90			27410-C3	50.50
	3/16	5/8	.006	3/16	2	27412	43.90			27412-C3	50.50
	1/4	3/4	.006	1/4	2-1/2	27416	61.20			27416-C3	70.10
	5/16	13/16	.007	5/16	2-1/2	27420	63.90			27420-C3	74.40
	3/8	7/8	.008	3/8	2-1/2	27424	76.50			27424-C3	87.90
	1/2	1	.008	1/2	3	27432	119.60			27432-C3	137.20
	5/8	1-1/4	.009	5/8	3-1/2	27440	182.70			27440-C3	200.40
	3/4	1-1/2	.010	3/4	4	27448	276.40			27448-C3	297.30
110°	1/8	1/2	.005	1/8	1-1/2	824408	42.40			824408-C3	48.30
	1/4	3/4	.006	1/4	2-1/2	824416	61.20			824416-C3	70.10
	3/8	7/8	.008	3/8	2-1/2	824424	76.50			824424-C3	87.90
	1/2	1	.008	1/2	3	824432	119.60			824432-C3	137.20
120°	1/32	3/32	.003	1/8	1-1/2	988102	39.10			988102-C3	45.00
	1/16	3/16	.005	1/8	1-1/2	988104	39.10			988104-C3	45.00
	3/32	3/8	.005	1/8	1-1/2	988106	39.10			988106-C3	45.00
	7/64	3/8	.005	1/8	1-1/2	988107	38.20			988107-C3	44.10
	3 mm	3/8	.005	1/8	1-1/2	98813M	39.80			98813M-C3	45.70
	1/8	1/2	.005	1/8	1-1/2	988108	39.10			988108-C3	45.00
	9/64	9/16	.006	3/16	2	988109	41.00			988109-C3	47.20
	5/32	9/16	.006	3/16	2	988110	40.30			988110-C3	46.80
	3/16	5/8	.006	3/16	2	988112	40.30			988112-C3	46.80
	1/4	3/4	.006	1/4	2-1/2	988116	56.60			988116-C3	65.30
	5/16	13/16	.007	5/16	2-1/2	988120	59.00			988120-C3	69.30
	3/8	7/8	.008	3/8	2-1/2	988124	70.20			988124-C3	81.60
	1/2	1	.008	1/2	3	988132	109.80			988132-C3	127.10
	5/8	1-1/4	.009	5/8	3-1/2	988140	166.60			988140-C3	183.90
	3/4	1-1/2	.010	3/4	4	988148	251.90			988148-C3	273.60
	1	2	.010	1	4	988164	378.70			988164-C3	406.90
135°	1/8	1/2	.005	1/8	1-1/2	870208	42.40			870208-C3	48.30
	3/16	5/8	.006	3/16	2	870212	43.90			870212-C3	50.50
	1/4	3/4	.006	1/4	2-1/2	870216	61.20			870216-C3	70.10
	3/8	7/8	.008	3/8	2-1/2	870224	77.20			870224-C3	88.60
	1/2	1	.008	1/2	3	870232	120.70			870232-C3	138.30
140°	1/8	1/2	.005	1/8	1-1/2	817208	42.40			817208-C3	48.30
	1/4	3/4	.006	1/4	2-1/2	817216	61.20			817216-C3	70.10

NEW SIZES!

DRILL / END MILLS

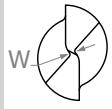
Drill Style – 2 Flute



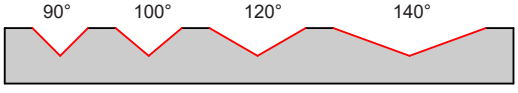
DRILL STYLE

Cammed relief with split point with "S" style gash to thin web.

Recommended For	
Chamfering	Light Duty
O.D. Milling	Yes
Drilling	Yes
Spotting	Yes



- Designed for drilling and milling applications
- 2 flutes
- Solid carbide
- CNC ground in the USA



Stocked in Four Included Angles!

INCLUDED ANGLE	CUTTER DIAMETER	WIRE SIZE	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED		
A +1° −1°	D1 +.000″ −.002″		L2 +.030″ −.000″	W	D2	L1	2 FL	USD$	2 FL	USD$	2 FL	USD$	
90°	.020	76	1/16	.002	1/8	1-1/2	46567	39.80	46567-C3	45.70			NEW
	.025	74	5/64	.002	1/8	1-1/2	46568	39.80	46568-C3	45.70			NEW
	1/32		3/32	.003	1/8	1-1/2	46502	39.80	46502-C3	45.70			
	1 mm		1/8	.003	1/8	1-1/2	4651M	42.80	4651M-C3	48.70			
	.040	60	1/8	.003	1/8	1-1/2	46571	39.80	46571-C3	45.70			NEW
	3/64		9/64	.004	1/8	1-1/2	46503	39.80	46503-C3	45.70	46503-C8	48.60	
	.055	54	5/32	.004	1/8	1-1/2	46574	39.80	46574-C3	45.70			NEW
	1/16		3/16	.005	1/8	1-1/2	46504	39.80	46504-C3	45.70			
	.070	50	7/32	.005	1/8	1-1/2	46577	39.80	46577-C3	45.70			NEW
	5/64		1/4	.005	1/8	1-1/2	46505	39.80	46505-C3	45.70			
	3/32		3/8	.005	1/8	1-1/2	46506	39.80	46506-C3	45.70			
	7/64		3/8	.005	1/8	1-1/2	46507	39.80	46507-C3	45.70			
	3 mm		3/8	.005	1/8	1-1/2	4653M	42.80	4653M-C3	48.70			
	1/8		1/2	.005	1/8	1-1/2	46508	39.80	46508-C3	45.70	46508-C8	48.60	
	9/64		9/16a	.006	3/16	2	46509	40.30	46509-C3	46.80			
	5/32		9/16	.006	3/16	2	46510	40.30	46510-C3	46.80			
	3/16		5/8	.006	3/16	2	46512	40.30	46512-C3	46.80			
	7/32		3/4	.006	1/4	2-1/2	46514	56.60	46514-C3	65.30			
	1/4		3/4	.006	1/4	2-1/2	46516	56.60	46516-C3	65.30	46516-C8	66.80	
	5/16		13/16	.007	5/16	2-1/2	46520	59.00	46520-C3	69.30			
	3/8		7/8	.008	3/8	2-1/2	46524	70.20	46524-C3	81.60			
	7/16		1	.008	7/16	2-3/4	46528	107.60	46528-C3	122.00			
	1/2		1	.008	1/2	3	46532	109.80	46532-C3	127.10			
	5/8		1-1/4	.010	5/8	3-1/2	46540	166.60	46540-C3	185.90			
	3/4		1-1/2	.012	3/4	4	46548	251.90	46548-C3	273.60			
	1		2	.015	1	4	46564	373.00	46564-C3	406.20			
100°	1/8		1/2	.005	1/8	1-1/2	849108	42.80	849108-C3	48.70			
	3/16		5/8	.006	3/16	2	849112	43.90	849112-C3	50.50			
	1/4		3/4	.006	1/4	2-1/2	849116	61.20	849116-C3	70.10			
	3/8		7/8	.008	3/8	2-1/2	849124	77.20	849124-C3	88.60			

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DRILL / END MILLS

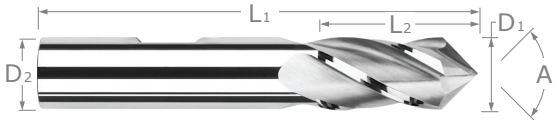
Drill Style – 2 Flute (cont.)

continued from previous page

	INCLUDED ANGLE	CUTTER DIAMETER	WIRE SIZE	LENGTH OF CUT	WEB THICKNESS	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$		L_2 $^{+.030″}_{-.000″}$	W	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
NEW		.020	76	1/16	.002	1/8	1-1/2	12967	39.80	12967-C3	45.70		
NEW		.025	74	5/64	.002	1/8	1-1/2	12968	39.80	12968-C3	45.70		
		1/32		3/32	.003	1/8	1-1/2	12902	39.80	12902-C3	45.70		
		1 mm		1/8	.003	1/8	1-1/2	1291M	42.80	1291M-C3	48.70		
NEW		.040	60	1/8	.003	1/8	1-1/2	12971	39.80	12971-C3	45.70		
		3/64		9/64	.004	1/8	1-1/2	12903	39.80	12903-C3	45.70		
NEW		.055	54	5/32	.004	1/8	1-1/2	12974	39.80	12974-C3	45.70		
		1/16		3/16	.005	1/8	1-1/2	12904	36.70	12904-C3	42.70		
NEW		.070	50	7/32	.005	1/8	1-1/2	12977	36.70	12977-C3	42.70		
		5/64		1/4	.005	1/8	1-1/2	12905	36.70	12905-C3	42.70		
		3/32		3/8	.005	1/8	1-1/2	12906	36.70	12906-C3	42.70		
		3 mm		3/8	.005	1/8	1-1/2	1293M	42.80	1293M-C3	48.70		
	120°	1/8		1/2	.005	1/8	1-1/2	12908	36.70	12908-C3	42.70	12908-C8	44.40
		9/64		9/16	.006	3/16	2	12909	40.30	12909-C3	46.80		
		5/32		9/16	.006	3/16	2	12910	40.30	12910-C3	46.80		
		3/16		5/8	.006	3/16	2	12912	37.50	12912-C3	43.90		
		7/32		3/4	.006	1/4	2-1/2	12914	56.60	12914-C3	65.30		
		1/4		3/4	.006	1/4	2-1/2	12916	52.30	12916-C3	61.00	12916-C8	63.00
		5/16		13/16	.007	5/16	2-1/2	12920	54.70	12920-C3	64.70		
		3/8		7/8	.008	3/8	2-1/2	12924	65.60	12924-C3	77.00	12924-C8	81.40
		7/16		1	.008	7/16	2-3/4	12928	107.60	12928-C3	120.90		
		1/2		1	.008	1/2	3	12932	102.50	12932-C3	119.50		
		5/8		1-1/4	.010	5/8	3-1/2	12940	155.60	12940-C3	172.70		
		3/4		1-1/2	.012	3/4	4	12948	235.40	12948-C3	253.70		
		1		2	.015	1	4	12964	373.00	12964-C3	406.20		
		1/16		3/16	.005	1/8	1-1/2	950504	42.40	950504-C3	48.30		
		5/64		1/4	.005	1/8	1-1/2	950505	42.40	950505-C3	48.30		
		3/32		3/8	.005	1/8	1-1/2	950506	42.40	950506-C3	48.30		
		1/8		1/2	.005	1/8	1-1/2	950508	42.40	950508-C3	48.30		
		3/16		5/8	.006	3/16	2	950512	43.90	950512-C3	50.50		
	140°	1/4		3/4	.006	1/4	2-1/2	950516	61.20	950516-C3	70.10		
		5/16		13/16	.007	5/16	2-1/2	950520	63.90	950520-C3	74.40		
		3/8		7/8	.008	3/8	2-1/2	950524	76.50	950524-C3	87.90		
		1/2		1	.008	1/2	3	950532	119.60	950532-C3	137.20		
		5/8		1-1/4	.010	5/8	3-1/2	950540	182.70	950540-C3	202.00		
		3/4		1-1/2	.012	3/4	4	950548	276.40	950548-C3	297.30		

DRILL / END MILLS

Cobalt – Mill Style – 2 & 4 Flute



- M-42 steel (8% cobalt)
- 90º included angle point
- Weldon flat
- CNC ground in the USA

MILL STYLE

END VIEW:



Flat Relief with end mill style gash to thin web

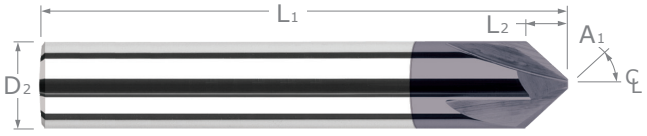
Recommended For	
Chamfering	Yes
O.D. Milling	Yes
Drilling	Non-Ferrous Only
Spotting	Light Duty

INCLUDED ANGLE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES*	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A +1° −1°	D1 +.000″ −.002″	L2 +.030″ −.000″		D2	L1	TOOL #	USD$
90°	1/8	3/8	4	3/8	2-5/16	14308	79.30
	3/16	1/2	4	3/8	2-3/8	14312	79.30
	1/4	5/8	4	3/8	2-1/2	14316	79.30
	1/4	5/8	2	3/8	2-1/2	14316-2	79.30
	5/16	3/4	4	3/8	2-1/2	14320	79.30
	3/8	3/4	4	3/8	2-1/2	14324	79.30
	7/16	1	4	3/8	2-11/16	14328	93.70
	1/2	1-1/4	4	1/2	3-1/4	14332	93.70
	5/8	1-5/8	4	5/8	3 3/4	14340	136.90
	3/4	1-5/8	4	3/4	3-7/8	14348	161.00
	1	1-7/8	4	3/4	4-1/8	14364-A	234.70
	1	2	4	1	4-1/2	14364	234.70

*2 flute style is two flutes to center. 4 flute style is two flutes to center and two flutes cut back.

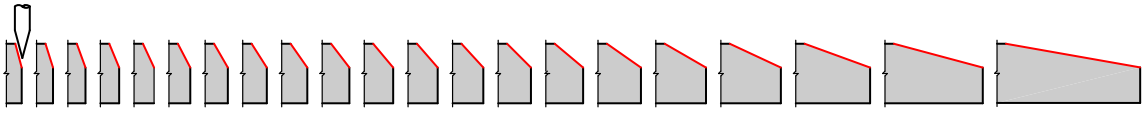
CHAMFER CUTTERS

Pointed & Flat End



Available in 2, 3, 4 & 6 Flutes!

- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots, and, small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA

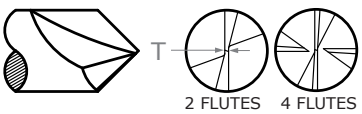


Stocked in 21 Angles Per Side, Ranging from 15°-80°!

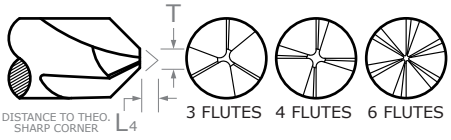
ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
15°	1/8	2	.010	I	.233		1-1/2		18715	21.40	18715-C3	27.30	18715-C8	29.10
	1/8	2	.010	I	.233		3	LONG!	50615	29.00	50615-C3	34.90		
	1/8	3	.040	II	.159	.075	1-1/2		968615	23.00	968615-C3	29.00		
	1/8	4	.040	II	.159	.075	1-1/2		866115	24.20	866115-C3	30.10		
	3/16	2	.010	I	.350		2		72415	30.00	72415-C3	36.60		
	3/16	2	.010	I	.350		4	LONG!	986915	46.50	986915-C3	55.50		
	3/16	3	.040	II	.275	.075	2		978115	34.30	978115-C3	40.70		
	3/16	4	.040	II	.275	.075	2		848715	35.90	848715-C3	42.50		
	1/4	2	.010	I	.448		2-1/2		47615	43.10	47615-C3	51.80	47615-C8	53.10
	1/4	3	.060	II	.355	.112	2-1/2		18515	40.00	18515-C3	48.60		
	1/4	3	.060	II	.355	.112	4	LONG!	48515	57.80	48515-C3	63.60		
	1/4	4	.060	II	.355	.112	2-1/2		876415	45.30	876415-C3	54.00		
	1/4	4	.040	III	.391	.075	2-1/2		833115	49.40	833115-C3	58.40		
	5/16	3	.060	II	.471	.112	2-1/2		977015	50.80	977015-C3	61.10		
	3/8	2	.010	I	.700		2-1/2		72515	57.80	72515-C3	69.20		
	3/8	3	.060	II	.588	.112	2-1/2		18415	53.70	18415-C3	65.10	18415-C8	74.10
	3/8	3	.060	II	.588	.112	4	LONG!	981215	87.40	981215-C3	103.60		
	3/8	4	.060	II	.588	.112	2-1/2		895115	60.70	895115-C3	72.10		
	3/8	4	.060	III	.588	.112	2-1/2		827815	66.20	827815-C3	77.60		
	1/2	2	.010	I	.933		3		960415	97.50	960415-C3	114.80		
	1/2	4	.080	II	.784	.149	3		18315	79.60	18315-C3	96.60		
	1/2	4	.080	III	.783	.149	3		820215	86.30	820215-C3	101.80		
	1/2	6	.080	II	.784	.149	3		839215	90.30	839215-C3	107.60		
	5/8	6	.080	II	1.017	.149	3-1/2		952815	142.00	952815-C3	159.30		
	3/4	6	.100	II	1.213	.187	4		949315	212.80	949315-C3	234.00		

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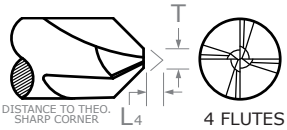
TYPE I - POINTED
Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), two flutes to center



NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
17.5°	1/8	2	.010	I	.198		1-1/2		18718	26.50	18718-C3	32.40		
	1/4	2	.010	I	.396		2-1/2		47618	48.30	47618-C3	57.20		
	1/4	3	.060	II	.301	.095	2-1/2		18518	48.30	18518-C3	57.20		
	3/8	3	.060	II	.500	.107	2-1/2		18418	62.90	18418-C3	74.30		
	1/2	4	.080	II	.666	.127	3		18318	96.50	18318-C3	114.20		
20°	1/8	2	.010	I	.172		1-1/2		18720	21.40	18720-C3	27.30	18720-C8	29.10
	1/8	2	.010	I	.172		3	LONG!	50620	29.00	50620-C3	34.90		
	1/8	3	.040	II	.117	.055	1-1/2		968620	23.00	968620-C3	29.00		
	1/8	4	.040	II	.117	.055	1-1/2		866120	24.20	866120-C3	30.10		
	3/16	2	.010	I	.258		2		72420	30.00	72420-C3	36.60	72420-C8	38.60
	3/16	2	.010	I	.258		4	LONG!	986920	46.50	986920-C3	53.70		
	3/16	3	.040	II	.203	.055	2		978120	34.30	978120-C3	40.70		
	3/16	4	.040	II	.203	.055	2		848720	35.90	848720-C3	42.50		
	1/4	2	.010	I	.343		2-1/2		47620	43.10	47620-C3	51.80	47620-C8	53.10
	1/4	3	.060	II	.261	.082	2-1/2		18520	40.00	18520-C3	48.60	18520-C8	50.20
	1/4	3	.060	II	.261	.082	4	LONG!	48520	57.80	48520-C3	66.40		
	1/4	4	.060	II	.261	.082	2-1/2		876420	50.40	876420-C3	59.30		
	1/4	4	.040	III	.288	.055	2-1/2		833120	52.00	833120-C3	61.00		
	5/16	3	.060	II	.347	.082	2-1/2		977020	57.80	977020-C3	68.00		
	3/8	2	.010	I	.515		2-1/2		72520	57.80	72520-C3	69.20		
	3/8	3	.060	II	.433	.082	2-1/2		18420	53.70	18420-C3	65.10		
	3/8	3	.060	II	.433	.082	4	LONG!	981220	87.40	981220-C3	103.60		
	3/8	4	.060	II	.433	.082	2-1/2		895120	67.80	895120-C3	79.20		
	1/2	2	.010	I	.687		3		960420	97.50	960420-C3	113.00		
	1/2	4	.080	II	.577	.110	3		18320	79.60	18320-C3	96.60		
	1/2	6	.080	II	.577	.110	3		839220	90.30	839220-C3	107.60		
	1/2	4	.080	III	.576	.110	3		820220	86.30	820220-C3	101.80		
22.5°	1/8	2	.010	I	.151		1-1/2		18723	25.50	18723-C3	31.50	18723-C8	33.20
	1/8	3	.040	II	.103	.048	1-1/2		968623	25.50	968623-C3	31.50		
	3/16	2	.010	I	.226		2		72423	33.60	72423-C3	40.20		
	3/16	3	.040	II	.178	.048	2		978123	33.60	978123-C3	40.20		
	1/4	2	.010	I	.302		2-1/2		47623	48.30	47623-C3	57.20		
	1/4	3	.060	II	.229	.072	2-1/2		18523	48.30	18523-C3	57.20		
	3/8	2	.010	I	.453		2-1/2		72523	64.90	72523-C3	76.30		
	3/8	3	.060	II	.380	.072	2-1/2		18423	64.90	18423-C3	76.30		
	1/2	2	.010	I	.604		3		960423	103.40	960423-C3	121.20		
	1/2	4	.080	II	.507	.097	3		18323	91.30	18323-C3	109.10		
25°	1/8	2	.010	I	.134		1-1/2		18725	25.50	18725-C3	31.50	18725-C8	33.20
	1/8	3	.040	II	.091	.043	1-1/2		968625	25.50	968625-C3	31.50		
	3/16	2	.010	I	.201		2		72425	33.40	72425-C3	40.00		
	3/16	3	.040	II	.158	.043	2		978125	33.40	978125-C3	40.00		
	1/4	2	.010	I	.268		2-1/2		47625	48.30	47625-C3	57.20		
	1/4	3	.060	II	.204	.064	2-1/2		18525	48.10	18525-C3	57.00		
	1/4	4	.060	II	.204	.064	2-1/2		876425	50.10	876425-C3	59.10		
	3/8	2	.010	I	.402		2-1/2		72525	64.50	72525-C3	75.90		
	3/8	3	.060	II	.338	.064	2-1/2		18425	64.50	18425-C3	75.90		
	1/2	2	.010	I	.536		3		960425	102.50	960425-C3	120.00		
	1/2	4	.080	II	.450	.086	3		18325	90.40	18325-C3	108.10		

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
		1/8	2	.010	I	.120		1-1/2		18728	26.50	18728-C3	32.40		
		3/16	2	.010	I	.180		2		72428	34.30	72428-C3	40.50		
	27.5°	1/4	2	.010	I	.240		2-1/2		47628	48.30	47628-C3	56.40		
		1/4	3	.060	II	.182	.058	2-1/2		18528	48.30	18528-C3	57.20		
		1/2	4	.080	II	.403	.077	3		18328	91.30	18328-C3	109.10		
		3 mm	2	.120 mm	I	2.60 mm		38 mm		900230	24.20	900230-C3	30.10		
		1/8	2	.010	I	.108		1-1/2		18730	21.40	18730-C3	27.30	18730-C8	29.10
		1/8	2	.010	I	.108		3	**LONG!**	50630	29.00	50630-C3	34.90		
		1/8	3	.040	II	.074	.035	1-1/2		968630	23.00	968630-C3	29.00		
NEW		1/8	4	.010	I	.100		1-1/2		731908	21.40	731908-C3	27.30		
		1/8	4	.040	II	.074	.035	1-1/2		866130	24.20	866130-C3	30.10		
		1/8	4	.040	III	.074	.035	1-1/2		802830	27.60	802830-C3	33.50		
		3/16	2	.010	I	.162		2		72430	30.00	72430-C3	36.60	72430-C8	38.60
		3/16	2	.010	I	.162		4	**LONG!**	986930	46.50	986930-C3	55.50		
		3/16	3	.040	II	.128	.035	2		978130	37.40	978130-C3	43.80		
NEW		3/16	4	.010	I	.154		2		731912	30.00	731912-C3	36.20		
		3/16	4	.040	II	.128	.035	2		848730	38.90	848730-C3	45.50		
		1/4	2	.010	I	.217		2-1/2		47630	43.10	47630-C3	51.80	47630-C8	53.10
		1/4	3	.060	II	.165	.052	2-1/2		18530	40.00	18530-C3	48.60	18530-C8	50.20
		1/4	3	.060	II	.165	.052	4	**LONG!**	48530	57.80	48530-C3	63.60		
NEW		1/4	4	.010	I	.208		2-1/2		731916	43.10	731916-C3	51.20		
		1/4	4	.060	II	.165	.052	2-1/2		876430	45.30	876430-C3	54.00		
	30°	1/4	4	.040	III	.181	.035	2-1/2		833130	49.10	833130-C3	58.10		
		5/16	2	.010	I	.271		2-1/2		880330	52.20	880330-C3	62.30		
		5/16	3	.060	II	.219	.052	2-1/2		977030	50.80	977030-C3	61.10		
		5/16	4	.060	II	.219	.052	2-1/2		873230	54.10	873230-C3	64.30		
		3/8	2	.010	I	.325		2-1/2		72530	57.80	72530-C3	69.20		
		3/8	3	.060	II	.273	.052	2-1/2		18430	53.70	18430-C3	65.10	18430-C8	69.40
		3/8	3	.060	II	.273	.052	4	**LONG!**	981230	87.40	981230-C3	103.60		
NEW		3/8	4	.010	I	.316		2-1/2		731924	57.80	731924-C3	69.20		
		3/8	4	.060	II	.273	.052	2-1/2		895130	60.70	895130-C3	72.10		
		3/8	4	.060	III	.273	.052	2-1/2		827830	66.20	827830-C3	77.60		
		1/2	2	.010	I	.433		3		960430	92.00	960430-C3	109.40		
		1/2	3	.080	II	.364	.069	3		871830	90.60	871830-C3	107.80		
		1/2	4	.080	II	.364	.069	3		18330	75.20	18330-C3	92.10	18330-C8	98.60
		1/2	4	.080	III	.364	.069	3		820230	86.30	820230-C3	104.00		
		1/2	6	.080	II	.364	.069	3		839230	85.10	839230-C3	102.40		
		5/8	6	.080	II	.472	.069	3-1/2		952830	142.00	952830-C3	159.30		
		3/4	6	.100	II	.563	.087	4		949330	212.80	949330-C3	234.00		
		1/8	2	.010	I	.098		1-1/2		18733	26.50	18733-C3	32.40		
	32.5°	1/4	3	.060	II	.149	.047	2-1/2		18533	48.30	18533-C3	57.20		
		1/2	4	.080	II	.330	.063	3		18333	91.30	18333-C3	109.10		

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
35°	1/8	2	.010	I	.089		1-1/2	18735	24.40	18735-C3	30.30		
	1/8	3	.040	II	.061	.029	1-1/2	968635	24.60	968635-C3	30.50		
	3/16	2	.010	I	.134		2	72435	31.60	72435-C3	38.30		
	3/16	3	.040	II	.105	.029	2	978135	31.60	978135-C3	38.30		
	1/4	2	.010	I	.179		2-1/2	47635	57.70	47635-C3	66.70		
	1/4	3	.060	II	.136	.043	2-1/2	18535	45.30	18535-C3	54.20		
	3/8	2	.010	I	.268		2-1/2	72535	61.10	72535-C3	72.60		
	3/8	3	.060	II	.225	.043	2-1/2	18435	61.10	18435-C3	72.60		
	1/2	2	.010	I	.357		3	960435	97.10	960435-C3	114.80		
	1/2	4	.080	II	.300	.057	3	18335	85.50	18335-C3	103.10		
37.5°	1/8	2	.010	I	.081		1-1/2	18738	26.50	18738-C3	32.40		
	1/4	2	.010	I	.163		2-1/2	47638	61.60	47638-C3	70.50		
	1/4	3	.060	II	.124	.039	2-1/2	18538	48.30	18538-C3	57.20		
	1/2	4	.080	II	.274	.052	3	18338	91.30	18338-C3	109.10		
40°	1/8	2	.010	I	.074		1-1/2	18740	24.40	18740-C3	30.30		
	1/8	3	.040	II	.051	.024	1-1/2	968640	23.00	968640-C3	29.00		
	1/8	4	.040	II	.051	.024	1-1/2	866140	24.20	866140-C3	30.10		
	3/16	2	.010	I	.112		2	72440	31.60	72440-C3	38.30		
	1/4	2	.010	I	.149		2-1/2	47640	57.70	47640-C3	66.70		
	1/4	3	.060	II	.113	.036	2-1/2	18540	45.30	18540-C3	54.20		
	1/4	4	.040	III	.125	.024	2-1/2	833140	56.20	833140-C3	65.10		
	1/4	4	.060	II	.113	.036	2-1/2	876440	49.20	876440-C3	58.20		
	3/8	3	.060	II	.188	.036	2-1/2	18440	61.10	18440-C3	72.60		
	1/2	4	.080	II	.25	.048	3	18340	85.50	18340-C3	103.10		
41°	1/8	2	.010	I	.072		1-1/2	18741	22.50	18741-C3	28.40	18741-C8	30.20
	1/8	3	.040	II	.049	.023	1-1/2	968641	27.20	968641-C3	33.10		
	3/16	2	.010	I	.108		2	72441	35.30	72441-C3	41.90		
	3/16	3	.040	II	.085	.023	2	978141	33.30	978141-C3	39.90		
	1/4	2	.010	I	.144		2-1/2	47641	49.90	47641-C3	59.00		
	1/4	3	.060	II	.109	.035	2-1/2	18541	42.40	18541-C3	51.00		
	3/8	2	.010	I	.216		2-1/2	72541	68.40	72541-C3	79.80		
	3/8	3	.060	II	.181	.035	2-1/2	18441	68.40	18441-C3	79.80		
	1/2	2	.010	I	.288		3	960441	103.40	960441-C3	121.20		
	1/2	4	.080	II	.242	.046	3	18341	79.60	18341-C3	96.60		
	1/2	4	.080	III	.241	.046	3	820241	86.30	820241-C3	101.80		
42.5°	1/8	2	.010	I	.068		1-1/2	18743	26.50	18743-C3	32.40		
	1/4	3	.060	II	.104	.033	2-1/2	18543	48.30	18543-C3	57.20		
	1/2	4	.080	II	.229	.044	3	18343	91.30	18343-C3	109.10		

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
45°	3 mm	2	.25 mm	I	1.50 mm		38 mm		900245	27.20	900245-C3	33.10		
	3 mm	3	1.00 mm	II	1.00 mm	.500 mm	38 mm		899545	27.20	899545-C3	33.10		
NEW	3 mm	4	.25 mm	I	1.38 mm		38 mm		693657	27.20	693657-C3	33.10		
	3 mm	4	1.00 mm	III	1.00 mm	.500 mm	38 mm		764845	29.20	764845-C3	35.10		
	1/8	2	.010	I	.063		1-1/2		18745	21.40	18745-C3	27.30	18745-C8	29.10
	1/8	2	.010	I	.063		3	LONG!	50645	29.00	50645-C3	34.90	50645-C8	37.90
	1/8	3	.040	II	.043	.020	1-1/2		968645	23.00	968645-C3	29.00	968645-C8	30.70
	1/8	3	.040	II	.043	.020	3	LONG!	790245	29.30	790245-C3	35.20		
	1/8	4	.010	I	.058		1-1/2		744445	24.20	744445-C3	30.10		
	1/8	4	.040	II	.043	.020	1-1/2		866145	24.20	866145-C3	30.10	866145-C8	31.90
	1/8	4	.040	III	.042	.020	1-1/2		802845	26.10	802845-C3	32.00		
	4 mm	2	.25 mm	I	2.00 mm		50 mm		878445	34.70	878445-C3	41.30		
	4 mm	3	1.00 mm	II	1.50 mm	.500 mm	50 mm		863845	34.70	863845-C3	41.30		
	3/16	2	.010	I	.094		2		72445	31.90	72445-C3	38.60	72445-C8	40.50
	3/16	2	.010	I	.094		4	LONG!	986945	46.50	986945-C3	55.50		
	3/16	3	.040	II	.074	.020	2		978145	37.40	978145-C3	43.80	978145-C8	46.00
	3/16	3	.040	II	.074	.020	3	LONG!	790945	37.40	790945-C3	43.80		
	3/16	4	.010	I	.089		2		743745	38.90	743745-C3	47.30		
	3/16	4	.040	II	.074	.020	2		848745	38.90	848745-C3	45.50		
	3/16	4	.040	III	.073	.020	2		809745	40.80	809745-C3	47.30		
	6 mm	2	.25 mm	I	3.00 mm		63 mm		840045	48.30	840045-C3	57.10	840045-C8	59.40
	6 mm	3	1.50 mm	II	2.25 mm	.750 mm	63 mm		837745	48.30	837745-C3	57.10		
	6 mm	4	1.50 mm	II	2.25 mm	.750 mm	63 mm		777645	50.40	777645-C3	59.30		
	6 mm	4	1.50 mm	III	2.25 mm	.750 mm	63 mm		764545	54.30	764545-C3	63.30		
	1/4	2	.010	I	.125		2-1/2		47645	43.10	47645-C3	51.80	47645-C8	53.10
	1/4	2	.010	I	.125		4	LONG!	790345	56.40	790345-C3	66.90		
	1/4	3	.060	II	.095	.030	2-1/2		18545	40.20	18545-C3	48.80	18545-C8	50.50
	1/4	3	.060	II	.095	.030	4	LONG!	48545	57.80	48545-C3	63.60		
	1/4	4	.010	I	.120		2-1/2		743145	50.80	743145-C3	59.50		
	1/4	4	.060	II	.095	.030	2-1/2		876445	50.80	876445-C3	59.50	876445-C8	61.00
	1/4	4	.060	II	.095	.030	4	LONG!	771545	67.30	771545-C3	77.90		
	1/4	4	.040	III	.105	.020	2-1/2		833145	56.20	833145-C3	65.10	833145-C8	66.20
	1/4	4	.060	III	.095	.030	2-1/2		794145	56.20	794145-C3	65.10		
	5/16	2	.010	I	.156		2-1/2		880345	50.80	880345-C3	61.10		
	5/16	3	.060	II	.126	.030	2-1/2		977045	50.80	977045-C3	61.10		
	5/16	4	.060	II	.126	.030	2-1/2		873245	54.10	873245-C3	64.30		
	5/16	4	.060	III	.126	.030	2-1/2		777545	59.20	777545-C3	69.60		
	8 mm	3	1.50 mm	II	3.25 mm	.750 mm	63 mm		868845	63.90	868845-C3	74.80		
	3/8	2	.010	I	.188		2-1/2		72545	61.10	72545-C3	72.60	72545-C8	76.90
	3/8	2	.010	I	.188		4	LONG!	791745	89.00	791745-C3	105.20		
	3/8	3	.060	II	.158	.030	2-1/2		18445	53.70	18445-C3	65.10	18445-C8	74.10
	3/8	3	.060	II	.158	.030	4	LONG!	981245	87.40	981245-C3	103.60	981245-C8	104.40
	3/8	4	.010	I	.183		2-1/2		742745	63.10	742745-C3	74.50		
	3/8	4	.060	II	.158	.030	2-1/2		895145	63.10	895145-C3	74.50		
	3/8	4	.040	III	.167	.020	2-1/2		764245	68.90	764245-C3	80.30		
	3/8	4	.060	III	.158	.030	2-1/2		827845	68.40	827845-C3	79.80		

continued on next page

NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End (cont.)

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ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_2		T (MAX.)		L_2	L_4 (MAX.)	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	
45°	10 mm	4	1.50 mm	II	4.25 mm	.750 mm	75 mm		871045	100.10	871045-C3	113.30			
	12 mm	4	1.50 mm	II	5.25 mm	.750 mm	75 mm		881245	100.10	881245-C3	117.70			
	1/2	2	.010	I	.250		3		960445	92.00	960445-C3	109.40	960445-C8	110.30	
	1/2	3	.080	II	.210	.040	3		871845	90.60	871845-C3	107.80			
	1/2	4	.010	I	.245		3		742245	77.00	742245-C3	94.30			
	1/2	4	.080	II	.210	.040	3		18345	75.20	18345-C3	92.10	18345-C8	98.60	
	1/2	4	.080	II	.210	.040	6	LONG!	982445	146.50	982445-C3	164.20			
	1/2	4	.080	III	.210	.040	3		820245	86.30	820245-C3	104.00			
	1/2	6	.080	II	.210	.040	3		839245	85.10	839245-C3	102.40			
	5/8	4	.080	II	.273	.040	3-1/2		763645	140.10	763645-C3	158.80			
	5/8	4	.080	III	.273	.040	3-1/2		765445	141.80	765445-C3	160.40			
	5/8	6	.080	II	.273	.040	3-1/2		952845	142.00	952845-C3	159.30			
	3/4	4	.100	II	.325	.050	4		764045	212.50	764045-C3	233.00			
	3/4	4	.100	III	.325	.050	4		765145	212.10	765145-C3	232.60			
	3/4	6	.100	II	.325	.050	4		949345	212.80	949345-C3	234.00			
	1	6	.120	II	.440	.060	4		884745	377.90	884745-C3	406.10			
50°	1/8	2	.010	I	.052		1-1/2		18750	24.40	18750-C3	30.30	18750-C8	33.30	
	1/8	3	.040	II	.036	.017	1-1/2		968650	24.60	968650-C3	30.50			
	1/8	4	.010	I	.048		1-1/2		691608	24.40	691608-C3	30.30			NEW
	3/16	2	.010	I	.079		2		72450	31.60	72450-C3	38.30			
	3/16	3	.040	II	.062	.017	2		978150	39.20	978150-C3	45.80			
	1/4	2	.010	I	.105		2-1/2		47650	45.80	47650-C3	54.70			
	1/4	3	.060	II	.080	.025	2-1/2		18550	45.30	18550-C3	54.20			
	1/4	4	.010	I	.101		2-1/2		691616	45.80	691616-C3	53.90			NEW
	1/4	4	.060	II	.080	.025	2-1/2		876450	49.20	876450-C3	58.20			
	1/4	4	.040	III	.088	.017	2-1/2		833150	56.20	833150-C3	65.10			
	3/8	2	.010	I	.157		2-1/2		72550	61.10	72550-C3	72.60	72550-C8	76.90	
	3/8	3	.060	II	.132	.025	2-1/2		18450	61.10	18450-C3	72.60			
	3/8	4	.060	II	.132	.025	2-1/2		895150	64.80	895150-C3	76.20			
	1/2	2	.010	I	.210		3		960450	97.10	960450-C3	114.80			
	1/2	4	.080	II	.176	.034	3		18350	85.50	18350-C3	103.10			
	1/2	4	.080	III	.176	.034	3		820250	86.30	820250-C3	101.80			
	5/8	6	.080	II	.229	.034	3-1/2		952850	144.10	952850-C3	163.40			
55°	1/8	2	.010	I	.044		1-1/2		18755	27.20	18755-C3	33.10			
	3/16	2	.010	I	.066		2		72455	33.60	72455-C3	40.20			
	1/4	2	.010	I	.088		2-1/2		47655	63.90	47655-C3	72.90			
	1/4	3	.060	II	.067	.021	2-1/2		18555	49.90	18555-C3	59.00			
	3/8	3	.060	II	.110	.021	2-1/2		18455	64.90	18455-C3	76.30			
	1/2	4	.080	II	.147	.028	3		18355	93.90	18355-C3	111.50			
60°	3 mm	2	.120 mm	I	.87 mm		38 mm		900260	24.20	900260-C3	30.10			
	1/8	2	.010	I	.036		1-1/2		18760	21.40	18760-C3	27.30	18760-C8	29.10	
	1/8	2	.010	I	.036		3	LONG!	50660	29.00	50660-C3	34.90			
	1/8	3	.040	II	.025	.012	1-1/2		968660	23.00	968660-C3	29.00			
	1/8	4	.010	I	.033		1-1/2		731808	21.40	731808-C3	27.30			NEW
	3/16	2	.010	I	.054		2		72460	30.00	72460-C3	36.60			
	3/16	3	.040	II	.043	.012	2		978160	37.40	978160-C3	43.80			
	3/16	4	.010	I	.051		2		731812	30.00	731812-C3	36.20			NEW

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CHAMFER CUTTERS

Pointed & Flat End (cont.)

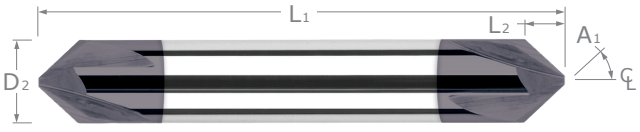
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	ANGLE PER SIDE	DIA.	FLUTES	TIP	TYPE	LOC		OAL		UNCOATED		AlTiN COATED		TiB_2 COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	60°	1/4	2	.010	I	.072		2-1/2		47660	43.10	47660-C3	51.80		
		1/4	3	.060	II	.055	.017	2-1/2		18560	40.00	18560-C3	48.60		
		1/4	3	.060	II	.055	.017	4	LONG!	48560	57.80	48560-C3	63.60		
NEW		1/4	4	.010	I	.069		2-1/2		731816	43.10	731816-C3	51.20		
		1/4	4	.060	II	.055	.017	2-1/2		876460	45.30	876460-C3	54.00		
		1/4	4	.040	III	.060	.012	2-1/2		833160	47.20	833160-C3	56.00		
		5/16	3	.060	II	.073	.017	2-1/2		977060	50.80	977060-C3	61.10		
		3/8	2	.010	I	.108		2-1/2		72560	57.80	72560-C3	69.20		
		3/8	3	.060	II	.091	.017	2-1/2		18460	53.70	18460-C3	65.10	18460-C8	69.40
NEW		3/8	4	.010	I	.105		2-1/2		731824	57.80	731824-C3	69.20		
		3/8	4	.060	II	.091	.017	2-1/2		895160	59.50	895160-C3	70.90		
		3/8	4	.060	III	.091	.017	2-1/2		827860	66.40	827860-C3	77.90		
		1/2	2	.010	I	.144		3		960460	92.00	960460-C3	109.40		
		1/2	4	.080	II	.121	.023	3		18360	75.20	18360-C3	92.10		
		1/2	4	.080	III	.121	.023	3		820260	81.70	820260-C3	99.00		
		5/8	6	.080	II	.157	.023	3-1/2		952860	142.00	952860-C3	159.30		
		3/4	6	.100	II	.188	.029	4		949360	212.80	949360-C3	234.00		
	65°	1/8	2	.010	I	.029		1-1/2		18765	25.50	18765-C3	31.50		
		3/16	2	.010	I	.044		2		72465	33.60	72465-C3	39.90		
		1/4	2	.010	I	.058		2-1/2		47665	61.60	47665-C3	69.60		
		1/4	3	.060	II	.044	.014	2-1/2		18565	48.30	18565-C3	57.20		
		3/8	3	.060	II	.073	.014	2-1/2		18465	64.90	18465-C3	76.30		
		1/2	4	.080	II	.098	.019	3		18365	91.30	18365-C3	109.10		
	70°	1/8	2	.010	I	.023		1-1/2		18770	24.40	18770-C3	30.30		
		3/16	2	.010	I	.034		2		72470	31.60	72470-C3	38.30		
		1/4	2	.010	I	.045		2-1/2		47670	57.70	47670-C3	66.70		
		1/4	3	.060	II	.035	.011	2-1/2		18570	45.30	18570-C3	54.20		
		3/8	3	.060	II	.057	.011	2-1/2		18470	65.90	18470-C3	77.30		
		1/2	4	.080	II	.076	.015	3		18370	85.50	18370-C3	103.10		
	75°	1/8	2	.010	I	.017		1-1/2		18775	27.20	18775-C3	33.10	18775-C8	34.90
		1/8	3	.040	II	.011	.005	1-1/2		968675	27.20	968675-C3	33.10		
		3/16	2	.010	I	.025		2		72475	35.30	72475-C3	41.90		
		3/16	3	.040	II	.020	.005	2		978175	41.70	978175-C3	47.60		
		1/4	2	.010	I	.033		2-1/2		47675	49.90	47675-C3	59.00		
		1/4	3	.060	II	.025	.008	2-1/2		18575	50.90	18575-C3	59.70		
		1/4	4	.060	II	.025	.008	2-1/2		876475	54.80	876475-C3	63.80		
		3/8	2	.010	I	.050		2-1/2		72575	68.40	72575-C3	79.80		
		3/8	3	.060	II	.042	.008	2-1/2		18475	68.40	18475-C3	79.80		
		3/8	4	.060	III	.042	.008	2-1/2		827875	80.80	827875-C3	92.20		
		1/2	2	.010	I	.067		3		960475	108.50	960475-C3	126.30		
		1/2	4	.080	II	.056	.011	3		18375	95.90	18375-C3	113.50		
	80°	1/8	2	.010	I	.011		1-1/2		18780	26.80	18780-C3	32.70		
		1/4	3	.060	II	.017	.005	2-1/2		18580	35.90	18580-C3	44.90		
		1/2	4	.080	II	.037	.007	3		18380	111.80	18380-C3	129.30		

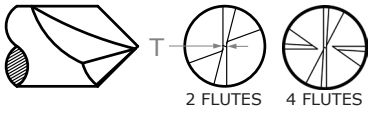
NEW SIZES!

CHAMFER CUTTERS

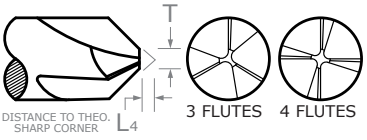
Pointed & Flat End – Double-Ended



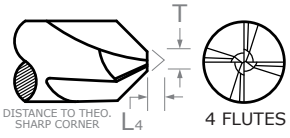
TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)



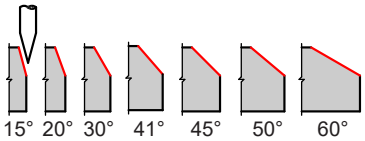
TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING Flat relief ground to an end cutting tip diameter (T), two flutes to center



- Double-ended
- Choose from three types:
  - Pointed (Type I): 2 flute style for deburring and chamfering in narrow grooves, slots, and small holes
  - Flat End (Type II): (non-cutting) multi-flute design improves tool life and finish for profiling and chamfering larger features
  - End Cutting (Type III): 4 flute center cutting geometry to blend the floor and a chamfered wall in a single pass
- Solid carbide • CNC ground in the USA



Stocked in Seven Angles Per Side!

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	USD$	TOOL #	USD$
15°	1/8	2	.010	I	.233		1-1/2	988415	43.90	988415-C3	49.80
	1/4	2	.010	I	.467		2-1/2	977615	64.60	977615-C3	76.10
	1/4	3	.060	II	.355	.112	2-1/2	891015	71.70	891015-C3	83.30
	3/8	2	.010	I	.700		3	998315	93.50	998315-C3	104.90
	3/8	3	.060	II	.588	.112	2-1/2	934015	108.10	934015-C3	125.30
	1/2	4	.080	II	.784	.149	3	18615	130.30	18615-C3	153.90
20°	1/8	2	.010	I	.172		1-1/2	988420	43.90	988420-C3	49.80
	1/4	2	.010	I	.343		2-1/2	977620	64.60	977620-C3	76.10
	1/4	3	.060	II	.261	.082	2-1/2	891020	71.70	891020-C3	83.30
	3/8	2	.010	I	.515		2-1/2	998320	93.50	998320-C3	110.80
	3/8	3	.060	II	.433	.082	2-1/2	934020	108.10	934020-C3	125.30
	1/2	4	.080	II	.577	.110	3	18620	130.30	18620-C3	153.90
30°	1/8	2	.010	I	.108		1-1/2	988430	37.40	988430-C3	43.30
	3/16	2	.010	I	.162		2	902330	37.40	902330-C3	46.00
	3/16	3	.040	II	.128	.035	2	897130	50.00	897130-C3	58.70
	1/4	2	.010	I	.217		2-1/2	977630	57.50	977630-C3	69.30
	1/4	3	.060	II	.165	.052	2-1/2	891030	66.60	891030-C3	78.10
	3/8	2	.010	I	.325		2-1/2	998330	86.80	998330-C3	98.60
	3/8	3	.060	II	.273	.052	2-1/2	934030	93.60	934030-C3	105.90
	1/2	2	.010	I	.433		3	905830	117.30	905830-C3	133.60
	1/2	4	.080	II	.364	.069	3	18630	117.80	18630-C3	135.00

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CHAMFER CUTTERS

Pointed & Flat End – Double-Ended (cont.)

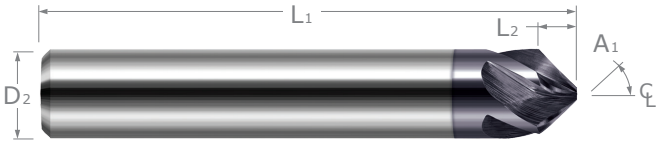
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	ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
	A_1 $^{+0°30'}_{-0°30'}$	D_2		$T_{(MAX.)}$		L_2	$L_{4\ (MAX.)}$	L_1	TOOL #	USD$	TOOL #	USD$
	41°	1/4	4	.060	II	.109	.035	2-1/2	842441	72.20	842441-C3	80.30
		3/8	4	.060	II	.181	.035	2-1/2	833641	101.10	833641-C3	112.50
		1/2	4	.080	II	.242	.046	3	18641	119.50	18641-C3	135.00
	45°	1/8	2	.010	I	.063		1-1/2	988445	37.40	988445-C3	43.30
		1/8	3	.040	II	.043	.020	1-1/2	873945	47.60	873945-C3	53.60
NEW		1/8	4	.010	I	.058		1-1/2	693545	39.20	693545-C3	45.20
		1/8	4	.040	II	.043	.020	1-1/2	808245	49.90	808245-C3	55.80
		1/8	4	.040	III	.043	.020	1-1/2	794245	53.60	794245-C3	61.00
		3/16	2	.010	I	.094		2	902345	37.40	902345-C3	46.00
		3/16	3	.040	II	.074	.020	2	897145	47.60	897145-C3	56.30
NEW		3/16	4	.010	I	.089		2	693445	39.20	693445-C3	45.50
		3/16	4	.040	II	.074	.020	2	808145	50.30	808145-C3	56.60
		3/16	4	.040	III	.073	.020	2	754545	53.70	754545-C3	59.90
		1/4	2	.010	I	.125		2-1/2	977645	57.50	977645-C3	69.30
		1/4	3	.060	II	.095	.030	2-1/2	891045	66.60	891045-C3	78.10
NEW		1/4	4	.010	I	.120		2-1/2	693345	59.40	693345-C3	67.50
		1/4	4	.060	II	.095	.030	2-1/2	842445	72.20	842445-C3	83.80
		1/4	4	.040	III	.105	.020	2-1/2	790045	73.90	790045-C3	85.50
		5/16	3	.060	II	.126	.030	2-1/2	966645	73.50	966645-C3	84.00
		3/8	2	.010	I	.188		2-1/2	998345	86.80	998345-C3	98.60
		3/8	3	.060	II	.158	.030	2-1/2	934045	93.60	934045-C3	105.90
NEW		3/8	4	.010	I	.183		2-1/2	693245	88.60	693245-C3	100.10
		3/8	4	.060	II	.158	.030	2-1/2	833645	101.10	833645-C3	118.40
		3/8	4	.040	III	.167	.030	2-1/2	752845	104.70	752845-C3	122.00
		1/2	2	.010	I	.250		3	905845	117.30	905845-C3	133.60
NEW		1/2	4	.010	I	.245		3	693145	119.20	693145-C3	134.70
		1/2	4	.080	II	.210	.040	3	18645	117.80	18645-C3	135.00
		1/2	4	.080	III	.210	.040	3	788045	125.10	788045-C3	141.00
		5/8	4	.080	II	.273	.040	3-1/2	976445	170.40	976445-C3	195.80
		3/4	4	.100	II	.325	.050	4	984645	216.60	984645-C3	239.70
	50°	1/8	2	.010	I	.052		1-1/2	988450	37.40	988450-C3	43.30
		1/4	2	.010	I	.105		2-1/2	977650	58.80	977650-C3	70.30
		1/4	3	.060	II	.080	.025	2-1/2	891050	70.10	891050-C3	81.70
		3/8	2	.010	I	.157		2-1/2	998350	88.30	998350-C3	100.20
		3/8	3	.060	II	.132	.025	2-1/2	934050	98.10	934050-C3	109.50
		1/2	2	.010	I	.210		3	905850	117.30	905850-C3	133.60
		1/2	4	.080	II	.173	.034	3	18650	123.70	18650-C3	139.60
	60°	1/8	2	.010	I	.036		1-1/2	988460	37.40	988460-C3	43.30
		3/16	2	.010	I	.054		2	902360	37.40	902360-C3	46.00
		1/4	2	.010	I	.072		2-1/2	977660	57.50	977660-C3	69.30
		1/4	3	.060	II	.055	.017	2-1/2	891060	66.60	891060-C3	78.10
		3/8	2	.010	I	.108		2-1/2	998360	86.80	998360-C3	98.60
		3/8	3	.060	II	.091	.017	2-1/2	934060	93.60	934060-C3	105.90
		1/2	2	.010	I	.144		3	905860	117.30	905860-C3	132.90
		1/2	4	.080	II	.121	.023	3	18660	117.80	18660-C3	135.00

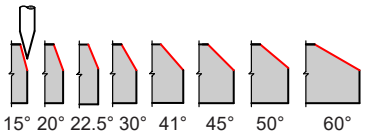
NEW SIZES!

CHAMFER CUTTERS

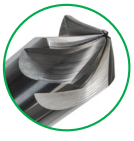
Pointed & Flat End – Helical Flutes



- **Specialized helical flute design for superior performance**
- Free cutting action provides excellent surface finish and chip evacuation
- Choose from three types:
  - Pointed (Type I): Used for deburring and chamfering in narrow grooves, slots and small holes
  - Flat End (Type II): (non-cutting) Improves tool life for profiling and chamfering larger features
  - End Cutting (Type III): Center cutting geometry to blend the floor and a chamfered wall in a single pass
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

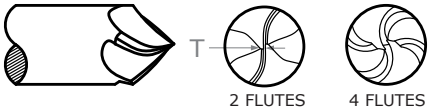


Stocked in Eight Angles Per Side!

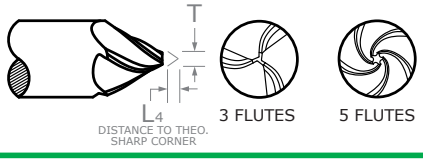


Free Cutting Action for Excellent Surface Finish

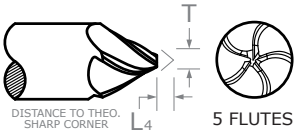
TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)



TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)



TYPE III - END CUTTING
Flat relief ground to an end cutting tip diameter (T), one flute to center



ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT	OAL		UNCOATED		AlTiN COATED		
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	USD$	TOOL #	USD$	
15°	1/8	3	.040	II	.159	.078	1-1/2	831308	27.50	831308-C3	33.40	
	1/4	3	.060	II	.355	.116	2-1/2	831316	47.00	831316-C3	54.90	
	1/4	5	.060	II	.355	.116	2-1/2 LONG!	832516	49.70	832516-C3	57.50	
	3/8	3	.070	II	.569	.134	2-1/2	831324	64.10	831324-C3	73.50	
	3/8	5	.070	II	.569	.134	2-1/2	832524	65.50	832524-C3	75.90	
	1/2	3	.080	II	.784	.153	3	831332	90.00	831332-C3	102.70	
	1/2	5	.080	II	.784	.153	3	832532	90.90	832532-C3	105.50	
20°	1/8	3	.040	II	.117	.085	1-1/2	844608	27.50	844608-C3	33.40	
	1/4	3	.060	II	.261	.085	2-1/2	844616	47.00	844616-C3	54.90	
	1/4	5	.060	II	.261	.085	2-1/2	851416	50.70	851416-C3	57.50	
	1/4	5	.060	III	.261	.085	2-1/2	713916	49.80	713916-C3	57.90	NEW
	3/8	3	.070	II	.419	.099	2-1/2	844624	62.90	844624-C3	73.50	
	3/8	5	.070	II	.419	.099	2-1/2	851424	66.70	851424-C3	75.90	
	3/8	5	.070	III	.153	.099	2-1/2	713924	68.90	713924-C3	80.30	
	1/2	3	.080	II	.577	.113	3	844632	88.20	844632-C3	102.70	
	1/2	5	.080	II	.577	.113	3	851432	90.90	851432-C3	105.50	

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

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ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OAL	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	USD$	TOOL #	USD$
22.5°	1/8	3	.040	II	.103	.051	1-1/2	700308	29.10	700308-C3	35.00
	1/4	3	.060	II	.229	.075	2-1/2	700316	49.60	700316-C3	57.70
	1/4	5	.060	II	.229	.075	2-1/2	700216	53.50	700216-C3	61.60
	3/8	3	.070	II	.368	.087	2-1/2	700324	66.30	700324-C3	77.70
	3/8	5	.070	II	.368	.087	2-1/2	700224	70.50	700224-C3	81.90
	1/2	3	.080	II	.507	.099	3	700332	93.10	700332-C3	108.70
	1/2	5	.080	II	.507	.099	3	700232	96.00	700232-C3	111.60
30°	1/8	2	.010	I	.100		1-1/2	900108	27.50	900108-C3	33.20
	1/8	3	.040	II	.074	.036	1-1/2	916508	28.10	916508-C3	33.80
	1/8	4	.010	I	.100		1-1/2	889708	30.30	889708-C3	36.20
	1/8	5	.040	II	.074	.036	1-1/2	899008	30.30	899008-C3	35.80
	3/16	2	.010	I	.154		2	900112	38.10	900112-C3	43.10
	3/16	3	.050	II	.119	.045	2	916512	38.10	916512-C3	43.10
	3/16	4	.010	I	.154		2	889712	39.80	889712-C3	45.70
	3/16	5	.050	II	.119	.045	2	899012	40.60	899012-C3	45.70
	1/4	2	.010	I	.208		2-1/2	900116	47.00	900116-C3	54.90
	1/4	3	.060	II	.164	.054	2-1/2	916516	43.40	916516-C3	50.80
	1/4	4	.010	I	.208		2-1/2	889716	49.70	889716-C3	57.50
	1/4	5	.060	II	.164	.054	2-1/2	899016	47.40	899016-C3	53.10
	1/4	5	.060	III	.165	.054	2-1/2	714016	49.80	714016-C3	55.70
	3/8	2	.010	I	.316		2-1/2	900124	62.90	900124-C3	73.50
	3/8	3	.070	II	.264	.062	2-1/2	916524	58.20	916524-C3	68.00
	3/8	4	.010	I	.316		2-1/2	889724	62.90	889724-C3	73.50
	3/8	5	.070	II	.264	.062	2-1/2	899024	58.20	899024-C3	68.00
NEW	3/8	5	.070	III	.264	.062	2-1/2	714024	59.10	714024-C3	70.50
	1/2	2	.010	I	.424		3	900132	88.20	900132-C3	102.70
	1/2	3	.080	II	.364	.071	3	916532	81.60	916532-C3	95.10
	1/2	4	.010	I	.424		3	889732	88.20	889732-C3	102.70
	1/2	5	.080	II	.364	.071	3	899032	81.60	899032-C3	95.10
	5/8	3	.090	II	.463	.080	3	916540	84.10	916540-C3	97.70
	5/8	5	.090	II	.463	.080	3	899040	147.40	899040-C3	157.90
	3/4	3	.100	II	.562	.088	3	916548	208.80	916548-C3	225.20
	3/4	4	.015	I	.637		3	889748	219.40	889748-C3	241.10
	3/4	5	.100	II	.562	.088	3	899048	211.60	899048-C3	221.50
41°	1/4	5	.060	II	.109	.036	2-1/2	738216	49.80	738216-C3	57.90
	3/8	5	.070	II	.153	.041	2-1/2	738224	61.10	738224-C3	72.60
	1/2	5	.080	II	.210	.047	3	738232	85.20	738232-C3	100.80

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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NEW SIZES!

CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

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ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OAL		UNCOATED		AlTiN COATED		
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1		TOOL #	USD$	TOOL #	USD$	
45°	1/8	2	.010	I	.058		1-1/2		860508	27.50	860508-C3	30.70	
	1/8	3	.040	II	.043	.021	1-1/2		897208	27.50	897208-C3	33.20	
	1/8	4	.010	I	.058		1-1/2		859708	30.30	859708-C3	36.20	
	1/8	4	.010	I	.058		3	LONG!	765008	33.50	765008-C3	39.40	
	1/8	5	.040	II	.043	.021	1-1/2		908408	30.30	908408-C3	35.80	
	1/8	5	.040	II	.043	.021	3	LONG!	789008	33.50	789008-C3	39.40	
	1/8	5	.040	III	.043	.021	1-1/2		773608	30.30	773608-C3	36.20	
	3/16	2	.010	I	.089		2		860512	37.40	860512-C3	43.10	
	3/16	3	.050	II	.069	.026	2		897212	37.40	897212-C3	43.10	
	3/16	4	.010	I	.089		2		859712	39.80	859712-C3	45.70	
	3/16	5	.050	II	.069	.026	2		908412	39.80	908412-C3	45.70	
	3/16	5	.050	III	.069	.026	2		773612	39.80	773612-C3	46.00	
	1/4	2	.010	I	.120		2-1/2		860516	47.00	860516-C3	54.90	
	1/4	3	.060	II	.095	.031	2-1/2		897216	43.40	897216-C3	50.80	
	1/4	3	.060	II	.095	.031	4	LONG!	765316	57.30	765316-C3	65.90	
	1/4	4	.010	I	.120		2-1/2		859716	49.70	859716-C3	57.50	
	1/4	4	.010	I	.120		4	LONG!	765016	56.40	765016-C3	66.60	
	1/4	5	.060	II	.095	.031	2-1/2		908416	46.00	908416-C3	53.10	
	1/4	5	.060	II	.095	.031	4	LONG!	789016	56.40	789016-C3	66.60	
	1/4	5	.060	III	.095	.031	2-1/2		773616	47.90	773616-C3	56.50	
	5/16	3	.060	II	.126	.031	2-1/2		897220	57.20	897220-C3	67.50	
	5/16	4	.010	I	.151		2-1/2		859720	62.90	859720-C3	72.60	NEW
	5/16	5	.060	II	.126	.031	2-1/2		908420	57.20	908420-C3	67.50	
	5/16	5	.060	III	.126	.031	2-1/2		773620	59.10	773620-C3	68.70	NEW
	3/8	2	.010	I	.183		2-1/2		860524	62.90	860524-C3	73.50	
	3/8	3	.070	II	.153	.036	2-1/2		897224	58.20	897224-C3	68.00	
	3/8	4	.010	I	.183		2-1/2		859724	62.90	859724-C3	73.50	
	3/8	5	.070	II	.153	.036	2-1/2		908424	58.20	908424-C3	68.00	
	3/8	5	.070	II	.153	.036	4	LONG!	789024	56.40	789024-C3	72.10	
	3/8	5	.070	III	.153	.036	2-1/2		773624	59.10	773624-C3	70.50	
	1/2	2	.010	I	.245		3		860532	88.20	860532-C3	102.70	
	1/2	3	.080	II	.210	.041	3		897232	81.60	897232-C3	95.10	
	1/2	4	.010	I	.245		3		859732	88.20	859732-C3	102.70	
	1/2	5	.080	II	.210	.041	3		908432	81.60	908432-C3	95.10	
	1/2	5	.080	III	.210	.041	3		773632	84.80	773632-C3	102.10	
	5/8	3	.090	II	.268	.046	3		897240	144.70	897240-C3	155.20	
	5/8	5	.090	II	.268	.046	3		908440	143.20	908440-C3	157.90	
	3/4	3	.100	II	.325	.051	3		897248	202.80	897248-C3	225.20	
	3/4	4	.015	I	.368		3		859748	219.40	859748-C3	236.60	
	3/4	5	.100	II	.325	.051	3		908448	205.50	908448-C3	221.50	

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

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CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes (cont.)

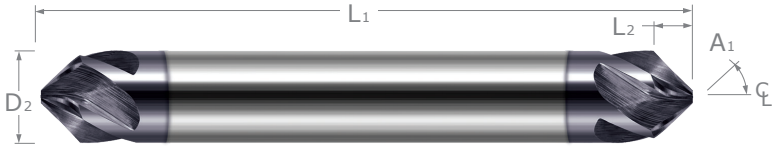
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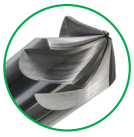
ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OAL	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	USD$	TOOL #	USD$
50°	1/4	3	.060	II	.080	.026	2-1/2	875016	47.00	875016-C3	54.90
	1/4	5	.060	II	.080	.026	2-1/2	871116	50.70	871116-C3	57.50
	3/8	3	.070	II	.128	.030	2-1/2	875024	62.90	875024-C3	73.50
	3/8	5	.070	II	.128	.030	2-1/2	871124	65.50	871124-C3	75.90
	1/2	3	.080	II	.176	.034	3	875032	88.20	875032-C3	102.70
	1/2	5	.080	II	.176	.034	3	871132	92.80	871132-C3	105.50
60°	1/8	2	.010	I	.033		1-1/2	872108	30.30	872108-C3	35.80
	1/8	4	.010	I	.033		1-1/2	888808	30.30	888808-C3	36.20
	1/8	5	.040	II	.025	.012	1-1/2	867608	30.30	867608-C3	36.20
	3/16	2	.010	I	.051		2	872112	38.10	872112-C3	44.00
	3/16	4	.010	I	.051		2	888812	38.10	888812-C3	43.10
	1/4	2	.010	I	.069		2-1/2	872116	47.00	872116-C3	56.20
	1/4	3	.060	II	.057	.018	2-1/2	863416	44.60	863416-C3	50.80
	1/4	4	.010	I	.069		2-1/2	888816	49.70	888816-C3	57.50
	1/4	5	.060	II	.057	.018	2-1/2	867616	47.40	867616-C3	53.10
NEW	1/4	5	.060	III	.095	.018	2-1/2	693016	47.90	693016-C3	55.90
	3/8	2	.010	I	.105		2-1/2	872124	64.10	872124-C3	74.90
	3/8	3	.070	II	.091	.021	2-1/2	863424	58.20	863424-C3	68.00
	3/8	4	.010	I	.105		2-1/2	888824	66.70	888824-C3	75.90
	3/8	5	.070	II	.091	.021	2-1/2	867624	62.40	867624-C3	70.40
	1/2	2	.010	I	.141		3	872132	88.20	872132-C3	104.70
	1/2	3	.080	II	.126	.024	3	863432	84.00	863432-C3	97.90
	1/2	4	.010	I	.141		3	888832	88.20	888832-C3	102.70
	1/2	5	.080	II	.126	.024	3	867632	86.60	867632-C3	97.70
NEW	1/2	5	.080	III	.210	.024	3	693032	84.80	693032-C3	100.40
	5/8	3	.090	II	.157	.027	3	863440	144.70	863440-C3	159.70
	5/8	5	.090	II	.157	.027	3	867640	147.40	867640-C3	157.90
	3/4	3	.100	II	.195	.029	3	863448	208.80	863448-C3	225.20
	3/4	4	.015	I	.212		3	888848	223.60	888848-C3	236.60
	3/4	5	.100	II	.195	.029	3	867648	211.60	867648-C3	227.80

* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

CHAMFER CUTTERS

Pointed & Flat End – Helical Flutes – Double-Ended





Free Cutting Action
for Excellent
Surface Finish

- **Specialized helical flute design for superior performance**
- Double-ended
- Free cutting action provides excellent surface finish and chip evacuation
- Offered in Type I pointed and Type II flat end (non-cutting) styles
- 4 and 5 flute options
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



30° 45°
Stocked in Two Angles
Per Side!

ANGLE PER SIDE	DIAMETER	FLUTES	TIP	TYPE	LENGTH OF CUT		OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°15'}_{-0°15'}$	D_2 (h6)		T*		L_2	L_4 (MAX.)	L_1	TOOL #	USD$	TOOL #	USD$
30°	1/4	5	.060	II	.165	.054	2-1/2	722116	65.40	722116-C3	73.50
	3/8	5	.070	II	.264	.062	2-1/2	722124	80.00	722124-C3	91.40
	1/2	5	.080	II	.364	.071	3	722132	112.40	722132-C3	128.00
45°	1/8	4	.010	I	.058		1-1/2	785008	47.00	785008-C3	52.90
	1/8	5	.040	II	.043	.021	1-1/2	784908	44.30	784908-C3	50.20
	1/4	4	.010	I	.120		2-1/2	785016	70.40	785016-C3	78.50
	1/4	5	.060	II	.095	.031	2-1/2	784916	67.70	784916-C3	75.80
	3/8	4	.010	I	.183		2-1/2	785024	86.70	785024-C3	98.50
	3/8	5	.070	II	.153	.036	2-1/2	784924	80.00	784924-C3	92.80
	1/2	4	.010	I	.245		3	785032	121.50	785032-C3	137.60
	1/2	5	.080	II	.210	.041	3	784932	112.40	784932-C3	129.80

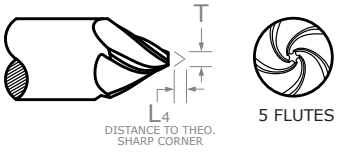
* Tolerance for Type I is +.000"/-.005". Tolerance for type II is +.002"/-.002".

TYPE I - POINTED Flat relief ground to center, yielding a web thickness at tip (T)



4 FLUTES

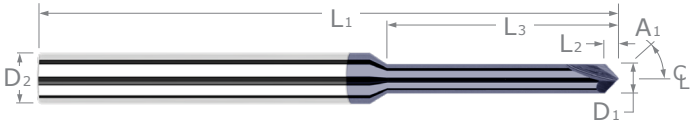
TYPE II - FLAT END Flat relief ground to a *non-end cutting* flat tip (T)

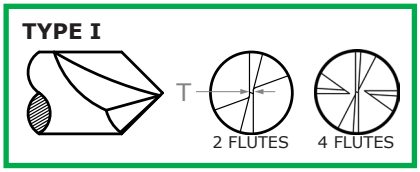


5 FLUTES

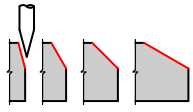
CHAMFER CUTTERS

Pointed – Long Reach





- **Reduced diameter for clearance along walls and in small features**
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- Available in multiple reaches and reduced diameters
- 2 and 4 flutes
- Solid carbide
- CNC ground in the USA



Stocked in Four Angles Per Side!

ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED		
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$
15°	.031 (1/32)	.156 (5x)	.058	.005	1/8	2-1/2	56815		33.60	56815-C3		39.50
	.031 (1/32)	.250 (8x)	.058	.005	1/8	2-1/2	57215		36.50	57215-C3		42.50
	.062 (1/16)	.312 (5x)	.116	.006	1/8	2-1/2	54715		33.60	54715-C3		39.50
	.062 (1/16)	.500 (8x)	.116	.006	1/8	2-1/2	55615		36.50	55615-C3		42.50
	.093 (3/32)	.500 (5x)	.174	.006	1/8	2-1/2	52115		33.90	52115-C3		39.90
	.093 (3/32)	.750 (8x)	.174	.006	1/8	2-1/2	53515		36.80	53515-C3		42.80
30°	.031 (1/32)	.093 (3x)	.027	.005	1/8	1-1/2	994830		31.60	994830-C3		37.50
	.031 (1/32)	.156 (5x)	.027	.005	1/8	2-1/2	56830		33.90	56830-C3		39.90
	.031 (1/32)	.250 (8x)	.027	.005	1/8	2-1/2	57230		36.50	57230-C3		42.50
	.047 (3/64)	.140 (3x)	.041	.005	1/8	1-1/2	911030		31.80	911030-C3		37.70
	.047 (3/64)	.250 (5x)	.041	.005	1/8	2-1/2	996830		33.30	996830-C3		39.20
	.047 (3/64)	.375 (8x)	.041	.005	1/8	2-1/2	999230		33.60	999230-C3		39.50
	.062 (1/16)	.187 (3x)	.054	.006	1/8	1-1/2	998930		31.60	998930-C3		37.50
	.062 (1/16)	.312 (5x)	.054	.006	1/8	2-1/2	54730		33.60	54730-C3		39.50
	.062 (1/16)	.500 (8x)	.054	.006	1/8	2-1/2	55630		36.50	55630-C3		42.50
	.078 (5/64)	.406 (5x)	.068	.006	1/8	2-1/2	996930		33.30	996930-C3		39.20
	.093 (3/32)	.279 (3x)	.081	.006	1/8	1-1/2	995330		31.80	995330-C3		37.70
	.093 (3/32)	.500 (5x)	.081	.006	1/8	2-1/2	52130		33.60	52130-C3		39.50
	.093 (3/32)	.750 (8x)	.081	.006	1/8	2-1/2	53530		36.80	53530-C3		42.80
45°	.015 (1/64)	.078 (5x)	.008	.003	1/8	2-1/2	997545		38.40	997545-C3		44.30
	.015 (1/64)	.125 (8x)	.008	.003	1/8	2-1/2	995945		42.80	995945-C3		48.70
	.020	.060 (3x)	.010	.003	1/8	1-1/2	794045		37.70	794045-C3		43.60
	.020	.100 (5x)	.010	.003	1/8	2-1/2	940245		37.70	940245-C3		43.60
	.020	.160 (8x)	.010	.003	1/8	2-1/2	948545		42.10	948545-C3		48.10
	.020	.200 (10x)	.010	.003	1/8	2-1/2	765545		44.20	765545-C3		50.10
	.025	.125 (5x)	.013	.003	1/8	2-1/2	821945		37.70	821945-C3		43.60
	.031 (1/32)	.093 (3x)	.016	.005	1/8	1-1/2	994845		32.00	994845-C3		37.90
	.031 (1/32)	.125 (4x)	.016	.005	1/8	2-1/2	862745		33.90	862745-C3		39.90
	.031 (1/32)	.156 (5x)	.016	.005	1/8	2-1/2	56845		33.60	56845-C3		39.50
	.031 (1/32)	.187 (6x)	.016	.005	1/8	2-1/2	870845		35.40	870845-C3		41.30
	.031 (1/32)	.218 (7x)	.016	.005	1/8	2-1/2	855445		35.40	855445-C3		41.30
	.031 (1/32)	.250 (8x)	.016	.005	1/8	2-1/2	57245		36.50	57245-C3		42.50
	.031 (1/32)	.312 (10x)	.016	.005	1/8	2-1/2	838445		38.50	838445-C3		44.40
	.031 (1/32)	.375 (12x)	.016	.005	1/8	2-1/2	998245		40.70	998245-C3		46.60
	.031 (1/32)	.470 (15x)	.016	.005	1/8	2-1/2	918245		43.90	918245-C3		49.80
	.039	.203 (5x)	.020	.005	1/8	2-1/2	788445		33.80	788445-C3		39.80
	.039	.325 (8x)	.020	.005	1/8	2-1/2	725245		36.50	725245-C3		42.50

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NEW SIZES!

CHAMFER CUTTERS

Pointed Long Reach (cont.)

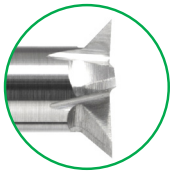
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ANGLE PER SIDE	NECK DIAMETER	OVERALL REACH	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED			AlTiN COATED			
A_1 $^{+0°30'}_{-0°30'}$	D_1 $^{+.000"}_{-.001"}$	L_3 $^{+.010"}_{-.000"}$	L_2	T (MAX.)	D_2	L_1	2 FL	4 FL	USD$	2 FL	4 FL	USD$	
45°	.040	.203 (5x)	.020	.005	1/8	2-1/2	830645		33.80	830645-C3		39.80	
	.047 (3/64)	.141 (3x)	.024	.005	1/8	1-1/2	911045		31.20	911045-C3		37.20	
	.047 (3/64)	.187 (4x)	.024	.005	1/8	2-1/2	788745		32.40	788745-C3		38.30	
	.047 (3/64)	.250 (5x)	.024	.005	1/8	2-1/2	996845	692745	33.80	996845-C3	692745-C3	39.80	NEW
	.047 (3/64)	.281 (6x)	.024	.005	1/8	2-1/2	772545		35.50	772545-C3		41.40	
	.047 (3/64)	.375 (8x)	.024	.005	1/8	2-1/2	999245		36.50	999245-C3		42.50	
	.047 (3/64)	.570 (12x)	.024	.005	1/8	2-1/2	919045		39.90	919045-C3		45.80	
	.047 (3/64)	.710 (15x)	.024	.005	1/8	2-1/2	725345		43.90	725345-C3		49.80	
	.050	.250 (5x)	.025	.005	1/8	2-1/2	788645		33.60	788645-C3		39.50	
	.060	.312 (5x)	.030	.006	1/8	2-1/2	788545		33.90	788545-C3		39.90	
	.062 (1/16)	.187 (3x)	.031	.006	1/8	1-1/2	998945		32.00	998945-C3		37.90	
	.062 (1/16)	.250 (4x)	.031	.006	1/8	2-1/2	853945		33.60	853945-C3		39.50	
	.062 (1/16)	.312 (5x)	.031	.006	1/8	2-1/2	54745	692645	33.60	54745-C3	692645-C3	39.50	NEW
	.062 (1/16)	.375 (6x)	.031	.006	1/8	2-1/2	846045		35.10	846045-C3		41.00	
	.062 (1/16)	.437 (7x)	.031	.006	1/8	2-1/2	869745		35.10	869745-C3		41.00	
	.062 (1/16)	.500 (8x)	.031	.006	1/8	2-1/2	55645		36.50	55645-C3		42.50	
	.062 (1/16)	.625 (10x)	.031	.006	1/8	2-1/2	844145		38.50	844145-C3		44.40	
	.062 (1/16)	.750 (12x)	.031	.006	1/8	2-1/2	997245		40.70	997245-C3		46.60	
	.062 (1/16)	.950 (15x)	.031	.006	1/8	2-1/2	913345		43.90	913345-C3		49.80	
	.078 (5/64)	.234 (3x)	.039	.006	1/8	1-1/2	906645		31.20	906645-C3		37.20	
	.078 (5/64)	.312 (4x)	.039	.006	1/8	2-1/2	787045		32.40	787045-C3		38.30	
	.078 (5/64)	.406 (5x)	.039	.006	1/8	2-1/2	996945		33.80	996945-C3		39.80	
	.078 (5/64)	.625 (8x)	.039	.006	1/8	2-1/2	999545		36.50	999545-C3		42.50	
	.078 (5/64)	.800 (10x)	.039	.006	1/8	2-1/2	764145		39.50	764145-C3		45.50	
	.078 (5/64)	.940 (12x)	.039	.006	1/8	2-1/2	924045		39.90	924045-C3		45.80	
	.093 (3/32)	.279 (3x)	.047	.006	1/8	1-1/2	995345		32.00	995345-C3		37.90	
	.093 (3/32)	.375 (4x)	.047	.006	1/8	2-1/2	874345		33.60	874345-C3		39.50	
	.093 (3/32)	.500 (5x)	.047	.006	1/8	2-1/2	52145	692545	33.60	52145-C3	692545-C3	39.50	NEW
	.093 (3/32)	.585 (6x)	.047	.006	1/8	2-1/2	849445		35.40	849445-C3		41.30	
	.093 (3/32)	.670 (7x)	.047	.006	1/8	2-1/2	843045		35.40	843045-C3		41.30	
	.093 (3/32)	.750 (8x)	.047	.006	1/8	2-1/2	53545		36.50	53545-C3		42.50	
	.093 (3/32)	.950 (10x)	.047	.006	1/8	2-1/2	825645		38.50	825645-C3		44.40	
	.093 (3/32)	1.125 (12x)	.047	.006	1/8	2-1/2	999645		40.70	999645-C3		46.60	
	.093 (3/32)	1.400 (15x)	.047	.006	1/8	2-1/2	902845		43.90	902845-C3		49.80	
	.118	.591 (5x)	.059	.006	1/8	2-1/2	788345		33.90	788345-C3		39.90	
	.118	.950 (8x)	.059	.006	1/8	2-1/2	725145		36.80	725145-C3		42.80	
60°	.031 (1/32)	.156 (5x)	.009	.005	1/8	2-1/2	56860		33.90	56860-C3		39.90	
	.031 (1/32)	.250 (8x)	.009	.005	1/8	2-1/2	57260		36.50	57260-C3		42.50	
	.062 (1/16)	.312 (5x)	.018	.006	1/8	2-1/2	54760		33.90	54760-C3		39.90	
	.062 (1/16)	.500 (8x)	.018	.006	1/8	2-1/2	55660		36.80	55660-C3		42.80	
	.093 (3/32)	.500 (5x)	.027	.006	1/8	2-1/2	52160		33.90	52160-C3		39.90	
	.093 (3/32)	.750 (8x)	.027	.006	1/8	2-1/2	53560		36.50	53560-C3		42.50	

CHAMFER CUTTERS

Back Chamfer Cutters





Left Hand Shear Flute & Right Hand Cut Evacuate Chips Away From Part

- Low profile design and greater radial projection ideal for generating chamfered features on the backside of small holes or slots
- Decrease costs by avoiding time-consuming changes to part set-ups
- Slightly undersized to fit in common hole sizes
- 60° and 90° included angle, cutting on angle only
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish • Solid carbide • CNC ground in the USA

	ANGLE PER SIDE	HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
		D_1 +.000" −.001"	L_2	D_3	L_3 +.010" −.000"		D_2	L_1	TOOL #	USD$	TOOL #	USD$
NEW	30°	.115	.038	.068	**.218** (3x)	4	1/8	1-1/2	692410	76.50	692410-C3	82.40
	45°	.055	.010	.033	**.093** (1.5x)	4	1/8	1-1/2	943355	79.50	943355-C3	85.40
		.055	.010	.033	**.156** (3x)	4	1/8	1-1/2	938155	79.50	938155-C3	85.40
		.055	.010	.033	**.250** (4.5x)	4	1/8	1-1/2	910355	78.90	910355-C3	84.80
		.080	.014	.047	**.070** (0.8x)	4	1/8	1-1/2	906080	78.10	906080-C3	84.00
		.080	.014	.047	**.140** (1.5x)	4	1/8	1-1/2	943380	78.10	943380-C3	84.00
		.080	.014	.047	**.250** (4x)	4	1/8	1-1/2	938180	78.10	938180-C3	84.00
		.080	.014	.047	**.375** (4.5x)	4	1/8	1-1/2	910380	77.30	910380-C3	83.20
		.115	.020	.068	**.109** (0.8x)	4	1/8	1-1/2	906015	76.50	906015-C3	82.40
		.115	.020	.068	**.218** (1.5x)	4	1/8	1-1/2	943410	76.50	943410-C3	82.40
		.115	.020	.068	**.312** (2.5x)	4	1/8	1-1/2	772010	76.50	772010-C3	82.40
		.115	.020	.068	**.375** (3x)	4	1/8	1-1/2	938210	76.50	938210-C3	82.40
		.115	.020	.068	**.562** (5x)	4	1/8	2	910410	78.90	910410-C3	84.80

		D_1 +.000" −.002"	L_2	D_3	L_3 +.030" −.000"		D_2	L_1	TOOL #	USD$	TOOL #	USD$
NEW	30°	.165	.053	.101	**.312** (3x)	5	3/16	2	692430	88.70	692430-C3	95.00
NEW		.210	.067	.130	**.375** (3x)	5	1/4	2-1/2	692440	100.70	692440-C3	108.80
NEW		.250	.079	.156	**.750** (5x)	5	1/4	2-1/2	692216	100.70	692216-C3	108.80
NEW		.375	.118	.237	**.750** (3x)	6	3/8	2-1/2	692470	114.70	692470-C3	126.10
NEW		.500	.156	.317	**1.000** (3x)	6	1/2	3	692480	158.20	692480-C3	173.80
	45°	.125	.022	.075	**.218** (3x)	5	1/8	1-1/2	943415	77.70	943415-C3	83.70
		.125	.022	.075	**.375** (5x)	5	1/8	1-1/2	938215	80.40	938215-C3	86.40
		.135	.024	.081	**.125** (0.8x)	5	3/16	2	906119	88.70	906119-C3	95.40
		.135	.024	.081	**.250** (1.5x)	5	3/16	2	943420	88.70	943420-C3	95.40
		.135	.024	.081	**.406** (3x)	5	3/16	2	938220	88.70	938220-C3	95.40
		.135	.024	.081	**.625** (5x)	5	3/16	2	910420	87.90	910420-C3	94.50
		.165	.029	.101	**.156** (0.8x)	5	3/16	2	906130	88.70	906130-C3	95.40
		.165	.029	.101	**.312** (2x)	5	3/16	2	943430	88.70	943430-C3	95.40
		.165	.029	.101	**.500** (3x)	5	3/16	2	938230	88.70	938230-C3	95.40
		.165	.029	.101	**.750** (4.5x)	5	3/16	2	910430	87.90	910430-C3	94.50
		.187	.033	.115	**.375** (3x)	5	3/16	2	943435	90.10	943435-C3	96.80
		.187	.033	.115	**.562** (5x)	5	3/16	2	938235	89.50	938235-C3	96.10
		.210	.037	.130	**.187** (0.8x)	5	1/4	2-1/2	906140	100.70	906140-C3	108.80
		.210	.037	.130	**.375** (1.5x)	5	1/4	2-1/2	943440	100.70	943440-C3	109.60
		.210	.037	.130	**.500** (2x)	5	1/4	2-1/2	772140	100.70	772140-C3	109.60
		.210	.037	.130	**.625** (3x)	5	1/4	2-1/2	938240	100.70	938240-C3	109.60

continued on next page

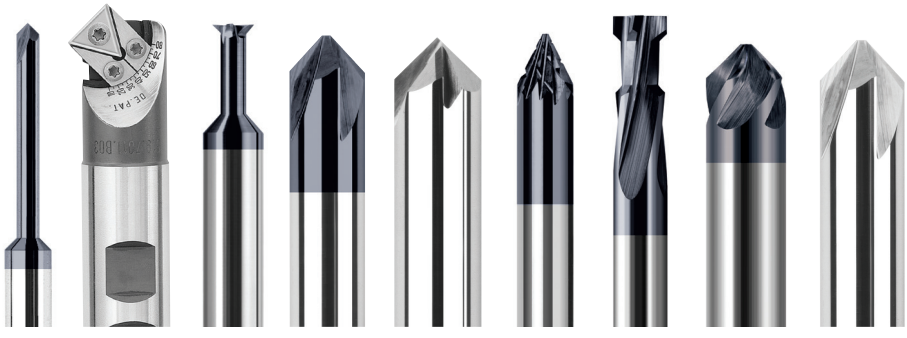
NEW SIZES!

CHAMFER CUTTERS

Back Chamfer Cutters (cont.)

continued from previous page

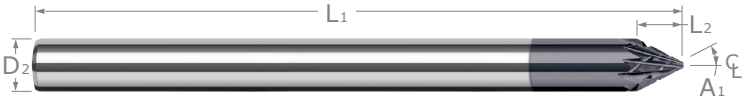
ANGLE PER SIDE	HEAD DIAMETER	AXIAL LOC	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000"}_{-.002"}$	L_2	D_3	L_3 $^{+.030"}_{-.000"}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$
45°	.210	.037	.130	**1.000** (5x)	5	1/4	2-1/2	910440	99.60	910440-C3	108.70
	.250	.044	.156	**.250** (1x)	5	1/4	2-1/2	906116	100.70	906116-C3	109.60
	.250	.044	.156	**.437** (2x)	5	1/4	2-1/2	943416	100.70	943416-C3	109.60
	.250	.044	.156	**.625** (2.5x)	5	1/4	2-1/2	772116	100.70	772116-C3	109.60
	.250	.044	.156	**.750** (3x)	5	1/4	2-1/2	938216	100.70	938216-C3	109.60
	.250	.044	.156	**1.250** (5x)	5	1/4	3	910450	103.10	910450-C3	112.10
	.312	.055	.196	**.281** (0.8x)	6	5/16	2-1/2	906120	106.30	906120-C3	116.80
	.312	.055	.196	**.562** (2x)	6	5/16	2-1/2	943460	106.30	943460-C3	116.80
	.312	.055	.196	**1.000** (3x)	6	5/16	2-1/2	938260	106.30	938260-C3	116.80
	.312	.055	.196	**1.500** (5x)	6	5/16	3	910460	109.10	910460-C3	119.60
	.375	.066	.237	**.375** (1x)	6	3/8	2-1/2	906124	114.70	906124-C3	126.10
	.375	.066	.237	**.750** (2x)	6	3/8	2-1/2	943470	114.70	943470-C3	126.10
	.375	.066	.237	**1.125** (3x)	6	3/8	2-1/2	938270	114.70	938270-C3	126.10
	.375	.066	.237	**1.870** (5x)	6	3/8	4	910470	120.70	910470-C3	130.60
	.500	.088	.317	**.500** (1x)	6	1/2	3	906132	158.20	906132-C3	175.90
	.500	.088	.317	**1.000** (2x)	6	1/2	3	943480	158.20	943480-C3	175.90
	.500	.088	.317	**1.500** (3x)	6	1/2	3	938280	158.20	938280-C3	175.90
	.500	.088	.317	**2.500** (5x)	6	1/2	4	910480	163.70	910480-C3	181.30



Check Out All of Our Chamfering Solutions!

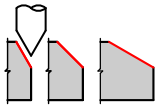
CHAMFER CUTTERS

Deburring Chamfer Cutters



End Mill Tolerances with Bur-Style Geometry!

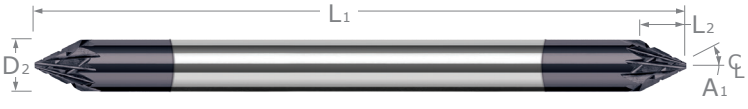
- Deburr in your CNC machine with these high precision burs held to end mill tolerances
- Stop scrapping expensive parts due to handheld operator errors
- High flute count allows for increased feeds which reduces cycle times
- Achieve better finish than with milling type cutters
- Tight end mill tolerances allow use of standard programming and tool paths
- Cone shaped burs are effective in removing burrs and/or adding a small controlled edge break with superior finish
- Double cut style flute pattern
- Solid carbide
- CNC ground in the USA

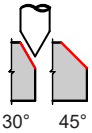


Stocked in Three Angles Per Side!

Single-Ended

ANGLE PER SIDE	LOC	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIA.	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	58130	31.00	58130-C3	37.00		
	.207	12	6	.012 (Max.)	1/4	2-1/2	994030	44.10	994030-C3	52.20		
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	58145	31.00	58145-C3	37.00	58145-C4	46.60
	.088	12	6	.012 (Max.)	3/16	2-1/2	891145	38.80	891145-C3	45.50	891145-C4	59.80
	.120	12	6	.012 (Max.)	1/4	2-1/2	994045	44.10	994045-C3	53.10	994045-C4	68.00
	.181	14	7	.013 (Max.)	3/8	2-1/2	784445	62.50	784445-C3	73.90	784445-C4	91.90
	.235	16	6	.012 (Max.)	1/2	2-1/2	722030	79.20	722030-C3	94.80		
60°	.033	12	6	.012 (Max.)	1/8	2-1/2	58160	31.30	58160-C3	37.30		
	.069	12	3	.012 (Max.)	1/4	2-1/2	994060	44.50	994060-C3	60.10		





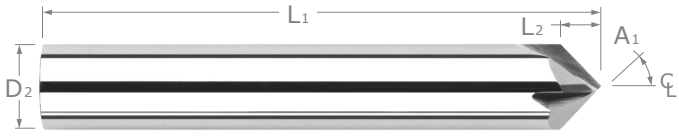
Stocked in Two Angles Per Side!

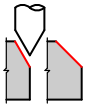
Double-Ended

ANGLE PER SIDE	LENGTH OF CUT	RIGHT HAND TEETH	LEFT HAND TEETH	MINOR DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2				D_2	L_1	TOOL #	USD$	TOOL #	USD$
30°	.099	12	6	.012 (Max.)	1/8	2-1/2	898330	46.70	898330-C3	54.20
45°	.057	12	6	.012 (Max.)	1/8	2-1/2	898345	46.70	898345-C3	54.20
	.088	12	6	.012 (Max.)	3/16	2-1/2	879745	56.20	879745-C3	65.10
	.120	12	6	.012 (Max.)	1/4	2-1/2	867545	66.40	867545-C3	74.50
	.181	14	7	.013 (Max.)	3/8	2-1/2	788145	85.60	788145-C3	97.40

CHAMFER CUTTERS

Cobalt – Pointed

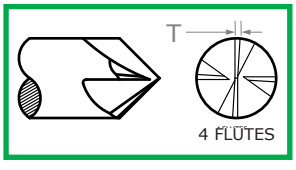




Stocked in Two Angles Per Side!

- 4 flutes (2 flutes to center)
- M-42 steel (8% cobalt)
- Type I pointed style ground to a point, yielding web thickness at tip (T)
- CNC ground in the USA

ANGLE PER SIDE	LENGTH OF CUT	TIP	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
A_1 $^{+0°30'}_{-0°30'}$	L_2	$T_{(MAX.)}$	D_2	L_1	4 FL	USD$
30°	.217	.010	1/4	2	18116	47.90
	.325	.010	3/8	2-1/2	18124	58.80
	.433	.010	1/2	3	18132	74.40
45°	.125	.010	1/4	2	18016	47.90
	.188	.010	3/8	2-1/2	18024	57.50
	.250	.010	1/2	3	18032	74.40



CHAMFER CUTTERS

Adjustable Chamfer Cutters

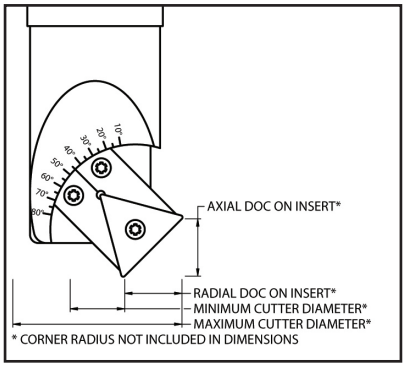


- **Mills any angle from 10° to 80°**
- Change chamfer angle with quick adjustment
- TPET-321 carbide insert (TiN coated) and wrench included
- TPET-321-AL carbide insert has polished face and upsharp relief for optimized performance in non-ferrous materials

SHANK DIAMETER	OVERALL LENGTH	TOOL #	USD$
3/4	3-3/4	81250	410.90
1	3-3/4	81260	410.90

DESCRIPTION	TOOL #	USD$	
TPET-321 Insert with TiN Coating	60031	15.90	(Box of 10)
TPET-321-AL Insert for Non-Ferrous Materials	60038	17.50	(Box of 10)
Clamp Plate (Replacement)	81245	24.80	(Each)
Screw (Replacement)	81247	9.00	(Each)
Seat Pocket (Replacement)	81249	90.60	(Each)

SPEEDS & FEEDS (Adjustable Chamfer Cutter)			
MATERIAL	**SPEED (RPM)**	**FEED (Inches/Min)**	**DEPTH (Inches)**
STEEL	600–2000	1″–4″	1/8″ MAX.
ALUMINUM	1000–6000 MAX.	3″–8″	1/8″ MAX.

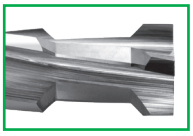


Angle Setting on Tool	Minimum Diameter*	Maximum Diameter*	Radial DOC of Insert*	Axial DOC of Insert*
10°	0.0717	1.2466	0.587	0.104
15°	0.1149	1.2672	0.576	0.154
20°	0.1617	1.2828	0.561	0.204
25°	0.2119	1.2931	0.541	0.252
30°	0.2649	1.2981	0.517	0.298
35°	0.3205	1.2977	0.489	0.342
40°	0.3781	1.2920	0.457	0.383
45°	0.4374	1.2810	0.422	0.422
50°	0.4978	1.2647	0.383	0.457
55°	0.5590	1.2433	0.342	0.489
60°	0.6205	1.2170	0.298	0.517
65°	0.6818	1.1860	0.252	0.541
70°	0.7424	1.1504	0.204	0.561
75°	0.8018	1.1106	0.154	0.576
80°	0.8597	1.0669	0.104	0.587

CHAMFER CUTTERS

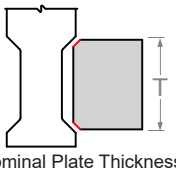
Plate Chamfer Cutters



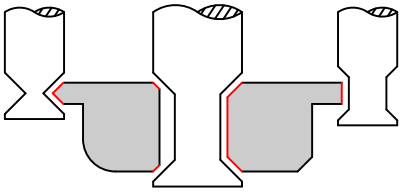


Cutting Along Entirety of Concave Form

- Tool designed to chamfer top and bottom in a single pass
- Cutting along entirety of concave form (L_2) only
- Minor diameter (D_3) relieved for light profiling and trimming edges
- 10° helix
- 4 flutes
- Solid carbide
- CNC ground in the USA



Nominal Plate Thickness

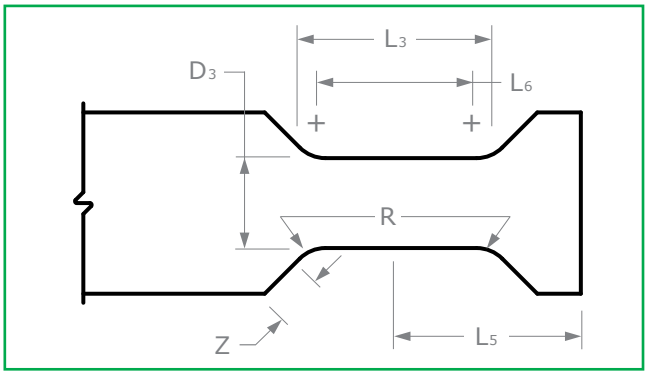


Capable of Performing Full Form Engagement, Light Profiling, & Edge Trimming

MAX OPENING WIDTH	MIN OPENING WIDTH	CHAMFER LENGTH	MINOR DIA.	MINOR DIA. LENGTH	RADIUS	END LENGTH	END TO CENTER	NOMINAL PLATE THICKNESS*	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
L_2 +.001" −.001"	L_3	Z	D_3 +.000" −.002"	L_6	R (MAX.)	L_4	L_5 +.001" −.001"	T	D_2	L_1	4 FL	USD$	4 FL	USD$
.037	.010	**.019**	.096	.008	.005	.040	.059	.031	1/8	1-1/2	955202	67.30	955202-C3	73.20
.068	.037	**.022**	.091	.029	.006	.040	.074	.062	1/8	1-1/2	955204	67.30	955204-C3	73.20
.074	.012	**.044**	.184	.001	.008	.060	.097	.068	1/4	2-1/2	971104	74.60	971104-C3	82.70
.099	.037	**.044**	.184	.026	.008	.060	.110	.093	1/4	2-1/2	971106	74.60	971106-C3	83.50
.135	.104	**.022**	.091	.096	.005	.040	.108	.125	1/8	1-1/2	955208	67.30	955208-C3	73.20
.135	.073	**.044**	.184	.062	.008	.060	.128	.125	1/4	2-1/2	971108	74.60	971108-C3	83.50
.197	.135	**.044**	.184	.124	.008	.060	.159	.187	1/4	2-1/2	971112	74.60	971112-C3	83.50
.197	.105	**.065**	.278	.093	.008	.060	.159	.187	3/8	2-1/2	980812	93.20	980812-C3	104.60
.260	.198	**.044**	.184	.187	.008	.060	.190	.250	1/4	2-1/2	971116	74.60	971116-C3	83.50
.260	.137	**.087**	.372	.126	.008	.060	.190	.250	1/2	3	965916	142.30	965916-C3	159.90
.385	.293	**.065**	.278	.281	.008	.060	.253	.375	3/8	2-1/2	980824	93.20	980824-C3	104.60
.385	.262	**.087**	.372	.251	.008	.060	.253	.375	1/2	3	965924	142.30	965924-C3	159.90
.510	.387	**.087**	.372	.376	.008	.060	.315	.500	1/2	3	965932	142.30	965932-C3	159.90

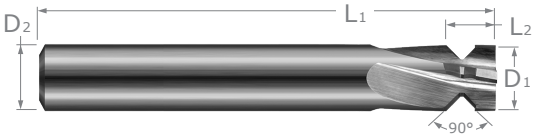
*Nominal Plate Thickness is ideal thickness of plate for chamfering top and bottom simultaneously.

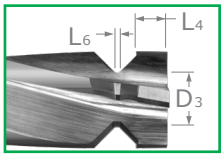
For additional tool dimensions, scan the QR code or visit harveytool.com/resources

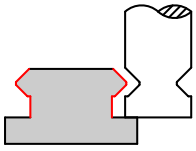


PICATINNY FORM CUTTERS

Picatinny Rail Form Cutters





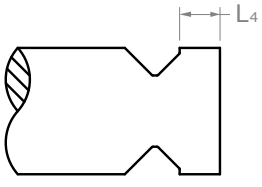


- Designed to the MIL-STD-1913 specifications
- Mill the entire Picatinny Rail in a single pass without tool changes
- Choose from two types:
  - Type I: Slight undercut at end of End Length (L4)
  - Type II: .005" radius tangent to angle and End Length (L4)
- Cutting on entirety of concave form and OD flat at end
- 4 helical flutes allow for better cutting action
- .005" max radii for all internal corners
- Solid carbide • CNC ground in the USA

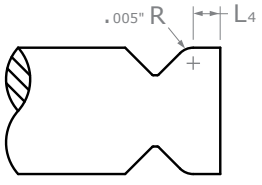
Outstanding in Aluminum!

CUTTER DIAMETER	LENGTH OF CUT	MINOR DIAMETER	MINOR DIA. LENGTH (TSC)	END LENGTH	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB2 COATED	
D_1 +.000" −.002"	L_2 +.008" −.000"	D_3 +.001" −.001"	L_6	L_4		D_2	L_1	4 FL	USD$	4 FL	USD$
.500 (1/2)	.377	.282	.021	.160	I	1/2	3	875632	182.30	875632-C8	211.30
.500 (1/2)	.377	.282	.021	.137	II	1/2	3	830032	182.30	830032-C8	211.30
.625 (5/8)	.377	.407	.021	.160	I	5/8	3-1/2	875640	208.80	875640-C8	251.00
.625 (5/8)	.377	.407	.021	.137	II	5/8	3-1/2	830040	208.80	830040-C8	251.00

Type I - Picatinny Rail Form 1995 Standard

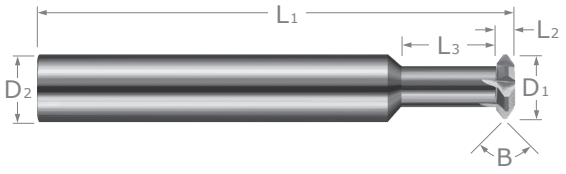


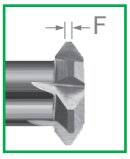
Type II - Picatinny Rail Form 1999 Standard



PICATINNY FORM CUTTERS

Picatinny Attachment Cutters





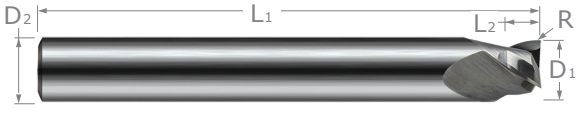
- Mill the inverse form for the Picatinny Rail used for attachments
- Cutting on entirety of angle and flat
- Short reaches for maximum strength
- 6 flutes • Solid carbide • CNC ground in the USA

Outstanding in Aluminum!

INCLUDED ANGLE	CUTTER DIAMETER	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB$_2$ COATED	
B $^{+0.5°}_{-0.5°}$	D_1 $^{+.000″}_{-.002″}$	F	L_2 $^{+.002″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	D_2	L_1	6 FL	USD$	6 FL	USD$
90°	.500 (1/2)	.021	.2075	1/4	.375	1/2	3	859232	163.70	859232-C8	192.60
	.625 (5/8)	.021	.2075	3/8	.500	5/8	3-1/2	859240	213.00	859240-C8	255.20

PICATINNY FORM CUTTERS

Picatinny Recoil Groove End Mills



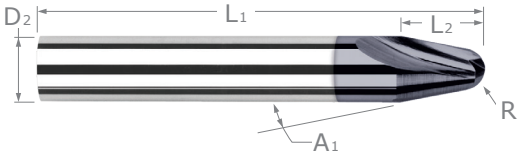
Stocked in sharp corner, .005", or .010" corner radius

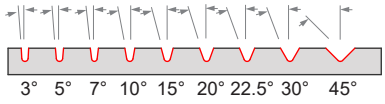
- Optimized for the grooves across the Picatinny Rail
- Diameter allows for a single pass to create the groove
- Stub flute length for improved strength
- Cutting on transition to allow for slight edge break at top of groove
- High helix and optimized geometry for improved performance
- 3 flutes • Center cutting
- Solid carbide • CNC ground in the USA

Outstanding in Aluminum!

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB$_2$ COATED	
D_1 $^{+.002″}_{-.000″}$	R $^{+.001″}_{-.001″}$	L_2 $^{+.008″}_{-.000″}$	D_2	L_1	3 FL	USD$	3 FL	USD$
.206	**SHARP!**	.118	1/4	2-1/2	864806	43.80	864806-C8	54.90
.206	.005	.118	1/4	2-1/2	874406	48.10	874406-C8	57.70
.206	.010	.118	1/4	2-1/2	862606	48.10	862606-C8	57.70
.210	**SHARP!**	.118	1/4	2-1/2	864810	43.80	864810-C8	53.50
.210	.005	.118	1/4	2-1/2	874410	48.10	874410-C8	57.70
.210	.010	.118	1/4	2-1/2	862610	48.10	862610-C8	57.70

RUNNER CUTTERS





Stocked in Nine Angles Per Side!

- Designed to mill 3°, 5°, 7°, 10°, 15°, 20°, 22.5°, 30°, or 45° channels in molds
- 2 helical flutes (12° helix)
- AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- Center cutting
- Solid carbide
- CNC ground in the USA

	ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
	A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
	3°	1/64	.921	1/8	1-1/2	843600	54.60	843600-C3	60.50		
		1/32	.631	1/8	1-1/2	843602	54.60	843602-C3	60.50		
		1/16	.666	3/16	2	843604	60.10	843604-C3	66.30		
	5°	1/64	.557	1/8	1-1/2	936300	54.60	936300-C3	60.50		
		1/32	.390	1/8	1-1/2	936302	54.60	936302-C3	60.50		
		3/64	.579	3/16	2	936303	60.10	936303-C3	66.80		
		1/16	.422	3/16	2	936304	60.10	936304-C3	66.80		
		3/32	.812	5/16	2-1/2	936306	77.20	936306-C3	87.60		
		1/8	.834	3/8	2-1/2	936308	86.70	936308-C3	98.10		
NEW	7°	.010	.437	1/8	1-1/2	764652	55.10	764652-C3	61.00		
		1/64	.401	1/8	1-1/2	764600	55.10	764600-C3	61.00		
NEW		.020	.365	1/8	1-1/2	764601	55.10	764601-C3	61.00		
		1/32	.286	1/8	1-1/2	764602	55.10	764602-C3	61.00		
		1/16	.571	1/4	2-1/2	764604	60.10	764604-C3	69.10		
	10°	.005	.331	1/8	1-1/2	75050	47.70	75050-C3	53.70		
		.010	.307	1/8	1-1/2	75052	47.70	75052-C3	53.70	75052-C6	56.70
		1/64	.283	1/8	1-1/2	75000	47.70	75000-C3	53.70	75000-C6	56.70
		.020	.259	1/8	1-1/2	75001	47.70	75001-C3	53.70	75001-C6	56.70
		.025	.235	1/8	1-1/2	75054	47.70	75054-C3	53.70		
		1/32	.384	3/16	2	75002	54.60	75002-C3	61.20	75002-C6	64.10
		.040	.341	3/16	2	75062	60.10	75062-C3	66.80		
		3/64	.308	3/16	2	75003	60.10	75003-C3	66.80		
		1/16	.414	1/4	2-1/2	75004	67.40	75004-C3	76.30	75004-C6	77.10
		5/64	.338	1/4	2-1/2	75005	69.00	75005-C3	78.00		
		3/32	.444	5/16	2-1/2	75006	77.20	75006-C3	87.60		
		7/64	.367	5/16	2-1/2	75007	77.50	75007-C3	88.00		
		1/8	.469	3/8	2-1/2	75008	86.70	75008-C3	98.10		
		5/32	.675	1/2	3	75010	102.00	75010-C3	119.60		

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NEW SIZES!

RUNNER CUTTERS

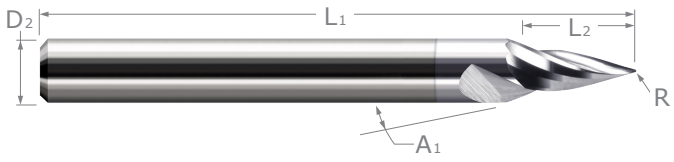
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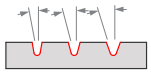
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ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005"}_{-.0005"}$	L_2	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$	
15°	.005	.219	1/8	1-1/2	75150	48.80	75150-C3	54.70			
	.010	.205	1/8	1-1/2	75152	47.70	75152-C3	53.70	75152-C6	56.70	
	1/64	.190	1/8	1-1/2	75100	47.70	75100-C3	53.70	75100-C6	56.70	
	.020	.176	1/8	1-1/2	75101	47.70	75101-C3	53.70	75101-C6	56.70	
	.025	.162	1/8	1-1/2	75154	47.70	75154-C3	53.70	75154-C6	54.60	
	1/32	.261	3/16	2	75102	54.60	75102-C3	61.20	75102-C6	64.10	
	.039	.238	3/16	2	75160	60.10	75160-C3	66.80			
	.040	.235	3/16	2	75162	60.10	75162-C3	66.80			
	3/64	.215	3/16	2	75103	60.10	75103-C3	66.80			
	.050	.207	3/16	2	75066	60.10	75066-C3	66.30			
	1/16	.289	1/4	2-1/2	75104	67.40	75104-C3	76.30	75104-C6	77.10	
	5/64	.243	1/4	2-1/2	75105	69.00	75105-C3	78.00			
	3/32	.317	5/16	2-1/2	75106	77.20	75106-C3	87.60			
	7/64	.271	5/16	2-1/2	75107	77.50	75107-C3	88.00			
	1/8	.342	3/8	2-1/2	75108	86.70	75108-C3	98.10			
	5/32	.486	1/2	3	75110	102.00	75110-C3	119.60			
	3/16	.398	1/2	3	75112	102.00	75112-C3	117.60			
20°	.005	.162	1/8	1-1/2	979950	50.10	979950-C3	56.10			
	.010	.152	1/8	1-1/2	979952	50.10	979952-C3	56.10			
	1/64	.143	1/8	1-1/2	979900	47.70	979900-C3	53.70	979900-C6	56.70	
	.020	.133	1/8	1-1/2	979901	51.50	979901-C3	57.40	979901-C6	58.30	
	.025	.124	1/8	1-1/2	979954	51.50	979954-C3	57.40			
	1/32	.198	3/16	2	979902	54.60	979902-C3	61.20	979902-C6	62.30	
	3/64	.167	3/16	2	979903	60.10	979903-C3	66.80			
	1/16	.224	1/4	2-1/2	979904	67.40	979904-C3	76.30			
	5/64	.193	1/4	2-1/2	979905	69.90	979905-C3	78.00			
	3/32	.250	5/16	2-1/2	979906	77.20	979906-C3	87.60			
	1/8	.275	3/8	2-1/2	979908	86.70	979908-C3	98.10			
22.5°	.010	.135	1/8	1-1/2	867852	50.10	867852-C3	56.10			
	1/64	.127	1/8	1-1/2	867800	47.70	867800-C3	53.70			
	.020	.194	3/16	2	867801	54.60	867801-C3	61.20			
	1/32	.176	3/16	2	867802	54.60	867802-C3	61.20			
	1/16	.277	5/16	2-1/2	867804	77.20	867804-C3	87.60			
30°	.005	.157	3/16	2	934550	71.30	934550-C3	77.90			
	.010	.152	3/16	2	934552	71.30	934552-C3	77.90	934552-C6	79.00	
	1/64	.147	3/16	2	934500	69.00	934500-C3	75.70	934500-C6	78.70	
	.020	.142	3/16	2	934501	69.00	934501-C3	75.70	934501-C6	76.70	
	.025	.192	1/4	2-1/2	934554	69.00	934554-C3	77.10			
	1/32	.186	1/4	2-1/2	934502	69.00	934502-C3	78.00	934502-C6	78.80	
	3/64	.224	5/16	2-1/2	934503	77.20	934503-C3	87.60			
	1/16	.263	3/8	2-1/2	934504	86.70	934504-C3	98.10	934504-C6	100.60	
45°	.005	.123	1/4	2-1/2	856550	72.70	856550-C3	80.80			
	.010	.121	1/4	2-1/2	856552	72.70	856552-C3	81.50	856552-C6	82.40	
	1/64	.119	1/4	2-1/2	856500	70.50	856500-C3	79.40	856500-C6	82.40	NEW
	.020	.148	5/16	2-1/2	856501	70.50	856501-C3	80.90			
	1/32	.143	5/16	2-1/2	856502	78.50	856502-C3	88.90	856502-C6	90.20	NEW
	3/64	.168	3/8	2-1/2	856503	88.20	856503-C3	99.60	856503-C6	102.10	NEW
	1/16	.224	1/2	3	856504	106.60	856504-C3	124.30			

RUNNER CUTTERS

For Non-Ferrous Materials





Stocked in Three Angles Per Side!

- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Designed to mill 10°, 15°, and 20° channels in molds
- 2 helical flutes (approx. 25° helix)
- Offered with TiB_2 coating to minimize galling
- Center cutting
- Solid carbide
- CNC ground in the USA

ANGLE PER SIDE	RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A_1 $^{+0°30'}_{-0°30'}$	R $^{+.0005''}_{-.0005''}$	L_2	D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
	.010	.307	1/8	1-1/2	773452	49.00	773452-C8	58.00
10°	.015	.283	1/8	1-1/2	773400	49.00	773400-C8	58.00
	.031	.384	3/16	2	773402	55.60	773402-C8	64.30
	.005	.219	1/8	1-1/2	772250	49.00	772250-C8	56.70
	.010	.205	1/8	1-1/2	772252	49.00	772252-C8	58.00
15°	.015	.190	1/8	1-1/2	772200	49.40	772200-C8	58.40
	.031	.261	3/16	2	772202	55.60	772202-C8	64.30
	.047	.215	3/16	2	772203	55.60	772203-C8	64.30
	.010	.152	1/8	1-1/2	771252	49.00	771252-C8	56.70
20°	.015	.143	1/8	1-1/2	771200	49.00	771200-C8	58.00
	.031	.198	3/16	2	771202	55.60	771202-C8	64.30

In The Loupe TV

Check Out Our New CNC Show!

Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

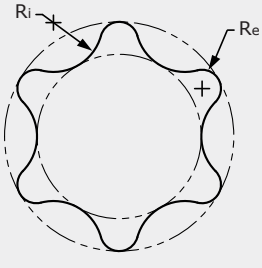
HEXALOBE CUTTERS



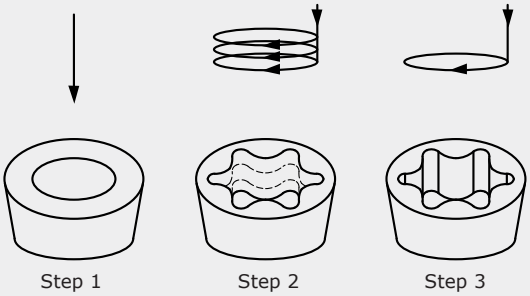
- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
T6	.010	**.060** (6x)	.1575 (4 mm)	1.575 (40 mm)	793310-C6	56.30
T8	.014	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	793314-C6	56.30
T10	.017	**.102** (6x)	.1575 (4 mm)	1.575 (40 mm)	793317-C6	56.30
T15	.020	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	793320-C6	56.30
T20	.022	**.132** (6x)	.1575 (4 mm)	1.575 (40 mm)	793322-C6	56.30
T25	.028	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	793328-C6	56.30
T30	.032	**.192** (6x)	.1575 (4 mm)	1.575 (40 mm)	793332-C6	56.30
T40	.039	**.240** (6x)	.1575 (4 mm)	1.575 (40 mm)	793339-C6	56.30
T45	.040	**.240** (6x)	.1575 (4 mm)	1.575 (40 mm)	793340-C6	56.30
T50 / T55	.055	**.330** (6x)	.1575 (4 mm)	1.575 (40 mm)	793355-C6	56.30
T60	.075	**.450** (6x)	.1575 (4 mm)	1.575 (40 mm)	793375-C6	56.30

Hexalobe Order of Operations



There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.



1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
(Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

HEXALOBE CUTTERS

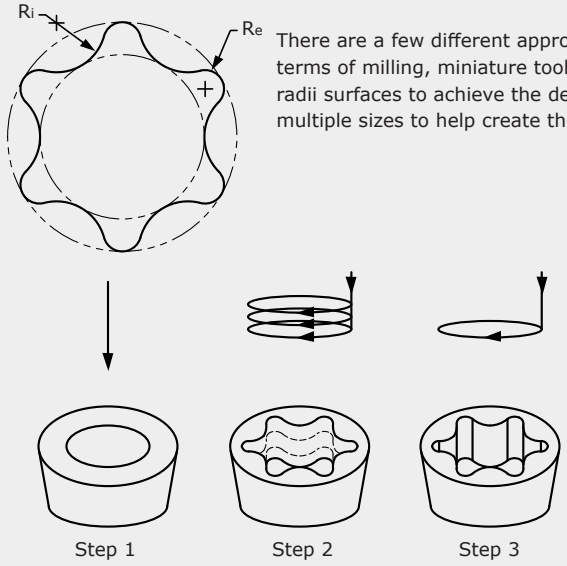
Long Reach



- Optimized for titanium alloys, Inconel, nickel alloys and other high temperature materials with outstanding performance in difficult-to-machine steels, stainless steels and tool steels
- Cutter diameters are slightly undersized common hexalobe sizes, created to contour the radii with ease and maximize the strength of the tool
- Reduced neck diameter to avoid heeling
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	CUTTER DIAMETER	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2 $^{+.010''}_{-.000''}$	L_3 $^{+.010''}_{-.000''}$	D_2 (h6)	L_1	4 FL	USD$
T8 / T10	**.014**	.023	**.045** (3x)	.1575 (4 mm)	1.575 (40 mm)	792714-C6	59.30
T8 / T10	**.014**	.023	**.084** (6x)	.1575 (4 mm)	1.575 (40 mm)	791814-C6	63.20
T15 / T20	**.020**	.030	**.060** (3x)	.1575 (4 mm)	1.575 (40 mm)	792720-C6	59.30
T15 / T20	**.020**	.030	**.120** (6x)	.1575 (4 mm)	1.575 (40 mm)	791820-C6	63.20
T25 / T30	**.028**	.042	**.084** (3x)	.1575 (4 mm)	1.575 (40 mm)	792728-C6	59.30
T25 / T30	**.028**	.042	**.168** (6x)	.1575 (4 mm)	1.575 (40 mm)	791828-C6	63.20

Hexalobe Order of Operations



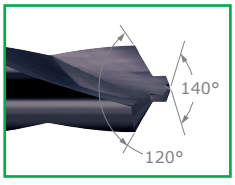
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1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
   (Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

HEXALOBE CUTTERS

Countersinks

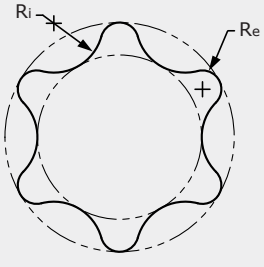




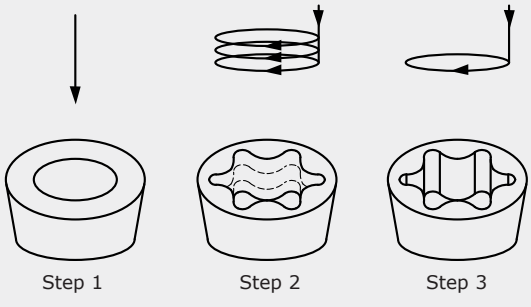
- Designed to be used before a Hexalobe cutter
- 140° included tip angle
- 120° included chamfer angle
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

HEXALOBULAR SOCKET NUMBER	DRILL DIAMETER	PILOT LENGTH	PILOT FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 +.0015″ −.0005″	L_4 +.005″ −.000″	L_2	D_2 (h6)	L_1	2 FL	USD$
T8	**.0630**	.0450	.057	.1575	1.575	741108-C6	58.60
T8	**.0630**	.0840	.096	.1575	1.575	725008-C6	60.20
T10	**.0748**	.0510	.065	.1575	1.575	741110-C6	58.60
T10	**.0748**	.1020	.116	.1575	1.575	725010-C6	60.20
T15	**.0906**	.0600	.077	.1575	1.575	741115-C6	58.60
T15	**.0906**	.1200	.137	.1575	1.575	725015-C6	60.20
T20	**.1063**	.0660	.085	.2360	2.480	741120-C6	77.70
T20	**.1063**	.1320	.151	.2360	2.480	725020-C6	79.30
T25	**.1220**	.0840	.106	.2360	2.480	741125-C6	77.70
T25	**.1220**	.1680	.190	.2360	2.480	725025-C6	79.30
	D_1 +.001″ −.001″	L_4 +.010″ −.000″	L_2	D_2 (h6)	L_1	2 FL	USD$
T30	**.1496**	.0960	.123	.2360	2.480	741130-C6	77.70
T30	**.1496**	.1920	.219	.2360	2.480	725030-C6	79.30

Hexalobe Order of Operations



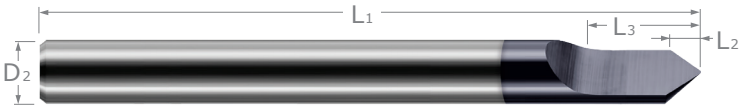
There are a few different approaches when machining a hexalobe pattern. In terms of milling, miniature tooling is required to properly contour the multiple radii surfaces to achieve the desired pattern and finish. Harvey Tool supplies multiple sizes to help create the shape and depth for the desired specification.

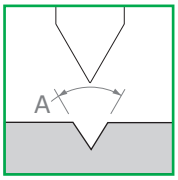


1. Pre-drill minor diameter and correct chamfer angle at the top of the hole with our compatible **Hexalobe Countersink** tools.
2. Select a **Long Reach Hexalobe Cutter** for either traditional roughing step downs or helical interpolation
   (Diameters have undersized radii (Re) to allow for contouring)
3. Finish with a Hexalobe Cutter to remove any witness marks and achieve required finish

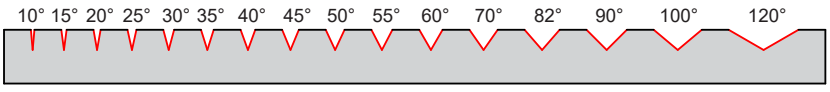
ENGRAVING CUTTERS

Pointed





- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

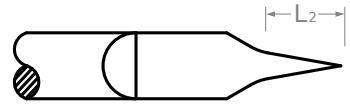


Stocked in Sixteen Included Angles!

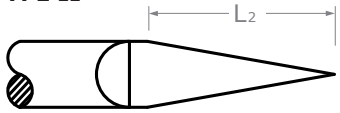
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
	1/8	.080	I	.200	1-1/2		996508	27.40	996508-C3	33.30		
10°	3/16	.080	I	1/4	2		996512	27.70	996512-C3	33.90		
	1/4	.080	I	5/16	2-1/2		996516	33.60	996516-C3	41.70		
	1/8	.080	I	.200	1-1/2		998108	27.40	998108-C3	33.30		
15°	3/16	.080	I	1/4	2		998112	27.70	998112-C3	34.40		
	1/4	.080	I	5/16	2-1/2		998116	33.60	998116-C3	42.70		
	1/8	.080	I	.200	1-1/2		999708	27.40	999708-C3	33.30	999708-C4	42.40
20°	3/16	.080	I	1/4	2		999712	27.70	999712-C3	33.90		
	1/4	.080	I	5/16	2-1/2		999716	33.60	999716-C3	41.70		
	1/8	.080	I	.200	1-1/2		983808	27.40	983808-C3	33.30		
25°	3/16	.080	I	1/4	2		983812	27.70	983812-C3	33.90		
	1/4	.080	I	5/16	2-1/2		983816	33.60	983816-C3	41.70		
	1/8	.080	I	.200	1-1/2		981508	23.30	981508-C3	29.20		
	1/8	.233	II	3/8	1-1/2		25010	17.70	25010-C3	23.70	25010-C4	32.70
30°	1/8	.233	II	3/8	4	**LONG!**	941708	30.10	941708-C3	36.40		
	3/16	.350	II	3/8	2		25020	23.00	25020-C3	29.50		
	1/4	.466	II	1/2	2-1/2		25030	28.50	25030-C3	37.30	25030-C4	52.10
35°	1/8	.198	II	3/8	1-1/2		853508	22.10	853508-C3	28.00		
	1/8	.080	I	.200	1-1/2		978608	24.30	978608-C3	30.20		
	1/8	.171	II	3/8	1-1/2		25110	18.60	25110-C3	24.50	25110-C4	33.50
40°	1/8	.171	II	3/8	4	**LONG!**	937808	31.80	937808-C3	38.10		
	3/16	.257	II	3/8	2		25120	25.20	25120-C3	31.50		
	1/4	.343	II	3/8	2-1/2		25130	30.00	25130-C3	38.90		
	1/8	.151	II	3/8	1-1/2		997308	20.40	997308-C3	26.40	997308-C4	35.40
45°	3/16	.226	II	3/8	2		997312	26.40	997312-C3	33.00		
	1/4	.302	II	3/8	2-1/2		997316	33.00	997316-C3	41.90		
	1/8	.134	II	3/8	1-1/2		998408	20.60	998408-C3	26.50		
50°	3/16	.201	II	3/8	2		998412	26.90	998412-C3	33.10		
	1/4	.268	II	3/8	2-1/2		998416	33.60	998416-C3	41.70		

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

Pointed (cont.)

continued from previous page

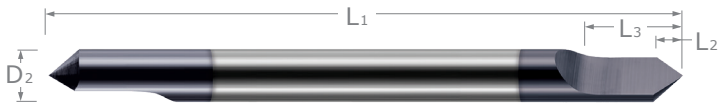
INCL. ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
55°	1/8	.120	II	3/8	1-1/2		855508	22.10	855508-C3	28.00		
60°	3 mm	2.60 mm	II	10 mm	38 mm		898657	20.20	898657-C3	26.20		
	1/8	.108	II	3/8	1-1/2		30010	17.70	30010-C3	23.70	30010-C4	32.70
	1/8	.108	II	3/8	4	**LONG!**	30410	30.10	30410-C3	36.40	30410-C4	45.70
	3/16	.162	II	3/8	2		30020	23.00	30020-C3	29.50	30020-C4	41.40
	3/16	.162	II	3/8	4	**LONG!**	30420	39.90	30420-C3	48.70		
	6 mm	5.20 mm	II	10 mm	63 mm		898666	33.10	898666-C3	41.20		
	1/4	.216	II	3/8	2-1/2		30030	28.50	30030-C3	37.30	30030-C4	52.10
	1/4	.216	II	3/8	6	**LONG!**	30430	57.30	30430-C3	69.20		
	3/8	.325	II	3/8	2-1/2		30040	41.90	30040-C3	53.40		
70°	1/8	.089	II	3/8	1-1/2		937208	20.60	937208-C3	26.50		
	3/16	.134	II	3/8	2		937212	26.90	937212-C3	33.10		
	1/4	.179	II	3/8	2-1/2		937216	33.60	937216-C3	42.70		
82°	1/8	.072	II	3/8	1-1/2		971708	20.60	971708-C3	26.50		
	3/16	.108	II	3/8	2		971712	26.90	971712-C3	33.10		
	1/4	.144	II	3/8	2-1/2		971716	33.60	971716-C3	42.70		
90°	3 mm	1.50 mm	II	10 mm	38 mm		884157	20.20	884157-C3	26.20		
	1/8	.062	II	3/8	1-1/2		30110	17.70	30110-C3	23.70	30110-C4	32.70
	1/8	.062	II	3/8	4	**LONG!**	30510	30.10	30510-C3	36.40		
	3/16	.093	II	3/8	2		30120	23.00	30120-C3	29.50	30120-C4	41.40
	3/16	.093	II	3/8	4	**LONG!**	30520	39.90	30520-C3	47.00		
	6 mm	3.00 mm	II	10 mm	63 mm		884166	33.10	884166-C3	41.20		
	1/4	.125	II	3/8	2-1/2		30130	28.50	30130-C3	37.30	30130-C4	52.10
	1/4	.125	II	3/8	6	**LONG!**	30530	57.30	30530-C3	69.20		
	3/8	.187	II	3/8	2-1/2		30140	41.90	30140-C3	53.40		
100°	1/8	.052	II	3/8	1-1/2		983508	20.60	983508-C3	26.50		
	3/16	.079	II	3/8	2		983512	26.90	983512-C3	33.50		
	1/4	.105	II	3/8	2-1/2		983516	33.60	983516-C3	41.70		
120°	1/8	.036	II	3/8	1-1/2		990508	17.70	990508-C3	23.70		
	3/16	.054	II	3/8	2		990512	23.00	990512-C3	29.30		
	1/4	.072	II	3/8	2-1/2		990516	28.50	990516-C3	37.30		

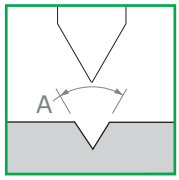


Check Out All of Our Engraving Solutions!

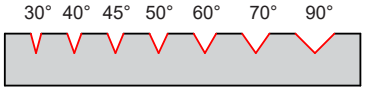
ENGRAVING CUTTERS

Pointed – Double-Ended





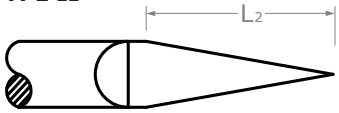
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Ground to a point
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Seven Included Angles!

INCLUDED ANGLE	DIA.	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	L_2		L_3	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
30°	1/8	.233	II	3/8	2	938408	30.70	938408-C3	38.00		
	3/16	.350	II	3/8	2	938410	38.20	938410-C3	47.00		
	1/4	.466	II	1/2	2-1/2	938412	45.50	938412-C3	54.10		
40°	1/8	.172	II	3/8	2	854008	34.30	854008-C3	40.20		
	3/16	.258	II	3/8	2	854010	42.50	854010-C3	48.70		
	1/4	.343	II	3/8	2-1/2	854012	50.40	854012-C3	58.50		
45°	1/8	.151	II	3/8	2	854508	34.30	854508-C3	41.90		
	3/16	.226	II	3/8	2	854510	42.00	854510-C3	48.30		
	1/4	.302	II	3/8	2-1/2	854512	50.40	854512-C3	62.20		
50°	1/8	.134	II	3/8	2	855008	34.70	855008-C3	40.60		
	3/16	.201	II	3/8	2	855010	42.00	855010-C3	48.30		
	1/4	.268	II	3/8	2-1/2	855012	50.40	855012-C3	62.20		
60°	1/8	.108	II	3/8	2	954608	30.70	954608-C3	38.00	954608-C4	54.50
	3/16	.162	II	3/8	2	954610	38.20	954610-C3	47.00		
	1/4	.216	II	3/8	2-1/2	954612	45.50	954612-C3	54.10		
70°	1/8	.089	II	3/8	2	857008	34.30	857008-C3	41.90		
	3/16	.134	II	3/8	2	857010	42.50	857010-C3	48.70		
	1/4	.179	II	3/8	2-1/2	857012	50.40	857012-C3	58.50		
90°	1/8	.062	II	3/8	2	975108	30.70	975108-C3	38.00	975108-C4	54.50
	3/16	.093	II	3/8	2	975110	38.20	975110-C3	47.00		
	1/4	.125	II	3/8	2-1/2	975112	45.50	975112-C3	54.10		

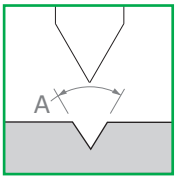
TYPE II



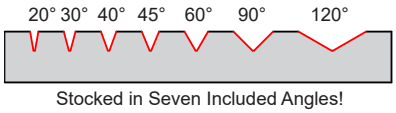
ENGRAVING CUTTERS

Pointed – Pyramid Point





- 3 facet design increases tip strength
- Ground to a point
- Solid carbide
- CNC ground in the USA



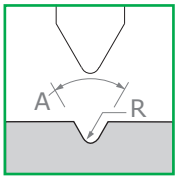
Stocked in Seven Included Angles!

INCLUDED ANGLE	DIAMETER	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	L_2	L_1	TOOL #	USD$	TOOL #	USD$
20°	1/8	.354	1-1/2	842810	31.20	842810-C3	37.20
	1/8	.354	2-1/2	716510	32.50	716510-C3	38.40
	3/16	.532	2	822010	34.00	822010-C3	40.70
	1/4	.709	2-1/2	834010	48.70	834010-C3	57.60
30°	1/8	.233	1-1/2	842815	31.20	842815-C3	37.20
	1/8	.233	2-1/2	716515	32.50	716515-C3	38.40
	3/16	.350	2	822015	34.00	822015-C3	40.70
	1/4	.467	2-1/2	834015	48.70	834015-C3	57.60
40°	1/8	.172	1-1/2	842820	31.20	842820-C3	37.20
	1/4	.343	2-1/2	834020	49.10	834020-C3	58.10
45°	1/8	.151	1-1/2	842823	31.20	842823-C3	37.20
	1/4	.302	2-1/2	834023	34.00	834023-C3	43.00
60°	1/8	.108	1-1/2	842830	31.20	842830-C3	37.20
	1/8	.108	2-1/2	716530	32.50	716530-C3	38.40
	3/16	.162	2	822030	34.00	822030-C3	40.70
	1/4	.217	2-1/2	834030	48.70	834030-C3	57.60
90°	1/8	.063	1-1/2	842845	31.20	842845-C3	37.20
	1/8	.063	2-1/2	716545	32.50	716545-C3	38.40
	3/16	.094	2	822045	34.00	822045-C3	40.70
	1/4	.125	2-1/2	834045	48.70	834045-C3	57.60
120°	1/8	.036	1-1/2	842860	31.60	842860-C3	37.50

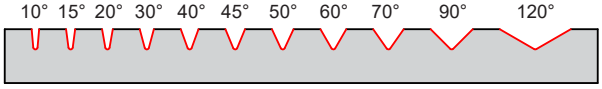
ENGRAVING CUTTERS

Tip Radius





- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide • CNC ground in the USA

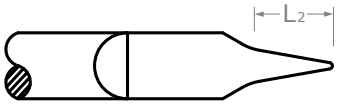


Stocked in Eleven Included Angles!

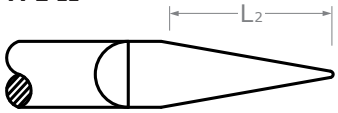
INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
10°	1/8	**.0050**	.080	I	.200	1-1/2		940410	29.60	940410-C3	35.50		
	1/8	**.0100**	.080	I	.200	1-1/2		948010	29.60	948010-C3	35.50		
15°	1/8	**.0050**	.080	I	.200	1-1/2		952910	29.60	952910-C3	35.50		
	1/8	**.0100**	.080	I	.200	1-1/2		963510	29.60	963510-C3	35.50		
20°	1/8	**.0050**	.080	I	.200	1-1/2		989310	29.60	989310-C3	35.50		
	1/8	**.0100**	.080	I	.200	1-1/2		956010	29.60	956010-C3	35.50		
30°	1/8	**.0025**	.226	II	3/8	1-1/2		72715	26.40	72715-C3	32.30	72715-C4	41.30
	1/8	**.0050**	.219	II	3/8	1-1/2		47510	26.40	47510-C3	32.30	47510-C4	41.30
	1/8	**.0100**	.207	II	3/8	1-1/2		48810	26.40	48810-C3	32.30	48810-C4	41.30
	1/8	**.0150**	.190	II	3/8	1-1/2		49710	26.40	49710-C3	32.30		
	1/8	**.0200**	.176	II	3/8	1-1/2		58610	26.40	58610-C3	32.30		
	1/8	**.0300**	.147	II	3/8	1-1/2		868910	26.40	868910-C3	32.30		
	3/16	**.0050**	.336	II	3/8	2		47520	32.30	47520-C3	38.90		
	3/16	**.0100**	.321	II	3/8	2		48820	32.30	48820-C3	38.50		
	1/4	**.0050**	.452	II	1/2	2-1/2		47530	45.50	47530-C3	53.60		
	1/4	**.0100**	.438	II	1/2	2-1/2		48830	45.50	48830-C3	54.20		
40°	1/8	**.0025**	.167	II	3/8	1-1/2		72720	27.70	72720-C3	33.60		
	1/8	**.0050**	.162	II	3/8	1-1/2		57610	27.70	57610-C3	33.60		
	1/8	**.0100**	.152	II	3/8	1-1/2		58210	27.70	58210-C3	33.60		
	1/8	**.0150**	.143	II	3/8	1-1/2		59310	27.70	59310-C3	33.60		
	1/8	**.0200**	.133	II	3/8	1-1/2		60510	27.70	60510-C3	33.60		
45°	1/8	**.0050**	.143	II	3/8	1-1/2		946502	29.20	946502-C3	35.10		
	1/8	**.0100**	.135	II	3/8	1-1/2		957910	29.20	957910-C3	35.10		
50°	1/8	**.0050**	.127	II	3/8	1-1/2		845010	29.40	845010-C3	35.30		
	1/8	**.0100**	.120	II	3/8	1-1/2		847210	29.40	847210-C3	35.30		
60°	1/8	**.0025**	.106	II	3/8	1-1/2		72730	26.40	72730-C3	32.30	72730-C4	41.30
	1/8	**.0050**	.103	II	3/8	1-1/2		48110	26.40	48110-C3	32.30	48110-C4	41.30
	1/8	**.0050**	.103	II	3/8	4	**LONG!**	974910	47.60	974910-C3	54.00		
	1/8	**.0075**	.101	II	3/8	1-1/2		967310	26.40	967310-C3	32.30		
	1/8	**.0100**	.098	II	3/8	1-1/2		49410	26.40	49410-C3	32.30	49410-C4	41.30
	1/8	**.0125**	.096	II	3/8	1-1/2		817110	26.40	817110-C3	32.30		
	1/8	**.0150**	.093	II	3/8	1-1/2		51710	26.40	51710-C3	32.30		
	1/8	**.0200**	.088	II	3/8	1-1/2		58910	26.40	58910-C3	32.30		
	1/8	**.0300**	.078	II	3/8	1-1/2		877010	26.40	877010-C3	32.30		

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

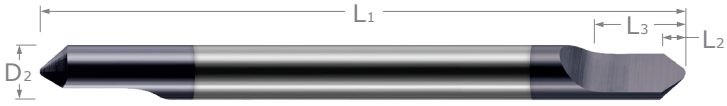
Tip Radius (cont.)

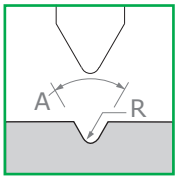
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INCL. ANGLE	DIA.	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	R	L_2		L_3	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
60°	3/16	.0025	.160	II	3/8	2		964830	32.30	964830-C3	38.90		
	3/16	.0050	.157	II	3/8	2		48120	32.30	48120-C3	38.90		
	3/16	.0075	.155	II	3/8	2		967320	32.30	967320-C3	38.50		
	3/16	.0100	.152	II	3/8	2		49420	32.30	49420-C3	38.90		
	3/16	.0150	.147	II	3/8	2		51720	32.30	51720-C3	38.50		
	3/16	.0200	.142	II	3/8	2		58920	32.30	58920-C3	38.50		
	1/4	.0025	.214	II	3/8	2-1/2		943730	35.50	943730-C3	43.60		
	1/4	.0050	.212	II	3/8	2-1/2		48130	35.50	48130-C3	44.20		
	1/4	.0075	.209	II	3/8	2-1/2		967330	35.50	967330-C3	43.60		
	1/4	.0100	.207	II	3/8	2-1/2		49430	35.50	49430-C3	44.20		
	1/4	.0150	.202	II	3/8	2-1/2		51730	35.50	51730-C3	44.20		
	1/4	.0200	.196	II	3/8	2-1/2		58930	35.50	58930-C3	44.20		
70°	1/8	.0050	.086	II	3/8	1-1/2		843810	29.20	843810-C3	35.10		
	1/8	.0100	.082	II	3/8	1-1/2		844710	29.40	844710-C3	35.30		
90°	1/8	.0025	.061	II	3/8	1-1/2		72745	26.40	72745-C3	32.30	72745-C4	41.30
	1/8	.0050	.060	II	3/8	1-1/2		48410	26.40	48410-C3	32.30	48410-C4	41.30
	1/8	.0050	.060	II	3/8	4	LONG!	986810	47.60	986810-C3	54.00		
	1/8	.0075	.059	II	3/8	1-1/2		959810	26.40	959810-C3	32.30		
	1/8	.0100	.058	II	3/8	1-1/2		49110	26.40	49110-C3	32.30	49110-C4	41.30
	1/8	.0125	.057	II	3/8	1-1/2		817010	26.90	817010-C3	32.80		
	1/8	.0150	.056	II	3/8	1-1/2		50810	26.40	50810-C3	32.30		
	1/8	.0200	.054	II	3/8	1-1/2		59910	26.40	59910-C3	32.30		
	1/8	.0300	.050	II	3/8	1-1/2		891410	26.40	891410-C3	32.30		
	3/16	.0025	.093	II	3/8	2		964845	32.30	964845-C3	38.50		
	3/16	.0050	.092	II	3/8	2		48420	32.30	48420-C3	38.50		
	3/16	.0100	.090	II	3/8	2		49120	32.30	49120-C3	38.50		
	3/16	.0150	.088	II	3/8	2		50820	32.30	50820-C3	38.50		
	3/16	.0200	.085	II	3/8	2		59920	32.30	59920-C3	38.90		
	1/4	.0025	.124	II	3/8	2-1/2		943745	35.50	943745-C3	44.20		
	1/4	.0050	.123	II	3/8	2-1/2		48430	35.50	48430-C3	44.20		
	1/4	.0100	.121	II	3/8	2-1/2		49130	35.50	49130-C3	44.20		
	1/4	.0150	.119	II	3/8	2-1/2		50830	35.50	50830-C3	43.60		
	1/4	.0200	.116	II	3/8	2-1/2		59930	35.50	59930-C3	44.20		
120°	1/8	.0050	.035	II	3/8	1-1/2		947310	26.90	947310-C3	32.80		
	1/8	.0100	.035	II	3/8	1-1/2		939110	26.40	939110-C3	32.30		

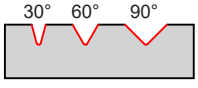
ENGRAVING CUTTERS

Tip Radius – Double-Ended





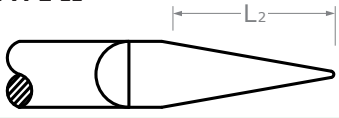
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Radius on tip creates radius in bottom of groove and improves strength
- Half-round drill style
- Relieved for right-hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Three Included Angles!

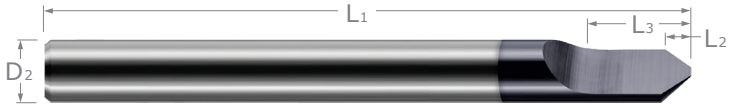
INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	R	L_2		L_3	L_1	TOOL #	USD$	TOOL #	USD$
30°	1/8	.0025	.226	II	3/8	2	842008	41.90	842008-C3	49.60
	1/8	.0050	.219	II	3/8	2	834408	41.90	834408-C3	49.60
	1/8	.0100	.205	II	3/8	2	835008	41.90	835008-C3	49.60
	1/8	.0150	.190	II	3/8	2	744508	42.40	744508-C3	48.30
	1/8	.0200	.176	II	3/8	2	836108	41.90	836108-C3	47.90
	1/4	.0050	.452	II	1/2	2-1/2	834416	55.60	834416-C3	63.70
	1/4	.0100	.438	II	1/2	2-1/2	835016	55.10	835016-C3	67.00
60°	1/8	.0025	.106	II	3/8	2	834708	41.90	834708-C3	49.60
	1/8	.0050	.103	II	3/8	2	828208	41.90	828208-C3	49.60
	1/8	.0100	.098	II	3/8	2	828808	41.90	828808-C3	49.60
	1/8	.0150	.093	II	3/8	2	743808	42.40	743808-C3	49.90
	1/8	.0200	.088	II	3/8	2	829908	41.90	829908-C3	49.60
	1/4	.0050	.212	II	3/8	2-1/2	828216	55.60	828216-C3	67.50
	1/4	.0100	.207	II	3/8	2-1/2	828816	55.10	828816-C3	67.00
90°	1/8	.0025	.061	II	3/8	2	828908	41.90	828908-C3	47.90
	1/8	.0050	.060	II	3/8	2	818308	41.90	818308-C3	49.60
	1/8	.0100	.058	II	3/8	2	818908	41.90	818908-C3	49.60
	1/8	.0150	.056	II	3/8	2	743208	42.40	743208-C3	49.90
	1/8	.0200	.054	II	3/8	2	820108	41.90	820108-C3	49.60
	1/4	.0050	.123	II	3/8	2-1/2	818316	55.10	818316-C3	67.00
	1/4	.0100	.121	II	3/8	2-1/2	818916	55.10	818916-C3	67.00

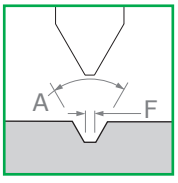
TYPE II



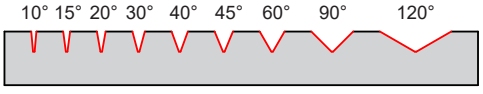
ENGRAVING CUTTERS

Tipped Off





- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

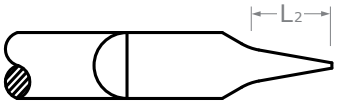


Stocked in Nine Included Angles!

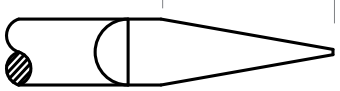
INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	F	L_2		L_3	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
10°	1/8	.005	.080	I	.200	1-1/2	993002	28.60	993002-C3	34.60		
	1/8	.010	.080	I	.200	1-1/2	993010	28.60	993010-C3	34.60		
	1/8	.020	.080	I	.200	1-1/2	993052	28.60	993052-C3	34.60		
15°	1/8	.005	.080	I	.200	1-1/2	990002	28.60	990002-C3	34.60		
	1/8	.010	.080	I	.200	1-1/2	990010	28.60	990010-C3	34.60		
	1/8	.020	.080	I	.200	1-1/2	990052	29.10	990052-C3	35.00		
20°	1/8	.005	.080	I	.200	1-1/2	987002	28.60	987002-C3	34.60		
	1/8	.010	.080	I	.200	1-1/2	987010	28.60	987010-C3	34.60		
	1/8	.020	.080	I	.200	1-1/2	987052	28.60	987052-C3	34.60		
30°	1/8	.005	.224	II	3/8	1-1/2	25202	20.10	25202-C3	26.10	25202-C4	35.10
	1/8	.010	.215	II	3/8	1-1/2	25210	20.10	25210-C3	26.10	25210-C4	35.10
	1/8	.015	.205	II	3/8	1-1/2	25242	20.10	25242-C3	26.10	25242-C4	35.10
	1/8	.020	.196	II	3/8	1-1/2	25252	20.10	25252-C3	26.10		
	1/8	.030	.177	II	3/8	1-1/2	25256	20.10	25256-C3	26.10		
	3/16	.010	.331	II	3/8	2	25220	26.40	25220-C3	32.60		
	3/16	.020	.313	II	3/8	2	25226	26.40	25226-C3	32.60		
	3/16	.030	.294	II	3/8	2	25224	26.40	25224-C3	32.60		
	1/4	.005	.457	II	1/2	2-1/2	25228	30.50	25228-C3	38.60		
	1/4	.010	.448	II	1/2	2-1/2	25230	30.50	25230-C3	39.40		
	1/4	.020	.429	II	1/2	2-1/2	25234	30.50	25234-C3	38.60		
	1/4	.030	.411	II	1/2	2-1/2	25236	30.50	25236-C3	38.60		
40°	1/8	.005	.165	II	3/8	1-1/2	25302	21.10	25302-C3	27.00		
	1/8	.010	.158	II	3/8	1-1/2	25310	21.10	25310-C3	27.00	25310-C4	36.00
	1/8	.015	.151	II	3/8	1-1/2	25342	21.10	25342-C3	27.00		
	1/8	.020	.144	II	3/8	1-1/2	25352	21.10	25352-C3	27.00		
	3/16	.010	.244	II	3/8	2	25320	28.20	25320-C3	34.50		
	1/4	.005	.337	II	3/8	2-1/2	25328	32.30	25328-C3	40.40		
	1/4	.010	.330	II	3/8	2-1/2	25330	32.30	25330-C3	41.10		

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

Tipped Off (cont.)

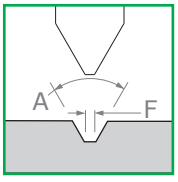
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INCL. ANGLE	DIA.	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OAL		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A	D_2	F	L_2		L_3	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
45°	1/8	.005	.145	II	3/8	1-1/2		955002	22.10	955002-C3	28.00		
	1/8	.010	.139	II	3/8	1-1/2		955010	22.10	955010-C3	28.00		
	3/16	.010	.214	II	3/8	2		955020	29.40	955020-C3	35.60		
	1/4	.010	.290	II	3/8	2-1/2		955030	34.00	955030-C3	42.10		
60°	1/8	.005	.104	II	3/8	1-1/2		50710	20.10	50710-C3	26.10	50710-C4	35.10
	1/8	.005	.104	II	3/8	4	LONG!	823602	20.10	823602-C3	33.80		
	1/8	.010	.099	II	3/8	1-1/2		30210	20.10	30210-C3	26.10	30210-C4	35.10
	1/8	.015	.095	II	3/8	1-1/2		18242	20.10	18242-C3	26.10		
	1/8	.020	.091	II	3/8	1-1/2		26910	20.10	26910-C3	26.10	26910-C4	35.10
	1/8	.025	.087	II	3/8	1-1/2		793055	20.70	793055-C3	26.60		
	1/8	.030	.082	II	3/8	1-1/2		27610	20.10	27610-C3	26.10	27610-C4	35.10
	3/16	.005	.158	II	3/8	2		50720	26.40	50720-C3	32.60		
	3/16	.005	.158	II	3/8	4	LONG!	823618	26.40	823618-C3	33.50		
	3/16	.010	.153	II	3/8	2		30220	26.40	30220-C3	33.00		
	3/16	.020	.145	II	3/8	2		26920	26.40	26920-C3	33.00		
	3/16	.030	.136	II	3/8	2		27620	26.40	27620-C3	33.00		
	1/4	.005	.212	II	3/8	2-1/2		50730	30.50	50730-C3	39.40		
	1/4	.005	.212	II	3/8	6	LONG!	823628	30.50	823628-C3	40.50		
	1/4	.010	.207	II	3/8	2-1/2		30230	30.50	30230-C3	39.40	30230-C4	51.90
	1/4	.015	.204	II	3/8	2-1/2		18232	30.50	18232-C3	38.60		
	1/4	.020	.199	II	3/8	2-1/2		26930	30.50	26930-C3	39.40		
	1/4	.030	.191	II	3/8	2-1/2		27630	30.50	27630-C3	39.40		
90°	1/8	.005	.060	II	3/8	1-1/2		30302	20.10	30302-C3	26.10		
	1/8	.010	.057	II	3/8	1-1/2		30310	20.10	30310-C3	26.10	30310-C4	35.10
	1/8	.015	.055	II	3/8	1-1/2		30342	20.10	30342-C3	26.10		
	1/8	.020	.053	II	3/8	1-1/2		30352	20.10	30352-C3	26.10		
	1/8	.030	.048	II	3/8	1-1/2		30356	20.10	30356-C3	26.10		
	3/16	.010	.088	II	3/8	2		30320	26.40	30320-C3	33.00		
	3/16	.020	.084	II	3/8	2		30324	26.40	30324-C3	32.60		
	3/16	.030	.079	II	3/8	2		30326	26.40	30326-C3	32.60		
	1/4	.005	.123	II	3/8	2-1/2		30328	30.50	30328-C3	39.40	30328-C4	51.90
	1/4	.010	.120	II	3/8	2-1/2		30330	30.50	30330-C3	39.40		
	1/4	.020	.115	II	3/8	2-1/2		30334	31.20	30334-C3	39.30		
	1/4	.030	.110	II	3/8	2-1/2		30336	30.50	30336-C3	37.00		
120°	1/8	.005	.035	II	3/8	1-1/2		954102	20.10	954102-C3	26.10		
	1/8	.010	.033	II	3/8	1-1/2		954110	20.10	954110-C3	26.10		

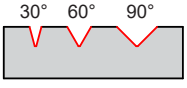
ENGRAVING CUTTERS

Tipped Off – Double-Ended





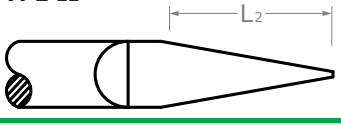
- Double-ended
- 180° opposing split lengths for improved balance at higher RPMs
- Tipped off end diameter for improved cutting
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



Stocked in Three Included Angles!

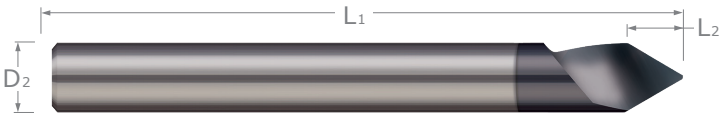
INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	TYPE	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A	D_2	F	L_2		L_3	L_1	TOOL #	USD$	TOOL #	USD$
30°	1/8	**.005**	.224	II	3/8	2	834308	35.50	834308-C3	43.00
	1/8	**.010**	.215	II	3/8	2	834908	35.50	834908-C3	43.00
	1/8	**.015**	.205	II	3/8	2	835508	35.50	835508-C3	41.40
	1/8	**.020**	.196	II	3/8	2	836208	35.50	836208-C3	41.40
	1/4	**.010**	.448	II	1/2	2-1/2	834916	50.80	834916-C3	58.90
60°	1/8	**.005**	.104	II	3/8	2	828108	35.50	828108-C3	43.00
	1/8	**.010**	.100	II	3/8	2	828708	35.50	828708-C3	43.00
	1/8	**.015**	.095	II	3/8	2	829308	35.50	829308-C3	43.00
	1/8	**.020**	.091	II	3/8	2	829808	35.80	829808-C3	41.70
	1/4	**.010**	.208	II	3/8	2-1/2	828716	50.30	828716-C3	62.00
90°	1/8	**.005**	.060	II	3/8	2	818208	35.50	818208-C3	43.00
	1/8	**.010**	.058	II	3/8	2	818808	35.50	818808-C3	41.40
	1/8	**.015**	.055	II	3/8	2	819408	35.80	819408-C3	41.70
	1/8	**.020**	.053	II	3/8	2	820008	35.80	820008-C3	43.40
	1/4	**.010**	.120	II	3/8	2-1/2	818816	50.30	818816-C3	62.00

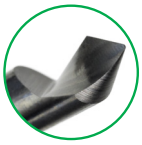
TYPE II



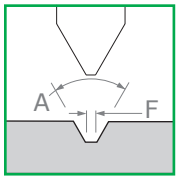
ENGRAVING CUTTERS

Tipped Off – Helical Flute

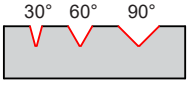




Spiral flute for soft materials



- Optimized geometry for superior engraving in softer materials such as plastics and aluminum
- Also excellent for stainless steel, Inconel, titanium, and other high temp alloys
- Free cutting action provides excellent surface finish and chip evacuation
- Tipped-off end diameter for improved cutting action
- AlTiN coating for increased performance in ferrous materials
- TiB_2 coating for outstanding performance in non-ferrous materials due to its extremely low affinity to aluminum
- Right hand spiral, right hand cut
- Solid carbide
- CNC ground in the USA

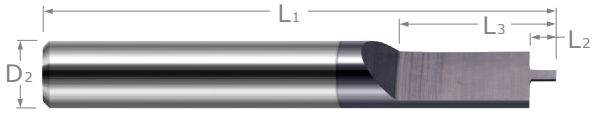


Stocked in Three Included Angles!

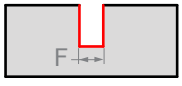
INCLUDED ANGLE	DIAMETER	FLAT ON PART	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A	D_2	F	L_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
30°	1/8	**.010**	.215	2	779008	22.00	779008-C3	27.90	779008-C8	30.90
	1/4	**.010**	.448	2-1/2	779016	33.60	779016-C3	41.70	779016-C8	44.70
60°	1/8	**.005**	.104	1-1/2	764708	22.00	764708-C3	27.90	764708-C8	30.90
	1/8	**.010**	.100	1-1/2	824708	22.00	824708-C3	27.90	824708-C8	29.70
	3/16	**.010**	.154	2	824712	28.50	824712-C3	34.80	824712-C8	37.20
	1/4	**.010**	.208	2-1/2	824716	33.60	824716-C3	39.90	824716-C8	43.50
90°	1/8	**.010**	.058	1-1/2	814708	22.00	814708-C3	27.90	814708-C8	29.70
	3/16	**.010**	.089	2	814712	29.00	814712-C3	35.20	814712-C8	37.60
	1/4	**.010**	.120	2-1/2	814716	33.60	814716-C3	42.60	814716-C8	44.70

ENGRAVING CUTTERS

Parallel – Square



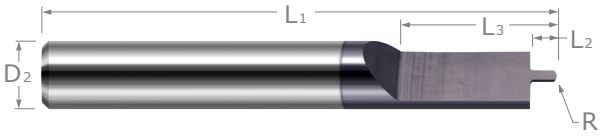
- Engraves a 90° vertical wall
- Flat (F) represents flat generated in workpiece
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA



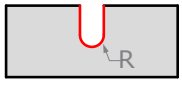
DIAMETER	FLAT ON PART	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	F	L_2	L_3	L_1	TOOL #	USD$	TOOL #	USD$
1/8	**.030**	.044	3/8	1-1/2	844230	22.70	844230-C3	28.60
1/8	**.060**	.090	3/8	1-1/2	844260	23.00	844260-C3	29.00
1/8	**.090**	.135	3/8	1-1/2	844290	23.00	844290-C3	29.00
3/16	**.060**	.090	3/8	2	827260	29.60	827260-C3	35.80
3/16	**.090**	.135	3/8	2	827290	29.60	827290-C3	35.80
3/16	**.125**	.190	1/2	2	827308	29.60	827308-C3	35.80
1/4	**.060**	.090	3/8	2-1/2	838960	34.40	838960-C3	42.50
1/4	**.090**	.135	3/8	2-1/2	838990	34.40	838990-C3	42.50
1/4	**.125**	.190	1/2	2-1/2	839008	34.40	839008-C3	42.50

ENGRAVING CUTTERS

Parallel – Ball



- Engraves a 90° vertical wall
- Radius on tip creates radius in the bottom of groove and improves strength
- Half-round drill style
- Non-cutting transition radius at end of length of cut
- Relieved for right hand milling
- Solid carbide
- CNC ground in the USA

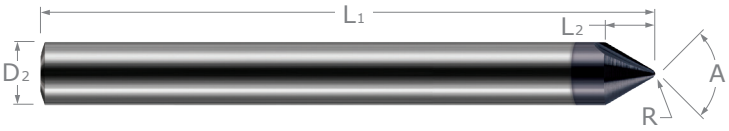


DIAMETER	RADIUS	LENGTH OF CUT	SPLIT LENGTH	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_2	R	L_2	L_3	L_1	TOOL #	USD$	TOOL #	USD$
1/8	**.0150**	.044	3/8	1-1/2	828530	25.50	828530-C3	31.50
1/8	**.0300**	.090	3/8	1-1/2	828560	25.50	828560-C3	31.50
1/8	**.0450**	.135	3/8	1-1/2	828590	25.70	828590-C3	31.70
3/16	**.0300**	.090	3/8	2	832660	32.30	832660-C3	38.50
3/16	**.0450**	.135	3/8	2	832690	32.30	832690-C3	38.50
3/16	**.0625**	.190	1/2	2	832708	32.30	832708-C3	38.50
1/4	**.0300**	.090	3/8	2-1/2	841360	37.40	841360-C3	45.50
1/4	**.0450**	.135	3/8	2-1/2	841390	37.40	841390-C3	45.50
1/4	**.0625**	.190	1/2	2-1/2	841408	37.40	841408-C3	45.50

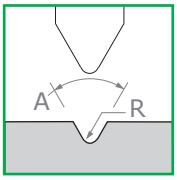
NEW SIZES!

ENGRAVING CUTTERS

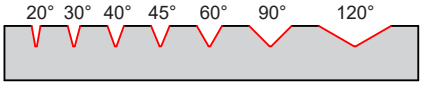
Tip Radius – 2 Flute – For Hardened Steels




2 Shallow Flute Design



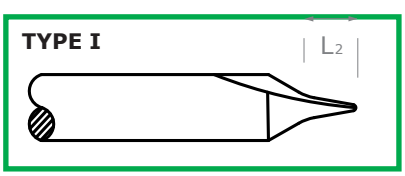
- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tip radius end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

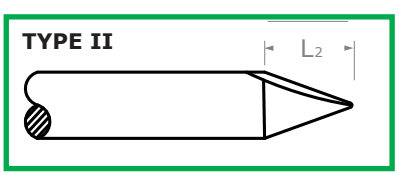


Stocked in Seven Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED		
A +0°30' −0°30'	D_2	R	L_2		L_1	2 FL	USD$	
20°	1/8	.0050	.080	I	1-1/2	873308-C6	37.20	
	1/8	.0075	.080	I	1-1/2	724908-C6	37.20	
	1/8	.0100	.080	I	1-1/2	857508-C6	37.20	
	1/8	.0150	.080	I	1-1/2	763308-C6	37.20	
	1/8	.0200	.080	I	1-1/2	724708-C6	37.20	
	1/4	.0100	.080	I	2-1/2	857516-C6	57.30	
30°	1/8	.0050	.218	II	1-1/2	858308-C6	35.70	
	1/8	.0075	.211	II	1-1/2	825508-C6	35.70	
	1/8	.0100	.204	II	1-1/2	851208-C6	35.70	
	1/8	.0150	.190	II	1-1/2	821208-C6	35.70	
	1/8	.0200	.175	II	1-1/2	843708-C6	35.70	
	1/8	.0250	.161	II	1-1/2	821008-C6	35.70	
	1/8	.0300	.147	II	1-1/2	692008-C6	35.70	NEW
	3/16	.0050	.335	II	2	858312-C6	43.70	
	3/16	.0100	.331	II	2	851212-C6	43.70	
	1/4	.0050	.452	II	2-1/2	858316-C6	54.90	
	1/4	.0100	.437	II	2-1/2	851216-C6	54.90	
	1/4	.0200	.409	II	2-1/2	843716-C6	54.90	
40°	1/8	.0050	.162	II	1-1/2	837508-C6	37.20	
	1/8	.0100	.152	II	1-1/2	859308-C6	37.20	
	1/4	.0100	.324	II	2-1/2	859316-C6	57.30	
45°	1/8	.0050	.142	II	1-1/2	825808-C6	37.20	
	1/8	.0100	.152	II	1-1/2	825708-C6	37.20	
	1/8	.0150	.126	II	1-1/2	756608-C6	37.50	
	1/4	.0100	.285	II	2-1/2	825716-C6	57.90	

continued on next page





ENGRAVING CUTTERS

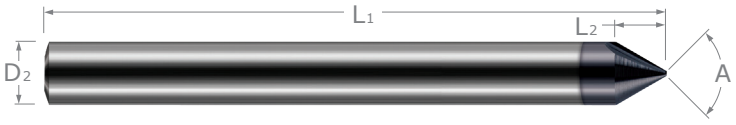
Tip Radius – 2 Flute – For Hardened Steels (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+0°30'}_{-0°30'}$	D_2	R	L_2		L_1	2 FL	USD$
60°	1/8	**.0050**	.103	II	1-1/2	860008-C6	35.70
	1/8	**.0075**	.100	II	1-1/2	838108-C6	35.70
	1/8	**.0100**	.098	II	1-1/2	877308-C6	35.70
	1/8	**.0150**	.093	II	1-1/2	849008-C6	35.70
	1/8	**.0200**	.088	II	1-1/2	845808-C6	36.00
	1/8	**.0250**	.083	II	1-1/2	820908-C6	36.00
NEW	1/8	**.0300**	.078	II	1-1/2	691908-C6	36.00
	3/16	**.0050**	.157	II	2	860012-C6	43.70
	3/16	**.0100**	.152	II	2	877312-C6	44.00
	3/16	**.0150**	.147	II	2	849012-C6	44.00
	1/4	**.0050**	.211	II	2-1/2	860016-C6	54.90
	1/4	**.0075**	.209	II	2-1/2	838116-C6	55.40
	1/4	**.0100**	.206	II	2-1/2	877316-C6	54.90
	1/4	**.0150**	.201	II	2-1/2	849016-C6	54.90
	1/4	**.0200**	.196	II	2-1/2	845816-C6	54.90
90°	1/8	**.0050**	.060	II	1-1/2	853108-C6	35.70
	1/8	**.0075**	.058	II	1-1/2	825908-C6	35.70
	1/8	**.0100**	.058	II	1-1/2	869408-C6	35.70
	1/8	**.0150**	.056	II	1-1/2	821108-C6	35.70
	1/8	**.0200**	.054	II	1-1/2	837108-C6	36.00
	1/8	**.0250**	.052	II	1-1/2	820808-C6	35.70
	3/16	**.0050**	.091	II	2	853112-C6	43.70
	3/16	**.0100**	.089	II	2	869412-C6	43.70
	1/4	**.0050**	.122	II	2-1/2	853116-C6	54.90
	1/4	**.0100**	.120	II	2-1/2	869416-C6	54.90
	1/4	**.0200**	.116	II	2-1/2	837116-C6	54.90
120°	1/8	**.0050**	.035	II	1-1/2	762908-C6	36.00
	1/8	**.0100**	.034	II	1-1/2	762408-C6	35.70

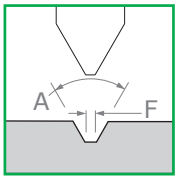
ENGRAVING CUTTERS

Tipped Off – 2 Flute – For Hardened Steels

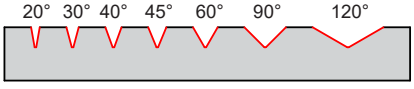




2 Shallow
Flute Design



- **Strong 2 flute design for engraving hardened steels 46–68Rc**
- Eccentric relief increases durability and tool life
- Tipped off end diameter and shallow flute design for improved cutting and strength
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Solid carbide
- CNC ground in the USA

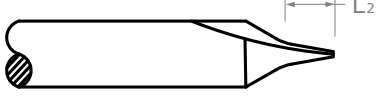


Stocked in Seven Included Angles!

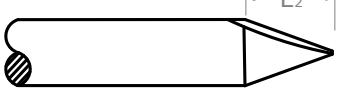
INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A +0°30' −0°30'	D_2	F	L_2		L_1	2 FL	USD$
20°	1/8	**.005**	.080	I	1-1/2	775008-C6	30.10
	1/8	**.010**	.080	I	1-1/2	892508-C6	30.10
	1/4	**.010**	.080	I	2-1/2	892516-C6	48.70
30°	1/8	**.005**	.223	II	1-1/2	896708-C6	28.60
	1/8	**.008**	.218	II	1-1/2	763908-C6	29.10
	1/8	**.010**	.214	II	1-1/2	882008-C6	28.60
	1/8	**.015**	.205	II	1-1/2	817908-C6	28.60
	1/8	**.020**	.195	II	1-1/2	879608-C6	28.60
	1/8	**.030**	.177	II	1-1/2	817608-C6	28.60
	3/16	**.010**	.331	II	2	882012-C6	34.90
	1/4	**.010**	.447	II	2-1/2	882016-C6	46.40
40°	1/8	**.005**	.164	I	1-1/2	811708-C6	30.50
	1/8	**.010**	.157	II	1-1/2	875108-C6	30.10
	1/4	**.010**	.329	II	2-1/2	875116-C6	48.70
45°	1/8	**.005**	.144	II	1-1/2	811608-C6	30.50
	1/8	**.010**	.138	II	1-1/2	811508-C6	30.50
60°	1/8	**.005**	.103	II	1-1/2	866708-C6	28.60
	1/8	**.008**	.101	II	1-1/2	762508-C6	29.10
	1/8	**.010**	.099	II	1-1/2	889608-C6	28.60
	1/8	**.015**	.095	II	1-1/2	868108-C6	28.60
	1/8	**.020**	.090	II	1-1/2	892308-C6	28.60
	1/8	**.030**	.082	II	1-1/2	817508-C6	28.60
	3/16	**.005**	.158	II	2	866712-C6	35.20
	3/16	**.010**	.153	II	2	889612-C6	35.20
	1/4	**.005**	.212	II	2-1/2	866716-C6	46.40
	1/4	**.010**	.207	II	2-1/2	889616-C6	46.40
	1/4	**.020**	.199	II	2-1/2	892316-C6	46.40
	1/4	**.030**	.190	II	2-1/2	817516-C6	46.40

continued on next page

TYPE I



TYPE II



ENGRAVING CUTTERS

Tipped Off – 2 Flute – For Hardened Steels (cont.)

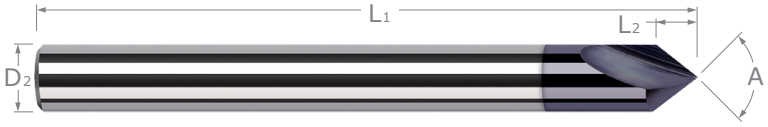
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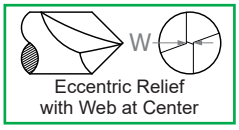
INCLUDED ANGLE	DIAMETER	TIP FLAT	LENGTH OF CUT	TYPE	OVERALL LENGTH	AlTiN NANO COATED	
A $^{+0°30'}_{-0°30'}$	D_2	F	L_2		L_1	2 FL	USD$
90°	1/8	**.005**	.060	II	1-1/2	880908-C6	28.60
	1/8	**.010**	.057	II	1-1/2	876508-C6	28.60
	1/8	**.015**	.055	II	1-1/2	817708-C6	28.60
	1/8	**.020**	.052	II	1-1/2	868408-C6	28.60
	1/8	**.030**	.047	II	1-1/2	817408-C6	29.10
	3/16	**.005**	.091	II	2	880912-C6	35.20
	3/16	**.010**	.088	II	2	876512-C6	34.90
	1/4	**.005**	.122	II	2-1/2	880916-C6	46.70
	1/4	**.010**	.120	II	2-1/2	876516-C6	46.40
120°	1/8	**.010**	.033	II	1-1/2	865308-C6	28.60
	1/4	**.010**	.069	II	2-1/2	865316-C6	46.70

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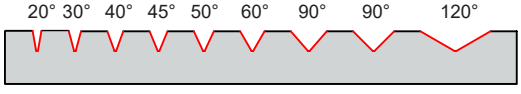
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials





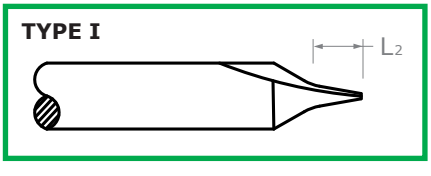
- **Designed for milling legible part numbers in difficult-to-machine materials**
- Burr-free, two flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half-round style engravers
- Requires less RPM than half-round engravers
- Solid carbide
- CNC ground in the USA

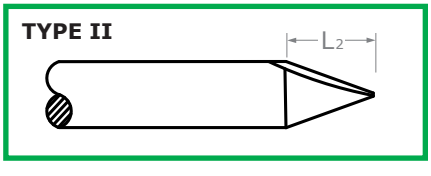


Stocked in Nine Included Angles

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	TYPE	OAL	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2		L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
20°	1/8	.005	.171	I	1-1/2	744608	24.60	744608-C3	30.50		
	1/8	.010	.171	I	1-1/2	743308	24.60	743308-C3	30.50		
30°	1/8	.003	.228	II	1-1/2	923908	22.10	923908-C3	28.00		
	1/8	.005	.224	II	1-1/2	47708	22.10	47708-C3	28.00	47708-C4	37.10
	1/8	.010	.215	II	1-1/2	996108	22.10	996108-C3	28.00		
	1/8	.015	.205	II	1-1/2	954008	22.10	954008-C3	28.00		
	3/16	.003	.344	II	2	923912	27.50	923912-C3	34.00		
	3/16	.005	.341	II	2	47712	27.50	47712-C3	33.70		
	3/16	.010	.331	II	2	996112	27.50	996112-C3	33.70		
	1/4	.003	.461	II	2-1/2	923916	38.60	923916-C3	47.40		
	1/4	.005	.457	II	2-1/2	47716	38.60	47716-C3	47.40		
	1/4	.010	.448	II	2-1/2	996116	38.60	996116-C3	47.40		
40°	1/8	.005	.165	II	1-1/2	995508	24.40	995508-C3	30.30	995508-C4	39.30
	1/8	.010	.158	II	1-1/2	996708	24.40	996708-C3	30.30		
	3/16	.005	.251	II	2	995512	30.90	995512-C3	37.40		
	3/16	.010	.244	II	2	996712	30.90	996712-C3	37.40		
	1/4	.005	.337	II	2-1/2	995516	43.20	995516-C3	52.20		
	1/4	.010	.330	II	2-1/2	996716	43.70	996716-C3	52.60		
45°	1/8	.005	.145	II	1-1/2	987408	24.00	987408-C3	29.90		
	3/16	.005	.220	II	2	987412	30.90	987412-C3	37.40		
	1/4	.005	.296	II	2-1/2	987416	43.20	987416-C3	52.20		
50°	1/8	.005	.129	II	1-1/2	976608	24.40	976608-C3	30.30		
	3/16	.005	.196	II	2	976612	31.00	976612-C3	37.30		
	1/4	.005	.263	II	2-1/2	976616	43.10	976616-C3	52.10		

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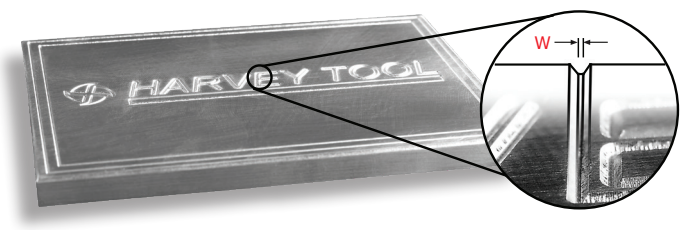
ENGRAVING CUTTERS

Marking Cutters for Ferrous Materials (cont.)

continued from previous page

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	TYPE	OAL		UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
A $^{+1°}_{-1°}$	D_2	W	L_2		L_1		2 FL	USD$	2 FL	USD$	2 FL	USD$
	1/8	.003	.106	II	1-1/2		905708	22.10	905708-C3	28.00		
	1/8	.005	.104	II	1-1/2		29608	22.10	29608-C3	28.00	29608-C4	37.10
	1/8	.005	.104	II	3	LONG!	957808	27.10	957808-C3	33.00		
	1/8	.010	.100	II	1-1/2		48308	22.10	48308-C3	28.00	48308-C4	37.10
60°	1/8	.015	.095	II	1-1/2		948108	22.10	948108-C3	28.00		
	3/16	.003	.160	II	2		905712	27.50	905712-C3	34.00		
	3/16	.005	.158	II	2		29612	27.50	29612-C3	34.00	29612-C4	44.20
	3/16	.010	.154	II	2		48312	27.50	48312-C3	34.00		
	3/16	.015	.149	II	2		948112	27.50	948112-C3	34.00		
	1/4	.003	.214	II	2-1/2		905716	38.60	905716-C3	47.40		
	1/4	.005	.212	II	2-1/2		29616	38.60	29616-C3	47.40	29616-C4	60.00
60°	1/4	.010	.208	II	2-1/2		48316	38.60	48316-C3	47.40		
	1/4	.015	.204	II	2-1/2		948116	38.60	948116-C3	47.40		
	3/8	.005	.320	II	2-1/2		29624	48.90	29624-C3	60.30		
82°	1/8	.005	.069	II	1-1/2		974108	24.40	974108-C3	30.30		
	1/8	.003	.061	II	1-1/2		914608	22.10	914608-C3	28.00		
	1/8	.005	.060	II	1-1/2		23608	22.10	23608-C3	28.00	23608-C4	37.10
	1/8	.005	.060	II	3	LONG!	968108	27.10	968108-C3	33.00		
	1/8	.010	.058	II	1-1/2		50408	22.10	50408-C3	28.00	50408-C4	37.10
	1/8	.015	.055	II	1-1/2		939708	22.10	939708-C3	28.00		
	3/16	.003	.092	II	2		914612	27.50	914612-C3	34.00		
	3/16	.005	.091	II	2		23612	27.50	23612-C3	34.00	23612-C4	44.20
90°	3/16	.010	.089	II	2		50412	27.50	50412-C3	34.00		
	3/16	.015	.086	II	2		939712	27.50	939712-C3	34.00		
	1/4	.003	.124	II	2-1/2		914616	38.60	914616-C3	47.40		
	1/4	.005	.123	II	2-1/2		23616	38.60	23616-C3	47.40	23616-C4	60.00
	1/4	.010	.120	II	2-1/2		50416	38.60	50416-C3	47.40		
	1/4	.015	.118	II	2-1/2		939716	38.60	939716-C3	46.70		
	3/8	.005	.185	II	2-1/2		23600	48.90	23600-C3	60.30		
	1/8	.003	.035	II	1-1/2		844808	22.10	844808-C3	28.00		
	1/8	.005	.035	II	1-1/2		23708	22.10	23708-C3	28.00	23708-C4	37.10
	1/8	.010	.033	II	1-1/2		998808	22.60	998808-C3	28.50		
120°	3/16	.005	.053	II	2		23712	27.50	23712-C3	34.00		
	3/16	.010	.051	II	2		998812	27.50	998812-C3	33.70		
	1/4	.005	.071	II	2-1/2		23716	38.60	23716-C3	47.40		
	1/4	.010	.069	II	2-1/2		998816	38.60	998816-C3	46.70		

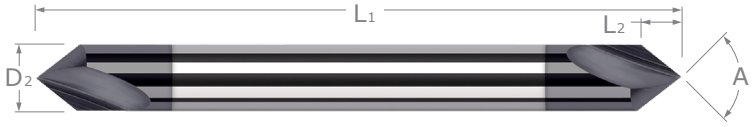
For Marking Cutters for Non-Ferrous Materials, please see page 384.

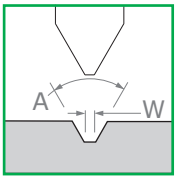


Produces Flat in Bottom of Groove

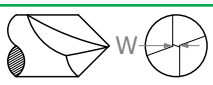
ENGRAVING CUTTERS

Marking Cutters – Double-Ended

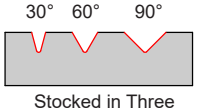




- Double-ended
- Designed for milling legible part numbers in difficult-to-machine materials
- Burr free 2 flute cutting design has improved strength over single point engravers
- Produces flat in bottom of groove
- Eccentric relief improves durability over half round style engravers
- Requires less RPM than half round engravers
- Solid carbide
- CNC ground in the USA



Flat Relief with Web at Center

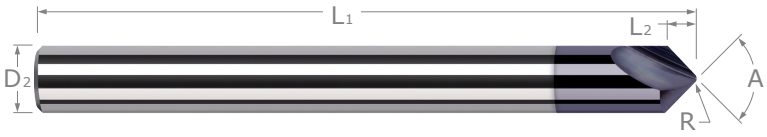


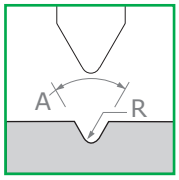
Stocked in Three Included Angles!

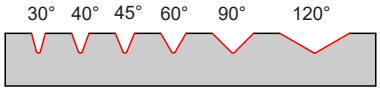
INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1	2 FL	USD$	2 FL	USD$
30°	1/8	.005	.224	1-1/2	713808	38.10	713808-C3	44.00
	1/8	.010	.215	1-1/2	713508	38.10	713508-C3	44.00
60°	1/8	.005	.104	1-1/2	713708	38.10	713708-C3	44.00
	1/8	.010	.100	1-1/2	713408	38.10	713408-C3	44.00
90°	1/8	.005	.060	1-1/2	713608	38.10	713608-C3	44.00
	1/8	.010	.058	1-1/2	713308	38.10	713308-C3	44.00

ENGRAVING CUTTERS

Marking Cutters – Tip Radius







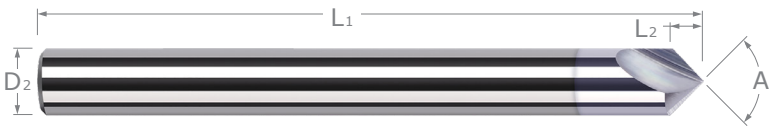
Stocked in Six Included Angles!

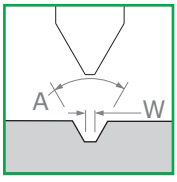
- **Designed for milling legible part numbers in difficult-to-machine materials**
- Radiused tip design for improved strength
- 2 flute cutting design has improved strength over single point engravers
- Produces radius in bottom of groove
- Solid carbide • CNC ground in the USA

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	USD$	2 FL	USD$
30°	1/8	.0050	.218	1-1/2	987615	27.30	987615-C3	33.20
	1/8	.0100	.204	1-1/2	961915	27.30	961915-C3	33.20
	1/8	.0150	.190	1-1/2	981815	27.30	981815-C3	33.20
	3/16	.0050	.335	2	958715	34.00	958715-C3	40.50
	3/16	.0100	.321	2	947215	33.30	947215-C3	39.80
	1/4	.0050	.452	2-1/2	966815	44.70	966815-C3	53.50
	1/4	.0100	.437	2-1/2	954915	44.70	954915-C3	53.50
40°	1/8	.0050	.162	1-1/2	987640	30.60	987640-C3	36.50
	1/8	.0100	.152	1-1/2	961940	30.60	961940-C3	36.50
	1/8	.0150	.142	1-1/2	981820	30.60	981820-C3	36.50
45°	1/8	.0050	.143	1-1/2	987622	30.60	987622-C3	36.50
	1/8	.0100	.135	1-1/2	961922	30.60	961922-C3	36.50
60°	1/8	.0050	.103	1-1/2	987630	27.30	987630-C3	33.20
	1/8	.0075	.100	1-1/2	926330	27.30	926330-C3	33.20
	1/8	.0100	.098	1-1/2	961930	27.30	961930-C3	33.20
	1/8	.0150	.093	1-1/2	981830	27.30	981830-C3	33.20
	1/8	.0200	.088	1-1/2	918430	27.30	918430-C3	33.20
	3/16	.0050	.157	2	958730	33.30	958730-C3	39.80
	3/16	.0100	.152	2	947230	33.30	947230-C3	39.80
	3/16	.0150	.147	2	914330	33.30	914330-C3	39.80
	1/4	.0050	.211	2-1/2	966830	44.70	966830-C3	53.50
	1/4	.0100	.206	2-1/2	954930	44.70	954930-C3	53.50
	1/4	.0150	.201	2-1/2	909730	44.70	909730-C3	53.50
	1/4	.0200	.197	2-1/2	831430	44.70	831430-C3	52.80
90°	1/8	.0050	.060	1-1/2	987645	27.30	987645-C3	33.20
	1/8	.0075	.059	1-1/2	926345	27.30	926345-C3	33.20
	1/8	.0100	.058	1-1/2	961945	27.30	961945-C3	33.20
	1/8	.0150	.056	1-1/2	981845	27.30	981845-C3	33.20
	1/8	.0200	.054	1-1/2	918445	27.30	918445-C3	33.20
	3/16	.0050	.091	2	958745	33.30	958745-C3	39.80
	3/16	.0100	.089	2	947245	33.30	947245-C3	39.80
	3/16	.0150	.087	2	914345	33.30	914345-C3	39.50
	1/4	.0050	.122	2-1/2	966845	44.70	966845-C3	53.50
	1/4	.0075	.122	2-1/2	830745	45.60	830745-C3	53.70
	1/4	.0100	.120	2-1/2	954945	44.70	954945-C3	53.50
	1/4	.0150	.118	2-1/2	909745	44.70	909745-C3	53.50
	1/4	.0200	.117	2-1/2	831445	44.70	831445-C3	53.50
120°	1/8	.0050	.035	1-1/2	987660	27.30	987660-C3	33.20
	1/8	.0100	.034	1-1/2	961960	27.80	961960-C3	33.70

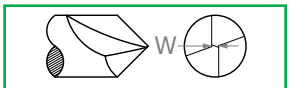
ENGRAVING CUTTERS

Marking Cutters for Non-Ferrous Materials

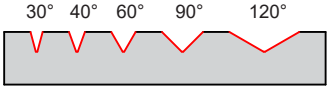




- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- 2 flute cutting design has improved strength over single point engravers
- Flat relief design for improved results in aluminum and other non-ferrous applications
- Produces flat in bottom of groove
- Solid carbide
- CNC ground in the USA



Flat Relief with Web at Center

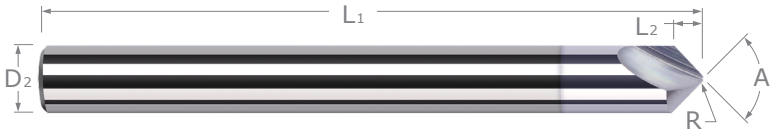


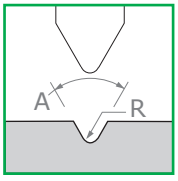
Stocked in Five Included Angles!

INCLUDED ANGLE	DIAMETER	WEB THICKNESS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	W	L_2	L_1	2 FL	USD$	2 FL	USD$
30°	1/8	**.005**	.230	1-1/2	993215	22.10	993215-C8	29.80
	1/8	**.010**	.228	1-1/2	963215	22.10	963215-C8	29.80
	1/8	**.015**	.225	1-1/2	902915	22.10	902915-C8	29.80
	3/16	**.005**	.347	2	987815	27.50	987815-C8	36.10
	1/4	**.005**	.461	2-1/2	967415	38.60	967415-C8	48.60
40°	1/8	**.005**	.170	1-1/2	993220	24.40	993220-C8	32.10
	1/8	**.010**	.168	1-1/2	963220	24.40	963220-C8	32.10
	3/16	**.005**	.255	2	987820	28.60	987820-C8	37.30
	1/4	**.005**	.339	2-1/2	967420	39.90	967420-C8	51.00
60°	1/8	**.005**	.107	1-1/2	993230	22.10	993230-C8	29.80
	1/8	**.010**	.106	1-1/2	963230	22.10	963230-C8	29.80
	1/8	**.015**	.104	1-1/2	902930	22.10	902930-C8	29.80
	3/16	**.005**	.161	2	987830	27.50	987830-C8	36.10
	3/16	**.010**	.160	2	921230	27.50	921230-C8	36.10
	1/4	**.005**	.215	2-1/2	967430	38.60	967430-C8	48.60
	1/4	**.010**	.214	2-1/2	918630	38.60	918630-C8	49.70
90°	1/8	**.005**	.062	1-1/2	993245	22.10	993245-C8	29.80
	1/8	**.010**	.061	1-1/2	963245	22.10	963245-C8	29.80
	1/8	**.015**	.060	1-1/2	902945	22.10	902945-C8	29.80
	3/16	**.005**	.093	2	987845	27.50	987845-C8	36.10
	3/16	**.010**	.092	2	921245	28.10	921245-C8	36.70
	1/4	**.005**	.124	2-1/2	967445	38.60	967445-C8	48.60
	1/4	**.010**	.123	2-1/2	918645	38.60	918645-C8	48.60
120°	1/8	**.005**	.036	1-1/2	993260	22.10	993260-C8	29.80
	1/8	**.010**	.035	1-1/2	963260	22.60	963260-C8	30.30

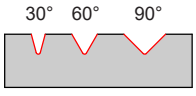
ENGRAVING CUTTERS

Marking Cutters – Tip Radius for Non-Ferrous Materials





- **Designed for milling legible part numbers in non-ferrous and easy-to-machine materials**
- Radiused tip design for improved strength
- Flat relief design for improved results
- Solid carbide
- CNC ground in the USA

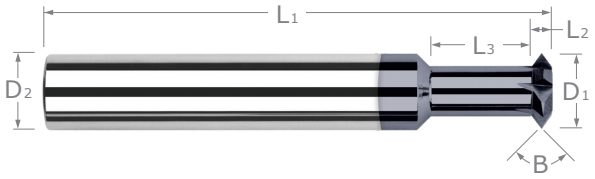


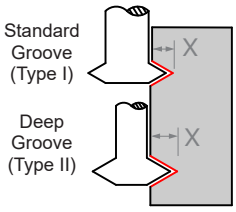
Stocked in Three Included Angles!

INCLUDED ANGLE	DIAMETER	RADIUS	LENGTH OF CUT	OVERALL LENGTH	UNCOATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_2	R	L_2	L_1	2 FL	USD$	2 FL	USD$
30°	1/8	**.005**	.219	1-1/2	847115	27.30	847115-C8	35.00
	1/8	**.010**	.205	1-1/2	854415	27.30	854415-C8	35.00
	1/8	**.015**	.190	1-1/2	738115	27.30	738115-C8	35.00
	1/4	**.005**	.452	2-1/2	774915	40.90	774915-C8	52.00
60°	1/8	**.005**	.103	1-1/2	847130	27.30	847130-C8	35.00
	1/8	**.010**	.098	1-1/2	854430	27.30	854430-C8	35.00
	1/8	**.015**	.093	1-1/2	738130	27.30	738130-C8	35.00
	3/16	**.005**	.336	2	724430	33.60	724430-C8	42.20
	3/16	**.010**	.321	2	724330	33.60	724330-C8	42.20
	1/4	**.005**	.212	2-1/2	774930	40.00	774930-C8	49.90
90°	1/8	**.005**	.060	1-1/2	847145	27.30	847145-C8	35.00
	1/8	**.010**	.058	1-1/2	854445	27.30	854445-C8	35.00
	1/8	**.015**	.056	1-1/2	738145	27.30	738145-C8	35.00
	1/4	**.005**	.123	2-1/2	774945	40.00	774945-C8	49.90

DOUBLE ANGLE SHANK CUTTERS

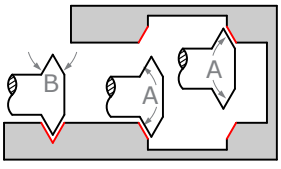
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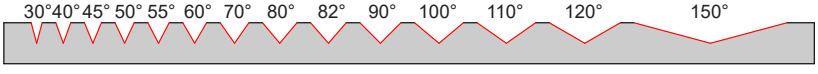
- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced neck for long reach machining
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide
- CNC ground in the USA

Great for Chamfering and Deburring



Included Angle Conversion

A = 180 - B	150°	140°	135°	130°	125°	120°	110°	100°	98°	90°	80°	70°	60°	30°
B = 180 - A	30°	40°	45°	50°	55°	60°	70°	80°	82°	90°	100°	110°	120°	150°



Included Angle (B) | Stocked in Fourteen Included Angles!

INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B +1° −1°	D1 +.000″ −.002″	L2		L3 +.020″ −.000″			D2	L1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
30°	1/16	.008	1/32	**.093**	I	2	1/8	1-1/2	66062	59.40	66062-C3	65.30		
	5/64	.010	.039	**.118**	I	2	1/8	1-1/2	66078	59.40	66078-C3	65.30		
	3/32	.012	3/64	**.141**	I	2	1/8	1-1/2	66093	59.40	66093-C3	65.30		
	1/8	.017	1/16	**.187**	I	4	1/8	1-1/2	66108	57.90	66108-C3	63.80		
	1/8	.017	1/16	**.500**	I	4	1/8	1-1/2	934308	59.40	934308-C3	65.30		
	3/16	.025	3/32	**.312**	I	4	3/16	2	66112	60.10	66112-C3	66.60		
	1/4	.033	1/8	**.312**	I	4	1/4	2	66116	76.30	66116-C3	85.10		
	1/4	.033	1/8	**.625**	I	4	1/4	2	921716	90.00	921716-C3	98.80		
	3/8	.033	1/4	**.500**	I	6	3/8	2-1/2	66105	102.50	66105-C3	113.90		
	3/8	.033	1/4	**1.500**	I	6	3/8	3-1/2	934324	119.60	934324-C3	131.80		
	1/2	.050	5/16	**.500**	I	6	1/2	3	66110	138.60	66110-C3	155.90		
	1/2	.050	5/16	**1.500**	I	6	1/2	4	934332	176.70	934332-C3	193.30		
40°	1/4	.045	1/8	**.312**	I	4	1/4	2	29720	78.00	29720-C3	86.90		
	1/4	.045	1/8	**.625**	I	4	1/4	2	918116	92.50	918116-C3	100.00		
	3/8	.045	1/4	**.500**	I	6	3/8	2-1/2	909924	100.60	909924-C3	112.00		
	3/8	.045	1/4	**1.500**	I	6	3/8	3-1/2	967505	124.90	967505-C3	137.10		
	1/2	.068	5/16	**.500**	I	6	1/2	3	909932	134.40	909932-C3	150.00		
	1/2	.068	5/16	**1.500**	I	6	1/2	4	967510	174.80	967510-C3	192.30		
45°	1/8	.026	1/16	**.187**	I	4	1/8	1-1/2	905608	59.40	905608-C3	65.30		
	3/16	.039	3/32	**.312**	I	4	3/16	2	905612	60.10	905612-C3	66.60		
	3/16	.039	3/32	**.750**	I	4	3/16	2-1/2	984902	70.10	984902-C3	76.70		
	1/4	.052	1/8	**.312**	I	4	1/4	2	29723	76.30	29723-C3	85.10		
	1/4	.052	1/8	**.625**	I	4	1/4	2	917016	90.00	917016-C3	98.80		
	1/4	.052	1/8	**1.000**	I	4	1/4	3	984903	93.50	984903-C3	102.30		
	3/8	.052	1/4	**.500**	I	6	3/8	2-1/2	905624	96.60	905624-C3	108.10		
	3/8	.052	1/4	**1.000**	I	6	3/8	2-1/2	917024	110.20	917024-C3	121.70		
	3/8	.052	1/4	**1.500**	I	6	3/8	3-1/2	984905	120.20	984905-C3	131.80		
	1/2	.078	5/16	**.500**	I	6	1/2	3	905632	131.80	905632-C3	149.10		
	1/2	.078	5/16	**1.500**	I	6	1/2	4	984910	171.50	984910-C3	188.80		

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DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
50°	1/8	.029	1/16	**.187**	I	4	1/8	1-1/2	985801	58.50	985801-C3	64.50		
	1/8	.029	1/16	**.500**	I	4	1/8	1-1/2	974401	69.80	974401-C3	75.70		
	3/16	.044	3/32	**.312**	I	4	3/16	2	985802	61.10	985802-C3	67.40		
	3/16	.044	3/32	**.750**	I	4	3/16	2-1/2	974402	71.20	974402-C3	77.90		
	1/4	.058	1/8	**.312**	I	4	1/4	2	29725	81.20	29725-C3	88.60		
	1/4	.058	1/8	**1.000**	I	4	1/4	3	974403	95.80	974403-C3	103.90		
	3/8	.058	1/4	**.500**	I	6	3/8	2-1/2	985805	101.80	985805-C3	113.20		
	3/8	.058	1/4	**1.500**	I	6	3/8	3-1/2	974405	124.90	974405-C3	137.10		
	1/2	.088	5/16	**.500**	I	6	1/2	3	985810	138.90	985810-C3	154.50		
	1/2	.088	5/16	**1.500**	I	6	1/2	4	974410	174.70	974410-C3	191.30		
55°	1/4	.065	1/8	**.312**	I	4	1/4	2	29728	82.80	29728-C3	91.70		
60°	1/16	.018	1/32	**.093**	I	2	1/8	1-1/2	47362	57.50	47362-C3	63.40		
	1/16	.018	1/32	**.156**	I	2	1/8	1-1/2	965562	57.50	965562-C3	63.40		
	5/64	.023	.039	**.118**	I	2	1/8	1-1/2	47378	57.50	47378-C3	63.40		
	3/32	.027	3/64	**.141**	I	2	1/8	1-1/2	47393	57.50	47393-C3	63.40		
	3/32	.027	3/64	**.250**	I	2	1/8	1-1/2	965593	57.50	965593-C3	63.40		
	1/8	.036	1/16	**.125**	I	4	1/8	1-1/2	937501	53.10	937501-C3	59.10		
	1/8	.036	1/16	**.187**	I	4	1/8	1-1/2	16201	53.10	16201-C3	59.10		
	1/8	.036	1/16	**.312**	I	4	1/8	1-1/2	984401	59.80	984401-C3	65.70		
	1/8	.036	1/16	**.500**	I	4	1/8	2	27501	65.10	27501-C3	71.00		
	1/8	.036	1/16	**.875**	I	4	1/8	2	981001	71.10	981001-C3	77.00		
	5/32	.045	5/64	**.250**	I	4	3/16	2	16256	57.50	16256-C3	64.10		
	5/32	.045	5/64	**.625**	I	4	3/16	2-1/2	27556	65.10	27556-C3	71.70		
	3/16	.055	3/32	**.187**	I	4	3/16	2	937502	56.60	937502-C3	62.80		
	3/16	.055	3/32	**.312**	I	4	3/16	2	16202	56.60	16202-C3	63.20		
	3/16	.055	3/32	**.500**	I	4	3/16	2	984402	65.50	984402-C3	72.00		
	3/16	.055	3/32	**.750**	I	4	3/16	2-1/2	27502	69.50	27502-C3	76.20		
	3/16	.055	3/32	**1.000**	I	4	3/16	2-1/2	925502	72.80	925502-C3	79.40		
	1/4	.072	1/8	**.187**	I	4	1/4	2	937503	76.30	937503-C3	85.10		
	1/4	.072	1/8	**.312**	I	4	1/4	2	16203	76.30	16203-C3	85.10	16203-C6	85.40
	1/4	.072	1/8	**.312**	I	6	1/4	2	808016	81.80	808016-C3	90.70		
	1/4	.072	1/8	**.625**	I	4	1/4	2-1/2	984403	85.60	984403-C3	94.50		
	1/4	.072	1/8	**1.000**	I	4	1/4	3	27503	91.40	27503-C3	100.30		
	1/4	.072	1/8	**1.312**	I	4	1/4	3	925503	91.90	925503-C3	100.00		
	1/4	.072	1/8	**1.750**	I	4	1/4	3	981003	93.20	981003-C3	101.30		
	5/16	.072	3/16	**.375**	I	6	5/16	2-1/2	16272	92.60	16272-C3	102.80		
	5/16	.072	3/16	**.875**	I	6	5/16	2-1/2	984472	95.40	984472-C3	105.50		
	3/8	.072	1/4	**.312**	I	6	3/8	2-1/2	937505	97.50	937505-C3	108.90		
	3/8	.072	1/4	**.500**	I	6	3/8	2-1/2	16205	97.50	16205-C3	108.90	16205-C6	111.40
	3/8	.072	1/4	**.750**	I	6	3/8	2-1/2	773305	103.60	773305-C3	115.00		
	3/8	.072	1/4	**1.000**	I	6	3/8	2-1/2	984405	109.80	984405-C3	121.20	984405-C6	123.70
	3/8	.072	1/4	**1.500**	I	6	3/8	3-1/2	27505	122.10	27505-C3	133.70		
	3/8	.072	1/4	**2.000**	I	6	3/8	3-1/2	925505	127.90	925505-C3	139.50		
	1/2	.109	5/16	**.500**	I	6	1/2	3	16210	133.50	16210-C3	150.80		
	1/2	.109	5/16	**.750**	I	6	1/2	3	773310	138.80	773310-C3	156.10		
	1/2	.109	5/16	**1.000**	I	6	1/2	3	984410	145.40	984410-C3	162.70		
	1/2	.109	5/16	**1.250**	I	6	1/2	3-1/2	762310	157.80	762310-C3	175.10		
	1/2	.109	5/16	**1.500**	I	6	1/2	4	27510	170.10	27510-C3	187.40	27510-C6	190.50
	1/2	.109	5/16	**2.000**	I	6	1/2	4	925510	174.50	925510-C3	191.80		
	1/2	.109	5/16	**2.625**	I	6	1/2	4	981010	179.10	981010-C3	196.30		
	5/8	.144	3/8	**.750**	I	6	5/8	3-1/2	16215	240.40	16215-C3	257.70		

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DOUBLE ANGLE SHANK CUTTERS

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
70°	1/4	.088	1/8	**.312**	I	4	1/4	2	871903	82.80	871903-C3	91.70		
	3/8	.088	1/4	**1.500**	I	6	3/8	3-1/2	791005	130.80	791005-C3	142.50		
80°	1/4	.105	1/8	**.312**	I	4	1/4	2	29740	82.80	29740-C3	91.70		
	3/8	.105	1/4	**1.500**	I	6	3/8	3-1/2	792005	133.30	792005-C3	145.10		
82°	1/4	.109	1/8	**.312**	I	4	1/4	2	29741	82.80	29741-C3	91.70		
	3/8	.109	1/4	**1.500**	I	6	3/8	3-1/2	920805	133.30	920805-C3	145.10		
	1/2	.163	5/16	**1.500**	I	6	1/2	4	920810	182.30	920810-C3	199.90		
90°	1/32	.015	.016	**.062**	I	2	1/8	1-1/2	807002	52.80	807002-C3	58.80		
	1/32	.015	.016	**.093**	I	2	1/8	1-1/2	45131	51.80	45131-C3	57.70		
	1/32	.015	.016	**.125**	I	2	1/8	1-1/2	71604	52.80	71604-C3	58.80		
	1/16	.031	1/32	**.062**	I	2	1/8	1-1/2	946862	51.80	946862-C3	57.70		
	1/16	.031	1/32	**.093**	I	2	1/8	1-1/2	19162	51.80	19162-C3	57.70		
	1/16	.031	1/32	**.093**	I	4	1/8	1-1/2	838804	51.80	838804-C3	57.70		
	1/16	.031	1/32	**.125**	I	2	1/8	1-1/2	807662	51.80	807662-C3	57.70		
	1/16	.031	1/32	**.156**	I	2	1/8	1-1/2	45162	57.50	45162-C3	63.40	45162-C6	64.40
	1/16	.031	1/32	**.156**	I	4	1/8	1-1/2	832404	60.50	832404-C3	66.40		
	1/16	.031	1/32	**.187**	I	2	1/8	1-1/2	822104	63.10	822104-C3	69.00		
	1/16	.031	1/32	**.250**	I	2	1/8	1-1/2	71662	63.10	71662-C3	69.00		
	1/16	.031	1/32	**.250**	I	4	1/8	1-1/2	792962	64.50	792962-C3	70.40		
	1/16	.031	1/32	**.312**	I	2	1/8	1-1/2	857862	63.10	857862-C3	69.00		
	1/16	.031	1/32	**.375**	I	2	1/8	1-1/2	963662	63.10	963662-C3	69.00		
	1/16	.031	1/32	**.437**	I	2	1/8	1-1/2	855762	64.50	855762-C3	70.40		
	5/64	.039	.039	**.078**	I	2	1/8	1-1/2	946878	51.80	946878-C3	57.70		
	5/64	.039	.039	**.093**	I	2	1/8	1-1/2	807105	51.80	807105-C3	57.70		
	5/64	.039	.039	**.118**	I	2	1/8	1-1/2	19178	51.80	19178-C3	57.70		
	5/64	.039	.039	**.125**	I	2	1/8	1-1/2	807005	51.80	807005-C3	57.70		
	5/64	.039	.039	**.187**	I	2	1/8	1-1/2	45178	57.50	45178-C3	63.40		
	5/64	.039	.039	**.187**	I	4	1/8	1-1/2	832405	60.50	832405-C3	66.40		
	5/64	.039	.039	**.250**	I	2	1/8	1-1/2	822178	60.50	822178-C3	68.10		
	5/64	.039	.039	**.312**	I	2	1/8	1-1/2	71678	63.10	71678-C3	69.00		
	5/64	.039	.039	**.312**	I	4	1/8	1-1/2	792978	64.50	792978-C3	70.40		
	5/64	.039	.039	**.375**	I	2	1/8	1-1/2	771978	64.50	771978-C3	70.40		
	5/64	.039	.039	**.500**	I	2	1/8	1-1/2	963678	63.10	963678-C3	69.00		
	3/32	.047	3/64	**.093**	I	2	1/8	1-1/2	946893	51.80	946893-C3	57.70		
	3/32	.047	3/64	**.125**	I	2	1/8	1-1/2	807106	51.80	807106-C3	57.70		
	3/32	.047	3/64	**.141**	I	2	1/8	1-1/2	19193	51.80	19193-C3	57.70		
	3/32	.047	3/64	**.141**	I	4	1/8	1-1/2	838806	51.80	838806-C3	57.70		
	3/32	.047	3/64	**.187**	I	2	1/8	1-1/2	807693	51.80	807693-C3	57.70		
	3/32	.047	3/64	**.250**	I	2	1/8	1-1/2	45193	57.50	45193-C3	63.40		
	3/32	.047	3/64	**.250**	I	4	1/8	1-1/2	832406	60.50	832406-C3	66.40		
	3/32	.047	3/64	**.312**	I	2	1/8	1-1/2	807493	63.10	807493-C3	69.00		
	3/32	.047	3/64	**.375**	I	2	1/8	1-1/2	71693	63.10	71693-C3	69.00		
	3/32	.047	3/64	**.375**	I	4	1/8	1-1/2	792906	63.10	792906-C3	69.00		
	3/32	.047	3/64	**.500**	I	2	1/8	1-1/2	857893	63.10	857893-C3	69.00		
	3/32	.047	3/64	**.625**	I	2	1/8	2	963693	65.50	963693-C3	71.40		
	3/32	.047	3/64	**.750**	I	2	1/8	2	855793	68.30	855793-C3	74.20		
	3 mm	.059	.059	**.187**	I	2	1/8	1-1/2	1913M	52.60	1913M-C3	58.50		
	3 mm	.059	.059	**.250**	I	2	1/8	1-1/2	80763M	61.70	80763M-C3	67.60		
	3 mm	.059	.059	**.312**	I	2	1/8	1-1/2	4513M	60.50	4513M-C3	66.40		
	3 mm	.059	.059	**.438**	I	2	1/8	1-1/2	82213M	69.30	82213M-C3	75.30		

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
90°	1/8	.062	1/16	**.125**	I	4	1/8	1-1/2	946901	51.80	946901-C3	57.70		
	1/8	.062	1/16	**.125**	I	6	1/8	1-1/2	791908	51.80	791908-C3	57.70		
	1/8	.062	1/16	**.187**	I	4	1/8	1-1/2	19201	51.80	19201-C3	57.70	19201-C6	58.60
	1/8	.083	.042	**.187**	II	4	1/8	1-1/2	759908	58.20	759908-C3	64.10		
	1/8	.062	1/16	**.187**	I	6	1/8	1-1/2	838808	54.30	838808-C3	60.20	838808-C6	61.10
	1/8	.062	1/16	**.250**	I	4	1/8	1-1/2	807308	54.90	807308-C3	60.80		
	1/8	.062	1/16	**.312**	I	4	1/8	1-1/2	72601	58.10	72601-C3	64.00	72601-C6	65.00
	1/8	.062	1/16	**.312**	I	6	1/8	1-1/2	847408	61.00	847408-C3	67.00		
	1/8	.062	1/16	**.375**	I	4	1/8	1-1/2	806908	58.10	806908-C3	64.00		
	1/8	.062	1/16	**.500**	I	4	1/8	2	19501	67.20	19501-C3	73.10	19501-C6	74.00
	1/8	.062	1/16	**.500**	I	6	1/8	2	807908	70.20	807908-C3	76.10		
	1/8	.062	1/16	**.625**	I	4	1/8	2	71701	69.50	71701-C3	75.50		
	1/8	.062	1/16	**.750**	I	4	1/8	2	821808	71.30	821808-C3	77.20		
	1/8	.062	1/16	**.875**	I	4	1/8	2	26801	73.20	26801-C3	79.10		
	1/8	.062	1/16	**1.000**	I	4	1/8	2	772301	76.80	772301-C3	82.70		
	1/8	.062	1/16	**1.125**	I	4	1/8	2-1/2	963701	80.50	963701-C3	86.50		
	5/32	.078	5/64	**.125**	I	4	3/16	2	771056	52.40	771056-C3	58.90		
	5/32	.078	5/64	**.156**	I	4	3/16	2	946956	52.40	946956-C3	58.90		
	5/32	.078	5/64	**.187**	I	4	3/16	2	807157	52.40	807157-C3	58.90		
	5/32	.078	5/64	**.250**	I	4	3/16	2	19256	55.00	19256-C3	61.60		
	5/32	.078	5/64	**.250**	I	6	3/16	2	838810	56.80	838810-C3	63.40		
	5/32	.078	5/64	**.375**	I	4	3/16	2	807310	59.10	807310-C3	65.50		
	5/32	.078	5/64	**.437**	I	4	3/16	2	72656	63.10	72656-C3	69.70		
	5/32	.078	5/64	**.500**	I	4	3/16	2	807210	63.10	807210-C3	69.70		
	5/32	.078	5/64	**.625**	I	4	3/16	2-1/2	19556	68.10	19556-C3	74.50		
	5/32	.078	5/64	**.875**	I	4	3/16	2-1/2	71756	73.30	71756-C3	79.90		
	5/32	.078	5/64	**1.125**	I	4	3/16	2-1/2	26856	75.90	26856-C3	82.50		
	3/16	.095	3/32	**.156**	I	4	3/16	2	771002	53.00	771002-C3	59.50		
	3/16	.095	3/32	**.187**	I	4	3/16	2	946902	53.00	946902-C3	59.50		
	3/16	.095	3/32	**.187**	I	6	3/16	2	807812	55.90	807812-C3	62.30		
	3/16	.095	3/32	**.250**	I	4	3/16	2	807112	54.00	807112-C3	60.50		
	3/16	.095	3/32	**.312**	I	4	3/16	2	19202	54.00	19202-C3	60.50	19202-C6	61.70
	3/16	.125	1/16	**.312**	II	4	3/16	2	759912	62.50	759912-C3	69.20		
	3/16	.095	3/32	**.312**	I	6	3/16	2	838812	56.90	838812-C3	63.50	838812-C6	66.40
	3/16	.095	3/32	**.375**	I	4	3/16	2	807312	59.10	807312-C3	65.50		
	3/16	.095	3/32	**.500**	I	4	3/16	2	72602	64.30	72602-C3	70.70	72602-C6	71.90
	3/16	.095	3/32	**.500**	I	6	3/16	2	847412	67.30	847412-C3	73.90		
	3/16	.095	3/32	**.625**	I	4	3/16	2	807212	68.30	807212-C3	74.70		
	3/16	.095	3/32	**.750**	I	4	3/16	2-1/2	19502	68.30	19502-C3	74.70	19502-C6	76.50
	3/16	.095	3/32	**.750**	I	6	3/16	2-1/2	822612	69.80	822612-C3	76.40		
	3/16	.095	3/32	**1.000**	I	4	3/16	2-1/2	71702	74.60	71702-C3	81.00		
	3/16	.095	3/32	**1.000**	I	6	3/16	2-1/2	755912	82.00	755912-C3	88.60		
	3/16	.095	3/32	**1.312**	I	4	3/16	2-1/2	26802	76.30	26802-C3	82.90		
	3/16	.095	3/32	**1.625**	I	4	3/16	3	963702	84.80	963702-C3	91.40		
	6 mm	.118	.118	**.312**	I	4	1/4	2	19262	84.50	19262-C3	93.20		
	6 mm	.118	.118	**.625**	I	4	1/4	2	72662	87.30	72662-C3	96.10		
	6 mm	.118	.118	**1.000**	I	4	1/4	2-1/2	19562	90.10	19562-C3	98.90		
	1/4	.125	1/8	**.187**	I	4	1/4	2	946903	65.10	946903-C3	73.90		
	1/4	.125	1/8	**.250**	I	4	1/4	2	807116	66.20	807116-C3	74.90		
	1/4	.125	1/8	**.312**	I	4	1/4	2	19203	66.20	19203-C3	74.90	19203-C6	79.00
	1/4	.167	.083	**.312**	II	4	1/4	2	759916	69.80	759916-C3	78.60		
	1/4	.125	1/8	**.312**	I	6	1/4	2	838816	69.50	838816-C3	78.40	838816-C6	82.50
	1/4	.125	1/8	**.375**	I	4	1/4	2-1/2	807016	73.20	807016-C3	82.10		

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INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B +1° −1°	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
90°	1/4	.125	1/8	**.500**	I	4	1/4	2	807316	67.00	807316-C3	75.80		
	1/4	.125	1/8	**.625**	I	4	1/4	2-1/2	72603	73.50	72603-C3	82.40	72603-C6	83.20
	1/4	.125	1/8	**.625**	I	6	1/4	2-1/2	847416	77.30	847416-C3	86.10		
	1/4	.125	1/8	**.750**	I	4	1/4	2-1/2	807216	73.50	807216-C3	82.40		
	1/4	.125	1/8	**1.000**	I	4	1/4	3	19503	80.50	19503-C3	89.20	19503-C6	90.30
	1/4	.125	1/8	**1.000**	I	6	1/4	3	822616	84.20	822616-C3	91.20		
	1/4	.125	1/8	**1.250**	I	4	1/4	3	822216	86.10	822216-C3	94.80		
	1/4	.125	1/8	**1.312**	I	4	1/4	3	71703	86.10	71703-C3	94.80		
	1/4	.125	1/8	**1.500**	I	4	1/4	3	821816	88.60	821816-C3	97.40		
	1/4	.125	1/8	**1.750**	I	4	1/4	3	26803	88.60	26803-C3	97.40		
	1/4	.125	1/8	**2.125**	I	4	1/4	4	963703	95.90	963703-C3	106.10		
	5/16	.125	3/16	**.250**	I	6	5/16	2-1/2	946904	89.70	946904-C3	99.90		
	5/16	.125	3/16	**.375**	I	6	5/16	2-1/2	19272	92.60	19272-C3	102.80		
	5/16	.125	3/16	**.375**	I	8	5/16	2-1/2	838820	102.50	838820-C3	112.10		
	5/16	.125	3/16	**.625**	I	6	5/16	2-1/2	833572	93.80	833572-C3	104.10		
	5/16	.125	3/16	**.625**	I	8	5/16	2-1/2	754920	101.50	754920-C3	111.60		
	5/16	.125	3/16	**.875**	I	6	5/16	2-1/2	72672	93.80	72672-C3	104.10		
	5/16	.125	3/16	**.875**	I	8	5/16	2-1/2	847420	103.40	847420-C3	113.60		
	5/16	.125	3/16	**1.000**	I	6	5/16	3	807220	100.50	807220-C3	110.80		
	5/16	.125	3/16	**1.250**	I	6	5/16	3	19572	100.50	19572-C3	110.80		
	5/16	.125	3/16	**1.250**	I	8	5/16	3	822620	105.40	822620-C3	115.00		
	5/16	.125	3/16	**1.500**	I	6	5/16	3	772873	102.20	772873-C3	112.60		
	5/16	.125	3/16	**1.625**	I	6	5/16	3	71772	104.40	71772-C3	114.60		
	5/16	.125	3/16	**2.125**	I	6	5/16	3	26872	108.20	26872-C3	118.40		
	3/8	.125	1/4	**.312**	I	6	3/8	2-1/2	946905	90.00	946905-C3	101.40		
	3/8	.125	1/4	**.375**	I	6	3/8	2-1/2	807124	93.00	807124-C3	104.40		
	3/8	.125	1/4	**.500**	I	6	3/8	2-1/2	19205	94.60	19205-C3	104.60	19205-C6	109.10
	3/8	.250	1/8	**.500**	II	6	3/8	2-1/2	759924	104.20	759924-C3	115.60		
	3/8	.125	1/4	**.500**	I	8	3/8	2-1/2	838824	99.40	838824-C3	110.90	838824-C6	113.80
	3/8	.125	1/4	**.750**	I	6	3/8	2-1/2	807324	100.10	807324-C3	111.50		
	3/8	.125	1/4	**1.000**	I	6	3/8	2-1/2	72605	105.40	72605-C3	116.80	72605-C6	119.30
	3/8	.125	1/4	**1.000**	I	8	3/8	2-1/2	847424	116.30	847424-C3	127.70		
	3/8	.125	1/4	**1.250**	I	6	3/8	3	807224	117.80	807224-C3	129.20		
	3/8	.125	1/4	**1.500**	I	6	3/8	3-1/2	19505	119.10	19505-C3	130.70	19505-C6	134.10
	3/8	.125	1/4	**1.500**	I	8	3/8	3-1/2	822624	123.90	822624-C3	131.30		
	3/8	.125	1/4	**1.750**	I	6	3/8	3-1/2	822224	124.90	822224-C3	136.40		
	3/8	.125	1/4	**2.000**	I	6	3/8	3-1/2	71705	124.90	71705-C3	136.40		
	3/8	.125	1/4	**2.312**	I	6	3/8	3-1/2	26805	128.20	26805-C3	139.90		
	3/8	.125	1/4	**2.625**	I	6	3/8	4	963705	135.80	963705-C3	151.60		
	.393	.133	.260	**.500**	I	6	7/16	2-3/4	19279	142.50	19279-C3	155.80		
	.393	.133	.260	**1.500**	I	6	7/16	3-1/2	19579	165.00	19579-C3	182.20		
	7/16	.157	9/32	**.500**	I	6	7/16	2-3/4	19208	139.70	19208-C3	154.20		
	7/16	.157	9/32	**1.500**	I	6	7/16	3-1/2	19508	161.90	19508-C3	179.20		
	1/2	.187	5/16	**.312**	I	6	1/2	3	946910	122.50	946910-C3	139.90		
	1/2	.187	5/16	**.500**	I	6	1/2	3	19210	126.60	19210-C3	143.90	19210-C6	145.50
	1/2	.187	5/16	**.500**	I	8	1/2	3	838832	132.90	838832-C3	150.10	838832-C6	151.80
	1/2	.187	5/16	**.750**	I	6	1/2	3	807332	130.20	807332-C3	147.40		
	1/2	.187	5/16	**1.000**	I	6	1/2	3	72610	137.80	72610-C3	155.20		
	1/2	.187	5/16	**1.000**	I	8	1/2	3	847432	140.20	847432-C3	157.40		
	1/2	.187	5/16	**1.250**	I	6	1/2	3-1/2	822432	141.50	822432-C3	153.10		

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DOUBLE ANGLE SHANK CUTTERS

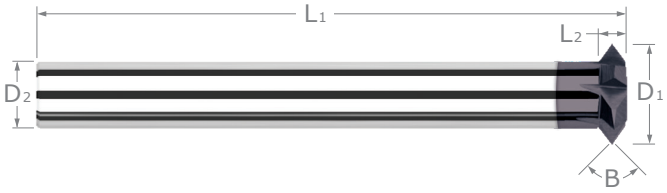
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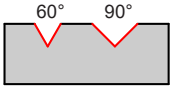
INCL. ANGLE	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		AlTiN NANO COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2		L_3 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
90°	1/2	.187	5/16	**1.500**	I	6	1/2	4	19510	161.90	19510-C3	179.20		
	1/2	.187	5/16	**1.500**	I	8	1/2	4	807932	168.30	807932-C3	185.50		
	1/2	.187	5/16	**1.750**	I	6	1/2	4	822232	165.00	822232-C3	182.20		
	1/2	.187	5/16	**2.000**	I	6	1/2	4	71710	167.60	71710-C3	184.90		
	1/2	.187	5/16	**2.312**	I	6	1/2	4	821810	169.20	821810-C3	186.40		
	1/2	.187	5/16	**2.625**	I	6	1/2	4	26810	172.20	26810-C3	189.50		
	1/2	.187	5/16	**3.125**	I	6	1/2	6	963710	180.10	963710-C3	197.40		
	1/2	.333	.167	**.500**	II	6	1/2	3	759932	132.30	759932-C3	149.90		
	5/8	.250	3/8	**.750**	I	6	5/8	3-1/2	19215	240.90	19215-C3	258.20		
	5/8	.250	3/8	**1.250**	I	6	5/8	3-1/2	72615	247.70	72615-C3	264.90		
100°	1/8	.075	1/16	**.187**	I	4	1/8	1-1/2	983401	57.90	983401-C3	63.80		
	1/8	.075	1/16	**.500**	I	4	1/8	1-1/2	969901	69.90	969901-C3	75.80		
	3/16	.113	3/32	**.312**	I	4	3/16	2	983402	59.80	983402-C3	66.40		
	3/16	.113	3/32	**.750**	I	4	3/16	2-1/2	969902	72.60	969902-C3	79.20		
	1/4	.149	1/8	**.312**	I	4	1/4	2	29750	83.40	29750-C3	90.80		
	1/4	.149	1/8	**1.000**	I	4	1/4	3	969903	97.40	969903-C3	105.50		
	3/8	.149	1/4	**.500**	I	6	3/8	2-1/2	983405	98.60	983405-C3	110.00		
	3/8	.149	1/4	**1.500**	I	6	3/8	3-1/2	969905	127.30	969905-C3	139.50		
	1/2	.224	5/16	**.500**	I	6	1/2	3	983410	131.10	983410-C3	146.70		
	1/2	.224	5/16	**1.500**	I	6	1/2	4	969910	169.70	969910-C3	187.30		
110°	1/4	.179	1/8	**.312**	I	4	1/4	2	830503	87.40	830503-C3	96.30		
120°	1/8	.109	1/16	**.125**	I	4	1/8	1-1/2	903608	53.10	903608-C3	59.10		
	1/8	.109	1/16	**.187**	I	4	1/8	1-1/2	39108	53.10	39108-C3	59.10		
	1/8	.109	1/16	**.500**	I	4	1/8	2	989401	63.10	989401-C3	69.00		
	3/16	.163	3/32	**.187**	I	4	3/16	2	903612	57.10	903612-C3	63.70		
	3/16	.163	3/32	**.312**	I	4	3/16	2	39112	57.90	39112-C3	64.40		
	3/16	.163	3/32	**.750**	I	4	3/16	2-1/2	989402	68.10	989402-C3	74.50		
	1/4	.216	1/8	**.187**	I	4	1/4	2	903616	75.50	903616-C3	82.90		
	1/4	.216	1/8	**.312**	I	4	1/4	2	39116	76.30	39116-C3	85.10		
	1/4	.216	1/8	**.625**	I	4	1/4	2-1/2	910716	73.50	910716-C3	82.40		
	1/4	.216	1/8	**1.000**	I	4	1/4	3	989403	86.80	989403-C3	95.40		
	3/8	.216	1/4	**.500**	I	6	3/8	2-1/2	39124	99.90	39124-C3	111.30		
	3/8	.216	1/4	**1.000**	I	6	3/8	2-1/2	910724	110.80	910724-C3	122.20		
	3/8	.216	1/4	**1.500**	I	6	3/8	3-1/2	989405	124.90	989405-C3	136.40		
	1/2	.325	5/16	**.500**	I	6	1/2	3	39132	132.90	39132-C3	150.10		
	1/2	.325	5/16	**1.000**	I	6	1/2	3	910732	144.40	910732-C3	160.00		
	1/2	.325	5/16	**1.500**	I	6	1/2	4	989410	169.60	989410-C3	186.90		
150°	1/4	.467	1/8	**.312**	I	4	1/4	2	826003	87.40	826003-C3	96.30		
	3/8	.467	1/4	**.500**	I	6	3/8	2-1/2	826005	113.60	826005-C3	125.00		

DOUBLE ANGLE SHANK CUTTERS

Pointed - Reduced Shank



- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Reduced straight shank allows any chucking depth
- Tip of included angle ground to a point
- 60° angle can also be used for thread milling
- Solid carbide head brazed onto steel shank
- CNC ground in the USA

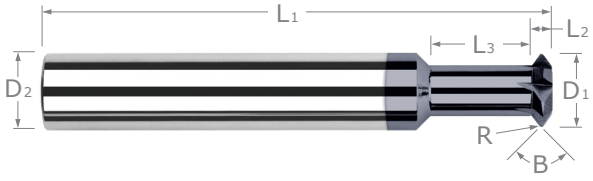


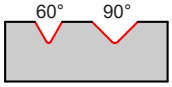
Included Angle (B)
Stocked in Two Included Angles!

INCL. ANGLE	CUTTER DIAMETER	CUTTER WIDTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
B +1° −1°	D1 +.000″ −.002″	L2		D2	L1	TOOL #	USD$	TOOL #	USD$
60°	1/4	.072	6	1/8	2.572	866403	108.00	866403-C3	116.20
	3/8	.108	8	3/16	3.108	866405	151.50	866405-C3	162.50
	1/2	.144	8	1/4	3.144	866410	170.80	866410-C3	188.00
	3/4	.144	8	1/2	3.644	16220	180.30	16220-C3	201.30
	3/4	.144	8	1/2	6.144	27520	188.80	27520-C3	215.70
	1	.217	8	5/8	4.217	16230	198.50	16230-C3	229.30
90°	1/4	.125	6	1/8	2.625	875503	108.00	875503-C3	116.70
	1/4	.125	6	1/8	4.125	777903	109.20	777903-C3	118.30
	5/16	.155	8	4 mm	3.155	877572	130.80	877572-C3	141.20
	3/8	.188	8	3/16	3.188	875505	151.50	875505-C3	170.20
	7/16	.201	8	15/64	3.201	877508	161.20	877508-C3	175.30
	1/2	.250	8	1/4	3.250	875510	170.80	875510-C3	188.00
	1/2	.250	8	1/4	6.250	777910	179.00	777910-C3	200.80
	5/8	.313	8	5/16	3.313	875515	173.30	875515-C3	192.00
	3/4	.250	8	1/2	3.750	19220	179.80	19220-C3	200.60
	3/4	.250	8	1/2	6.250	19520	188.10	19520-C3	214.90
	1	.375	8	5/8	4.375	19230	198.80	19230-C3	229.70
	1-1/4	.500	8	3/4	4.500	875520	246.00	875520-C3	285.30

DOUBLE ANGLE SHANK CUTTERS

Tip Radius





Included Angle (B)

Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Radius on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	R $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$
60°	1/8	**.005**	.042	1/16	**.187**	4	1/8	1-1/2	922508	68.10	922508-C3	74.00
	3/16	**.005**	.060	3/32	**.312**	4	3/16	2	922512	71.70	922512-C3	78.30
	1/4	**.005**	.078	1/8	**.312**	4	1/4	2	922516	92.00	922516-C3	100.70
	1/4	**.010**	.084	1/8	**.312**	4	1/4	2	934716	92.00	934716-C3	100.70
	1/4	**.010**	.084	1/8	**1.000**	4	1/4	3	930516	103.20	930516-C3	112.10
	3/8	**.010**	.084	1/4	**.500**	6	3/8	2-1/2	934724	123.40	934724-C3	134.80
	3/8	**.015**	.089	1/4	**.500**	6	3/8	2-1/2	911224	123.40	911224-C3	134.80
	1/2	**.010**	.120	5/16	**.500**	6	1/2	3	934732	153.20	934732-C3	170.70
	1/2	**.015**	.126	5/16	**.500**	6	1/2	3	911232	153.20	911232-C3	170.70
90°	1/16	**.005**	.035	1/32	**.093**	2	1/8	1-1/2	45804	70.50	45804-C3	76.40
	5/64	**.005**	.043	.039	**.118**	2	1/8	1-1/2	45805	70.50	45805-C3	76.40
	3/32	**.005**	.050	3/64	**.141**	2	1/8	1-1/2	45806	70.50	45806-C3	76.40
	1/8	**.005**	.067	1/16	**.187**	4	1/8	1-1/2	45808	70.50	45808-C3	76.40
	1/8	**.005**	.067	1/16	**.312**	4	1/8	1-1/2	898408	79.30	898408-C3	85.20
	1/8	**.005**	.067	1/16	**.500**	4	1/8	1-1/2	928708	86.90	928708-C3	92.80
	1/8	**.010**	.071	1/16	**.187**	4	1/8	1-1/2	46608	71.00	46608-C3	76.90
	5/32	**.005**	.082	5/64	**.250**	4	3/16	2	45810	74.20	45810-C3	80.80
	5/32	**.005**	.082	5/64	**.625**	4	3/16	2-1/2	928710	83.10	928710-C3	89.80
	3/16	**.005**	.099	3/32	**.187**	4	3/16	2	755212	74.80	755212-C3	81.40
	3/16	**.005**	.099	3/32	**.312**	4	3/16	2	45812	74.20	45812-C3	80.80
	3/16	**.005**	.099	3/32	**.500**	4	3/16	2	898412	78.70	898412-C3	85.30
	3/16	**.005**	.099	3/32	**.750**	4	3/16	2-1/2	928712	83.10	928712-C3	89.80
	3/16	**.010**	.103	3/32	**.312**	4	3/16	2	46612	74.20	46612-C3	80.80
	1/4	**.005**	.129	1/8	**.312**	4	1/4	2	45816	85.50	45816-C3	94.40
	1/4	**.005**	.129	1/8	**.625**	4	1/4	2-1/2	898416	91.70	898416-C3	100.50
	1/4	**.005**	.129	1/8	**1.000**	4	1/4	3	928716	99.80	928716-C3	108.70
	1/4	**.010**	.133	1/8	**.312**	4	1/4	2	46616	85.50	46616-C3	94.40
	1/4	**.010**	.133	1/8	**.625**	4	1/4	2-1/2	890716	91.70	890716-C3	100.50
	1/4	**.010**	.133	1/8	**1.000**	4	1/4	3	931916	99.80	931916-C3	108.70
	1/4	**.015**	.137	1/8	**.312**	4	1/4	2	988616	86.30	988616-C3	93.70
	1/4	**.020**	.142	1/8	**.312**	4	1/4	2	831016	85.50	831016-C3	94.40
	5/16	**.005**	.130	3/16	**1.250**	6	5/16	3	928720	105.70	928720-C3	116.10
	5/16	**.010**	.134	3/16	**.375**	6	5/16	2-1/2	46620	107.50	46620-C3	118.00
	5/16	**.010**	.134	3/16	**.875**	6	5/16	2-1/2	890720	109.10	890720-C3	119.50
	5/16	**.010**	.134	3/16	**1.250**	6	5/16	3	931920	108.60	931920-C3	119.10

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DOUBLE ANGLE SHANK CUTTERS

Tip Radius (cont.)

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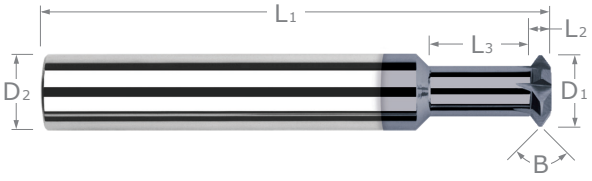
INCL. ANGLE	CUTTER DIA.	RADIUS	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	R $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$
90°	3/8	**.010**	.133	1/4	**.500**	6	3/8	2-1/2	46624	115.80	46624-C3	127.30
	3/8	**.010**	.133	1/4	**1.000**	6	3/8	2-1/2	890724	117.80	890724-C3	129.20
	3/8	**.010**	.133	1/4	**1.500**	6	3/8	3-1/2	931924	139.70	931924-C3	152.00
	3/8	**.015**	.137	1/4	**.500**	6	3/8	2-1/2	988624	114.70	988624-C3	126.10
	3/8	**.015**	.137	1/4	**1.000**	6	3/8	2-1/2	894124	117.80	894124-C3	129.20
	3/8	**.015**	.137	1/4	**1.500**	6	3/8	3-1/2	923524	139.70	923524-C3	152.00
	3/8	**.020**	.142	1/4	**.500**	6	3/8	2-1/2	831024	114.70	831024-C3	126.10
	1/2	**.010**	.196	5/16	**.500**	6	1/2	3	46632	148.60	46632-C3	166.10
	1/2	**.010**	.196	5/16	**1.000**	6	1/2	3	890732	151.40	890732-C3	169.10
	1/2	**.010**	.196	5/16	**1.500**	6	1/2	4	931932	182.60	931932-C3	199.20
	1/2	**.015**	.200	5/16	**.500**	6	1/2	3	988632	148.60	988632-C3	166.10
	1/2	**.015**	.200	5/16	**1.000**	6	1/2	3	894132	151.40	894132-C3	169.10
	1/2	**.015**	.200	5/16	**1.500**	6	1/2	4	923532	182.60	923532-C3	200.30

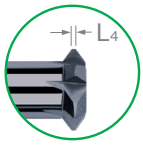
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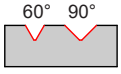
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DOUBLE ANGLE SHANK CUTTERS

Tip Flat





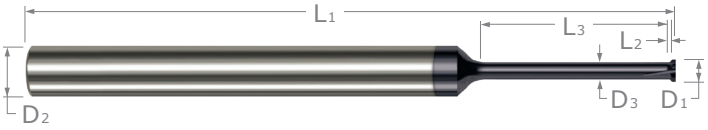


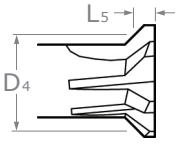
Included Angle (B)
Stocked in Two Included Angles!

- Ideal for back chamfering, chamfering, deburring, and milling a "V-groove"
- Flat on tip for improved strength and wear resistance
- Reduced neck for long reach machining
- Solid carbide
- CNC ground in the USA

INCL. ANGLE	CUTTER DIA.	TIP FLAT	CUTTER WIDTH	NECK DIAMETER	NECK LENGTH	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
B $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_4 $^{+.001″}_{-.001″}$	L_2		L_3 $^{+.020″}_{-.000″}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$
60°	1/8	**.010**	.046	1/16	**.187**	4	1/8	1-1/2	778008	56.70	778008-C3	62.60
	3/16	**.010**	.065	3/32	**.312**	4	3/16	2	778012	60.20	778012-C3	66.90
	1/4	**.010**	.082	1/8	**.312**	4	1/4	2	778016	80.40	778016-C3	87.90
	3/8	**.010**	.082	1/4	**.500**	6	3/8	2-1/2	778024	102.90	778024-C3	114.30
	1/2	**.010**	.119	5/16	**.500**	6	1/2	3	778032	140.90	778032-C3	158.50
90°	1/8	**.010**	.073	1/16	**.187**	4	1/8	1-1/2	776608	54.60	776608-C3	60.50
	1/8	**.010**	.073	1/16	**.500**	4	1/8	1-1/2	775108	70.90	775108-C3	76.80
	3/16	**.010**	.105	3/32	**.312**	4	3/16	2	776612	57.00	776612-C3	63.60
	3/16	**.010**	.105	3/32	**.750**	4	3/16	2-1/2	775112	72.00	775112-C3	78.70
	1/4	**.010**	.135	1/8	**.312**	4	1/4	2	776616	69.90	776616-C3	78.70
	1/4	**.010**	.135	1/8	**1.000**	4	1/4	3	775116	85.00	775116-C3	93.90
	3/8	**.010**	.135	1/4	**.500**	6	3/8	2-1/2	776624	99.80	776624-C3	111.20
	3/8	**.010**	.135	1/4	**1.500**	6	3/8	3-1/2	775124	125.60	775124-C3	137.40
	1/2	**.010**	.198	5/16	**.500**	6	1/2	3	776632	133.60	776632-C3	151.10
	1/2	**.010**	.198	5/16	**1.500**	6	1/2	4	775132	170.90	775132-C3	188.40

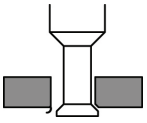
BACK DEBURRING MILLS





- **Ideal for deburring on backside of small holes and tight pockets**
- Slightly undersized to fit in common hole sizes
- 90° included angle, cutting on angle only
- Design has smaller radial projection than double angle shank cutters and back chamfer cutters, which results in increased neck diameter and improved strength
- Left hand shear flute / right hand cut evacuates chip away from part
- Multiple flutes for improved finish
- Solid carbide • CNC ground in the USA

Reach Through Miniature Holes and Slots to Remove Burr on Backside of Part

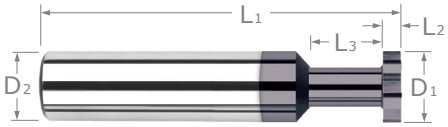


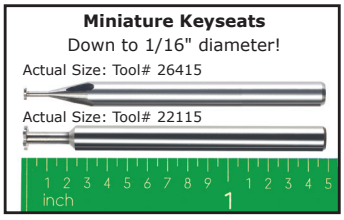
HEAD DIA.	AXIAL LOC	NECK DIA.	NECK LENGTH	CHAMFER CENTER LENGTH	CHAMFER CENTER DIAMETER	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.001″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	USD$	TOOL #	USD$
.028	.0029	.021	**.093**	.0215	.0261	3	1/8	2	846328	79.30	846328-C3	85.20
.028	.0029	.021	**.125**	.0215	.0261	3	1/8	2	65728	79.30	65728-C3	85.20
.028	.0029	.021	**.250**	.0215	.0261	3	1/8	2	57028	79.30	57028-C3	85.20
.040	.0048	.028	**.125**	.0324	.0362	4	1/8	2	846340	73.70	846340-C3	79.60
.040	.0048	.028	**.187**	.0324	.0362	4	1/8	2	65740	73.70	65740-C3	79.60
.040	.0048	.028	**.312**	.0324	.0362	4	1/8	2	57040	73.70	57040-C3	79.60
.055	.0045	.043	**.187**	.0423	.0515	4	1/8	2	846355	73.70	846355-C3	79.60
.055	.0045	.043	**.281**	.0423	.0515	4	1/8	2	65755	73.70	65755-C3	79.60
.055	.0045	.043	**.437**	.0423	.0515	4	1/8	2	57055	73.70	57055-C3	79.60
.080	.0077	.060	**.250**	.0638	.0733	5	1/8	2	846380	66.60	846380-C3	72.60
.080	.0077	.060	**.375**	.0638	.0733	5	1/8	2	65780	66.60	65780-C3	72.60
.080	.0077	.060	**.625**	.0638	.0733	5	1/8	2	57080	66.60	57080-C3	72.60
.115	.0111	.087	**.375**	.0655	.1049	5	1/8	2	846410	66.60	846410-C3	72.60
.115	.0111	.087	**.562**	.0655	.1049	5	1/8	2	65810	66.60	65810-C3	72.60
.115	.0111	.087	**1.000**	.0655	.1049	5	1/8	2	57110	66.60	57110-C3	72.60

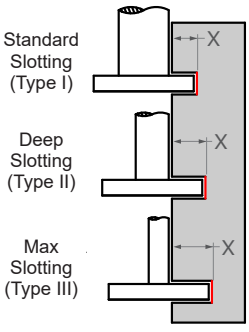
D_1 +.000″ −.002″	L_2	D_3	L_3 +.010″ −.000″	L_5 +.0005″ −.0005″	D_4 (Max.)		D_2	L_1	TOOL #	USD$	TOOL #	USD$
.125	.0111	.097	**.375**	.0655	.1139	6	1/8	2	846425	66.60	846425-C3	72.60
.135	.0111	.107	**.437**	.0655	.1249	5	3/16	2	846420	67.70	846420-C3	74.30
.135	.0111	.107	**.625**	.0655	.1249	5	3/16	2-1/2	65820	68.60	65820-C3	75.30
.135	.0111	.107	**1.125**	.0655	.1249	5	3/16	2-1/2	57120	68.60	57120-C3	75.30
.165	.0191	.121	**.500**	.0695	.1469	6	3/16	2	846430	67.70	846430-C3	74.30
.165	.0191	.121	**.750**	.0695	.1469	6	3/16	2-1/2	65830	68.60	65830-C3	75.30
.165	.0191	.121	**1.375**	.0695	.1469	6	3/16	2-1/2	57130	68.60	57130-C3	75.30
.187	.0191	.143	**.563**	.0695	.1679	6	3/16	2	846435	67.70	846435-C3	74.30
.210	.0191	.166	**.625**	.0695	.1919	6	1/4	2-1/2	846440	72.20	846440-C3	81.10
.210	.0191	.166	**1.000**	.0695	.1919	6	1/4	3	65840	73.70	65840-C3	82.70
.210	.0191	.166	**1.750**	.0695	.1919	6	1/4	3	57140	73.70	57140-C3	82.70
.262	.0251	.206	**1.375**	.0925	.2379	8	5/16	3	65850	74.80	65850-C3	85.30
.262	.0251	.206	**2.125**	.0925	.2379	8	5/16	4	57150	86.30	57150-C3	96.60
.315	.0251	.259	**1.625**	.0925	.2909	8	3/8	3	65860	92.60	65860-C3	104.00
.315	.0251	.259	**2.500**	.0925	.2909	8	3/8	4	57160	104.20	57160-C3	120.30
.420	.0321	.350	**2.125**	.1160	.3889	10	7/16	4	65870	117.20	65870-C3	134.90
.420	.0321	.350	**3.375**	.1160	.3889	10	7/16	6	57170	136.10	57170-C3	155.80

KEYSEAT CUTTERS

Square







- **Keyseat cutters down to 1/16″ diameter**
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.010	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26410	57.90	26410-C3	63.80
	.015 (1/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26415	54.80	26415-C3	60.70
	.015 (1/64)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955115	64.30	955115-C3	70.20
	.020	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26420	54.80	26420-C3	60.70
	.020	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955120	56.10	955120-C3	62.00
	.025	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26425	54.80	26425-C3	60.70
1/16	.030	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26430	54.80	26430-C3	60.70
	.031 (1/32)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26431	54.80	26431-C3	60.70
	.031 (1/32)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955131	64.30	955131-C3	70.20
	.039 (1 mm)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26439	54.80	26439-C3	60.70
	.047 (3/64)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26447	54.80	26447-C3	60.70
	.062 (1/16)	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	26462	54.80	26462-C3	60.70
	.062 (1/16)	1/32	3/16 (3x)	.012	I	4	1/8	1-1/2	955162	64.30	955162-C3	70.20
	.010	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27310	57.10	27310-C3	63.00
	.015 (1/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27315	54.00	27315-C3	59.90
	.020	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27320	54.00	27320-C3	59.90
	.025	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27325	54.00	27325-C3	59.90
5/64	.031 (1/32)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27331	54.00	27331-C3	59.90
	.031 (1/32)	1 mm	6 mm (3x)	.018	I	4	1/8	1-1/2	922031	63.20	922031-C3	69.10
	.039 (1 mm)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27339	54.00	27339-C3	59.90
	.047 (3/64)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27347	54.00	27347-C3	59.90
	.062 (1/16)	1 mm	3 mm (1.5x)	.018	I	4	1/8	1-1/2	27362	54.00	27362-C3	59.90
	.010	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28210	56.60	28210-C3	62.50
	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28215	53.10	28215-C3	59.10
	.020	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28220	53.10	28220-C3	59.10
	.020	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967720	53.10	967720-C3	59.10
	.025	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28225	53.10	28225-C3	59.10
	.030	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28230	53.10	28230-C3	59.10
	.031 (1/32)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901131	57.70	901131-C3	63.60
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28231	53.10	28231-C3	59.10
3/32	.031 (1/32)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967731	62.50	967731-C3	68.40
	.039 (1 mm)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28239	53.10	28239-C3	59.10
	.040	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28240	53.10	28240-C3	59.10
	.047 (3/64)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28247	53.10	28247-C3	59.10
	.047 (3/64)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967747	62.50	967747-C3	68.40
	.062 (1/16)	1/32	3/64 (.5x)	**.031**	II	4	1/8	1-1/2	901162	57.70	901162-C3	63.60
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28262	53.10	28262-C3	59.10
	.062 (1/16)	3/64	9/32 (3x)	.021	I	4	1/8	1-1/2	967762	62.50	967762-C3	68.40
	.093 (3/32)	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	28293	53.10	28293-C3	59.10
	.015 (1/64)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777415	56.90	777415-C3	62.80
3 mm	.031 (1/32)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777431	56.40	777431-C3	62.30
	.047 (3/64)	.059	3/16 (1.5x)	.019	I	4	1/8	1-1/2	777447	56.40	777447-C3	62.30

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/8	.010	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22110	54.30	22110-C3	60.20
	.010	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43510	64.60	43510-C3	70.50
	.015 (1/64)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982515	66.20	982515-C3	72.10
	.015 (1/64)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893315	67.60	893315-C3	73.50
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22115	51.30	22115-C3	57.20
	.015 (1/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43515	60.30	43515-C3	66.20
	.020	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982520	66.20	982520-C3	72.10
	.020	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893320	67.60	893320-C3	73.50
	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22120	51.30	22120-C3	57.20
	.020	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43520	60.30	43520-C3	66.20
	.025	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982525	66.20	982525-C3	72.10
	.025	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893325	67.60	893325-C3	73.50
	.025	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22125	51.30	22125-C3	57.20
	.025	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43525	60.30	43525-C3	66.20
	.030	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22130	51.30	22130-C3	57.20
	.030	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43530	60.30	43530-C3	66.20
	.031 (1/32)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982531	66.20	982531-C3	72.10
	.031 (1/32)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893331	67.60	893331-C3	73.50
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22131	51.30	22131-C3	57.20
	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43531	60.30	43531-C3	66.20
	.035	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22135	51.30	22135-C3	57.20
	.035	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43535	60.30	43535-C3	66.20
	.039 (1 mm)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22139	51.30	22139-C3	57.20
	.039 (1 mm)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43539	61.40	43539-C3	67.40
	.040	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982540	66.20	982540-C3	72.10
	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22140	51.30	22140-C3	57.20
	.040	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43540	60.30	43540-C3	66.20
	.045	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22145	51.30	22145-C3	57.20
	.047 (3/64)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982547	66.20	982547-C3	72.10
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22147	51.30	22147-C3	57.20
	.047 (3/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43547	60.30	43547-C3	66.20
	.050	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22150	51.30	22150-C3	57.20
	.055	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22155	51.30	22155-C3	57.20
	.060	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22160	51.30	22160-C3	57.20
	.062 (1/16)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982562	66.20	982562-C3	72.10
	.062 (1/16)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893362	67.60	893362-C3	73.50
	.062 (1/16)	1/16	1/8 (1x)	.022	I	6	1/8	1-1/2	806662	51.30	806662-C3	57.20
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22162	51.30	22162-C3	57.20
	.062 (1/16)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43562	60.30	43562-C3	66.20
	.062 (1/16)	1/16	1/2 (4x)	.022	I	6	1/8	1-1/2	749762	63.60	749762-C3	69.50
	.078 (5/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22178	51.30	22178-C3	57.20
	.078 (5/64)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43578	60.30	43578-C3	66.20
	.093 (3/32)	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	982593	66.70	982593-C3	72.70
	.093 (3/32)	.040	1/8 (1x)	**.032**	II	6	1/8	1-1/2	893393	67.60	893393-C3	73.50
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22193	51.30	22193-C3	57.20
	.093 (3/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43593	60.30	43593-C3	66.20
	.100	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22182	51.30	22182-C3	57.20
	.118	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22157	52.40	22157-C3	58.30
	.125 (1/8)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	22195	51.30	22195-C3	57.20
	.125 (1/8)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	43595	60.30	43595-C3	66.20

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.031 (1/32)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716310	53.90	716310-C3	60.10
9/64	.062 (1/16)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716330	53.90	716330-C3	60.10
	.093 (3/32)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716350	53.90	716350-C3	60.10
	.125 (1/8)	.070	13/64 (1.5x)	.035	I	6	3/16	2	716360	53.90	716360-C3	60.10
	.010	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69410	56.80	69410-C3	63.40
	.015 (1/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69415	53.90	69415-C3	60.40
	.015 (1/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956215	62.70	956215-C3	68.90
	.020	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69420	53.90	69420-C3	60.40
	.020	5/64	1/2 (3x)	.029	I	6	3/16	2	956220	62.70	956220-C3	69.30
	.025	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69425	53.90	69425-C3	60.10
	.025	5/64	1/2 (3x)	.029	I	6	3/16	2	956225	62.70	956225-C3	69.30
	.031 (1/32)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900331	68.60	900331-C3	75.30
	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69431	53.90	69431-C3	60.40
	.031 (1/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956231	62.70	956231-C3	69.30
	.039 (1 mm)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69439	53.90	69439-C3	60.40
	.040	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69440	53.90	69440-C3	60.40
5/32	.047 (3/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69447	53.90	69447-C3	60.40
	.047 (3/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956247	62.70	956247-C3	68.90
	.050	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69450	53.90	69450-C3	60.40
	.060	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69460	53.90	69460-C3	60.10
	.062 (1/16)	.050	5/64 (.5x)	**.043**	II	6	3/16	2	900362	68.60	900362-C3	75.30
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69462	53.90	69462-C3	60.40
	.062 (1/16)	5/64	1/2 (3x)	.029	I	6	3/16	2	956262	62.70	956262-C3	69.30
	.078 (5/64)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69478	53.90	69478-C3	60.40
	.078 (5/64)	5/64	1/2 (3x)	.029	I	6	3/16	2	956278	62.70	956278-C3	69.30
	.093 (3/32)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69493	53.90	69493-C3	60.40
	.093 (3/32)	5/64	1/2 (3x)	.029	I	6	3/16	2	956293	62.70	956293-C3	69.30
	.125 (1/8)	5/64	1/4 (1.5x)	.029	I	6	3/16	2	69495	53.90	69495-C3	60.40
	.125 (1/8)	5/64	1/2 (3x)	.029	I	6	3/16	2	956295	62.70	956295-C3	69.30
	.010	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22210	56.60	22210-C3	63.20
	.015 (1/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980015	67.70	980015-C3	74.30
	.015 (1/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22215	53.00	22215-C3	59.50
	.015 (1/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43715	66.60	43715-C3	72.90
	.018	Please see page 414 for Retaining Ring sizes.										
	.020	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980020	67.70	980020-C3	74.30
	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22220	53.00	22220-C3	59.50
	.020	3/32	9/16 (3x)	.037	I	6	3/16	2	43720	66.60	43720-C3	73.10
	.025	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980025	67.70	980025-C3	73.90
3/16	.025	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22225	53.00	22225-C3	59.50
	.025	3/32	9/16 (3x)	.037	I	6	3/16	2	43725	66.60	43725-C3	73.10
	.029	Please see page 414 for Retaining Ring sizes.										
	.030	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22230	53.00	22230-C3	59.50
	.030	3/32	9/16 (3x)	.037	I	6	3/16	2	43730	66.60	43730-C3	73.10
	.031 (1/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980031	67.70	980031-C3	74.30
	.031 (1/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928931	67.70	928931-C3	74.30
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22231	53.00	22231-C3	59.50
	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43731	66.60	43731-C3	72.90
	.035	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22235	53.00	22235-C3	59.50

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/16	.035	3/32	9/16 (3x)	.037	I	6	3/16	2	43735	66.60	43735-C3	73.10
	.039 (1 mm)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22239	53.00	22239-C3	59.50
	.039 (1 mm)	3/32	9/16 (3x)	.037	I	6	3/16	2	43739	66.60	43739-C3	73.10
	.040	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980040	67.70	980040-C3	74.30
	.040	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928940	67.70	928940-C3	74.30
	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22240	53.00	22240-C3	59.50
	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	43740	66.60	43740-C3	73.10
	.045	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22246	53.00	22246-C3	59.50
	.045	3/32	9/16 (3x)	.037	I	6	3/16	2	43745	66.60	43745-C3	73.10
	.047 (3/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980047	67.70	980047-C3	74.30
	.047 (3/64)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928947	67.70	928947-C3	74.30
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22247	53.00	22247-C3	59.50
	.047 (3/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43747	66.60	43747-C3	72.90
	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22250	53.00	22250-C3	59.50
	.050	3/32	9/16 (3x)	.037	I	6	3/16	2	43750	66.60	43750-C3	73.10
	.055	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22255	53.00	22255-C3	59.50
	.055	3/32	9/16 (3x)	.037	I	6	3/16	2	43755	66.60	43755-C3	72.90
	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22261	53.00	22261-C3	59.50
	.060	3/32	9/16 (3x)	.037	I	6	3/16	2	43760	66.60	43760-C3	73.10
	.062 (1/16)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980062	67.70	980062-C3	74.30
	.062 (1/16)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928962	67.70	928962-C3	74.30
	.062 (1/16)	3/32	3/16 (1x)	.037	I	6	3/16	2	806562	53.00	806562-C3	59.30
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22262	53.00	22262-C3	59.50
	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	43762	66.60	43762-C3	73.10
	.078 (5/64)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980078	67.70	980078-C3	74.30
	.078 (5/64)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928978	67.70	928978-C3	74.30
	.078 (5/64)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22278	53.00	22278-C3	59.50
	.078 (5/64)	3/32	9/16 (3x)	.037	I	6	3/16	2	43778	66.60	43778-C3	73.10
	.093 (3/32)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980093	67.70	980093-C3	74.30
	.093 (3/32)	1/16	3/16 (1x)	**.052**	II	6	3/16	2	928993	67.70	928993-C3	74.30
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22293	53.00	22293-C3	59.50
	.093 (3/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	43793	66.60	43793-C3	73.10
	.118	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22257	57.00	22257-C3	63.20
	.125 (1/8)	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	980095	67.70	980095-C3	74.30
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22295	53.00	22295-C3	59.50
	.125 (1/8)	3/32	9/16 (3x)	.037	I	6	3/16	2	43795	66.60	43795-C3	73.10
	.156 (5/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	22297	53.00	22297-C3	59.50
6 mm	.031 (1/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947531	62.90	947531-C3	71.90
	.039 (1 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947539	62.90	947539-C3	71.90
	.062 (1/16)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947562	62.90	947562-C3	71.90
	.093 (3/32)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947593	62.90	947593-C3	71.90
	.118 (3 mm)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947588	62.90	947588-C3	71.90
	.125 (1/8)	3 mm	9 mm (1.5x)	.049	I	6	1/4	2-1/2	947595	62.90	947595-C3	71.90
1/4	.010	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22310	63.60	22310-C3	72.50
	.010	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43910	76.30	43910-C3	84.40
	.015 (1/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70815	74.80	70815-C3	83.70
	.015 (1/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986115	77.30	986115-C3	86.30
	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22315	60.10	22315-C3	68.80
	.015 (1/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43915	73.20	43915-C3	82.10

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.020	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70820	65.50	70820-C3	74.40
	.020	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986120	67.70	986120-C3	75.80
	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22320	60.10	22320-C3	68.80
	.020	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43920	73.20	43920-C3	82.10
	.025	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70825	66.00	70825-C3	74.90
	.025	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986125	67.70	986125-C3	76.60
	.025	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22325	60.10	22325-C3	68.80
	.025	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43925	73.20	43925-C3	82.10
	.030	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70830	66.00	70830-C3	74.90
	.030	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22330	60.10	22330-C3	68.80
	.030	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43930	73.20	43930-C3	82.10
	.031 (1/32)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964731	110.30	964731-C3	119.40
	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70831	65.50	70831-C3	74.40
	.031 (1/32)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986131	85.50	986131-C3	94.40
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22331	60.10	22331-C3	68.80
	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43931	73.20	43931-C3	82.10
	.035	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22335	60.10	22335-C3	68.80
	.035	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43935	74.70	43935-C3	82.80
	.039 (1 mm)	Please see page 414 for Retaining Ring sizes.										
	.039 (1 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22339	60.10	22339-C3	68.80
	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70840	65.50	70840-C3	74.40
	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22340	60.10	22340-C3	68.80
	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43940	73.20	43940-C3	82.10
	.045	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22346	60.10	22346-C3	68.80
1/4	.046	Please see page 414 for Retaining Ring sizes.										
	.047 (3/64)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964747	107.60	964747-C3	115.70
	.047 (3/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70847	65.50	70847-C3	74.40
	.047 (3/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986147	85.50	986147-C3	94.40
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22347	60.10	22347-C3	68.80
	.047 (3/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43947	73.20	43947-C3	82.10
	.050	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70850	65.50	70850-C3	74.40
	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22350	60.10	22350-C3	68.80
	.050	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43950	73.20	43950-C3	82.10
	.055	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22355	60.10	22355-C3	68.80
	.055	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43955	73.20	43955-C3	82.10
	.060	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70860	66.00	70860-C3	74.90
	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22361	60.10	22361-C3	68.80
	.060	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43961	73.20	43961-C3	82.10
	.062 (1/16)	.050	5/64 (.3x)	**.092**	III	8	1/4	2-1/2	964762	110.30	964762-C3	119.40
	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70862	65.50	70862-C3	74.40
	.062 (1/16)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986162	85.50	986162-C3	94.40
	.062 (1/16)	1/8	1/4 (1x)	.053	I	6	1/4	2-1/2	806462	60.10	806462-C3	68.80
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22362	60.10	22362-C3	68.80
	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43962	73.20	43962-C3	82.10
	.062 (1/16)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984262	84.80	984262-C3	93.50
	.078 (5/64)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70878	65.50	70878-C3	74.40
	.078 (5/64)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986178	85.50	986178-C3	94.40
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22378	60.10	22378-C3	68.80
	.078 (5/64)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43978	73.20	43978-C3	82.10

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/4	.080	1/8	3/8 (1.5x)	**.053**	I	6	1/4	2-1/2	22380	60.10	22380-C3	68.20
	.090	1/8	3/8 (1.5x)	**.053**	I	6	1/4	2-1/2	22390	60.10	22390-C3	68.20
	.093 (3/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70893	65.50	70893-C3	74.40
	.093 (3/32)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986193	85.50	986193-C3	94.40
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22393	60.10	22393-C3	68.80
	.093 (3/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43993	73.20	43993-C3	82.10
	.100	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22382	60.10	22382-C3	68.80
	.100	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43982	73.20	43982-C3	82.10
	.109 (7/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22384	60.10	22384-C3	68.80
	.118 (3 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22388	60.10	22388-C3	68.80
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	70895	65.50	70895-C3	74.40
	.125 (1/8)	5/64	1/4 (1x)	**.076**	II	6	1/4	2-1/2	986195	85.50	986195-C3	94.40
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22395	60.10	22395-C3	68.80
	.125 (1/8)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43995	73.20	43995-C3	82.10
	.125 (1/8)	1/8	1 (4x)	.053	I	6	1/4	2-1/2	984295	84.80	984295-C3	93.50
	.156 (5/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22397	60.10	22397-C3	68.80
	.156 (5/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43997	73.20	43997-C3	82.10
	.187 (3/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22398	60.10	22398-C3	68.80
	.187 (3/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	43998	73.20	43998-C3	82.10
	.250 (1/4)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	22399	60.10	22399-C3	68.80
5/16	.010	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22401	84.10	22401-C3	94.40
	.015 (1/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22403	81.00	22403-C3	91.20
	.020	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22405	79.40	22405-C3	89.70
	.025	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22407	79.40	22407-C3	89.70
	.030	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22409	79.40	22409-C3	89.70
	.031 (1/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973410	91.00	973410-C3	101.60
	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22410	79.40	22410-C3	89.70
	.031 (1/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69710	93.80	69710-C3	104.10
	.039 (1 mm)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22414	79.40	22414-C3	89.70
	.039 (1 mm)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69714	93.80	69714-C3	103.50
	.040	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22415	79.40	22415-C3	89.70
	.047 (3/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973420	91.00	973420-C3	101.60
	.047 (3/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22420	79.40	22420-C3	89.70
	.050	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22422	79.40	22422-C3	89.70
	.056	Please see page 414 for Retaining Ring sizes.										
	.060	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22428	79.40	22428-C3	89.70
	.062 (1/16)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959430	125.10	959430-C3	135.50
	.062 (1/16)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973430	91.00	973430-C3	101.60
	.062 (1/16)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907930	110.80	907930-C3	121.30
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22430	79.40	22430-C3	89.70
	.062 (1/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69730	93.80	69730-C3	104.10
	.078 (5/64)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973440	91.00	973440-C3	101.60
	.078 (5/64)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22440	79.40	22440-C3	89.70
	.078 (5/64)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69740	93.80	69740-C3	104.10
	.093 (3/32)	.063	3/32 (.3x)	**.116**	III	10	5/16	2-1/2	959450	125.10	959450-C3	134.70
	.093 (3/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973450	91.00	973450-C3	101.60
	.093 (3/32)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907950	110.80	907950-C3	121.30
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22450	79.40	22450-C3	89.70

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
5/16	.093 (3/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69750	93.80	69750-C3	104.10
	.100	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22452	79.40	22452-C3	89.70
	.125 (1/8)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973460	91.00	973460-C3	101.60
	.125 (1/8)	7/64	3/8 (1x)	**.091**	II	6	5/16	2-1/2	907960	110.80	907960-C3	121.30
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22455	79.40	22455-C3	89.70
	.125 (1/8)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69760	93.80	69760-C3	104.10
	.156 (5/32)	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	973465	91.00	973465-C3	101.60
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22465	79.40	22465-C3	89.70
	.156 (5/32)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69765	93.80	69765-C3	103.50
	.187 (3/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22470	79.40	22470-C3	89.70
	.187 (3/16)	5/32	1 (3x)	.068	I	6	5/16	2-1/2	69770	93.80	69770-C3	104.10
	.250 (1/4)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	22480	79.40	22480-C3	89.70
3/8	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22503	92.80	22503-C3	104.20
	.020	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71105	97.60	71105-C3	109.00
	.020	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22505	92.80	22505-C3	104.20
	.020	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70305	104.80	70305-C3	116.30
	.025	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22507	92.80	22507-C3	104.20
	.025	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70307	104.80	70307-C3	116.30
	.030	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22509	92.80	22509-C3	104.20
	.031 (1/32)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991310	129.50	991310-C3	141.00
	.031 (1/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71110	97.60	71110-C3	109.00
	.031 (1/32)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958910	117.80	958910-C3	129.20
	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22510	89.60	22510-C3	101.00
	.031 (1/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70310	104.80	70310-C3	116.30
	.035	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22512	89.60	22512-C3	101.00
	.035	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70312	106.80	70312-C3	118.20
	.039 (1 mm)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71114	97.60	71114-C3	109.00
	.039 (1 mm)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22514	89.60	22514-C3	101.00
	.039 (1 mm)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70314	104.80	70314-C3	116.30
	.040	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71115	96.70	71115-C3	108.20
	.040	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22515	89.60	22515-C3	101.00
	.040	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70315	104.80	70315-C3	116.30
	.045	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22518	89.60	22518-C3	101.00
	.047 (3/64)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71120	97.60	71120-C3	109.00
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22520	89.60	22520-C3	101.00
	.047 (3/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70320	104.80	70320-C3	116.30
	.050	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958922	97.60	958922-C3	109.00
	.050	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22522	89.60	22522-C3	101.00
	.055	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958925	97.60	958925-C3	109.00
	.055	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22525	89.60	22525-C3	101.00
	.060	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22528	89.60	22528-C3	101.00
	.060	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70328	104.80	70328-C3	116.30
	.062 (1/16)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991330	129.50	991330-C3	141.00
	.062 (1/16)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71130	97.60	71130-C3	109.00
	.062 (1/16)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958930	117.80	958930-C3	129.20
	.062 (1/16)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806330	89.60	806330-C3	101.00
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22530	89.60	22530-C3	101.00
	.062 (1/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70330	104.80	70330-C3	116.30
	.068	Please see page 385 for Retaining Ring sizes.										

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/8	.078 (5/64)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71140	97.60	71140-C3	109.00
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22540	89.60	22540-C3	101.00
	.078 (5/64)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70340	89.60	70340-C3	101.00
	.086	Please see page 414 for Retaining Ring sizes.										
	.093 (3/32)	.075	7/64 (.3x)	**.142**	III	10	3/8	2-1/2	991350	129.50	991350-C3	141.00
	.093 (3/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71150	97.60	71150-C3	109.00
	.093 (3/32)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958950	117.80	958950-C3	129.20
	.093 (3/32)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806350	89.60	806350-C3	101.00
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22550	89.60	22550-C3	101.00
	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70350	104.80	70350-C3	116.30
	.100	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71152	93.90	71152-C3	105.40
	.100	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22552	89.60	22552-C3	101.00
	.100	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70352	104.80	70352-C3	116.30
	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71160	97.60	71160-C3	109.00
	.125 (1/8)	1/8	3/8 (1x)	**.115**	II	8	3/8	2-1/2	958960	117.80	958960-C3	129.20
	.125 (1/8)	3/16	3/8 (1x)	.084	I	8	3/8	2-1/2	806360	89.60	806360-C3	101.00
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22560	89.60	22560-C3	101.00
	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	70360	104.80	70360-C3	116.30
	.156 (5/32)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71165	97.60	71165-C3	109.00
	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22565	89.60	22565-C3	101.00
	.156 (5/32)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70365	104.80	70365-C3	116.30
	.187 (3/16)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71170	97.60	71170-C3	109.00
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22570	89.60	22570-C3	101.00
	.187 (3/16)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70370	104.80	70370-C3	116.30
	.250 (1/4)	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	71180	97.60	71180-C3	109.00
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22580	89.60	22580-C3	101.00
	.250 (1/4)	3/16	1-1/8 (3x)	.084	I	8	3/8	3	70380	104.80	70380-C3	116.30
	.312 (5/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	22585	89.60	22585-C3	101.00
7/16	.031 (1/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71810	121.90	71810-C3	135.10
	.047 (3/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71820	119.60	71820-C3	134.10
	.062 (1/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71830	119.60	71830-C3	134.10
	.078 (5/64)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71840	119.60	71840-C3	134.10
	.093 (3/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71850	119.60	71850-C3	134.10
	.125 (1/8)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71860	119.60	71860-C3	134.10
	.125 (1/8)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892960	135.30	892960-C3	149.70
	.156 (5/32)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71865	119.60	71865-C3	134.10
	.187 (3/16)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71870	119.60	71870-C3	134.10
	.187 (3/16)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892970	135.30	892970-C3	149.70
	.250 (1/4)	7/32	5/8 (1.5x)	.099	I	8	7/16	2-3/4	71880	119.60	71880-C3	134.10
	.250 (1/4)	7/32	1-5/16 (3x)	.099	I	8	7/16	2-3/4	892980	135.30	892980-C3	149.70
1/2	.015 (1/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22603	121.80	22603-C3	138.90
	.020	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71205	131.40	71205-C3	148.90
	.020	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22605	121.80	22605-C3	138.90
	.025	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22607	121.80	22607-C3	138.90
	.025	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71507	136.80	71507-C3	152.40
	.030	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22609	121.80	22609-C3	138.90
	.031 (1/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71210	127.40	71210-C3	144.90
	.031 (1/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975710	129.10	975710-C3	146.60
	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22610	117.80	22610-C3	135.10

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.031 (1/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71510	133.10	71510-C3	150.40
	.035	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22612	117.80	22612-C3	135.10
	.039 (1 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22614	117.80	22614-C3	135.10
	.040	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71215	127.40	71215-C3	144.90
	.040	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22615	117.80	22615-C3	135.10
	.040	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71515	133.10	71515-C3	150.40
	.045	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22618	117.80	22618-C3	135.10
	.045	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71518	133.10	71518-C3	148.60
	.047 (3/64)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71220	127.40	71220-C3	144.90
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22620	117.80	22620-C3	135.10
	.047 (3/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71520	133.10	71520-C3	148.60
	.050	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22622	117.80	22622-C3	135.10
	.050	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71522	133.10	71522-C3	150.40
	.055	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22625	117.80	22625-C3	135.10
	.055	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71525	133.10	71525-C3	150.40
	.060	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71228	127.40	71228-C3	142.90
	.060	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22628	117.80	22628-C3	135.10
	.062 (1/16)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985230	161.90	985230-C3	179.50
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71230	127.40	71230-C3	144.90
	.062 (1/16)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975730	151.00	975730-C3	168.60
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22630	117.80	22630-C3	135.10
	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71530	133.10	71530-C3	150.40
	.070	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22635	117.80	22635-C3	135.10
	.078 (5/64)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71240	127.40	71240-C3	144.90
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22640	117.80	22640-C3	135.10
	.078 (5/64)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71540	133.10	71540-C3	150.40
	.080	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22642	117.80	22642-C3	135.10
	.090	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22647	117.80	22647-C3	135.10
	.093 (3/32)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985250	161.90	985250-C3	179.50
	.093 (3/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71250	127.40	71250-C3	144.90
	.093 (3/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975750	151.00	975750-C3	168.60
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22650	117.80	22650-C3	135.10
	.093 (3/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71550	133.10	71550-C3	150.40
	.100	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71252	127.40	71252-C3	144.90
	.100	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22652	117.80	22652-C3	135.10
	.100	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71552	133.10	71552-C3	148.60
	.103	Please see page 414 for Retaining Ring sizes.										
	.109 (7/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22654	117.80	22654-C3	135.10
	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22657	117.80	22657-C3	135.10
	.118 (3 mm)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71557	133.10	71557-C3	148.60
	.120	Please see page 414 for Retaining Ring sizes.										
	.125 (1/8)	.100	5/32 (.3x)	**.192**	III	12	1/2	3	985260	161.90	985260-C3	177.50
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71260	127.40	71260-C3	144.90
	.125 (1/8)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975760	151.00	975760-C3	168.60
	.125 (1/8)	1/4	1/2 (1x)	.115	I	8	1/2	3	806260	117.80	806260-C3	135.10
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22660	117.80	22660-C3	135.10
	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	8	1/2	3	71560	133.10	71560-C3	150.40
	.125 (1/8)	1/4	2 (4x)	.115	I	8	1/2	4	933160	198.80	933160-C3	216.10
	.140 (9/64)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975762	151.00	975762-C3	168.60

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square (cont.)

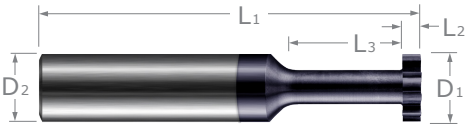
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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.140 (9/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22662	117.80	22662-C3	135.10
	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71265	127.40	71265-C3	142.90
	.156 (5/32)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975765	151.00	975765-C3	168.60
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22665	117.80	22665-C3	135.10
	.156 (5/32)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71565	133.10	71565-C3	150.40
	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71270	127.40	71270-C3	144.90
	.187 (3/16)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975770	151.00	975770-C3	168.60
	.187 (3/16)	1/4	1/2 (1x)	.115	I	8	1/2	3	806270	120.10	806270-C3	137.40
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22670	117.80	22670-C3	135.10
	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71570	133.10	71570-C3	150.40
	.250 (1/4)	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	71280	127.40	71280-C3	144.90
	.250 (1/4)	5/32	1/2 (1x)	**.162**	II	8	1/2	3	975780	151.00	975780-C3	168.60
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22680	117.80	22680-C3	135.10
	.250 (1/4)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71580	133.10	71580-C3	150.40
	.312 (5/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22685	117.80	22685-C3	135.10
	.312 (5/16)	1/4	1-1/2 (3x)	.115	I	8	1/2	3-1/2	71585	133.10	71585-C3	149.70
	.375 (3/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	22687	117.80	22687-C3	135.10
5/8	.031 (1/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70910	184.60	70910-C3	201.80
	.031 (1/32)	5/16	2 (3x)	.146	I	8	5/8	3-1/2	972910	238.70	972910-C3	258.00
	.047 (3/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70920	184.60	70920-C3	201.80
	.062 (1/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70930	184.60	70930-C3	201.80
	.078 (5/64)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70940	184.60	70940-C3	201.80
	.093 (3/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950650	255.80	950650-C3	273.40
	.093 (3/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70950	184.60	70950-C3	201.80
	.093 (3/32)	5/16	2 (3x)	.146	I	8	5/8	4	972950	238.70	972950-C3	258.00
	.120	Please see page 414 for Retaining Ring sizes.										
	.125 (1/8)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950660	255.80	950660-C3	273.40
	.125 (1/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70960	184.60	70960-C3	201.80
	.125 (1/8)	5/16	2 (3x)	.146	I	8	5/8	4	972960	238.70	972960-C3	258.00
	.139	Please see page 414 for Retaining Ring sizes.										
	.156 (5/32)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950665	255.80	950665-C3	273.40
	.156 (5/32)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70965	184.60	70965-C3	201.80
	.156 (5/32)	5/16	2 (3x)	.146	I	8	5/8	4	972965	238.70	972965-C3	258.00
	.187 (3/16)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950670	255.80	950670-C3	273.40
	.187 (3/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70970	184.60	70970-C3	201.80
	.187 (3/16)	5/16	2 (3x)	.146	I	8	5/8	4	972970	238.70	972970-C3	258.00
	.250 (1/4)	13/64	5/16 (.5x)	**.201**	II	8	5/8	3-1/2	950680	255.80	950680-C3	273.40
	.250 (1/4)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70980	184.60	70980-C3	201.80
	.250 (1/4)	5/16	2 (3x)	.146	I	8	5/8	4	972980	238.70	972980-C3	258.00
	.312 (5/16)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70985	184.60	70985-C3	201.80
	.375 (3/8)	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	70987	184.60	70987-C3	201.80

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 411, 419, 422, 427

KEYSEAT CUTTERS

Square for Hardened Steels

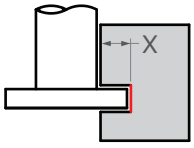


- Optimized for hardened steels 45-68Rc with high flute count and specialized internal geometry
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



High Flute Count and Specialized Internal Geometry

Standard Slotting (Type I)



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$
	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867415-C6	67.90
	.020	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867420-C6	67.90
1/8	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867431-C6	67.90
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867462-C6	67.90
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	8	1/8	1-1/2	867493-C6	67.90
5/32	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	8	3/16	2	746631-C6	70.40
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	8	3/16	2	746662-C6	70.40
	.020	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875920-C6	70.40
	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875931-C6	70.40
3/16	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875962-C6	70.40
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875993-C6	70.40
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	8	3/16	2	875995-C6	70.40
	.015 (1/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860115-C6	79.40
	.020	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860120-C6	79.40
	.031 (1/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860131-C6	79.40
	.040	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860140-C6	79.40
	.047 (3/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860147-C6	79.40
1/4	.062 (1/16)	1/8	1/4 (1x)	.048	I	8	1/4	2-1/2	743962-C6	79.40
	.062 (1/16)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860162-C6	79.40
	.062 (1/16)	1/8	3/4 (3x)	.048	I	8	1/4	2-1/2	742830-C6	83.00
	.078 (5/64)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860178-C6	79.40
	.093 (3/32)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860193-C6	79.40
	.125 (1/8)	1/8	3/8 (1.5x)	.048	I	8	1/4	2-1/2	860195-C6	79.40
	.031 (1/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855610-C6	105.30
	.062 (1/16)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855630-C6	105.30
5/16	.093 (3/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855650-C6	105.30
	.125 (1/8)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855660-C6	105.30
	.156 (5/32)	5/32	15/32 (1.5x)	.063	I	8	5/16	2-1/2	855665-C6	105.30
	.031 (1/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894710-C6	118.50
	.062 (1/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894730-C6	118.50
	.093 (3/32)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894750-C6	118.50
3/8	.100	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894752-C6	118.50
	.125 (1/8)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894760-C6	118.50
	.187 (3/16)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894770-C6	118.50
	.250 (1/4)	3/16	9/16 (1.5x)	.074	I	10	3/8	3	894780-C6	118.50

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Square for Hardened Steels (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	AlTiN NANO COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891310-C6	161.00
	.047 (3/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891320-C6	161.00
	.062 (1/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891330-C6	161.00
	.078 (5/64)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891340-C6	161.00
	.093 (3/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891350-C6	161.00
	.125 (1/8)	1/4	1/2 (1x)	.105	I	10	1/2	3	744760-C6	161.00
	.125 (1/8)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891360-C6	161.00
	.125 (1/8)	1/4	1-1/2 (3x)	.105	I	10	1/2	3	748260-C6	164.60
	.156 (5/32)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891365-C6	161.00
	.187 (3/16)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891370-C6	161.00
	.250 (1/4)	1/4	3/4 (1.5x)	.105	I	10	1/2	3	891380-C6	161.00
5/8	.125 (1/8)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744360-C6	244.80
	.187 (3/16)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744370-C6	244.80
	.250 (1/4)	5/16	1 (1.5x)	.137	I	10	5/8	3-1/2	744380-C6	244.80

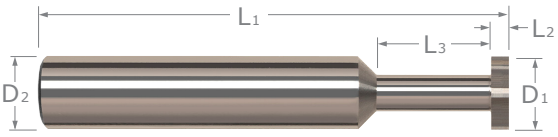
*Radial DOC accounts for max transition radius at neck

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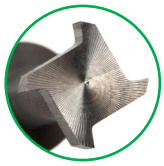
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KEYSEAT CUTTERS

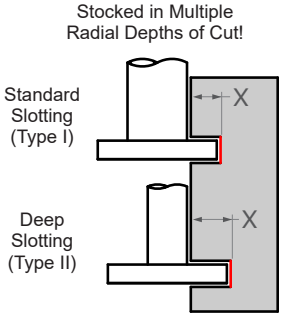
Square for Non-Ferrous Materials



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Large flute opening and sharper cutting edge
- Offered with TiB_2 coating to minimize galling
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA



Large Flute Opening & Sharper Cutting Edge



CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/32	.015 (1/64)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849815	57.90	849815-C8	65.60
	.031 (1/32)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849831	57.90	849831-C8	65.60
	.062 (1/16)	3/64	9/64 (1.5x)	.021	I	3	1/8	1-1/2	849862	59.10	849862-C8	66.70
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962915	57.90	962915-C8	65.60
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962931	57.90	962931-C8	66.70
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962962	57.90	962962-C8	66.70
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	4	1/8	1-1/2	962993	57.90	962993-C8	65.60
5/32	.031 (1/32)	5/64	1/4 (1.5x)	.029	I	4	3/16	2	744031	61.10	744031-C8	69.80
	.062 (1/16)	5/64	1/4 (1.5x)	.029	I	4	3/16	2	744062	61.10	744062-C8	69.80
3/16	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998031	60.10	998031-C8	68.70
	.047 (3/64)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998047	60.10	998047-C8	68.70
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998062	60.10	998062-C8	68.70
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	4	3/16	2	998095	60.10	998095-C8	68.70
1/4	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970315	66.60	970315-C8	77.00
	.020	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970320	66.60	970320-C8	77.00
	.025	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970325	66.60	970325-C8	77.70
	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970331	66.60	970331-C8	77.00
	.040	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970340	66.60	970340-C8	77.00
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970347	66.60	970347-C8	77.00
	.060	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970360	66.60	970360-C8	77.00
	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909262	72.20	909262-C8	82.40
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970362	66.60	970362-C8	77.00
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970378	66.60	970378-C8	77.00
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970393	66.60	970393-C8	77.00
	.125 (1/8)	5/64	1/8 (.5x)	**.076**	II	4	1/4	2-1/2	909295	72.20	909295-C8	82.40
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	4	1/4	2-1/2	970395	66.60	970395-C8	77.00

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Square for Non-Ferrous Materials (cont.)

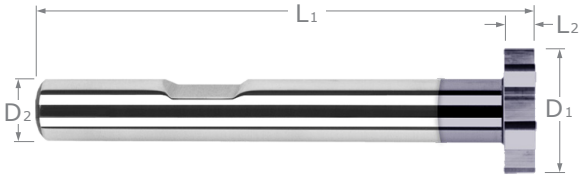
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CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
5/16	.031 (1/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984310	91.40	984310-C8	105.50
	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984330	91.40	984330-C8	105.50
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984350	91.40	984350-C8	105.50
	.125 (1/8)	5/32	15/32 (1.5x)	.068	I	4	5/16	2-1/2	984360	91.40	984360-C8	104.70
3/8	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975210	102.20	975210-C8	119.70
	.047 (3/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975220	102.20	975220-C8	118.00
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975230	102.20	975230-C8	119.70
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975240	102.20	975240-C8	118.00
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975250	102.20	975250-C8	119.70
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975260	102.20	975260-C8	119.70
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	975270	102.20	975270-C8	119.70
1/2	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988910	134.70	988910-C8	154.50
	.047 (3/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988920	134.70	988920-C8	153.10
	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917530	144.00	917530-C8	163.00
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988930	134.70	988930-C8	154.50
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988940	134.70	988940-C8	153.10
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988950	134.70	988950-C8	154.50
	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	917560	144.00	917560-C8	163.00
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988960	134.70	988960-C8	154.50
	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988965	134.70	988965-C8	153.10
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988970	134.70	988970-C8	154.50
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	988980	134.70	988980-C8	154.50
5/8	.062 (1/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891730	193.20	891730-C8	219.80
	.078 (5/64)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891740	193.20	891740-C8	219.80
	.093 (3/32)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891750	197.00	891750-C8	223.70
	.125 (1/8)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891760	193.20	891760-C8	222.10
	.187 (3/16)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891770	193.20	891770-C8	222.10
	.250 (1/4)	5/16	1 (1.5x)	.146	I	6	5/8	3-1/2	891780	193.20	891780-C8	222.10

*Radial DOC accounts for max transition radius at neck

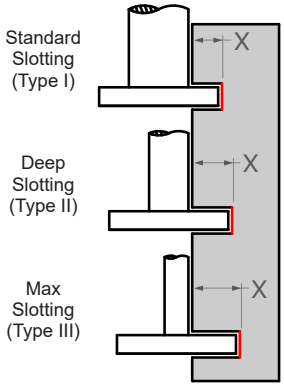
KEYSEAT CUTTERS

Square – Reduced Shank



- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Weldon flat
- CNC ground in the USA

Stocked in Multiple Radial Depths of Cut!



CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.031 (1/32)	.115	I	8	1/4*	3-1/32	849305	104.70	849305-C3	121.30
	.047 (3/64)	.115	I	8	1/4*	3-3/64	849310	104.70	849310-C3	121.30
	.062 (1/16)	**.146**	II	8	3/16*	3-1/16	713162	114.90	713162-C3	131.50
	.062 (1/16)	.115	I	8	1/4*	3-1/16	849320	104.70	849320-C3	122.00
	.078 (5/64)	.115	I	8	1/4*	3-5/64	849330	104.70	849330-C3	122.00
	.093 (3/32)	**.146**	II	8	3/16*	3-3/32	713193	114.90	713193-C3	131.50
	.093 (3/32)	.115	I	8	1/4*	3-3/32	849340	104.70	849340-C3	122.00
	.125 (1/8)	**.146**	II	8	3/16*	3-1/8	713195	114.90	713195-C3	131.50
	.125 (1/8)	.115	I	8	1/4*	3-1/8	849350	104.70	849350-C3	122.00
	.156 (5/32)	.115	I	8	1/4*	3-5/32	849355	104.70	849355-C3	121.30
	.187 (3/16)	.115	I	8	1/4*	3-3/16	849360	104.70	849360-C3	122.00
	.250 (1/4)	.115	I	8	1/4*	3-1/4	849370	104.70	849370-C3	122.00
3/4	.031 (1/32)	**.240**	III	10	1/4*	3-1/32	899805	145.10	899805-C3	164.30
	.031 (1/32)	**.177**	II	10	3/8	3-1/32	984505	133.80	984505-C3	153.90
	.031 (1/32)	.115	I	10	1/2	3-1/32	52005	126.10	52005-C3	146.30
	.040	**.177**	II	10	3/8	3.040	984508	133.80	984508-C3	153.90
	.040	.115	I	10	1/2	3.040	52008	126.10	52008-C3	146.30
	.047 (3/64)	**.240**	III	10	1/4*	3-3/64	899810	145.10	899810-C3	164.30
	.047 (3/64)	**.177**	II	10	3/8	3-3/64	984510	133.80	984510-C3	153.90
	.047 (3/64)	.115	I	10	1/2	3-3/64	52010	126.10	52010-C3	146.30
	.050	.115	I	10	1/2	3.050	52011	126.10	52011-C3	146.30
	.060	.115	I	10	1/2	3.060	52019	126.10	52019-C3	146.30
	.062 (1/16)	**.240**	III	10	1/4*	3-1/16	899820	145.10	899820-C3	164.30
	.062 (1/16)	**.177**	II	10	3/8	3-1/16	984520	133.80	984520-C3	153.90
	.062 (1/16)	.115	I	10	1/2	3-1/16	52020	126.10	52020-C3	146.30
	.078 (5/64)	**.177**	II	10	3/8	3-5/64	984530	133.80	984530-C3	153.90
	.078 (5/64)	.115	I	10	1/2	3-5/64	52030	126.10	52030-C3	146.30
	.093 (3/32)	**.240**	III	10	1/4*	3-3/32	899840	145.10	899840-C3	164.30
	.093 (3/32)	**.177**	II	10	3/8	3-3/32	984540	133.80	984540-C3	153.90
	.093 (3/32)	.115	I	10	1/2	3-3/32	52040	126.10	52040-C3	146.30
	.100	.115	I	10	1/2	3.100	52045	126.10	52045-C3	146.30
	.118 (3 mm)	.115	I	10	1/2	3.118	52048	126.10	52048-C3	146.30
	.125 (1/8)	**.177**	II	10	3/8	3-1/8	984550	133.80	984550-C3	153.90
	.125 (1/8)	.115	I	10	1/2	3-1/8	52050	126.10	52050-C3	146.30

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

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KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

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CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/4	.156 (5/32)	**.177**	II	10	3/8	3-5/32	984555	133.80	984555-C3	153.90
	.156 (5/32)	.115	I	10	1/2	3-5/32	52055	126.10	52055-C3	146.30
	.174	Please see page 414 for Retaining Ring sizes.								
	.187 (3/16)	**.177**	II	10	3/8	3-3/16	984560	133.80	984560-C3	153.90
	.187 (3/16)	.115	I	10	1/2	3-3/16	52060	126.10	52060-C3	146.30
	.236 (6 mm)	.115	I	10	1/2	3.236	52066	136.80	52066-C3	159.90
	.250 (1/4)	**.177**	II	10	3/8	3-1/4	984570	150.10	984570-C3	170.20
	.250 (1/4)	.115	I	10	1/2	3-1/4	52070	142.30	52070-C3	162.70
	.312 (5/16)	.115	I	10	1/2	3-5/16	52080	167.60	52080-C3	190.70
	.375 (3/8)	.115	I	10	1/2	3-3/8	52090	174.70	52090-C3	203.10
7/8	.062 (1/16)	.177	I	12	1/2	3-1/16	961020	134.70	961020-C3	155.20
	.093 (3/32)	.177	I	12	1/2	3-3/32	961040	134.70	961040-C3	155.20
	.125 (1/8)	**.240**	II	12	3/8	3-1/8	890650	142.10	890650-C3	162.10
	.125 (1/8)	.177	I	12	1/2	3-1/8	961050	134.70	961050-C3	155.20
	.187 (3/16)	**.240**	II	12	3/8	3-3/16	890660	142.10	890660-C3	162.10
	.187 (3/16)	.177	I	12	1/2	3-3/16	961060	134.70	961060-C3	162.40
	.250 (1/4)	**.240**	II	12	3/8	3-1/4	890670	158.20	890670-C3	178.40
	.250 (1/4)	.177	I	12	1/2	3-1/4	961070	149.90	961070-C3	170.60
	.312 (5/16)	.177	I	12	1/2	3-5/16	961080	167.60	961080-C3	188.30
	.375 (3/8)	.177	I	12	1/2	3-3/8	961090	174.70	961090-C3	195.60
1	.031 (1/32)	**.365**	III	12	1/4*	3-1/32	914905	169.20	914905-C3	198.20
	.031 (1/32)	**.302**	II	12	3/8	3-1/32	982005	149.50	982005-C3	179.40
	.031 (1/32)	.240	I	12	1/2	3-1/32	55905	141.80	55905-C3	172.00
	.040	.240	I	12	1/2	3.040	55908	141.80	55908-C3	172.00
	.047 (3/64)	**.365**	III	12	1/4*	3-3/64	914910	169.20	914910-C3	198.20
	.047 (3/64)	**.302**	II	12	3/8	3-3/64	982010	149.50	982010-C3	179.40
	.047 (3/64)	.240	I	12	1/2	3-3/64	55910	141.80	55910-C3	172.00
	.062 (1/16)	**.365**	III	12	1/4*	3-1/16	914920	169.20	914920-C3	198.20
	.062 (1/16)	**.302**	II	12	3/8	3-1/16	982020	149.50	982020-C3	179.40
	.062 (1/16)	.240	I	12	1/2	3-1/16	55920	141.80	55920-C3	172.00
	.078 (5/64)	**.365**	III	12	1/4*	3-5/64	914930	169.20	914930-C3	198.20
	.078 (5/64)	**.302**	II	12	3/8	3-5/64	982030	149.50	982030-C3	179.40
	.078 (5/64)	.240	I	12	1/2	3-5/64	55930	141.80	55930-C3	172.00
	.093 (3/32)	**.365**	III	12	1/4*	3-3/32	914940	169.20	914940-C3	198.20
	.093 (3/32)	**.302**	II	12	3/8	3-3/32	982040	149.50	982040-C3	179.40
	.093 (3/32)	.240	I	12	1/2	3-3/32	55940	141.80	55940-C3	172.00
	.125 (1/8)	**.365**	III	12	1/4*	3-1/8	914950	169.20	914950-C3	198.20
	.125 (1/8)	**.302**	II	12	3/8	3-1/8	982050	149.50	982050-C3	179.40
	.125 (1/8)	.240	I	12	1/2	3-1/8	55950	141.80	55950-C3	172.00
	.156 (5/32)	**.302**	II	12	3/8	3-5/32	982055	149.50	982055-C3	179.40
	.156 (5/32)	.240	I	12	1/2	3-5/32	55955	141.80	55955-C3	172.00
	.187 (3/16)	**.302**	II	12	3/8	3-3/16	982060	149.50	982060-C3	179.40
	.187 (3/16)	.240	I	12	1/2	3-3/16	55960	141.80	55960-C3	172.00
	.209	Please see page 414 for Retaining Ring sizes.								
	.250 (1/4)	**.302**	II	12	3/8	3-1/4	982070	166.00	982070-C3	196.00
	.250 (1/4)	.240	I	12	1/2	3-1/4	55970	157.40	55970-C3	187.70
	.312 (5/16)	**.302**	II	12	3/8	3-5/16	982080	177.00	982080-C3	207.10
	.312 (5/16)	.240	I	12	1/2	3-5/16	55980	167.60	55980-C3	198.20
	.375 (3/8)	**.302**	II	12	3/8	3-3/8	982090	167.50	982090-C3	197.70
	.375 (3/8)	.240	I	12	1/2	3-3/8	55990	174.70	55990-C3	205.40

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

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KEYSEAT CUTTERS

Square – Reduced Shank (cont.)

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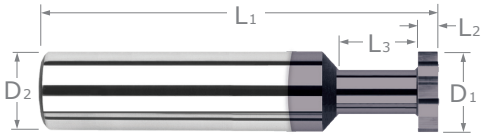
CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC**	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.500 (1/2)	.240	I	12	1/2	3-1/2	55995	181.90	55995-C3	212.40
1-1/8	.125 (1/8)	.177	I	14	3/4	3-3/8	741750	165.60	741750-C3	204.80
	.250 (1/4)	.177	I	14	3/4	3-1/2	741770	185.30	741770-C3	224.50
	.093 (3/32)	.240	I	14	3/4	3-11/32	973940	179.60	973940-C3	218.80
	.125 (1/8)	**.365**	II	14	1/2	3-1/8	879950	185.80	879950-C3	217.60
	.125 (1/8)	.240	I	14	3/4	3-3/8	973950	176.10	973950-C3	206.00
1-1/4	.250 (1/4)	**.365**	II	14	1/2	3-1/4	879970	187.60	879970-C3	217.60
	.250 (1/4)	.240	I	14	3/4	3-1/2	973970	196.00	973970-C3	216.80
	.375 (3/8)	.240	I	14	3/4	3-5/8	973990	211.20	973990-C3	250.50
	.500 (1/2)	.240	I	14	3/4	3-3/4	973995	211.20	973995-C3	250.50
	.062 (1/16)	**.428**	II	14	1/2	3-1/16	713262	198.60	713262-C3	246.20
1-3/8	.125 (1/8)	**.428**	II	14	1/2	3-1/8	713295	198.60	713295-C3	246.20
	.250 (1/4)	**.428**	II	14	1/2	3-1/4	713299	198.60	713299-C3	246.20
	.062 (1/16)	**.490**	II	16	1/2	3-1/16	887020	197.60	887020-C3	235.40
	.062 (1/16)	.365	I	16	3/4	3-5/16	962020	187.70	962020-C3	225.50
	.093 (3/32)	.365	I	16	3/4	3-11/32	962040	187.70	962040-C3	225.50
	.125 (1/8)	**.552**	III	16	3/8	3-1/8	868750	208.80	868750-C3	245.10
	.125 (1/8)	**.490**	II	16	1/2	3-1/8	887050	197.60	887050-C3	235.40
	.125 (1/8)	.365	I	16	3/4	3-3/8	962050	187.70	962050-C3	225.50
	.187 (3/16)	**.552**	III	16	3/8	3-3/16	868760	208.80	868760-C3	245.10
1-1/2	.187 (3/16)	**.490**	II	16	1/2	3-3/16	887060	197.60	887060-C3	235.40
	.187 (3/16)	.365	I	16	3/4	3-7/16	962060	187.70	962060-C3	225.50
	.250 (1/4)	**.490**	II	16	1/2	3-1/4	887070	212.70	887070-C3	250.40
	.250 (1/4)	.365	I	16	3/4	3-1/2	962070	201.70	962070-C3	239.80
	.312 (5/16)	.365	I	16	3/4	3-9/16	962080	232.00	962080-C3	270.50
	.375 (3/8)	.365	I	16	3/4	3-5/8	962090	260.50	962090-C3	299.40
	.437 (7/16)	.365	I	16	3/4	3-11/16	962093	287.40	962093-C3	335.10
	.500 (1/2)	.365	I	16	3/4	3-3/4	962095	303.00	962095-C3	342.20

*No Weldon Flat **Radial DOC Accounts for max transition raduis at neck

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 411, 419, 422, 427

KEYSEAT CUTTERS

Retaining Ring Keyseats



Designed for Milling Retaining / Snap Ring Grooves

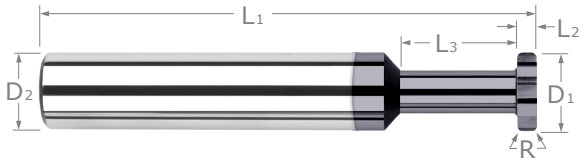
- Designed to mill proper slot widths for common retaining ring sizes
- Cutter diameter, neck length, radial, and axial depths of cut optimized for internal retaining ring grooves per ANSI standards
- Both sides of cutter are dished for clearance
- Solid carbide
- CNC ground in the USA

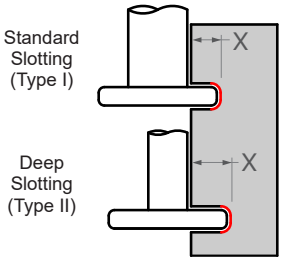
CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC**	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.002″ −.000″		L_3 +.020″ −.000″			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/16	.018	1/8	1/8	.021	6	3/16	2	23504	56.80	23504-C3	63.40
	.029	1/8	1/8	.021	6	3/16	2	23508	56.80	23508-C3	63.40
1/4	.039	5/32	5/32	.037	6	1/4	2-1/2	23512	67.20	23512-C3	76.00
	.046	5/32	5/32	.037	6	1/4	2-1/2	23516	67.20	23516-C3	76.00
5/16	.056	3/16	3/16	.052	6	5/16	2-1/2	23520	80.50	23520-C3	90.80
3/8	.068	3/16	1/4	.084	8	3/8	2-1/2	23524	93.80	23524-C3	105.30
	.086	3/16	1/4	.084	8	3/8	2-1/2	23528	93.80	23528-C3	105.30
1/2	.103	1/4	5/16	.115	8	1/2	3	23532	103.40	23532-C3	120.70
	.120	1/4	3/8	.115	8	1/2	3	23536	103.40	23536-C3	120.70
5/8	.120	5/16	1/2	.146	8	5/8	3-1/2	23540	192.40	23540-C3	211.80
	.139	5/16	1/2	.146	8	5/8	3-1/2	23544	192.40	23544-C3	209.70
3/4	.174	-	-	.177	10	3/8	3.174	23548*	139.00	23548-C3*	159.40
1	.209	-	-	.240	12	1/2	3.209	23564*	166.40	23564-C3*	196.90

*Carbide head with reduced steel shank **Radial DOC accounts for max transition at neck

KEYSEAT CUTTERS

Corner Radius





- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.015 (1/64)	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910615	67.20	910615-C3	73.10
1/16	.020	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910620	67.20	910620-C3	73.10
	.031 (1/32)	**.005**	1/32	3/32 (1.5x)	.012	I	4	1/8	1-1/2	910631	67.20	910631-C3	73.10
	.031 (1/32)	**.005**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902531	65.50	902531-C3	71.40
3/32	.031 (1/32)	**.010**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909131	65.50	909131-C3	71.40
	.062 (1/16)	**.005**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	902562	65.50	902562-C3	71.40
	.062 (1/16)	**.010**	3/64	9/64 (1.5x)	.021	I	4	1/8	1-1/2	909162	65.50	909162-C3	71.40
	.015 (1/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965115	63.60	965115-C3	69.50
	.020	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965120	63.60	965120-C3	69.50
	.025	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965125	63.60	965125-C3	69.50
	.031 (1/32)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965131	63.60	965131-C3	69.50
	.031 (1/32)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	732231	73.30	732231-C3	79.20
	.031 (1/32)	**.010**	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	837631	77.20	837631-C3	83.10
1/8	.040	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965140	63.60	965140-C3	69.50
	.047 (3/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965147	63.60	965147-C3	69.50
	.062 (1/16)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	965162	63.60	965162-C3	69.50
	.062 (1/16)	**.010**	.040	1/16 (.5x)	**.032**	II	6	1/8	1-1/2	837662	77.20	837662-C3	83.10
	.062 (1/16)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985962	63.60	985962-C3	69.50
	.078 (5/64)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985978	65.00	985978-C3	70.90
	.093 (3/32)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	985993	63.60	985993-C3	69.50
	.093 (3/32)	**.015**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	960793	65.00	960793-C3	70.90
	.015 (1/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954715	65.90	954715-C3	72.40
	.020	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954720	65.90	954720-C3	72.40
	.025	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954725	65.90	954725-C3	72.10
	.031 (1/32)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954731	65.90	954731-C3	72.40
	.040	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954740	65.90	954740-C3	72.40
	.047 (3/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954747	65.90	954747-C3	72.40
	.062 (1/16)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	954762	65.90	954762-C3	72.40
3/16	.062 (1/16)	**.010**	1/16	3/32 (.5x)	**.052**	II	6	3/16	2	837262	80.00	837262-C3	86.70
	.062 (1/16)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949962	65.90	949962-C3	72.40
	.062 (1/16)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937762	65.90	937762-C3	72.40
	.078 (5/64)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949978	65.90	949978-C3	72.40
	.093 (3/32)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949993	65.90	949993-C3	72.40
	.093 (3/32)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937793	65.90	937793-C3	72.40
	.125 (1/8)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	949995	65.90	949995-C3	72.40
	.125 (1/8)	**.015**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	937795	65.90	937795-C3	72.40

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/4	.015 (1/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981115	72.80	981115-C3	81.60
	.020	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981120	72.80	981120-C3	81.60
	.025	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981125	72.80	981125-C3	81.60
	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981131	72.80	981131-C3	81.60
	.031 (1/32)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916631	86.10	916631-C3	94.10
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972631	72.80	972631-C3	81.60
	.040	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981140	72.80	981140-C3	81.60
	.047 (3/64)	**.005**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	777147	86.90	777147-C3	95.90
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981147	72.80	981147-C3	81.60
	.047 (3/64)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	916647	86.10	916647-C3	94.10
	.047 (3/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972647	72.80	972647-C3	81.60
	.047 (3/64)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968447	72.80	968447-C3	81.60
	.050	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981150	72.80	981150-C3	81.60
	.060	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972660	72.80	972660-C3	81.60
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981162	71.40	981162-C3	80.20
	.062 (1/16)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911762	86.90	911762-C3	95.90
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972662	71.40	972662-C3	80.20
	.062 (1/16)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900062	84.70	900062-C3	93.40
	.062 (1/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968462	71.40	968462-C3	80.20
	.062 (1/16)	**.020**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	776762	71.40	776762-C3	80.20
	.078 (5/64)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972678	72.80	972678-C3	81.60
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981193	71.40	981193-C3	80.20
	.093 (3/32)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911793	86.90	911793-C3	95.90
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972693	71.40	972693-C3	80.20
	.093 (3/32)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900093	84.70	900093-C3	93.40
	.093 (3/32)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968493	71.40	968493-C3	80.20
	.093 (3/32)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904593	71.40	904593-C3	80.20
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	981195	71.40	981195-C3	80.20
	.125 (1/8)	**.010**	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	911795	86.90	911795-C3	95.90
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972695	71.40	972695-C3	80.20
	.125 (1/8)	**.010**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	900095	84.70	900095-C3	93.40
	.125 (1/8)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968495	71.40	968495-C3	80.20
	.125 (1/8)	**.020**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	776795	71.40	776795-C3	80.20
	.125 (1/8)	**.030**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	904595	71.40	904595-C3	80.20
	.187 (3/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972697	71.40	972697-C3	80.20
	.187 (3/16)	**.015**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	968497	71.40	968497-C3	79.50
5/16	.031 (1/32)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931610	104.80	931610-C3	115.10
	.031 (1/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921110	104.80	921110-C3	115.10
	.062 (1/16)	**.005**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	931630	104.80	931630-C3	115.10
	.062 (1/16)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921130	104.80	921130-C3	115.10
	.062 (1/16)	**.020**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	776562	104.80	776562-C3	114.50
	.093 (3/32)	**.010**	7/64	3/16 (.5x)	**.091**	II	6	5/16	2-1/2	776850	110.70	776850-C3	121.20
	.093 (3/32)	**.010**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	921150	104.80	921150-C3	115.10
	.093 (3/32)	**.015**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	927750	104.80	927750-C3	115.10
	.093 (3/32)	**.020**	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	776550	104.80	776550-C3	115.10

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987210	107.80	987210-C3	119.30
	.047 (3/64)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987220	107.80	987220-C3	119.30
	.062 (1/16)	**.005**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	836830	114.00	836830-C3	125.40
	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987230	105.70	987230-C3	117.10
	.062 (1/16)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916830	114.90	916830-C3	126.30
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981630	105.70	981630-C3	117.10
	.062 (1/16)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793730	107.20	793730-C3	118.60
	.062 (1/16)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903330	114.90	903330-C3	126.30
	.062 (1/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970030	105.70	970030-C3	117.10
	.062 (1/16)	**.020**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	776462	105.70	776462-C3	117.10
	.078 (5/64)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981640	107.80	981640-C3	119.30
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987250	105.70	987250-C3	117.10
	.093 (3/32)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916850	114.90	916850-C3	126.30
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981650	105.70	981650-C3	117.10
	.093 (3/32)	**.010**	3/16	1-1/8 (3x)	.084	I	8	3/8	2-1/2	793750	107.20	793750-C3	118.60
	.093 (3/32)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903350	114.90	903350-C3	126.30
3/8	.093 (3/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970050	105.70	970050-C3	117.10
	.093 (3/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905950	105.70	905950-C3	117.10
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	987260	105.70	987260-C3	117.10
	.125 (1/8)	**.010**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	916860	114.90	916860-C3	126.30
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981660	105.70	981660-C3	117.10
	.125 (1/8)	**.015**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	903360	114.90	903360-C3	126.30
	.125 (1/8)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970060	105.70	970060-C3	117.10
	.125 (1/8)	**.020**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	776460	105.70	776460-C3	117.10
	.125 (1/8)	**.030**	1/8	3/16 (.5x)	**.115**	II	8	3/8	2-1/2	857960	114.90	857960-C3	126.30
	.125 (1/8)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905960	105.70	905960-C3	117.10
	.156 (5/32)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970065	109.80	970065-C3	121.20
	.156 (5/32)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905965	109.80	905965-C3	121.20
	.187 (3/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	981670	107.80	981670-C3	119.30
	.187 (3/16)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970070	107.80	970070-C3	119.30
	.187 (3/16)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905970	107.80	905970-C3	119.30
	.250 (1/4)	**.015**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970080	107.80	970080-C3	119.30
	.250 (1/4)	**.030**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	905980	107.80	905980-C3	119.30
	.020	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976005	139.20	976005-C3	156.50
	.025	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976007	136.60	976007-C3	152.20
	.031 (1/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976010	136.60	976010-C3	153.90
	.031 (1/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987710	136.60	987710-C3	153.90
	.040	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976015	136.60	976015-C3	153.90
	.047 (3/64)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976020	136.60	976020-C3	153.90
1/2	.047 (3/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987720	136.60	987720-C3	153.90
	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976030	134.20	976030-C3	151.40
	.062 (1/16)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901030	143.30	901030-C3	161.00
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987730	134.20	987730-C3	151.40
	.062 (1/16)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913430	143.30	913430-C3	161.00
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990330	134.20	990330-C3	151.40
	.062 (1/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933730	134.20	933730-C3	151.40

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius (cont.)

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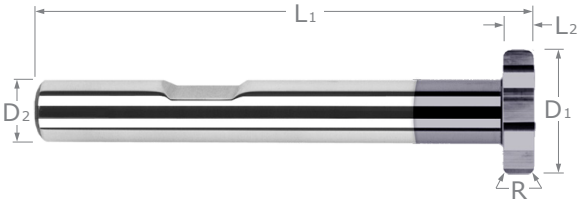
CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.078 (5/64)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901040	146.00	901040-C3	161.60
	.078 (5/64)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987740	136.60	987740-C3	153.90
	.078 (5/64)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990340	136.60	990340-C3	153.90
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976050	134.20	976050-C3	151.40
	.093 (3/32)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901050	143.30	901050-C3	161.00
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987750	134.20	987750-C3	151.40
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990350	134.20	990350-C3	151.40
	.093 (3/32)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933750	134.20	933750-C3	151.40
	.093 (3/32)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969150	136.60	969150-C3	153.90
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	976060	134.20	976060-C3	151.40
	.125 (1/8)	**.010**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	901060	143.30	901060-C3	161.00
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987760	134.20	987760-C3	151.40
	.125 (1/8)	**.010**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	793960	135.70	793960-C3	152.90
	.125 (1/8)	**.015**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	913460	143.30	913460-C3	161.00
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990360	134.20	990360-C3	151.40
	.125 (1/8)	**.020**	5/32	1/4 (.5x)	.162	II	8	1/2	3	777060	143.30	777060-C3	161.00
	.125 (1/8)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933760	134.20	933760-C3	151.40
	.125 (1/8)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926660	143.30	926660-C3	161.00
	.125 (1/8)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969160	136.60	969160-C3	153.90
	.125 (1/8)	**.040**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	838060	136.60	838060-C3	153.90
	.156 (5/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987765	140.10	987765-C3	157.30
	.156 (5/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990365	140.10	990365-C3	157.30
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987770	136.60	987770-C3	153.90
	.187 (3/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990370	136.60	990370-C3	153.90
	.187 (3/16)	**.015**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	792870	137.80	792870-C3	155.20
	.187 (3/16)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933770	136.60	933770-C3	153.90
	.187 (3/16)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926670	166.10	926670-C3	183.60
	.187 (3/16)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969170	136.60	969170-C3	153.90
	.187 (3/16)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926170	139.10	926170-C3	156.40
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	987780	134.20	987780-C3	151.40
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	990380	134.20	990380-C3	151.40
	.250 (1/4)	**.020**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	933780	134.20	933780-C3	151.40
	.250 (1/4)	**.030**	5/32	1/4 (.5x)	**.162**	II	8	1/2	3	926680	143.30	926680-C3	161.00
	.250 (1/4)	**.030**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	969180	134.20	969180-C3	151.40
	.250 (1/4)	**.045**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	929580	134.20	929580-C3	151.40
	.250 (1/4)	**.060**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	926180	134.20	926180-C3	151.40
5/8	.125 (1/8)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903960	201.00	903960-C3	218.20
	.125 (1/8)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911160	201.00	911160-C3	218.20
	.125 (1/8)	**.020**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	731060	201.00	731060-C3	220.30
	.125 (1/8)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908560	201.00	908560-C3	218.20
	.187 (3/16)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903970	201.00	903970-C3	218.20
	.187 (3/16)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911170	201.00	911170-C3	218.20
	.187 (3/16)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908570	201.00	908570-C3	218.20
	.250 (1/4)	**.010**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	903980	201.00	903980-C3	218.20
	.250 (1/4)	**.015**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	911180	201.00	911180-C3	218.20
	.250 (1/4)	**.030**	5/16	1 (1.5x)	.146	I	8	5/8	3-1/2	908580	201.00	908580-C3	218.20

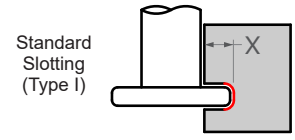
*Radial DOC accounts for max transition radius at neck

For reduced shank and greater radial depths of cut, please see Reduced Shank Keyseat Cutters on pages 383, 391, 394, 399.

KEYSEAT CUTTERS

Corner Radius – Reduced Shank





- Solid carbide head brazed onto a steel shank
- Both sides of cutter are dished for clearance
- Corner radius for improved strength
- Weldon flat
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.031 (1/32)	**.010**	.115	I	8	1/4	3-1/32	721910	109.60	721910-C3	126.20
	.062 (1/16)	**.010**	.115	I	8	1/4	3-1/16	721930	109.60	721930-C3	126.20
	.093 (3/32)	**.010**	.115	I	8	1/4	3-3/32	721950	109.60	721950-C3	126.20
	.125 (1/8)	**.010**	.115	I	8	1/4	3-1/8	721960	109.60	721960-C3	126.20
	.187 (3/16)	**.010**	.115	I	8	1/4	3-3/16	721970	109.60	721970-C3	126.20
	.250 (1/4)	**.010**	.115	I	8	1/4	3-1/4	721980	109.60	721980-C3	126.20
3/4	.031 (1/32)	**.005**	.177	I	10	3/8	3-1/32	841505	142.80	841505-C3	163.20
	.062 (1/16)	**.005**	.177	I	10	3/8	3-1/16	841520	142.80	841520-C3	163.20
	.062 (1/16)	**.010**	.177	I	10	3/8	3-1/16	923820	142.80	923820-C3	163.20
	.078 (5/64)	**.005**	.177	I	10	3/8	3-5/64	841530	145.50	841530-C3	166.00
	.078 (5/64)	**.010**	.177	I	10	3/8	3-5/64	923830	142.80	923830-C3	163.20
	.093 (3/32)	**.005**	.177	I	10	3/8	3-3/32	841540	142.80	841540-C3	163.20
	.093 (3/32)	**.010**	.177	I	10	3/8	3-3/32	923840	142.80	923840-C3	163.20
	.093 (3/32)	**.030**	.177	I	10	3/8	3-3/32	905240	142.80	905240-C3	163.20
	.125 (1/8)	**.005**	.177	I	10	3/8	3-1/8	841550	142.80	841550-C3	163.20
	.125 (1/8)	**.010**	.177	I	10	3/8	3-1/8	923850	142.80	923850-C3	163.20
	.125 (1/8)	**.015**	.177	I	10	3/8	3-1/8	840950	142.80	840950-C3	163.20
	.125 (1/8)	**.030**	.177	I	10	3/8	3-1/8	905250	142.80	905250-C3	163.20
	.187 (3/16)	**.010**	.177	I	10	3/8	3-3/16	923860	151.30	923860-C3	171.80
	.187 (3/16)	**.015**	.177	I	10	3/8	3-3/16	840960	151.30	840960-C3	171.80
	.187 (3/16)	**.030**	.177	I	10	3/8	3-3/16	905260	151.30	905260-C3	171.80
	.250 (1/4)	**.010**	.177	I	10	3/8	3-1/4	923870	159.20	923870-C3	179.90
	.250 (1/4)	**.015**	.177	I	10	3/8	3-1/4	840970	159.20	840970-C3	179.90
	.250 (1/4)	**.030**	.177	I	10	3/8	3-1/4	905270	159.20	905270-C3	179.90
	.250 (1/4)	**.060**	.177	I	10	3/8	3-1/4	894070	167.80	894070-C3	187.90
1	.031 (1/32)	**.005**	.240	I	12	1/2	3-1/32	840305	161.40	840305-C3	194.60
	.062 (1/16)	**.005**	.240	I	12	1/2	3-1/16	840320	158.30	840320-C3	188.70
	.062 (1/16)	**.010**	.240	I	12	1/2	3-1/16	918520	158.30	918520-C3	188.70
	.078 (5/64)	**.005**	.240	I	12	1/2	3-5/64	840330	161.40	840330-C3	194.60
	.078 (5/64)	**.010**	.240	I	12	1/2	3-5/64	918530	158.30	918530-C3	188.70
	.093 (3/32)	**.005**	.240	I	12	1/2	3-3/32	840340	161.40	840340-C3	191.80
	.093 (3/32)	**.010**	.240	I	12	1/2	3-3/32	918540	158.30	918540-C3	188.70
	.093 (3/32)	**.030**	.240	I	12	1/2	3-3/32	910040	158.30	910040-C3	188.70
	.125 (1/8)	**.005**	.240	I	12	1/2	3-1/8	840350	158.30	840350-C3	188.70
	.125 (1/8)	**.010**	.240	I	12	1/2	3-1/8	918550	158.30	918550-C3	188.70
	.125 (1/8)	**.015**	.240	I	12	1/2	3-1/8	839750	158.30	839750-C3	188.70
	.125 (1/8)	**.030**	.240	I	12	1/2	3-1/8	910050	158.30	910050-C3	188.70

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Corner Radius – Reduced Shank (cont.)

continued from previous page

CUTTER DIAMETER	CUTTER WIDTH	CORNER RADIUS	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.001″ −.001″	R +.001″ −.001″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1	.187 (3/16)	**.010**	.240	I	12	1/2	3-3/16	918560	167.10	918560-C3	197.50
	.187 (3/16)	**.015**	.240	I	12	1/2	3-3/16	839760	167.10	839760-C3	197.50
	.187 (3/16)	**.030**	.240	I	12	1/2	3-3/16	910060	167.10	910060-C3	197.50
	.250 (1/4)	**.010**	.240	I	12	1/2	3-1/4	918570	173.90	918570-C3	204.40
	.250 (1/4)	**.015**	.240	I	12	1/2	3-1/4	839770	173.90	839770-C3	204.40
	.250 (1/4)	**.030**	.240	I	12	1/2	3-1/4	910070	173.90	910070-C3	204.40
	.250 (1/4)	**.060**	.240	I	12	1/2	3-1/4	897570	173.90	897570-C3	204.40
	.375 (3/8)	**.010**	.240	I	12	1/2	3-3/8	918590	182.30	918590-C3	212.80
	.375 (3/8)	**.015**	.240	I	12	1/2	3-3/8	839790	182.30	839790-C3	212.80
	.375 (3/8)	**.030**	.240	I	12	1/2	3-3/8	910090	182.30	910090-C3	212.80
1-1/2	.125 (1/8)	**.010**	.365	I	16	3/4	3-3/8	839150	204.40	839150-C3	242.50
	.125 (1/8)	**.030**	.365	I	16	3/4	3-3/8	838550	204.40	838550-C3	242.50
	.187 (3/16)	**.010**	.365	I	16	3/4	3-7/16	839160	204.40	839160-C3	242.50
	.187 (3/16)	**.030**	.365	I	16	3/4	3-7/16	838560	204.40	838560-C3	242.50
	.250 (1/4)	**.010**	.365	I	16	3/4	3-1/2	839170	218.90	839170-C3	257.20
	.250 (1/4)	**.030**	.365	I	16	3/4	3-1/2	838570	218.90	838570-C3	257.20
	.375 (3/8)	**.010**	.365	I	16	3/4	3-5/8	839190	277.50	839190-C3	316.40
	.375 (3/8)	**.030**	.365	I	16	3/4	3-5/8	838590	277.50	838590-C3	316.40
	.500 (1/2)	**.010**	.365	I	16	3/4	3-3/4	839195	320.00	839195-C3	359.40
	.500 (1/2)	**.030**	.365	I	16	3/4	3-3/4	838595	320.00	838595-C3	359.40

*Radial DOC accounts for max transition radius at neck

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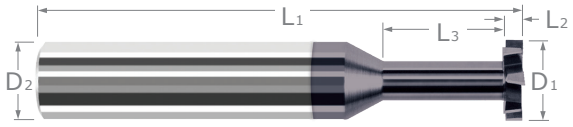
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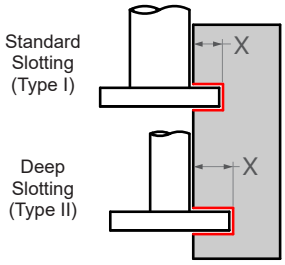
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KEYSEAT CUTTERS

Staggered Tooth – Square



Stocked in Multiple Radial Depths of Cut!



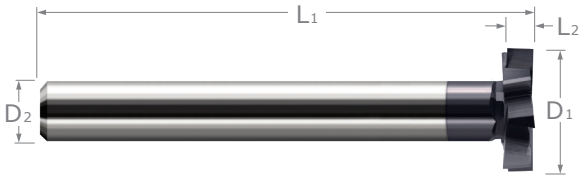
- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Relieved to allow cutting on both sides of head
- Design improves shearing action and finish while minimizing chip dragging and recutting and decreasing vibration
- Tool can be offset to increase width of groove
- Solid carbide • CNC ground in the USA

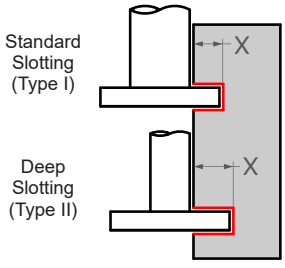
CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/8	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969815	72.50	969815-C3	78.40
	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969831	72.50	969831-C3	78.40
	.047 (3/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969847	72.50	969847-C3	78.40
	.062 (1/16)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969862	72.50	969862-C3	78.40
	.093 (3/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	969893	73.80	969893-C3	79.70
5/32	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744831	86.30	744831-C3	92.70
	.062 (1/16)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744862	86.30	744862-C3	92.50
	.093 (3/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	744893	86.30	744893-C3	92.50
3/16	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907031	87.60	907031-C3	94.20
	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907062	86.10	907062-C3	92.30
	.093 (3/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907093	86.10	907093-C3	92.50
	.125 (1/8)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	907095	86.10	907095-C3	92.50
1/4	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972131	100.30	972131-C3	109.10
	.047 (3/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972147	100.30	972147-C3	109.10
	.062 (1/16)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878962	112.30	878962-C3	120.40
	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972162	100.30	972162-C3	109.10
	.078 (5/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972178	100.30	972178-C3	108.40
	.093 (3/32)	5/64	1/8 (0.5x)	.076	II	6	1/4	2-1/2	878993	112.30	878993-C3	120.40
	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972193	100.30	972193-C3	109.10
	.125 (1/8)	5/64	1/8 (0.5x)	**.076**	II	6	1/4	2-1/2	878995	114.70	878995-C3	123.70
	.125 (1/8)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	972195	100.30	972195-C3	109.10
5/16	.062 (1/16)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759530	123.90	759530-C3	134.20
	.093 (3/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759550	126.30	759550-C3	136.40
	.156 (5/32)	5/32	15/32 (1.5x)	.068	I	6	5/16	2-1/2	759565	126.30	759565-C3	136.40
3/8	.062 (1/16)	1/8	3/16 (0.5x)	**.115**	II	8	3/8	2-1/2	867330	136.90	867330-C3	148.30
	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915830	123.90	915830-C3	135.40
	.078 (5/64)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915878	123.90	915878-C3	135.40
	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915850	123.90	915850-C3	135.40
	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915860	123.90	915860-C3	135.40
	.187 (3/16)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915870	123.90	915870-C3	135.40
	.250 (1/4)	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	915880	123.90	915880-C3	135.40
1/2	.062 (1/16)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895030	178.70	895030-C3	196.30
	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955630	161.30	955630-C3	178.60
	.078 (5/64)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955640	161.30	955640-C3	178.60
	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955650	161.30	955650-C3	178.60
	.125 (1/8)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895060	178.70	895060-C3	196.30
	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955660	161.30	955660-C3	178.60
	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955670	161.30	955670-C3	178.60
	.250 (1/4)	5/32	1/4 (0.5x)	**.162**	II	8	1/2	3	895080	178.70	895080-C3	196.30
	.250 (1/4)	1/4	3/4 (1.5x)	.115	I	8	1/2	3	955680	161.30	955680-C3	178.60
5/8	.093 (3/32)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904993	228.20	904993-C3	247.50
	.125 (1/8)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904960	228.20	904960-C3	245.40
	.187 (3/16)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904970	228.20	904970-C3	245.40
	.250 (1/4)	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	904980	228.20	904980-C3	245.40

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Staggered Tooth – Square – Reduced Shank





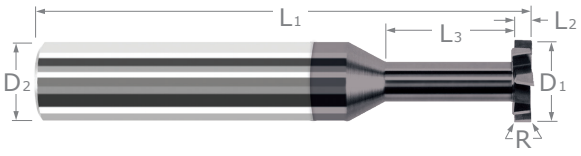
- Staggered tooth design with alternating right-hand/left-hand shear flutes, right-hand cut
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Solid carbide construction for maximum rigidity
- CNC ground in the USA

CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.001''}_{-.001''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
3/4	.062 (1/16)	.178	II	10	3/8	3	773530	379.00	773530-C3	400.40
	.078 (5/64)	.178	II	10	3/8	3	773540	379.00	773540-C3	400.40
	.093 (3/32)	.178	II	10	3/8	3	773550	379.00	773550-C3	398.10
	.125 (1/8)	.178	II	10	3/8	3	773560	379.00	773560-C3	398.10
	.187 (3/16)	.178	II	10	3/8	3	773570	379.00	773570-C3	398.10
	.250 (1/4)	.178	II	10	3/8	3	773580	379.00	773580-C3	398.10
1	.062 (1/16)	.240	I	12	1/2	3-1/2	772430	431.70	772430-C3	464.90
	.078 (5/64)	.240	I	12	1/2	3-1/2	772440	431.70	772440-C3	464.90
	.093 (3/32)	.240	I	12	1/2	3-1/2	772450	431.70	772450-C3	460.60
	.125 (1/8)	.240	I	12	1/2	3-1/2	772460	431.70	772460-C3	460.60
	.187 (3/16)	.240	I	12	1/2	3-1/2	772470	431.70	772470-C3	460.60
	.250 (1/4)	.240	I	12	1/2	3-1/2	772480	431.70	772480-C3	460.60
1-1/2	.062 (1/16)	.365	I	16	3/4	3-1/2	771130	546.10	771130-C3	586.10
	.078 (5/64)	.365	I	16	3/4	3-1/2	771140	546.10	771140-C3	593.70
	.093 (3/32)	.365	I	16	3/4	3-1/2	771150	546.10	771150-C3	593.70
	.125 (1/8)	.365	I	16	3/4	3-1/2	771160	546.10	771160-C3	586.10
	.187 (3/16)	.365	I	16	3/4	3-1/2	771170	546.10	771170-C3	586.10
	.250 (1/4)	.365	I	16	3/4	3-1/2	771180	546.10	771180-C3	586.10

*Radial DOC Accounts for max transition radius at neck

KEYSEAT CUTTERS

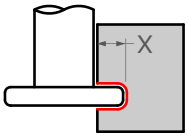
Staggered Tooth – Corner Radius

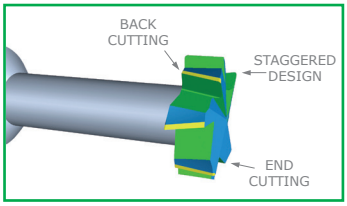


Staggered Tooth Design for Optimal Performance

- Staggered tooth design with alternating RH / LH shear flutes, RH cut
- Design improves shearing action, minimizes chip dragging and recutting, decreases vibration, and improves side wall finish
- Relieved to allow cutting on both sides of head
- Tool can be offset to increase width of groove
- Corner radius for improved strength
- Solid carbide
- CNC ground in the USA

Standard Slotting (Type I)





CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 +.000″ −.002″	L_2 +.0005″ −.0005″	R +.001″ −.001″		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/8	.031 (1/32)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43631	76.50	43631-C3	82.40
	.031 (1/32)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	989931	92.90	989931-C3	98.80
	.047 (3/64)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43647	77.20	43647-C3	83.10
	.062 (1/16)	**.005**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	43662	76.50	43662-C3	82.40
	.062 (1/16)	**.005**	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	989962	92.10	989962-C3	98.00
	.062 (1/16)	**.010**	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	44462	76.50	44462-C3	82.40
3/16	.031 (1/32)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943531	84.80	943531-C3	91.40
	.047 (3/64)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943547	84.80	943547-C3	91.40
	.062 (1/16)	**.005**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	943562	84.80	943562-C3	91.40
	.062 (1/16)	**.010**	3/32	9/32 (1.5x)	.037	I	6	3/16	2	951762	84.80	951762-C3	91.40
1/4	.031 (1/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43831	105.70	43831-C3	114.80
	.031 (1/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44531	106.80	44531-C3	114.90
	.047 (3/64)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43847	105.70	43847-C3	114.80
	.047 (3/64)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	958047	122.40	958047-C3	130.50
	.062 (1/16)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43862	105.70	43862-C3	114.80
	.062 (1/16)	**.005**	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	958062	122.40	958062-C3	131.30
	.062 (1/16)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44562	105.70	44562-C3	114.80
	.093 (3/32)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43893	105.70	43893-C3	113.80
	.093 (3/32)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44593	106.80	44593-C3	114.90
	.125 (1/8)	**.005**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43895	105.70	43895-C3	114.80
	.125 (1/8)	**.010**	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	44595	105.70	44595-C3	114.80
3/8	.031 (1/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967210	137.10	967210-C3	148.50
	.062 (1/16)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967230	137.10	967230-C3	148.50
	.062 (1/16)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970930	137.10	970930-C3	148.50
	.093 (3/32)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967250	137.10	967250-C3	148.50
	.093 (3/32)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970950	137.10	970950-C3	148.50
	.125 (1/8)	**.005**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	967260	137.10	967260-C3	148.50
	.125 (1/8)	**.010**	3/16	9/16 (1.5x)	.084	I	8	3/8	2-1/2	970960	137.10	970960-C3	148.50

*Radial DOC accounts for max transition radius at neck

continued on next page

KEYSEAT CUTTERS

Staggered Tooth – Corner Radius (cont.)

continued from previous page

CUTTER DIA.	CUTTER WIDTH	CORNER RADIUS	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.0005''}_{-.0005''}$	R $^{+.001''}_{-.001''}$		L_3 $^{+.020''}_{-.000''}$	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/2	.062 (1/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44330	170.00	44330-C3	187.50
	.062 (1/16)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976730	188.10	976730-C3	205.70
	.062 (1/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44630	170.00	44630-C3	187.50
	.062 (1/16)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921330	170.00	921330-C3	185.60
	.093 (3/32)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44350	170.00	44350-C3	187.50
	.093 (3/32)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976750	188.10	976750-C3	203.70
	.093 (3/32)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44650	170.00	44650-C3	187.50
	.093 (3/32)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921350	170.00	921350-C3	187.50
	.125 (1/8)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44360	170.00	44360-C3	187.50
	.125 (1/8)	**.005**	1/4	1-1/2 (3x)	.115	I	8	1/2	3	976760	188.10	976760-C3	205.70
	.125 (1/8)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44660	170.00	44660-C3	187.50
	.125 (1/8)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921360	170.00	921360-C3	187.50
	.187 (3/16)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44370	170.00	44370-C3	187.50
	.187 (3/16)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44670	170.00	44670-C3	187.50
	.250 (1/4)	**.005**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44380	170.00	44380-C3	187.50
	.250 (1/4)	**.010**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	44680	170.00	44680-C3	187.50
	.250 (1/4)	**.015**	1/4	3/4 (1.5x)	.115	I	8	1/2	3	921380	170.00	921380-C3	187.50
5/8	.125 (1/8)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860460	240.20	860460-C3	257.80
	.125 (1/8)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872960	240.20	872960-C3	257.80
	.187 (3/16)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860470	240.20	860470-C3	259.50
	.187 (3/16)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872970	240.20	872970-C3	257.80
	.250 (1/4)	**.005**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	860480	240.20	860480-C3	259.50
	.250 (1/4)	**.010**	5/16	15/16 (1.5x)	.146	I	8	5/8	3-1/2	872980	240.20	872980-C3	257.80

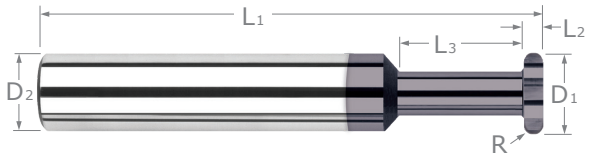
*Radial DOC accounts for max transition radius at neck

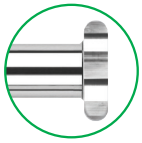
Access Simulation Files in DXF Format for Every Harvey Tool Product

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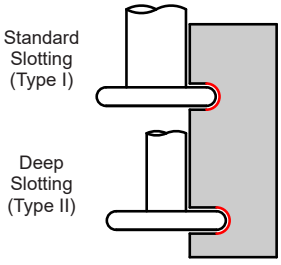
KEYSEAT CUTTERS

Full Radius





Full Radius



- Ground form relieved (can be reground without losing radius)
- Both sides of cutter are dished for clearance
- Solid carbide • CNC ground in the USA

RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001" −.001"	D1 +.000" −.002"	L2		L3 +.020" −.000"	X			D2	L1	TOOL #	USD$	TOOL #	USD$
.0075	**3/32**	.015 (1/64)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976907	93.80	976907-C3	99.80
.0075	**1/8**	.015 (1/64)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67507	97.40	67507-C3	103.30
.0075	**1/4**	.015 (1/64)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67707	120.50	67707-C3	129.40
.0075	**3/8**	.015 (1/64)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43303	136.10	43303-C3	147.50
.0100	**3/32**	.020	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976910	88.60	976910-C3	94.60
.0100	**1/8**	.020	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67510	92.00	67510-C3	97.90
.0100	**5/32**	.020	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965310	96.60	965310-C3	103.20
.0100	**3/16**	.020	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68310	106.30	68310-C3	112.90
.0100	**1/4**	.020	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67710	114.40	67710-C3	123.20
.0100	**5/16**	.020	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944410	126.60	944410-C3	136.90
.0100	**3/8**	.020	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68410	136.10	68410-C3	147.50
.0156 (1/64)	**3/32**	.031 (1/32)	3/64	9/64 (1.5x)	.020	I	4	1/8	1-1/2	976915	79.00	976915-C3	84.90
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67515	81.80	67515-C3	87.70
.0156 (1/64)	**1/8**	.031 (1/32)	1/16	3/8 (3x)	.022	I	6	1/8	1-1/2	895215	87.30	895215-C3	93.20
.0156 (1/64)	**5/32**	.031 (1/32)	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965315	96.60	965315-C3	103.20
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68315	96.90	68315-C3	103.40
.0156 (1/64)	**3/16**	.031 (1/32)	3/32	9/16 (3x)	.037	I	6	3/16	2	924415	113.30	924415-C3	119.80
.0156 (1/64)	**1/4**	.031 (1/32)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953915	111.50	953915-C3	120.50
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43315	104.20	43315-C3	113.10
.0156 (1/64)	**1/4**	.031 (1/32)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971415	120.80	971415-C3	129.60
.0156 (1/64)	**5/16**	.031 (1/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944415	115.90	944415-C3	126.20
.0156 (1/64)	**3/8**	.031 (1/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68415	125.70	68415-C3	137.10
.0156 (1/64)	**1/2**	.031 (1/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67915	129.60	67915-C3	146.90
.0200	**1/8**	.040	1/16	3/16 (1.5x)	.022	I	6	1/8	1-1/2	67520	81.80	67520-C3	87.70
.0200	**5/32**	.040	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965320	96.60	965320-C3	103.20
.0200	**3/16**	.040	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68320	96.90	68320-C3	103.40
.0200	**3/16**	.040	3/32	9/16 (3x)	.037	I	6	3/16	2	924420	113.30	924420-C3	119.80
.0200	**1/4**	.040	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953920	111.50	953920-C3	120.50
.0200	**1/4**	.040	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67720	105.40	67720-C3	114.00
.0200	**1/4**	.040	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971420	120.80	971420-C3	129.60
.0200	**5/16**	.040	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944420	115.90	944420-C3	126.20
.0200	**3/8**	.040	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68420	126.90	68420-C3	138.40
.0200	**3/8**	.040	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968520	142.80	968520-C3	154.20
.0200	**1/2**	.040	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67920	130.30	67920-C3	147.60
.0250	**3/16**	.050	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68325	96.90	68325-C3	103.40
.0250	**1/4**	.050	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67725	105.40	67725-C3	114.00
.0250	**3/8**	.050	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68425	126.90	68425-C3	138.40
.0300	**5/32**	.060	5/64	15/64 (1.5x)	.029	I	6	3/16	2	965330	96.60	965330-C3	103.20
.0300	**3/16**	.060	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68330	96.90	68330-C3	103.40
.0300	**1/4**	.060	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67730	105.40	67730-C3	114.00

*Radial DOC accounts for max transition radius at neck

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KEYSEAT CUTTERS

Full Radius (cont.)

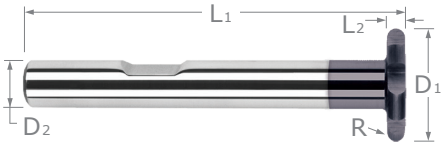
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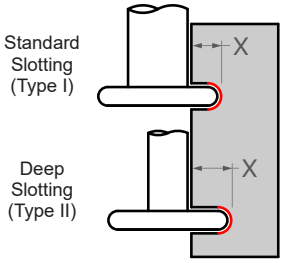
RADIUS	CUTTER DIA.	CUTTER WIDTH	NECK DIA.	NECK LENGTH	RADIAL DOC*	TYPE	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2		L_3 +.020″ −.000″	X			D_2	L_1	TOOL #	USD$	TOOL #	USD$
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/32 (1.5x)	.037	I	6	3/16	2	68331	96.90	68331-C3	103.40
.0312 (1/32)	**3/16**	.062 (1/16)	3/32	9/16 (3x)	.037	I	6	3/16	2	924431	113.30	924431-C3	119.80
.0312 (1/32)	**1/4**	.062 (1/16)	5/64	1/8 (.5x)	**.076**	II	6	1/4	2-1/2	953931	111.50	953931-C3	120.50
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	43331	104.20	43331-C3	113.10
.0312 (1/32)	**1/4**	.062 (1/16)	1/8	3/4 (3x)	.053	I	6	1/4	2-1/2	971431	120.80	971431-C3	129.60
.0312 (1/32)	**5/16**	.062 (1/16)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944431	115.90	944431-C3	126.20
.0312 (1/32)	**3/8**	.062 (1/16)	1/8	3/16 (.5x)	.115	II	6	3/8	2-1/2	949231	133.40	949231-C3	144.80
.0312 (1/32)	**3/8**	.062 (1/16)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68431	125.70	68431-C3	137.10
.0312 (1/32)	**1/2**	.062 (1/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898531	139.00	898531-C3	156.60
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67931	129.60	67931-C3	146.90
.0312 (1/32)	**1/2**	.062 (1/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942731	141.50	942731-C3	158.80
.0312 (1/32)	**5/8**	.062 (1/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43431	212.50	43431-C3	229.70
.0394 (1 mm)	**1/4**	.078 (2 mm)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67739	105.40	67739-C3	114.00
.0394 (1 mm)	**5/16**	.078 (2 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944439	117.50	944439-C3	127.70
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43339	126.90	43339-C3	138.40
.0394 (1 mm)	**3/8**	.078 (2 mm)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968539	142.80	968539-C3	154.20
.0394 (1 mm)	**1/2**	.078 (2 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67939	130.30	67939-C3	147.60
.0469 (3/64)	**1/4**	.093 (3/32)	1/8	3/8 (1.5x)	.053	I	6	1/4	2-1/2	67747	104.20	67747-C3	113.10
.0469 (3/64)	**5/16**	.093 (3/32)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944447	115.90	944447-C3	126.20
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43347	125.70	43347-C3	137.10
.0469 (3/64)	**3/8**	.093 (3/32)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968547	142.80	968547-C3	154.20
.0469 (3/64)	**1/2**	.093 (3/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67947	129.60	67947-C3	146.90
.0469 (3/64)	**5/8**	.093 (3/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43447	212.50	43447-C3	229.70
.0500	**3/8**	.100	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68450	133.80	68450-C3	145.20
.0500	**1/2**	.100	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67950	151.30	67950-C3	169.00
.0590 (1.5 mm)	**5/16**	.118 (3 mm)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944459	117.50	944459-C3	127.70
.0590 (1.5 mm)	**3/8**	.118 (3 mm)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68459	126.90	68459-C3	138.40
.0590 (1.5 mm)	**1/2**	.118 (3 mm)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67959	130.30	67959-C3	147.60
.0625 (1/16)	**5/16**	.125 (1/8)	5/32	1/2 (1.5x)	.068	I	6	5/16	2-1/2	944462	115.90	944462-C3	126.20
.0625 (1/16)	**3/8**	.125 (1/8)	1/8	3/16 (.5x)	**.115**	II	6	3/8	2-1/2	949262	134.30	949262-C3	145.70
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	43362	125.70	43362-C3	137.10
.0625 (1/16)	**3/8**	.125 (1/8)	3/16	1-1/8 (3x)	.084	I	6	3/8	3	968562	142.80	968562-C3	154.20
.0625 (1/16)	**1/2**	.125 (1/8)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898562	139.00	898562-C3	156.60
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	67962	129.60	67962-C3	146.90
.0625 (1/16)	**1/2**	.125 (1/8)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942762	180.30	942762-C3	197.60
.0625 (1/16)	**5/8**	.125 (1/8)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43462	212.50	43462-C3	229.70
.0781 (5/64)	**3/8**	.156 (5/32)	3/16	9/16 (1.5x)	.084	I	6	3/8	2-1/2	68478	125.70	68478-C3	137.10
.0781 (5/64)	**1/2**	.156 (5/32)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898578	139.70	898578-C3	157.30
.0781 (5/64)	**1/2**	.156 (5/32)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43378	130.30	43378-C3	147.60
.0781 (5/64)	**5/8**	.156 (5/32)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43478	212.50	43478-C3	229.70
.0937 (3/32)	**1/2**	.187 (3/16)	5/32	1/4 (.5x)	**.162**	II	6	1/2	3	898593	139.70	898593-C3	157.30
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	3/4 (1.5x)	.115	I	6	1/2	3	43393	130.30	43393-C3	147.60
.0937 (3/32)	**1/2**	.187 (3/16)	1/4	1-1/2 (3x)	.115	I	6	1/2	3-1/2	942793	152.10	942793-C3	169.30
.0937 (3/32)	**5/8**	.187 (3/16)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43493	212.50	43493-C3	229.70
.1181 (3 mm)	**5/8**	.236 (6 mm)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	4343M	212.50	4343M-C3	229.70
.1250 (1/8)	**5/8**	.250 (1/4)	.300	1 (1.5x)	.152	I	6	5/8	3-1/2	43408	212.50	43408-C3	229.70
.1250 (1/8)	**5/8**	.250 (1/4)	.300	2 (3x)	.152	I	6	5/8	4	983008	239.80	983008-C3	259.10

*Radial DOC accounts for max transition radius at neck

KEYSEAT CUTTERS

Full Radius – Reduced Shank



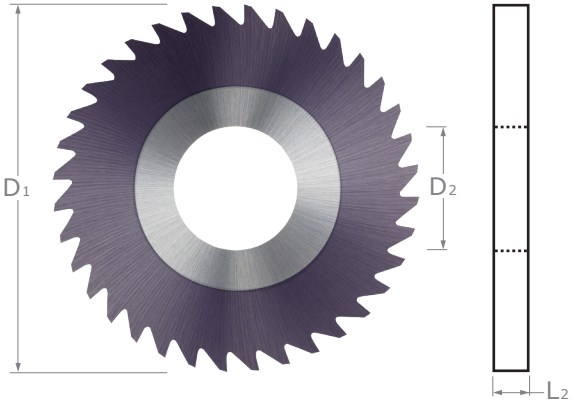


- Ground form relieved (can be reground without losing radius)
- 6 flutes • Both sides of cutter are dished for clearance
- Solid carbide head with steel shank
- Weldon flat • CNC ground in the USA

RADIUS	CUTTER DIAMETER	CUTTER WIDTH	RADIAL DOC*	TYPE	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED	
R +.001″ −.001″	D1 +.010″ −.000″	L2	X		D2	L1	6 FL	USD$	6 FL	USD$
.0156 (1/64)	3/4	.031 (1/32)	**.177**	II	3/8	3-1/32	965415	184.50	965415-C3	204.80
.0156 (1/64)	3/4	.031 (1/32)	.115	I	1/2	3-1/32	32901	162.10	32901-C3	182.90
.0156 (1/64)	1	.031 (1/32)	.240	I	1/2	3-1/32	942615	178.10	942615-C3	208.70
.0200	3/4	.040	.115	I	1/2	3.040	959720	162.10	959720-C3	182.90
.0200	1	.040	.240	I	1/2	3.040	942620	178.10	942620-C3	208.70
.0300	3/4	.060	**.177**	II	3/8	3.060	965430	184.50	965430-C3	204.80
.0312 (1/32)	3/4	.062 (1/16)	**.177**	II	3/8	3-1/16	965431	184.50	965431-C3	204.80
.0312 (1/32)	3/4	.062 (1/16)	.115	I	1/2	3-1/16	32902	162.10	32902-C3	182.90
.0312 (1/32)	1	.062 (1/16)	.240	I	1/2	3-1/16	942631	178.10	942631-C3	208.70
.0394 (1 mm)	3/4	.078 (2 mm)	.115	I	1/2	3.078	3291M	162.10	3291M-C3	182.90
.0394 (1 mm)	1	.078 (2 mm)	.240	I	1/2	3.078	94261M	178.10	94261M-C3	208.70
.0469 (3/64)	3/4	.093 (3/32)	**.177**	II	3/8	3-3/32	965447	184.50	965447-C3	204.80
.0469 (3/64)	3/4	.093 (3/32)	.115	I	1/2	3-3/32	32903	162.10	32903-C3	182.90
.0469 (3/64)	1	.093 (3/32)	.240	I	1/2	3-3/32	942647	178.10	942647-C3	208.70
.0590 (1.5 mm)	3/4	.118 (3 mm)	**.177**	II	3/8	3.118	965459	184.50	965459-C3	204.80
.0625 (1/16)	3/4	.125 (1/8)	**.177**	II	3/8	3-1/8	965462	184.50	965462-C3	204.80
.0625 (1/16)	3/4	.125 (1/8)	.115	I	1/2	3-1/8	32904	162.10	32904-C3	182.90
.0625 (1/16)	1	.125 (1/8)	**.302**	II	3/8	3-1/8	937362	184.50	937362-C3	214.80
.0625 (1/16)	1	.125 (1/8)	.240	I	1/2	3-1/8	942662	178.10	942662-C3	208.70
.0781 (5/64)	3/4	.156 (5/32)	.115	I	1/2	3-5/32	959778	162.10	959778-C3	182.90
.0781 (5/64)	1	.156 (5/32)	**.302**	II	3/8	3-5/32	937378	187.70	937378-C3	217.80
.0781 (5/64)	1	.156 (5/32)	.240	I	1/2	3-5/32	32905	190.20	32905-C3	220.90
.0787 (2 mm)	3/4	.157 (4 mm)	**.177**	II	3/8	3.157	96542M	184.50	96542M-C3	204.80
.0787 (2 mm)	1	.157 (4 mm)	.240	I	1/2	3.157	3292M	190.20	3292M-C3	220.90
.0937 (3/32)	3/4	.187 (3/16)	.115	I	1/2	3-3/16	959793	162.10	959793-C3	182.90
.0937 (3/32)	1	.187 (3/16)	**.302**	II	3/8	3-3/16	937393	184.50	937393-C3	214.80
.0937 (3/32)	1	.187 (3/16)	.240	I	1/2	3-3/16	32906	190.20	32906-C3	220.90
.0937 (3/32)	1-1/2	.187 (3/16)	.365	I	3/4	3-11/16	850493	203.40	850493-C3	241.60
.1181 (3 mm)	1	.236 (6 mm)	.240	I	1/2	3.236	942694	190.20	942694-C3	216.30
.1250 (1/8)	1	.250 (1/4)	**.302**	II	3/8	3-1/4	937395	184.50	937395-C3	214.80
.1250 (1/8)	1	.250 (1/4)	.240	I	1/2	3-1/4	942695	190.20	942695-C3	220.90
.1250 (1/8)	1-1/4	.250 (1/4)	**.365**	II	1/2	3-1/4	848695	216.40	848695-C3	254.20
.1250 (1/8)	1-1/4	.250 (1/4)	.240	I	3/4	3-1/2	32908	213.60	32908-C3	251.90
.1250 (1/8)	1-1/2	.250 (1/4)	.365	I	3/4	3-3/4	850495	216.60	850495-C3	254.90
.1562 (5/32)	1-1/2	.312 (5/16)	.365	I	3/4	3-13/16	32910	261.90	32910-C3	300.70
.1875 (3/16)	1-3/8	.375 (3/8)	.302	I	3/4	3-5/8	32912	261.90	32912-C3	300.70
.2500 (1/4)	1-1/2	.500 (1/2)	.365	I	3/4	4	32916	289.90	32916-C3	329.00

*Radial DOC accounts for max transition radius at neck

SLITTING SAWS



- Sides of saw are dished for clearance
- Cutting on OD only • No keyway or hub
- For use with standard saw arbors
- Solid carbide • CNC ground in the USA

◀ **Fully stocked uncoated or AlTiN coated**

CUTTER DIAMETER	CENTER THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	USD$	TOOL #	USD$
3/4	.0100	1/4	18	SAG0100	71.70	SAG0100-C3	92.30
	.0156 (1/64)	1/4	18	SAG0156	71.70	SAG0156-C3	92.30
	.0200	1/4	18	SAG0200	71.70	SAG0200-C3	92.30
	.0312 (1/32)	1/4	18	SAG0312	71.70	SAG0312-C3	92.30
	.0400	1/4	18	SAG0400	71.70	SAG0400-C3	91.90
	.0625 (1/16)	1/4	18	SAG0625	63.60	SAG0625-C3	84.20
1	.0100	3/8	20	SAA0100	74.70	SAA0100-C3	100.60
	.0120	3/8	20	SAA0120	74.70	SAA0120-C3	100.60
	.0156 (1/64)	3/8	20	SAA0156	74.70	SAA0156-C3	100.60
	.0156 (1/64)	3/8	40	SLG0156	74.70	SLG0156-C3	104.00
	.0180	3/8	20	SAA0180	74.70	SAA0180-C3	100.60
	.0200	3/8	20	SAA0200	75.20	SAA0200-C3	101.00
	.0250	3/8	20	SAA0250	75.20	SAA0250-C3	101.00
	.0312 (1/32)	3/8	20	SAA0312	75.20	SAA0312-C3	101.00
	.0312 (1/32)	3/8	40	SLG0312	75.20	SLG0312-C3	104.40
	.0400	3/8	20	SAA0400	75.20	SAA0400-C3	101.00
	.0468 (3/64)	3/8	20	SAA0468	66.70	SAA0468-C3	92.50
	.0468 (3/64)	3/8	40	SLG0468	80.50	SLG0468-C3	109.80
	.0625 (1/16)	3/8	20	SAA0625	66.70	SAA0625-C3	92.50
	.0625 (1/16)	3/8	40	SLG0625	80.50	SLG0625-C3	109.80
1-1/4	.0100	3/8	24	SAB0100	89.10	SAB0100-C3	123.50
	.0156 (1/64)	3/8	24	SAB0156	89.10	SAB0156-C3	123.50
	.0200	3/8	24	SAB0200	83.40	SAB0200-C3	117.80
	.0312 (1/32)	3/8	24	SAB0312	83.40	SAB0312-C3	117.80
	.0625 (1/16)	3/8	24	SAB0625	83.40	SAB0625-C3	117.80
1-1/2	.0100	1/2	36	SAC0100	95.60	SAC0100-C3	135.30
	.0120	1/2	36	SAC0120	97.40	SAC0120-C3	139.10
	.0156 (1/64)	1/2	36	SAC0156	95.60	SAC0156-C3	135.30
	.0180	1/2	36	SAC0180	97.40	SAC0180-C3	139.10
	.0200	1/2	36	SAC0200	86.10	SAC0200-C3	125.60
	.0250	1/2	36	SAC0250	86.10	SAC0250-C3	125.60
	.0312 (1/32)	1/2	36	SAC0312	86.10	SAC0312-C3	125.60
	.0400	1/2	36	SAC0400	86.10	SAC0400-C3	125.60
	.0468 (3/64)	1/2	36	SAC0468	83.80	SAC0468-C3	123.40
	.0625 (1/16)	1/2	36	SAC0625	83.80	SAC0625-C3	123.40

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SLITTING SAWS

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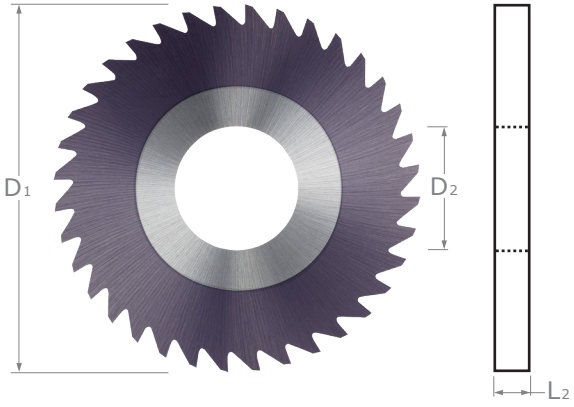
CUTTER DIAMETER	CENTER THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	USD$	TOOL #	USD$
1-3/4	.0100	1/2	38	SAD0100	116.50	SAD0100-C3	158.20
	.0156 (1/64)	1/2	38	SAD0156	116.50	SAD0156-C3	158.20
	.0200	1/2	38	SAD0200	102.30	SAD0200-C3	142.20
	.0312 (1/32)	1/2	38	SAD0312	102.30	SAD0312-C3	142.20
	.0625 (1/16)	1/2	38	SAD0625	111.60	SAD0625-C3	151.50
2	.0100	1/2	40	SAW0100	134.70	SAW0100-C3	175.00
	.0120	1/2	40	SAW0120	134.70	SAW0120-C3	175.00
	.0156 (1/64)	1/2	40	SAW0156	134.70	SAW0156-C3	176.50
	.0156 (1/64)	1/2	80	SLH0156	134.70	SLH0156-C3	176.50
	.0180	1/2	40	SAW0180	137.30	SAW0180-C3	179.10
	.0200	1/2	40	SAW0200	134.70	SAW0200-C3	175.00
	.0250	1/2	40	SAW0250	134.70	SAW0250-C3	175.00
	.0312 (1/32)	1/2	40	SAW0312	134.70	SAW0312-C3	175.00
	.0312 (1/32)	1/2	80	SLH0312	134.70	SLH0312-C3	176.50
	.0400	1/2	40	SAW0400	134.70	SAW0400-C3	175.00
	.0468 (3/64)	1/2	40	SAW0468	134.70	SAW0468-C3	175.00
	.0468 (3/64)	1/2	80	SLH0468	134.70	SLH0468-C3	176.50
	.0625 (1/16)	1/2	40	SAW0625	134.70	SAW0625-C3	175.00
	.0625 (1/16)	1/2	80	SLH0625	134.70	SLH0625-C3	176.50
	.0937 (3/32)	1/2	40	SAW0937	134.70	SAW0937-C3	175.00
	.0937 (3/32)	1/2	80	SLH0937	134.70	SLH0937-C3	176.50
	.1250 (1/8)	1/2	40	SAW1250	169.50	SAW1250-C3	210.00
	.1250 (1/8)	1/2	80	SLH1250	169.50	SLH1250-C3	211.20
3	.0200	1	72	SAE0200	209.40	SAE0200-C3	261.20
	.0312 (1/32)	1	72	SAE0312	209.40	SAE0312-C3	261.20
	.0312 (1/32)	1	100	SLJ0312	209.40	SLJ0312-C3	251.10
	.0625 (1/16)	1	72	SAE0625	235.70	SAE0625-C3	287.70
	.0625 (1/16)	1	100	SLJ0625	235.70	SLJ0625-C3	277.50
	.0937 (3/32)	1	72	SAE0937	301.60	SAE0937-C3	343.40
	.0937 (3/32)	1	100	SLJ0937	301.60	SLJ0937-C3	343.40
	.1250 (1/8)	1	72	SAE1250	343.90	SAE1250-C3	395.70
	.1250 (1/8)	1	100	SLJ1250	343.90	SLJ1250-C3	385.60
	.1875 (3/16)	1	72	SAE1875	437.60	SAE1875-C3	479.30
	.2500 (1/4)	1	72	SAE2500	516.80	SAE2500-C3	558.50
4	.0312 (1/32)	1	80	SAF0312	299.70	SAF0312-C3	341.40
	.0312 (1/32)	1	120	SLK0312	299.70	SLK0312-C3	341.40
	.0625 (1/16)	1	80	SAF0625	306.50	SAF0625-C3	353.80
	.0625 (1/16)	1	120	SLK0625	306.50	SLK0625-C3	348.20
	.0937 (3/32)	1	80	SAF0937	354.20	SAF0937-C3	395.90
	.0937 (3/32)	1	120	SLK0937	354.20	SLK0937-C3	395.90
	.1250 (1/8)	1	80	SAF1250	427.80	SAF1250-C3	494.50
	.1250 (1/8)	1	120	SLK1250	427.80	SLK1250-C3	469.50
	.1875 (3/16)	1	80	SAF1875	554.60	SAF1875-C3	596.30
	.2500 (1/4)	1	80	SAF2500	688.90	SAF2500-C3	730.60

For Saw Arbors, see page 570

NEW

SLITTING SAWS

Metric



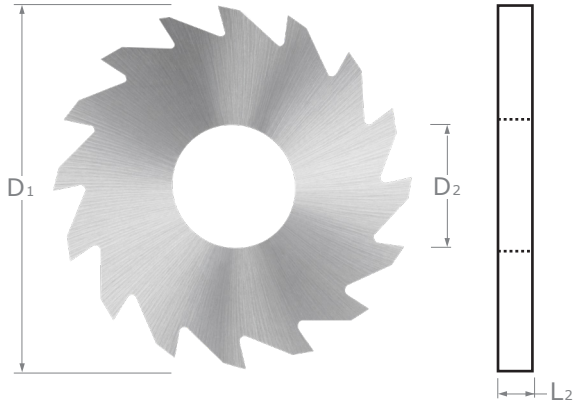
- All dimensions and tolerances in metric value
- Sides of saw are dished for clearance
- Cutting on OD only
- No keyway or hub
- For use with metric saw arbors
- Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	CENTER THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		ALTiN COATED		
D_1 +.13mm −.00mm	L_2 +.0064mm −.0064mm	D_2 +.012mm +.002mm		TOOL #	USD$	TOOL #	USD$	
25 mm	.60 mm	8 mm	20	SME0600	91.30	SME0600-C3	120.60	NEW
	.80 mm	8 mm	20	SME0800	91.30	SME0800-C3	120.60	NEW
	1.00 mm	8 mm	20	SME1000	91.30	SME1000-C3	120.60	NEW
	1.20 mm	8 mm	20	SME1200	91.30	SME1200-C3	120.60	NEW
50 mm	.60 mm	13 mm	40	SMQ0600	133.90	SMQ0600-C3	175.60	NEW
	1.00 mm	13 mm	40	SMQ1000	133.90	SMQ1000-C3	175.60	NEW
	1.20 mm	13 mm	40	SMQ1200	133.90	SMQ1200-C3	175.60	NEW
	2.00 mm	13 mm	40	SMQ2000	165.00	SMQ2000-C3	206.70	NEW
80 mm	1.00 mm	22 mm	72	SMS1000	300.00	SMS1000-C3	341.70	NEW
	1.60 mm	22 mm	72	SMS1600	314.50	SMS1600-C3	356.20	NEW
	2.00 mm	22 mm	72	SMS2000	328.00	SMS2000-C3	369.70	NEW
	3.00 mm	22 mm	72	SMS3000	340.50	SMS3000-C3	382.20	NEW
100 mm	1.00 mm	22 mm	80	SMT1000	345.70	SMT1000-C3	387.40	NEW
	1.20 mm	22 mm	80	SMT1200	338.40	SMT1200-C3	380.10	NEW
	2.00 mm	22 mm	80	SMT2000	334.20	SMT2000-C3	375.90	NEW
	3.00 mm	22 mm	80	SMT3000	402.70	SMT3000-C3	444.40	NEW

For Saw Arbors, see page 570

SLITTING SAWS

For Non-Ferrous Materials



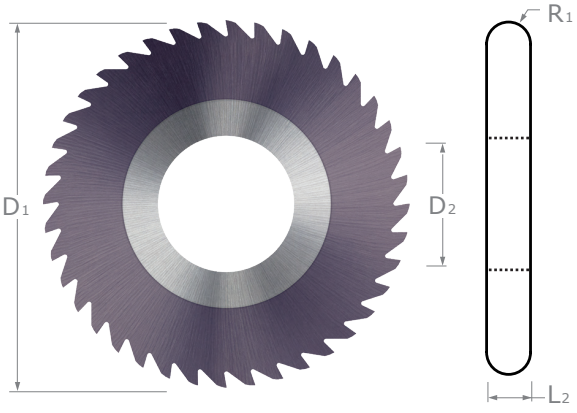
- Sides of saw have increased dish to minimize part contact
- Polished sides lessen saw binding in cut • Cutting on OD only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED	
D_1 $^{+.005''}_{-.000''}$	L_2 $^{+.00025''}_{-.00025''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	USD$
1	.0100	3/8	12	SNA0100	77.60
	.0156 (1/64)	3/8	12	SNA0156	76.80
	.0200	3/8	12	SNA0200	76.20
	.0312 (1/32)	3/8	12	SNA0312	76.20
	.0625 (1/16)	3/8	12	SNA0625	66.70
1-1/4	.0156 (1/64)	1/2	16	SNB0156	89.10
	.0200	1/2	16	SNB0200	83.40
	.0312 (1/32)	1/2	16	SNB0312	83.40
	.0625 (1/16)	1/2	16	SNB0625	84.90
1-1/2	.0120	1/2	16	SNC0120	97.40
	.0156 (1/64)	1/2	16	SNC0156	97.40
	.0200	1/2	16	SNC0200	86.10
	.0312 (1/32)	1/2	16	SNC0312	86.10
	.0400	1/2	16	SNC0400	86.10
	.0625 (1/16)	1/2	16	SNC0625	86.10
1-3/4	.0200	1/2	24	SND0200	104.40
	.0312 (1/32)	1/2	24	SND0312	104.40
	.0625 (1/16)	1/2	24	SND0625	111.60
2	.0200	1/2	24	SNE0200	137.30
	.0312 (1/32)	1/2	24	SNE0312	134.70
	.0400	1/2	24	SNE0400	134.70
	.0625 (1/16)	1/2	24	SNE0625	134.70
	.0937 (3/32)	1/2	24	SNE0937	134.70
	.1250 (1/8)	1/2	24	SNE1250	172.70
3	.0312 (1/32)	1	30	SNF0312	209.40
	.0625 (1/16)	1	30	SNF0625	235.70
	.0937 (3/32)	1	30	SNF0937	301.60
	.1250 (1/8)	1	30	SNF1250	343.90
4	.0312 (1/32)	1	36	SNG0312	305.50
	.0625 (1/16)	1	36	SNG0625	306.50
	.0937 (3/32)	1	36	SNG0937	361.00
	.1250 (1/8)	1	36	SNG1250	436.00

For Saw Arbors, see page 570

SLITTING SAWS

Full Radius

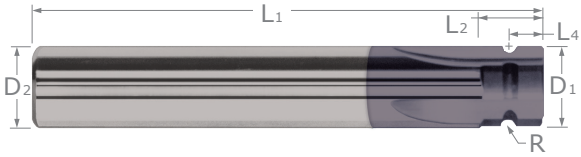


- Full radius profile
- Sides of saw are dished for clearance
- Cutting on radius only • No keyway or hub
- For use with standard saw arbors • Solid carbide • CNC ground in the USA

CUTTER DIAMETER	RADIUS	THICKNESS	INSIDE DIAMETER	NUMBER OF TEETH	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.005''}$	R_1 $^{+.002''}_{-.000''}$	L_2 $^{+.0005''}_{-.0005''}$	D_2 $^{+.0005''}_{+.0001''}$		TOOL #	USD$	TOOL #	USD$
1	.0100	.0200	3/8	20	SFR0200	183.70	SFR0200-C3	213.00
	.0156 (1/64)	.0312 (1/32)	3/8	20	SFR0312	183.70	SFR0312-C3	213.00
	.0234	.0468 (3/64)	3/8	20	SFR0468	183.70	SFR0468-C3	213.00
	.0312 (1/32)	.0625 (1/16)	3/8	20	SFR0625	183.70	SFR0625-C3	213.00
2	.0156 (1/64)	.0312 (1/32)	1/2	40	SAK0312	287.20	SAK0312-C3	328.90
	.0234	.0468 (3/64)	1/2	40	SAK0468	287.20	SAK0468-C3	328.90
	.0312 (1/32)	.0625 (1/16)	1/2	40	SAK0625	287.20	SAK0625-C3	328.90
	.0468 (3/64)	.0937 (3/32)	1/2	40	SAK0937	287.20	SAK0937-C3	328.90
	.0625 (1/16)	.1250 (1/8)	1/2	40	SAK1250	298.70	SAK1250-C3	340.50
3	.0156 (1/64)	.0312 (1/32)	1	72	SAH0312	402.20	SAH0312-C3	444.00
	.0234	.0468 (3/64)	1	72	SAH0468	402.20	SAH0468-C3	444.00
	.0312 (1/32)	.0625 (1/16)	1	72	SAH0625	402.20	SAH0625-C3	444.00
	.0468 (3/64)	.0937 (3/32)	1	72	SAH0937	459.60	SAH0937-C3	501.40
	.0625 (1/16)	.1250 (1/8)	1	72	SAH1250	524.10	SAH1250-C3	565.80
4	.0234	.0468 (3/64)	1	80	SAJ0468	466.70	SAJ0468-C3	508.40
	.0312 (1/32)	.0625 (1/16)	1	80	SAJ0625	466.70	SAJ0625-C3	508.40
	.0468 (3/64)	.0937 (3/32)	1	80	SAJ0937	539.00	SAJ0937-C3	580.80
	.0625 (1/16)	.1250 (1/8)	1	80	SAJ1250	651.80	SAJ1250-C3	693.50

For Saw Arbors, see page 570

CONCAVE RADIUS END MILLS



- Ground form relieved (can be re-ground without losing radius)
- 4 flutes
- Cutting on OD and radius only (non-end cutting)
- Solid carbide
- CNC ground in the USA

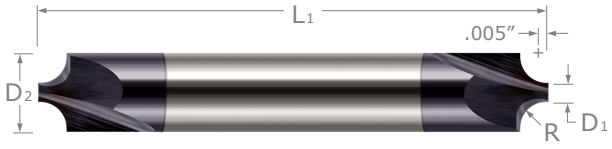
RADIUS	CUTTER DIAMETER	LENGTH OF CUT	RADIUS CENTER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.001″ −.001″	D_1 +.000″ −.002″	L_2 +.060″ −.000″	L_4 +.001″ −.001″	D_2	L_1	4 FL	USD$	4 FL	USD$
1/64	1/4	.281	.1406	1/4	2-1/2	45915	69.80	45915-C3	78.60
1/64	1/2	.281	.1406	1/2	3	32801	137.00	32801-C3	152.60
.020	1/4	.281	.1450	1/4	2-1/2	45920	68.60	45920-C3	77.40
1/32	1/4	.312	.1562	1/4	2-1/2	45931	69.80	45931-C3	78.60
1/32	1/2	.312	.1562	1/2	3	32802	134.40	32802-C3	150.00
1 mm	1/4	.329	.1644	1/4	2-1/2	4591M	72.10	4591M-C3	81.00
1 mm	1/2	.329	.1644	1/2	3	3281M	144.20	3281M-C3	159.70
3/64	1/4	.344	.1719	1/4	2-1/2	45947	69.80	45947-C3	78.60
3/64	1/2	.344	.1719	1/2	3	32803	136.80	32803-C3	154.10
1/16	3/8	.375	.1875	3/8	2-1/2	45962	87.00	45962-C3	98.40
1/16	1/2	.375	.1875	1/2	3	32804	134.40	32804-C3	151.70
5/64	1/2	.407	.2034	1/2	3	32805	134.40	32805-C3	151.70
2 mm	1/2	.407	.2044	1/2	3	3282M	144.20	3282M-C3	159.70
3/32	1/2	.437	.2187	1/2	3	32806	136.80	32806-C3	154.10
7/64	5/8	.469	.2344	5/8	3-1/2	32807	175.30	32807-C3	192.50
1/8	5/8	.500	.2500	5/8	3-1/2	32808	172.20	32808-C3	189.50
5/32	3/4	.562	.2812	3/4	4	32810	290.10	32810-C3	308.90
3/16	1	.624	.3120	3/4	3-1/2	32812*	235.20	32812-C3*	256.70
1/4	1-1/4	.750	.3750	3/4	4	32816*	276.40	32816-C3*	298.00

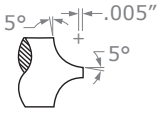
*Solid carbide head with steel shank

NEW SIZES!

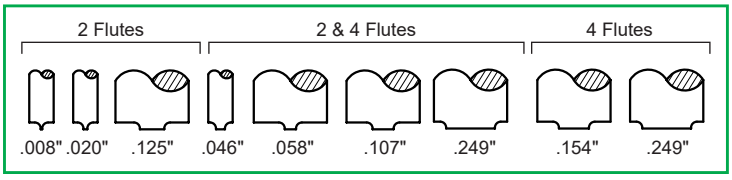
CORNER ROUNDING END MILLS

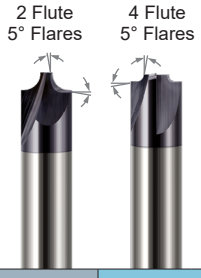
2 & 4 Flute – Flared





- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Double-ended
- Axial depth of cut ≈ radius plus .005″
- End cutting
- Solid carbide • CNC ground in the USA





RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	USD$	TOOL #	USD$
.003	**.046**	2	1/8	1-1/2		17003	50.90	17003-C3	58.40
.004	**.046**	2	1/8	1-1/2		17004	50.90	17004-C3	58.40
.005	**.008**	2	1/8	1-1/2		67405	63.90	67405-C3	71.50
.005	**.020**	2	1/8	1-1/2		45305	54.90	45305-C3	62.40
.005	**.046**	2	1/8	1-1/2		17005	50.90	17005-C3	58.40
.005	**.046**	2	3/16	4	**LONG!**	31605	90.80	31605-C3	98.00
.005	**.046**	4	1/8	1-1/2		806105	69.00	806105-C3	76.70
.005	**.058**	4	1/8	1-1/2		67605	69.00	67605-C3	76.70
.005	**.107**	4	1/8	1-1/2		68005	69.00	68005-C3	76.70
.005	**.249**	4	3/8	2-1/2		21005	80.70	21005-C3	92.70
.006	**.020**	2	1/8	1-1/2		45306	54.90	45306-C3	62.40
.006	**.046**	2	1/8	1-1/2		17006	50.90	17006-C3	58.40
.006	**.058**	4	1/8	1-1/2		67606	69.90	67606-C3	75.80
.006	**.107**	4	1/8	1-1/2		68006	69.90	68006-C3	77.30
.007	**.020**	2	1/8	1-1/2		45307	54.90	45307-C3	62.40
.007	**.046**	2	1/8	1-1/2		17007	50.90	17007-C3	58.40
.007	**.058**	4	1/8	1-1/2		67607	69.00	67607-C3	76.70
.007	**.107**	4	1/8	1-1/2		68007	69.00	68007-C3	76.70
.008	**.008**	2	1/8	1-1/2		67408	63.90	67408-C3	71.50
.008	**.020**	2	1/8	1-1/2		45308	54.90	45308-C3	62.40
.008	**.046**	2	1/8	1-1/2		17008	50.90	17008-C3	58.40
.008	**.046**	2	3/16	4	**LONG!**	31608	90.80	31608-C3	98.00
.008	**.058**	4	1/8	1-1/2		67608	69.00	67608-C3	76.70
.008	**.249**	4	3/8	2-1/2		21008	80.70	21008-C3	92.10
.009	**.020**	2	1/8	1-1/2		45309	55.40	45309-C3	61.30
.009	**.046**	2	1/8	1-1/2		17009	50.90	17009-C3	58.40
.010	**.008**	2	1/8	1-1/2		67410	63.90	67410-C3	71.50
.010	**.020**	2	1/8	1-1/2		45310	54.90	45310-C3	62.40
.010	**.046**	2	1/8	1-1/2		17010	50.90	17010-C3	58.40
.010	**.046**	2	3/16	4	**LONG!**	31610	90.80	31610-C3	101.30

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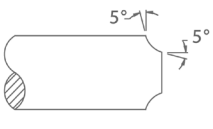
CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

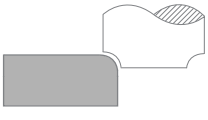
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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$
.010	**.046**	4	1/8	1-1/2		806110	69.20	806110-C3	76.80
.010	**.058**	4	1/8	1-1/2		67610	69.00	67610-C3	76.70
.010	**.107**	4	3/16	2		68010	74.80	68010-C3	83.70
.010	**.125**	2	3/16	2		941510	74.80	941510-C3	83.70
.010	**.249**	4	3/8	2-1/2		21010	80.70	21010-C3	92.70
.011	**.020**	2	1/8	1-1/2		45311	55.40	45311-C3	61.30
.011	**.046**	2	1/8	1-1/2		17011	50.90	17011-C3	58.40
.012	**.020**	2	1/8	1-1/2		45312	54.90	45312-C3	62.40
.012	**.046**	2	1/8	1-1/2		17012	50.90	17012-C3	58.40
.012	**.107**	4	3/16	2		68012	74.80	68012-C3	83.70
.013	**.020**	2	1/8	1-1/2		45313	54.90	45313-C3	60.80
.013	**.046**	2	1/8	1-1/2		17013	50.90	17013-C3	58.40
.014	**.020**	2	1/8	1-1/2		45314	54.90	45314-C3	62.40
.014	**.046**	2	1/8	1-1/2		17014	50.90	17014-C3	58.40
.015 (1/64)	**.008**	2	1/8	1-1/2		67415	63.90	67415-C3	71.50
.015 (1/64)	**.020**	2	1/8	1-1/2		45315	54.90	45315-C3	62.40
.015 (1/64)	**.046**	2	1/8	1-1/2		17015	50.90	17015-C3	58.40
.015 (1/64)	**.046**	2	3/16	4	**LONG!**	31615	90.80	31615-C3	101.30
.015 (1/64)	**.046**	4	1/8	1-1/2		806115	69.00	806115-C3	76.70
.015 (1/64)	**.058**	2	1/8	1-1/2		770515	50.90	770515-C3	58.40
.015 (1/64)	**.058**	4	1/8	1-1/2		67615	69.00	67615-C3	76.70
.015 (1/64)	**.107**	4	3/16	2		68015	74.80	68015-C3	83.70
.015 (1/64)	**.125**	2	3/16	2		941515	74.80	941515-C3	83.70
.015 (1/64)	**.249**	2	3/8	2		749015	77.20	749015-C3	88.00
.015 (1/64)	**.249**	4	3/8	2-1/2		21015	80.70	21015-C3	92.70
.018	**.020**	2	1/8	1-1/2		45318	54.90	45318-C3	62.40
.018	**.046**	2	1/8	1-1/2		17018	50.90	17018-C3	58.40
.018	**.107**	4	3/16	2		68018	74.80	68018-C3	83.70
.020	**.008**	2	1/8	1-1/2		67420	63.90	67420-C3	71.50
.020	**.020**	2	1/8	1-1/2		45320	54.90	45320-C3	62.40
.020	**.046**	2	1/8	1-1/2		17020	50.90	17020-C3	58.40
.020	**.046**	2	3/16	4	**LONG!**	31620	90.80	31620-C3	101.30
.020	**.046**	4	1/8	1-1/2		806120	69.00	806120-C3	76.70
.020	**.058**	2	1/8	1-1/2		770520	50.90	770520-C3	58.40
.020	**.058**	4	1/8	1-1/2		67620	69.00	67620-C3	76.70
.020	**.107**	2	3/16	2		748620	75.70	748620-C3	84.60
.020	**.107**	4	3/16	2		68020	74.80	68020-C3	82.50
.020	**.125**	2	3/16	2		941520	74.80	941520-C3	83.70
.020	**.249**	4	3/8	2-1/2		21020	80.70	21020-C3	92.70

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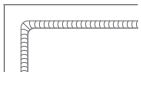
5° Flares at Shoulder and Pilot to Avoid Steps in Workpiece



Large Pilots for Profiling, Increasing Strength and Requiring Less Speed



Small Pilots for Narrow Slots and Holes



Small Pilots Allow Milling of Tight Inside Corners

NEW SIZES!

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

continued from previous page

RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R $^{+.0005''}_{-.0005''}$	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$
.022	**.020**	2	1/8	1-1/2		45322	54.90	45322-C3	60.80
.022	**.046**	2	1/8	1-1/2		17022	50.90	17022-C3	58.40
.022	**.107**	4	3/16	2		68022	74.80	68022-C3	83.70
.025	**.008**	2	1/8	1-1/2		67425	64.50	67425-C3	72.00
.025	**.020**	2	1/8	1-1/2		45325	54.90	45325-C3	62.40
.025	**.046**	2	1/8	1-1/2		17025	50.90	17025-C3	58.40
.025	**.046**	2	3/16	4	**LONG!**	31625	90.80	31625-C3	98.00
.025	**.058**	4	1/8	1-1/2		67625	69.00	67625-C3	76.70
.025	**.107**	4	3/16	2		68025	74.80	68025-C3	82.50
.025	**.125**	2	3/16	2		941525	74.80	941525-C3	83.70
.025	**.249**	4	3/8	2-1/2		21025	80.70	21025-C3	92.70
.027	**.046**	2	1/8	1-1/2		17027	50.90	17027-C3	58.40
.027	**.107**	4	3/16	2		68027	74.80	68027-C3	83.70
.030	**.008**	2	1/8	1-1/2		67430	63.90	67430-C3	71.50
.030	**.020**	2	1/8	1-1/2		45330	54.90	45330-C3	62.40
.030	**.046**	2	1/8	1-1/2		17030	50.90	17030-C3	58.40
.030	**.046**	2	3/16	4	**LONG!**	31630	90.80	31630-C3	101.30
.030	**.046**	4	1/8	1-1/2		806130	69.00	806130-C3	76.70
.030	**.058**	2	1/8	1-1/2		756930	69.90	756930-C3	77.30
.030	**.058**	4	1/8	1-1/2		67630	69.00	67630-C3	76.70
.030	**.107**	2	3/16	2		748630	75.70	748630-C3	81.90
.030	**.107**	4	3/16	2		68030	74.80	68030-C3	82.50
.030	**.125**	2	3/16	2		941530	74.80	941530-C3	83.70
.030	**.249**	2	3/8	2		749030	85.10	749030-C3	95.90
.030	**.249**	4	3/8	2-1/2		21030	88.70	21030-C3	106.30
.031 (1/32)	**.008**	2	1/8	1-1/2		67431	63.90	67431-C3	69.90
.031 (1/32)	**.020**	2	1/8	1-1/2		45331	54.90	45331-C3	62.40
.031 (1/32)	**.046**	2	1/8	1-1/2		17031	50.90	17031-C3	58.40
.031 (1/32)	**.046**	2	3/16	4	**LONG!**	31631	90.80	31631-C3	101.30
.031 (1/32)	**.046**	4	1/8	1-1/2		806131	69.00	806131-C3	76.70
.031 (1/32)	**.058**	4	1/8	1-1/2		67631	69.00	67631-C3	76.70
.031 (1/32)	**.107**	4	3/16	2		68031	74.80	68031-C3	83.70
.031 (1/32)	**.125**	2	3/16	2		941531	83.70	941531-C3	92.50
.031 (1/32)	**.154**	4	1/4	2		946631	98.30	946631-C3	105.80
.031 (1/32)	**.249**	4	3/8	2-1/2		21031	88.70	21031-C3	106.30
.032	**.046**	2	1/8	1-1/2		17032	50.90	17032-C3	58.40
.032	**.249**	4	3/8	2-1/2		21032	88.70	21032-C3	106.30
.035	**.020**	2	1/8	1-1/2		67835	54.90	67835-C3	60.80
.035	**.046**	2	1/8	1-1/2		17035	50.90	17035-C3	58.40
.035	**.046**	2	3/16	4	**LONG!**	31635	90.80	31635-C3	98.00
.035	**.058**	4	3/16	2		67635	77.50	67635-C3	86.50
.035	**.125**	2	1/4	2		941535	76.80	941535-C3	85.80
.035	**.249**	4	3/8	2-1/2		21035	88.70	21035-C3	106.30
.037	**.107**	4	3/16	2		68037	75.70	68037-C3	81.90
.039 (1 mm)	**.020**	2	1/8	1-1/2		67839	54.90	67839-C3	62.40
.039 (1 mm)	**.046**	2	1/8	1-1/2		17039	50.90	17039-C3	58.40
.039 (1 mm)	**.046**	2	3/16	4	**LONG!**	31639	90.80	31639-C3	101.30
.039 (1 mm)	**.046**	4	1/8	1-1/2		806139	69.00	806139-C3	76.70
.039 (1 mm)	**.058**	4	3/16	2		67639	77.50	67639-C3	86.50

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CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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	RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
	R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$
	.039 (1 mm)	**.100**	2	3/16	2		45339	66.70	45339-C3	75.70
	.039 (1 mm)	**.107**	4	3/16	2		68039	66.70	68039-C3	75.70
	.039 (1 mm)	**.154**	4	1/4	2		946639	98.30	946639-C3	105.80
	.039 (1 mm)	**.249**	4	3/8	2-1/2		21039	88.70	21039-C3	106.30
	.040	**.020**	2	1/8	1-1/2		45340	54.90	45340-C3	62.40
	.040	**.046**	2	3/16	2		17040	64.80	17040-C3	73.70
	.040	**.107**	4	1/4	2		68040	98.30	68040-C3	105.80
NEW	.040	.125	2	1/4	2		941540	98.30	941540-C3	105.80
	.040	**.249**	4	3/8	2-1/2		21040	107.50	21040-C3	125.10
	.043	**.046**	2	3/16	2		17043	64.80	17043-C3	73.70
	.043	**.058**	4	3/16	2		67643	77.50	67643-C3	86.50
	.043	**.249**	4	3/8	2-1/2		21043	108.60	21043-C3	120.00
	.045	**.046**	2	3/16	2		17045	64.80	17045-C3	73.70
	.045	**.058**	4	3/16	2		67645	77.50	67645-C3	86.50
	.047 (3/64)	**.020**	2	1/8	1-1/2		67847	54.90	67847-C3	62.40
	.047 (3/64)	**.046**	2	3/16	2		17047	64.80	17047-C3	73.70
	.047 (3/64)	**.046**	2	3/16	4	**LONG!**	31647	90.80	31647-C3	98.00
	.047 (3/64)	**.058**	4	3/16	2		67647	77.50	67647-C3	86.50
	.047 (3/64)	**.107**	4	1/4	2		68047	98.30	68047-C3	105.80
	.047 (3/64)	**.125**	2	1/4	2		45347	76.80	45347-C3	89.00
	.047 (3/64)	**.249**	4	3/8	2-1/2		21047	107.50	21047-C3	125.10
	.050	**.020**	2	1/8	1-1/2		67850	54.90	67850-C3	62.40
	.050	**.046**	2	3/16	2		17050	64.80	17050-C3	73.70
	.050	**.046**	2	1/4	4	**LONG!**	31650	108.00	31650-C3	116.60
	.050	**.058**	4	3/16	2		67650	77.50	67650-C3	86.50
	.050	**.107**	4	1/4	2		68050	98.30	68050-C3	105.80
	.050	**.125**	2	1/4	2		45350	76.80	45350-C3	89.00
	.050	**.249**	4	3/8	2-1/2		21050	107.50	21050-C3	125.10
	.052	**.107**	4	1/4	2		68052	99.10	68052-C3	106.60
	.055	**.046**	2	3/16	2		17055	64.80	17055-C3	73.70
	.055	**.058**	4	3/16	2		67655	77.50	67655-C3	83.80
	.055	**.107**	4	1/4	2		68055	98.30	68055-C3	105.80
	.058	**.107**	4	1/4	2		68058	98.30	68058-C3	105.80
	.060	**.020**	2	3/16	2		67860	67.40	67860-C3	76.30
	.060	**.046**	2	3/16	2		17060	64.80	17060-C3	73.70
	.060	**.046**	2	1/4	4	**LONG!**	31660	108.00	31660-C3	118.30
	.060	**.046**	4	3/16	2		806060	73.90	806060-C3	82.90
	.060	**.058**	2	3/16	2		756960	65.60	756960-C3	74.50
	.060	**.058**	4	3/16	2		67660	77.50	67660-C3	86.50
	.060	**.107**	2	1/4	2		748660	77.60	748660-C3	89.80
	.060	**.107**	4	1/4	2		68060	98.30	68060-C3	105.80
	.060	**.125**	2	1/4	2		45360	76.80	45360-C3	89.00
	.060	**.154**	4	5/16	2-1/2		946660	113.30	946660-C3	128.00
	.060	**.249**	4	1/2	3		21060	120.00	21060-C3	138.10

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NEW SIZES!

CORNER ROUNDING END MILLS

2 & 4 Flute – Flared (cont.)

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RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$
.062 (1/16)	**.020**	2	3/16	2		67862	67.40	67862-C3	76.30
.062 (1/16)	**.046**	2	3/16	2		17062	64.80	17062-C3	73.70
.062 (1/16)	**.046**	2	1/4	4	**LONG!**	31662	108.00	31662-C3	118.30
.062 (1/16)	**.046**	4	3/16	2		806062	77.50	806062-C3	84.20
.062 (1/16)	**.058**	2	3/16	2		770562	64.80	770562-C3	73.70
.062 (1/16)	**.058**	4	3/16	2		67662	77.50	67662-C3	86.50
.062 (1/16)	**.107**	2	1/4	2		748662	77.60	748662-C3	89.80
.062 (1/16)	**.107**	4	1/4	2		68062	98.30	68062-C3	105.80
.062 (1/16)	**.125**	2	1/4	2		45362	76.80	45362-C3	89.00
.062 (1/16)	**.154**	4	5/16	2-1/2		946662	113.30	946662-C3	128.00
.062 (1/16)	**.249**	4	1/2	3		21062	120.00	21062-C3	135.80
.065	**.046**	2	3/16	2		17065	64.80	17065-C3	73.70
.070	**.046**	2	3/16	2		17070	64.80	17070-C3	73.70
.070	**.058**	4	1/4	2		67670	98.30	67670-C3	105.80
.070	**.107**	4	1/4	2		68070	98.30	68070-C3	105.80
.072	**.046**	2	1/4	2		17072	74.40	17072-C3	86.60
.072	**.249**	4	1/2	3		21072	125.60	21072-C3	149.70
.075	**.046**	2	1/4	2		17075	74.40	17075-C3	86.60
.078 (5/64)	**.020**	2	3/16	2		67878	74.80	67878-C3	83.70
.078 (5/64)	**.046**	2	1/4	2		17078	74.40	17078-C3	86.60
.078 (5/64)	**.046**	2	1/4	4	**LONG!**	31678	108.00	31678-C3	116.60
.078 (5/64)	**.046**	4	1/4	2		806078	98.30	806078-C3	105.80
.078 (5/64)	**.058**	4	1/4	2		67678	98.30	67678-C3	105.80
.078 (5/64)	**.107**	4	5/16	2-1/2		68078	113.30	68078-C3	128.00
.078 (5/64)	**.125**	2	5/16	2-1/2		941578	113.30	941578-C3	123.00
.078 (5/64)	**.154**	4	5/16	2-1/2		946678	113.30	946678-C3	128.00
.078 (5/64)	**.249**	4	1/2	3		21078	125.60	21078-C3	149.70
.080	**.046**	2	1/4	2		17080	74.40	17080-C3	86.60
.080	**.058**	4	1/4	2		67680	98.30	67680-C3	105.80
.080	**.107**	4	5/16	2-1/2		68080	113.30	68080-C3	128.00
.085	**.046**	2	1/4	2		17085	74.40	17085-C3	86.60
.089	**.045**	2	1/4	2		17089	74.40	17089-C3	86.60
.089	**.107**	4	5/16	2-1/2		68089	114.50	68089-C3	124.10
.089	**.248**	4	1/2	3		21089	126.80	21089-C3	150.90
.090	**.045**	2	1/4	2		17090	74.40	17090-C3	86.60
.090	**.058**	4	1/4	2		67690	98.30	67690-C3	105.80
.090	**.107**	4	5/16	2-1/2		68090	113.30	68090-C3	128.00
.093 (3/32)	**.045**	2	1/4	2		17093	74.40	17093-C3	86.60
.093 (3/32)	**.045**	2	5/16	4	**LONG!**	31693	142.30	31693-C3	152.70
.093 (3/32)	**.046**	4	1/4	2		806093	98.30	806093-C3	105.80
.093 (3/32)	**.058**	4	1/4	2		67693	98.30	67693-C3	105.80
.093 (3/32)	**.107**	4	5/16	2-1/2		68093	113.30	68093-C3	128.00
.093 (3/32)	**.125**	2	5/16	2-1/2		941593	114.50	941593-C3	124.10
.093 (3/32)	**.154**	4	3/8	2-1/2		946693	139.00	946693-C3	156.60
.093 (3/32)	**.248**	4	1/2	3		21093	127.90	21093-C3	152.00
.095	**.045**	2	1/4	2		17095	74.40	17095-C3	86.60

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CORNER ROUNDING END MILLS

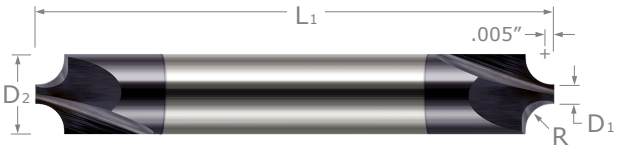
2 & 4 Flute – Flared (cont.)

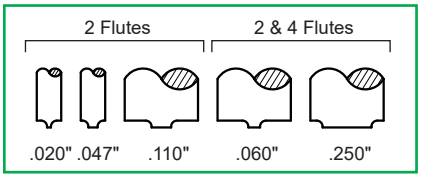
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	RADIUS	PILOT DIAMETER	FLUTES	SHANK DIAMETER	OVERALL LENGTH		UNCOATED		AlTiN COATED	
	R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$
	.100	**.045**	2	1/4	2		17100	74.40	17100-C3	86.60
	.100	**.045**	2	5/16	4	**LONG!**	31700	142.30	31700-C3	152.70
	.100	**.058**	4	5/16	2-1/2		77800	114.00	77800-C3	128.70
	.100	**.107**	4	5/16	2-1/2		68100	114.00	68100-C3	128.70
	.100	**.125**	2	3/8	2-1/2		941600	136.70	941600-C3	148.10
	.100	**.248**	4	1/2	3		21100	127.90	21100-C3	152.00
	.109 (7/64)	**.058**	2	5/16	2-1/2		17109	114.00	17109-C3	128.70
	.109 (7/64)	**.107**	4	3/8	2-1/2		68109	139.00	68109-C3	156.60
	.118 (3 mm)	**.058**	2	5/16	2-1/2		17118	114.00	17118-C3	128.70
	.118 (3 mm)	**.107**	4	3/8	2-1/2		68118	139.00	68118-C3	156.60
	.118 (3 mm)	**.125**	2	3/8	2-1/2		941618	136.70	941618-C3	148.10
	.118 (3 mm)	**.248**	4	1/2	3		21118	162.20	21118-C3	177.80
	.125 (1/8)	**.046**	2	5/16	2-1/2		948425	110.50	948425-C3	125.20
	.125 (1/8)	**.046**	4	5/16	2-1/2		805908	114.90	805908-C3	125.40
	.125 (1/8)	**.058**	2	5/16	2-1/2		17125	114.00	17125-C3	128.70
	.125 (1/8)	**.058**	2	3/8	4	**LONG!**	31725	169.80	31725-C3	179.30
	.125 (1/8)	**.058**	4	5/16	2-1/2		67708	114.00	67708-C3	128.70
NEW	.125 (1/8)	.107	2	3/8	2-1/2		748601	139.00	748601-C3	150.40
	.125 (1/8)	**.107**	4	3/8	2-1/2		68125	139.00	68125-C3	156.60
	.125 (1/8)	**.125**	2	7/16	2-1/2		941608	185.40	941608-C3	198.70
	.125 (1/8)	**.154**	4	7/16	2-1/2		946725	185.40	946725-C3	198.70
	.125 (1/8)	**.248**	4	5/8	3-1/2		21125	206.30	21125-C3	232.50
	.140 (9/64)	**.058**	2	3/8	2-1/2		17140	136.70	17140-C3	154.30
	.140 (9/64)	**.107**	4	7/16	2-1/2		68140	185.40	68140-C3	198.70
	.156 (5/32)	**.058**	2	3/8	2-1/2		17156	136.70	17156-C3	154.30
	.156 (5/32)	**.107**	4	7/16	2-1/2		68156	185.40	68156-C3	198.70
	.156 (5/32)	**.248**	4	5/8	3-1/2		21156	227.00	21156-C3	253.10
	.172 (11/64)	**.058**	2	7/16	2-1/2		17172	206.30	17172-C3	228.50
	.187 (3/16)	**.058**	2	7/16	2-1/2		17187	206.30	17187-C3	228.50
	.187 (3/16)	**.107**	4	1/2	3		68187	216.40	68187-C3	240.50
	.187 (3/16)	**.125**	2	5/8	3-1/2		941612	249.00	941612-C3	266.50
	.187 (3/16)	**.248**	4	5/8	3-1/2		21187	243.30	21187-C3	269.50
	.197 (5 mm)	**.058**	2	1/2	3		17197	216.40	17197-C3	240.50
	.197 (5 mm)	**.107**	4	5/8	3-1/2		68197	324.80	68197-C3	350.90
	.219 (7/32)	**.058**	2	1/2	3		17219	218.40	17219-C3	234.00
	.219 (7/32)	**.107**	4	5/8	3-1/2		68219	324.80	68219-C3	350.90
	.236 (6 mm)	**.107**	2	5/8	3-1/2		17236	328.10	17236-C3	347.40
	.236 (6 mm)	**.107**	4	5/8	3-1/2		68236	324.80	68236-C3	350.90
	.250 (1/4)	**.058**	2	5/8	3-1/2		17199	328.10	17199-C3	354.30
	.250 (1/4)	**.107**	2	5/8	3-1/2		17250	324.80	17250-C3	350.90
	.250 (1/4)	**.107**	4	5/8	3-1/2		68250	324.80	68250-C3	350.90
	.250 (1/4)	**.154**	4	3/4	4		946750	361.50	946750-C3	391.80
	.250 (1/4)	**.247**	4	3/4	4		21250	361.50	21250-C3	391.80
	.312 (5/16)	**.247**	4	1	4		21312	510.80	21312-C3	553.90
	.375 (3/8)	**.246**	4	1	4		21375	557.60	21375-C3	600.80

CORNER ROUNDING END MILLS

2 & 4 Flute – Unflared





- Unflared shoulder and pilot for full radius form
- Double-ended
- Axial depth of cut = radius plus .005″
- End cutting
- Solid carbide
- CNC ground in the USA



RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005″ −.0005″	D1		D2	L1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.005	**.020**	2	1/8	1-1/2		932205	51.30			932205-C3	57.20		
.005	**.047**	2	1/8	1-1/2		46005	39.50	46005-C1	43.50	46005-C3	45.50	46005-C4	58.40
.008	**.047**	2	1/8	1-1/2		46008	39.50	46008-C1	43.50	46008-C3	45.50		
.010	**.020**	2	1/8	1-1/2		932210	51.30			932210-C3	58.70		
.010	**.047**	2	1/8	1-1/2		46010	38.80	46010-C1	43.90	46010-C3	44.70	46010-C4	57.80
.010	**.060**	4	1/8	1-1/2		929910	62.20			929910-C3	69.60		
.010	**.250**	4	3/8	2-1/2		44010	68.30			44010-C3	79.70		
.012	**.047**	2	1/8	1-1/2		46012	39.50	46012-C1	44.50	46012-C3	45.50		
.015 (1/64)	**.020**	2	1/8	1-1/2		932215	51.30			932215-C3	58.70		
.015 (1/64)	**.047**	2	1/8	1-1/2		46015	38.80	46015-C1	43.90	46015-C3	44.70	46015-C4	57.80
.015 (1/64)	**.047**	2	3/16	4	**LONG!**	928015	80.70			928015-C3	87.80		
.015 (1/64)	**.060**	4	1/8	1-1/2		929915	62.20			929915-C3	69.60		
.015 (1/64)	**.250**	4	3/8	2-1/2		44015	68.30			44015-C3	81.00		
.018	**.047**	2	1/8	1-1/2		46018	39.50	46018-C1	43.50	46018-C3	45.50		
.020	**.020**	2	1/8	1-1/2		932220	51.30			932220-C3	58.70		
.020	**.047**	2	1/8	1-1/2		46020	38.80	46020-C1	43.90	46020-C3	44.70	46020-C4	57.80
.020	**.047**	2	3/16	4	**LONG!**	928020	79.00			928020-C3	86.20		
.020	**.060**	4	1/8	1-1/2		929920	63.20			929920-C3	70.60		
.020	**.250**	4	3/8	2-1/2		44020	68.30			44020-C3	81.00		
.022	**.047**	2	1/8	1-1/2		46022	39.50	46022-C1	43.50	46022-C3	45.50		
.025	**.020**	2	1/8	1-1/2		932225	51.30			932225-C3	57.20		
.025	**.047**	2	1/8	1-1/2		46025	38.80	46025-C1	42.80	46025-C3	44.70	46025-C4	53.80
.025	**.250**	4	3/8	2-1/2		44025	68.30			44025-C3	81.00		
.027	**.047**	2	1/8	1-1/2		46027	39.50	46027-C1	43.50	46027-C3	45.50		
.030	**.047**	2	1/8	1-1/2		46030	39.50	46030-C1	44.50	46030-C3	45.50	46030-C4	58.40
.030	**.250**	4	3/8	2-1/2		44030	74.80			44030-C3	87.20		
.031 (1/32)	**.020**	2	1/8	1-1/2		932231	51.30			932231-C3	58.70		
.031 (1/32)	**.047**	2	1/8	1-1/2		46031	38.80	46031-C1	43.90	46031-C3	44.70	46031-C4	57.80
.031 (1/32)	**.047**	2	3/16	4	**LONG!**	928031	79.00			928031-C3	86.20		
.031 (1/32)	**.060**	4	1/8	1-1/2		929931	62.20			929931-C3	69.60		
.031 (1/32)	**.250**	4	3/8	2-1/2		44031	74.80			44031-C3	87.20		
.032	**.047**	2	1/8	1-1/2		46032	43.90	46032-C1	47.90	46032-C3	49.80		
.035	**.047**	2	1/8	1-1/2		46035	43.90	46035-C1	47.90	46035-C3	49.80		
.039 (1 mm)	**.020**	2	1/8	1-1/2		932239	44.70			932239-C3	50.70		
.039 (1 mm)	**.047**	2	1/8	1-1/2		46039	43.90	46039-C1	48.60	46039-C3	49.80	46039-C4	62.40
.039 (1 mm)	**.060**	4	3/16	2		929939	63.20			929939-C3	72.00		
.039 (1 mm)	**.250**	4	3/8	2-1/2		44039	74.80			44039-C3	87.20		

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CORNER ROUNDING END MILLS

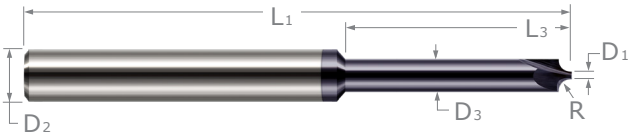
2 & 4 Flute – Unflared (cont.)

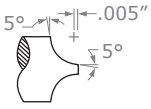
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RADIUS	PILOT DIA.	FLUTES	SHANK DIA.	OAL		UNCOATED		TiN COATED		AlTiN COATED		AMORPHOUS DIAMOND	
R +.0005" −.0005"	D_1		D_2	L_1		TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.043	**.047**	2	3/16	2		46043	52.20	46043-C1	56.70	46043-C3	58.40		
.047 (3/64)	**.047**	2	3/16	2		46047	51.30	46047-C1	55.70	46047-C3	60.20	46047-C4	68.00
.047 (3/64)	**.250**	4	3/8	2-1/2		44047	76.30			44047-C3	87.70		
.050	**.047**	2	3/16	2		46050	51.30	46050-C1	57.00	46050-C3	60.20	46050-C4	68.00
.050	**.250**	4	3/8	2-1/2		44050	74.80			44050-C3	87.20		
.055	**.047**	2	3/16	2		46055	51.30	46055-C1	57.00	46055-C3	57.50		
.060	**.047**	2	3/16	2		46060	53.00	46060-C1	58.60	46060-C3	61.80	46060-C4	79.10
.060	**.250**	4	1/2	3		44060	105.70			44060-C3	122.50		
.062 (1/16)	**.047**	2	3/16	2		46062	52.20	46062-C1	57.80	46062-C3	61.00	46062-C4	78.20
.062 (1/16)	**.047**	2	1/4	4	**LONG!**	928062	94.40			928062-C3	103.00		
.062 (1/16)	**.060**	4	3/16	2		929962	69.80			929962-C3	76.00		
.062 (1/16)	**.110**	2	1/4	2		793462	60.10			793462-C3	68.20		
.062 (1/16)	**.250**	4	1/2	3		44062	105.70			44062-C3	122.50		
.067	**.047**	2	3/16	2		46067	53.00	46067-C1	57.50	46067-C3	61.80		
.072	**.047**	2	1/4	2		46072	60.90	46072-C1	66.20	46072-C3	69.20		
.078 (5/64)	**.047**	2	1/4	2		46078	60.10	46078-C1	67.90	46078-C3	68.20	46078-C4	89.70
.078 (5/64)	**.060**	4	1/4	2		929978	86.80			929978-C3	94.30		
.078 (5/64)	**.250**	4	1/2	3		44078	105.70			44078-C3	122.50		
.089	**.047**	2	1/4	2		46089	60.90	46089-C1	66.20	46089-C3	69.20		
.093 (3/32)	**.047**	2	1/4	2		46093	60.90	46093-C1	68.80	46093-C3	69.20	46093-C4	90.70
.093 (3/32)	**.047**	2	5/16	4	**LONG!**	928093	112.70			928093-C3	129.00		
.093 (3/32)	**.060**	4	1/4	2		929993	86.80			929993-C3	98.70		
.093 (3/32)	**.110**	2	5/16	2-1/2		793493	93.30			793493-C3	103.00		
.093 (3/32)	**.250**	4	1/2	3		44093	119.00			44093-C3	135.20		
.100	**.047**	2	1/4	2		46100	60.10	46100-C1	67.90	46100-C3	68.20	46100-C4	80.10
.104	**.060**	2	5/16	2-1/2		46104	84.80	46104-C1	91.70	46104-C3	99.20		
.109 (7/64)	**.060**	2	5/16	2-1/2		46109	83.50	46109-C1	90.30	46109-C3	97.80		
.118 (3 mm)	**.060**	2	5/16	2-1/2		46118	84.80	46118-C1	91.70	46118-C3	99.20	46118-C4	113.20
.118 (3 mm)	**.250**	4	1/2	3		44118	119.00			44118-C3	135.20		
.125 (1/8)	**.060**	2	5/16	2-1/2		46125	84.80	46125-C1	94.10	46125-C3	99.20	46125-C4	110.30
.125 (1/8)	**.060**	2	3/8	4	**LONG!**	928125	168.30			928125-C3	187.00		
.125 (1/8)	**.110**	2	3/8	3		793508	139.20			793508-C3	153.70		
.125 (1/8)	**.250**	4	5/8	3-1/2		44125	174.50			44125-C3	193.80		
.140 (9/64)	**.060**	2	3/8	2-1/2		46140	97.50	46140-C1	105.60	46140-C3	114.80		
.156 (5/32)	**.060**	2	3/8	2-1/2		46156	105.40	46156-C1	116.20	46156-C3	122.50		
.156 (5/32)	**.250**	4	5/8	3-1/2		44156	187.70			44156-C3	207.00		
.172 (11/64)	**.060**	2	7/16	2-1/2		46172	173.20	46172-C1	182.60	46172-C3	195.10		
.187 (3/16)	**.060**	2	7/16	2-1/2		46187	178.50	46187-C1	189.60	46187-C3	200.30		
.187 (3/16)	**.250**	4	5/8	3-1/2		44187	205.20			44187-C3	224.50		
.197 (5 mm)	**.060**	2	1/2	3		46197	247.90	46197-C1	270.70	46197-C3	263.40		
.219 (7/32)	**.060**	2	1/2	3		46219	237.90	46219-C1	248.90	46219-C3	253.50		
.236 (6 mm)	**.110**	2	5/8	3-1/2		46236	317.70	46236-C1	331.30	46236-C3	337.00		
.250 (1/4)	**.060**	4	5/8	3-1/2		930016	334.90			930016-C3	360.40		
.250 (1/4)	**.110**	2	5/8	3-1/2		46250	317.70	46250-C1	343.40	46250-C3	343.40		
.250 (1/4)	**.250**	4	3/4	4		44250	333.20			44250-C3	362.80		
.312 (5/16)	**.250**	2	1	4		46312	493.60	46312-C1	517.00	46312-C3	536.00		
.375 (3/8)	**.250**	2	1	4		46375	538.00	46375-C1	561.50	46375-C3	571.20		

CORNER ROUNDING END MILLS

Long Reach – Flared



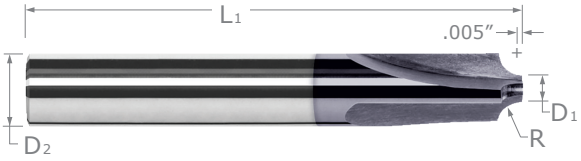


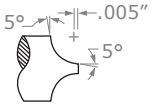
- **Reduced diameter for clearance along walls and in small features**
- Small pilot design for miniature holes, narrow slots and small inside corners
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Axial depth of cut = radius plus .005″ • 2 flutes • Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIAMETER	NECK DIAMETER	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1 +.000″ −.001″	D3	L3 +.010″ −.000″	D2	L1	2 FL	USD$	2 FL	USD$
.005	.010	.031	.156	1/8	1-1/2	994605	47.40	994605-C3	53.40
	.010	.031	.250	1/8	1-1/2	56905	47.40	56905-C3	53.40
	.010	.031	.375	1/8	1-1/2	57305	49.00		
	.020	.031	.156	1/8	1-1/2	992205	47.40	992205-C3	53.40
	.020	.031	.250	1/8	1-1/2	55705	47.40	55705-C3	53.40
	.020	.031	.375	1/8	1-1/2	56005	49.40		
	.020	.062	.312	1/8	1-1/2	990905	47.40	990905-C3	53.40
	.020	.062	.500	1/8	1-1/2	57505	47.40	57505-C3	53.40
	.020	.062	.750	1/8	2	55305	49.00		
	.020	.093	.750	1/8	2	57405	54.60		
	.020	.093	1.125	1/8	2	54305	55.10		
.008	.010	.031	.156	1/8	1-1/2	994608	47.40	994608-C3	53.40
	.010	.031	.250	1/8	1-1/2	56908	47.40		
	.010	.031	.375	1/8	1-1/2	57308	49.00	57308-C3	54.90
.010	.010	.031	.156	1/8	1-1/2	994610	47.40	994610-C3	53.40
	.010	.031	.250	1/8	1-1/2	56910	47.40	56910-C3	53.40
	.010	.031	.375	1/8	1-1/2	57310	49.00		
	.020	.062	.312	1/8	1-1/2	990910	47.40	990910-C3	53.40
	.020	.062	.500	1/8	1-1/2	57510	47.40	57510-C3	53.40
	.020	.062	.750	1/8	2	55310	49.00		
	.020	.093	.750	1/8	2	57410	54.60		
	.020	.093	1.125	1/8	2	54310	54.60		
.015	.020	.062	.312	1/8	1-1/2	990915	47.40	990915-C3	53.40
	.020	.062	.500	1/8	1-1/2	57515	47.40	57515-C3	53.40
	.020	.062	.750	1/8	2	55315	49.00	55315-C3	54.90
	.020	.093	.750	1/8	2	57415	54.60	57415-C3	60.50
	.020	.093	1.125	1/8	2	54315	55.10		
.020	.020	.062	.312	1/8	1-1/2	990920	47.40	990920-C3	53.40
	.020	.062	.500	1/8	1-1/2	57520	47.40	57520-C3	53.40
	.020	.062	.750	1/8	2	55320	49.00		
	.020	.093	.750	1/8	2	57420	54.60	57420-C3	60.50
	.020	.093	1.125	1/8	2	54320	54.60		
.025	.020	.093	.750	1/8	2	57425	54.60	57425-C3	60.50
	.020	.093	1.125	1/8	2	54325	54.60		
.030	.020	.093	.750	1/8	2	57430	54.60	57430-C3	60.50
	.020	.093	1.125	1/8	2	54330	54.60	54330-C3	60.50
.031	.020	.093	.750	1/8	2	57431	54.60	57431-C3	60.50
	.020	.093	1.125	1/8	2	54331	55.10		

CORNER ROUNDING END MILLS

3 Flute – Flared



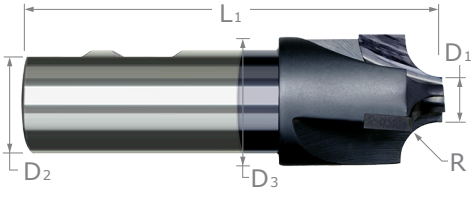


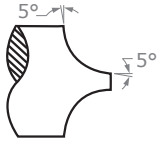
- Single end • Cutting on radius, flares, and end only (not center cutting)
- 5° flares tangent at pilot and shoulder to avoid steps
- Axial depth of cut ≈ radius plus .005″ • 3 flutes • Solid carbide • CNC ground in the USA

RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1	D2	L1	3 FL	USD$	3 FL	USD$
.015 (1/64)	.046	1/8	1-1/2	760215	39.20	760215-C3	45.20
.015 (1/64)	.058	1/8	1-1/2	933415	39.20	933415-C3	45.20
.020	.046	1/8	1-1/2	760220	39.20	760220-C3	45.20
.020	.058	1/8	1-1/2	933420	39.20	933420-C3	45.20
.031 (1/32)	.046	1/8	1-1/2	760231	39.20	760231-C3	45.20
.031 (1/32)	.058	1/8	1-1/2	933431	39.20	933431-C3	45.20
.062 (1/16)	.058	3/16	2	933462	50.10	933462-C3	56.60
.062 (1/16)	.154	5/16	2-1/2	928262	85.80	928262-C3	96.30
.093 (3/32)	.058	1/4	2	933493	73.70	933493-C3	81.20
.093 (3/32)	.154	3/8	2-1/2	928293	97.90	928293-C3	109.30
.125 (1/8)	.058	5/16	2-1/2	933508	85.80	933508-C3	96.30
.125 (1/8)	.248	5/8	3-1/2	973008	143.60	973008-C3	162.20
.187 (3/16)	.058	7/16	2-1/2	933512	140.90	933512-C3	154.10
.187 (3/16)	.248	5/8	3-1/2	973012	162.90	973012-C3	182.20

CORNER ROUNDING END MILLS

3 Flute – Flared – Carbide Tipped



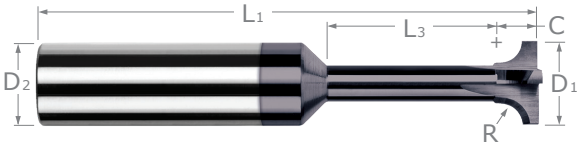


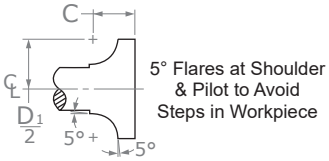
- Carbide tipped - cutting on radius and flares only
- 5° flares tangent to radius at pilot and shoulder to avoid steps
- 3 flutes • Weldon flat • CNC ground in the USA

RADIUS	PILOT DIAMETER	HEAD DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R	D1	D3	D2	L1	3 FL	USD$	3 FL	USD$
1/4	13/32	1	3/4	3-1/4	45016	268.20	45016-C3	297.10
5/16	13/32	1-1/8	7/8	3-1/2	45020	274.90	45020-C3	298.30
3/8	13/32	1-1/4	7/8	3-3/4	45024	284.60	45024-C3	309.20
7/16	13/32	1-3/8	1	4	45028	318.90	45028-C3	347.90
1/2	13/32	1-1/2	1	4	45032	352.70	45032-C3	381.80
5/8	21/32	2	1-1/4	4-1/4	45040	437.60	45040-C3	489.00

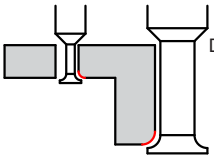
CORNER ROUNDING END MILLS

Back Corner Rounding End Mills – Flared





- Designed to mill radius on backside of workpiece
- 5° flares at neck and shoulder to avoid steps
- Flares are tangent to radius (flare is blended to radius to ensure smooth form)
- Cutting on radius and flares only
- Solid carbide
- CNC ground in the USA



RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R +.0005″ −.0005″	D1 +.000″ −.002″		L3	C +.003″ −.001″ *		D2	L1	TOOL #	USD$	TOOL #	USD$
.005	.030	.017	.062	.025	3	1/8	1-1/2	57705	76.80	57705-C3	82.70
.005	.060	.047	.250	.025	3	1/8	1-1/2	58005	76.80	58005-C3	82.70
.005	.115	.102	.875	.025	3	1/8	2	59805	80.00	59805-C3	85.90
.008	.075	.056	.312	.028	3	1/8	1-1/2	58708	76.80	58708-C3	82.70
.008	.187	.144	.500	.070	3	3/16	2	16008	81.60	16008-C3	88.20
.010	.045	.022	.078	.030	3	1/8	1-1/2	60910	76.80	60910-C3	82.70
.010	.075	.052	.281	.030	3	1/8	1-1/2	58710	76.80	58710-C3	82.70
.010	.115	.092	.281	.030	3	1/8	1-1/2	59810	76.80	59810-C3	82.70
.010	.187	.140	.500	.072	3	3/16	2	16010	81.60	16010-C3	88.20
.012	.075	.048	.250	.032	3	1/8	1-1/2	58712	76.80	58712-C3	82.70
.015 (1/64)	.060	.027	.093	.035	3	1/8	1-1/2	58515	76.80	58515-C3	82.70
.015 (1/64)	.090	.057	.312	.035	3	1/8	1-1/2	59715	76.80	59715-C3	82.70
.015 (1/64)	.115	.082	.281	.035	3	1/8	1-1/2	59815	76.80	59815-C3	82.70
.015 (1/64)	.187	.130	.500	.077	3	3/16	2	16015	81.60	16015-C3	88.20
.015 (1/64)	.187	.130	1.000	.077	3	3/16	2-1/2	992815	82.90	992815-C3	89.60
.020	.075	.032	.109	.040	3	1/8	1-1/2	59220	76.80	59220-C3	82.70
.020	.115	.072	.375	.040	3	1/8	1-1/2	60420	76.80	60420-C3	82.70
.020	.187	.120	.500	.082	3	3/16	2	16020	81.60	16020-C3	88.20
.022	.187	.116	.500	.084	3	3/16	2	16022	81.60	16022-C3	88.20
.025	.090	.037	.125	.055	3	1/8	1-1/2	60125	76.80	60125-C3	82.70
.025	.187	.110	.500	.087	3	3/16	2	16025	81.60	16025-C3	88.20
.027	.187	.106	.500	.089	3	3/16	2	16027	81.60	16027-C3	87.80
.030	.115	.052	.187	.060	3	1/8	1-1/2	60630	76.80	60630-C3	82.70
.030	.187	.100	.500	.092	3	3/16	2	16030	81.60	16030-C3	88.20
.030	.187	.100	1.000	.092	3	3/16	2-1/2	992830	82.90	992830-C3	89.60
.031 (1/32)	.115	.050	.156	.061	3	1/8	1-1/2	60631	76.80	60631-C3	82.70
.031 (1/32)	.187	.098	.500	.093	3	3/16	2	16031	81.60	16031-C3	88.20
.031 (1/32)	.187	.098	1.000	.093	3	3/16	2-1/2	992831	82.90	992831-C3	89.60
.035	.250	.153	.500	.097	3	1/4	2-1/2	16035	88.70	16035-C3	97.70
.039 (1 mm)	.250	.145	.500	.101	3	1/4	2-1/2	16039	88.70	16039-C3	97.70
.039 (1 mm)	.250	.145	1.000	.101	3	1/4	2-1/2	992839	88.70	992839-C3	97.70

*Radius center is in the same plane as cutter OD (radial component of radius center = D1/2, see above drawing).

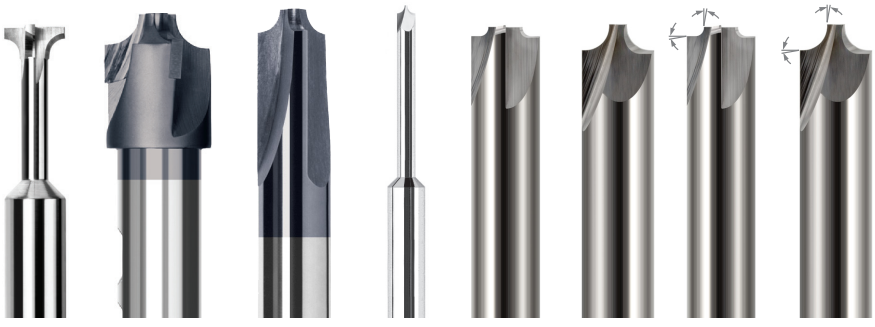
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CORNER ROUNDING END MILLS

Back Corner Rounding End Mills – Flared (cont.)

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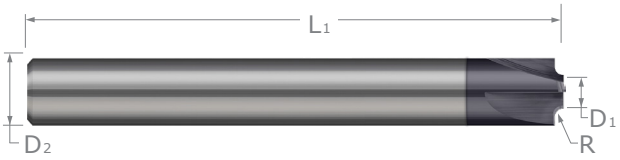
RADIUS	HEAD DIAMETER	NECK DIAMETER	NECK LENGTH	RADIUS CENTER	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
R $^{+.0005''}_{-.0005''}$	D_1 $^{+.000''}_{-.002''}$		L_3	C $^{+.003''}_{-.001''}$*		D_2	L_1	TOOL #	USD$	TOOL #	USD$
.040	.250	.143	.500	.102	3	1/4	2-1/2	16040	88.70	16040-C3	97.70
.045	.250	.133	.500	.107	3	1/4	2-1/2	16045	88.70	16045-C3	97.70
.047 (3/64)	.250	.128	.625	.109	3	1/4	2-1/2	16047	88.70	16047-C3	97.70
.047 (3/64)	.250	.128	1.250	.109	3	1/4	3	992847	97.90	992847-C3	106.00
.050	.250	.122	.375	.112	3	1/4	2-1/2	985050	88.70	985050-C3	97.70
.050	.250	.122	.625	.112	3	1/4	2-1/2	16050	88.70	16050-C3	97.70
.050	.250	.122	1.250	.112	3	1/4	3	992850	97.10	992850-C3	106.00
.055	.250	.113	.625	.117	3	1/4	2-1/2	16055	88.70	16055-C3	96.80
.060	.312	.164	.437	.122	3	5/16	2-1/2	985060	121.70	985060-C3	132.20
.060	.312	.165	.875	.122	3	5/16	2-1/2	16060	121.70	16060-C3	132.20
.062 (1/16)	.312	.160	.437	.124	3	5/16	2-1/2	985062	121.70	985062-C3	132.20
.062 (1/16)	.312	.161	.875	.124	3	5/16	2-1/2	16062	121.70	16062-C3	132.20
.062 (1/16)	.312	.160	1.250	.124	3	5/16	3	992862	128.60	992862-C3	139.00
.070	.375	.207	.875	.132	3	3/8	2-1/2	16070	139.30	16070-C3	150.70
.078 (5/64)	.375	.191	.500	.171	3	3/8	2-1/2	985078	139.30	985078-C3	150.70
.078 (5/64)	.375	.191	1.000	.171	3	3/8	2-1/2	16078	139.30	16078-C3	150.70
.078 (5/64)	.375	.191	1.500	.171	3	3/8	3	992878	151.20	992878-C3	162.70
.080	.375	.187	1.000	.173	3	3/8	2-1/2	16080	139.30	16080-C3	150.70
.090	.375	.167	1.000	.183	3	3/8	2-1/2	16090	140.80	16090-C3	152.20
.093 (3/32)	.375	.161	.500	.186	3	3/8	2-1/2	985093	139.30	985093-C3	150.70
.093 (3/32)	.375	.161	1.000	.186	3	3/8	2-1/2	16093	139.30	16093-C3	150.70
.093 (3/32)	.375	.161	1.500	.186	3	3/8	3	992893	151.20	992893-C3	162.70
.100	.500	.272	.500	.193	4	1/2	3	985100	200.90	985100-C3	216.40
.100	.500	.272	1.000	.193	4	1/2	3	16100	200.90	16100-C3	218.30
.118 (3 mm)	.500	.236	1.000	.211	4	1/2	3	1613M	200.90	1613M-C3	218.30
.125 (1/8)	.500	.222	.500	.218	4	1/2	3	985108	200.90	985108-C3	218.30
.125 (1/8)	.500	.222	1.000	.218	4	1/2	3	16108	200.90	16108-C3	218.30
.125 (1/8)	.500	.222	1.500	.218	4	1/2	3-1/2	992908	208.50	992908-C3	226.10
.156 (5/32)	.625	.284	1.000	.250	4	5/8	3-1/2	16110	272.20	16110-C3	289.80
.187 (3/16)	.625	.222	1.000	.281	4	5/8	3-1/2	16112	272.20	16112-C3	289.80
.250 (1/4)	1.000	.471	1.500	.376	4	1	4	16116	408.80	16116-C3	440.50

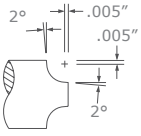


Check Out All of Our Corner Rounding Solutions!

CORNER ROUNDING END MILLS

4 Flute – Flared – High Performance

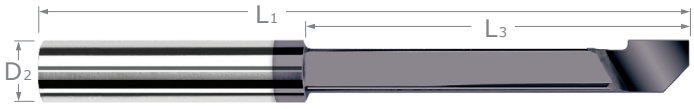


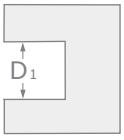


- Helically ground with positive rake for high performance and excellent part finish
- 2° flares for smooth transitions
- Radius center is offset .005″ from end of tool
- AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
$R^{+.0005″}_{-.0005″}$	D_1	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
.020	.058	1/8	1-1/2	728620	41.60	728620-C6	48.50
.031 (1/32)	.058	1/8	1-1/2	728631	41.60	728631-C6	48.50
.031 (1/32)	.107	3/16	2	712931	47.20	712931-C6	54.90
.031 (1/32)	.125	1/4	2-1/2	712731	56.10	712731-C6	65.80
.039 (1 mm)	.058	3/16	2	728639	47.20	728639-C6	54.90
.047 (3/64)	.107	1/4	2	712947	55.50	712947-C6	64.70
.047 (3/64)	.125	1/4	2-1/2	712747	56.10	712747-C6	65.80
.062 (1/16)	.107	1/4	2	712962	55.50	712962-C6	64.70
.062 (1/16)	.125	1/4	2-1/2	712762	56.10	712762-C6	65.80
.078 (5/64)	.125	5/16	2-1/2	712778	100.90	712778-C6	112.60
.078 (5/64)	.249	7/16	2-1/2	712578	101.80	712578-C6	118.00
.093 (3/32)	.249	7/16	2-1/2	712593	106.20	712593-C6	122.40
.100	.249	1/2	3	712600	106.80	712600-C6	125.70
.125 (1/8)	.249	1/2	3	712608	118.70	712608-C6	137.60

BORING BARS





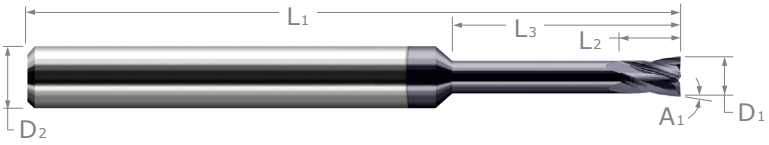
- Helical back rake flute improves accuracy and chip flow
- Square neck improves rigidity and has less deflection
- Tip is ground to sharp corner
- 70% stronger than round neck design
- Solid carbide
- CNC ground in the USA

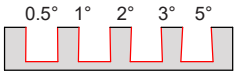
Helical Back Rake Design!

MIN. BORE DIAMETER	MAX BORE DEPTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1	L_3	D_2	L_1	TOOL #	USD$	TOOL #	USD$
.031	**5/32**	1/8	1-1/2	29030	40.80	29030-C3	46.70
.036	**5/32**	1/8	1-1/2	29035	41.60		
.042	**1/4**	1/8	1-1/2	29040	37.40	29040-C3	43.30
.052	**5/16**	1/8	1-1/2	29050	36.10	29050-C3	42.00
.057	**5/16**	1/8	1-1/2	29055	36.10		
.062	**3/8**	1/8	1-1/2	29060	36.10	29060-C3	42.00
.062	**1/2**	1/8	1-1/2	29060L	38.20	29060L-C3	44.10
.072	**7/16**	1/8	1-1/2	29070	36.10	29070-C3	42.00
.082	**1/2**	1/8	1-1/2	29080	36.10		
.087	**1/2**	1/8	1-1/2	29085	36.10		
.087	**5/8**	1/8	2	29085L	42.60	29085L-C3	48.50
.092	**1/2**	1/8	1-1/2	29090	36.10	29090-C3	42.00
.092	**5/8**	1/8	2	29090L	42.60	29090L-C3	48.50
.102	**9/16**	1/8	1-1/2	29100	36.10	29100-C3	42.00
.102	**5/8**	1/8	2	29100L	43.50	29100L-C3	49.40
.112	**9/16**	1/8	1-1/2	29110	36.10	29110-C3	42.00
.112	**5/8**	1/8	2	29110L	42.60	29110L-C3	48.50
.120	**5/8**	1/8	1-1/2	29120	36.10	29120-C3	42.00
.120	**3/4**	1/8	2	29120L	42.60	29120L-C3	48.50
.135	**3/4**	5/32	2	29135	40.50	29135-C3	47.00
.150	**3/4**	3/16	2	29150	41.60	29150-C3	48.10
.150	**1**	3/16	2	29150L	49.70	29150L-C3	56.10
.150	**1-1/2**	3/16	2-1/2	29150XL	53.00	29150XL-C3	59.70
.180	**1**	3/16	2	29180	41.60	29180-C3	48.10
.180	**1-1/2**	3/16	2-1/2	29180L	50.40	29180L-C3	57.10
.180	**2**	3/16	3	29180XL	65.90	29180XL-C3	72.60
.210	**1**	1/4	2	29210	43.40	29210-C3	52.10
.210	**1-1/2**	1/4	2-1/2	29210L	51.10	29210L-C3	59.80
.210	**2**	1/4	3	29210XL	62.90	29210XL-C3	71.70
.240	**1**	1/4	2	29240	43.40	29240-C3	52.10
.240	**1-1/2**	1/4	2-1/2	29240L	51.10	29240L-C3	59.80
.240	**2**	1/4	3	29240XL	75.50	29240XL-C3	84.20
.300	**1**	5/16	2-1/2	29300	105.10	29300-C3	115.40
.360	**2**	3/8	3	29360	137.80	29360-C3	149.30

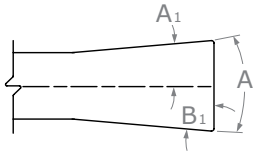
BACKDRAFT CUTTERS

Square





- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA



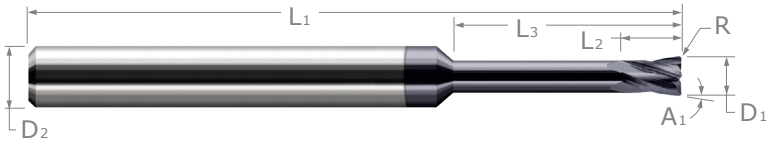
A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

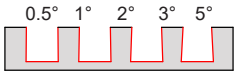
ANGLES PER SIDE	CUTTER DIA.	LOC	NECK DIA.	OVERALL REACH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A_1 +0°15' −0°15'	D_1 +.0005" −.0005"	L_2 +.010" −.000"		L_3 +.010" −.000"	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
0.5°	**.062**	.093	.058	.312 (5x)	1/8	2-1/2	781362	62.30	781362-C3	68.20
	.093	.139	.088	.500 (5x)	1/8	2-1/2	781393	62.30	781393-C3	68.20
1°	**.062**	.093	.056	.312 (5x)	1/8	2-1/2	780762	62.30	780762-C3	68.20
	.093	.139	.086	.500 (5x)	1/8	2-1/2	780793	62.30	780793-C3	68.20
2°	**.062**	.093	.053	.312 (5x)	1/8	2-1/2	780162	62.30	780162-C3	68.20
	.093	.139	.081	.500 (5x)	1/8	2-1/2	780193	61.80	780193-C3	67.70
3°	**.062**	.093	.049	.312 (5x)	1/8	2-1/2	779562	61.80	779562-C3	67.70
	.093	.139	.075	.500 (5x)	1/8	2-1/2	779593	61.80	779593-C3	67.70
5°	**.062**	.093	.042	.312 (5x)	1/8	2-1/2	716162	61.80	716162-C3	67.70
	.093	.139	.065	.500 (5x)	1/8	2-1/2	716193	61.80	716193-C3	67.70

A_1 +0°15' −0°15'	D_1 +.000" −.002"	L_2 +.030" −.000"		L_3 +.030" −.000"	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
0.5°	**.125**	.187	.117	.625 (5x)	1/8	2-1/2	781408	62.30	781408-C3	68.20
	.187	.285	.177	1.000 (5x)	3/16	2-1/2	781412	67.40	781412-C3	74.00
	.250	.375	.238	1.250 (5x)	1/4	2-1/2	781416	74.80	781416-C3	83.70
1°	**.125**	.187	.113	.625 (5x)	1/8	2-1/2	780808	62.30	780808-C3	68.20
	.187	.285	.172	1.000 (5x)	3/16	2-1/2	780812	67.40	780812-C3	74.00
	.250	.375	.231	1.250 (5x)	1/4	2-1/2	780816	74.80	780816-C3	83.70
2°	**.125**	.187	.105	.625 (5x)	1/8	2-1/2	780208	61.80	780208-C3	67.70
	.187	.285	.160	1.000 (5x)	3/16	2-1/2	780212	67.40	780212-C3	74.00
	.250	.375	.217	1.250 (5x)	1/4	2-1/2	780216	74.80	780216-C3	83.70
3°	**.125**	.187	.098	.625 (5x)	1/8	2-1/2	779608	61.80	779608-C3	67.70
	.187	.285	.149	1.000 (5x)	3/16	2-1/2	779612	66.60	779612-C3	73.30
	.250	.375	.203	1.250 (5x)	1/4	2-1/2	779616	74.80	779616-C3	83.70
5°	**.125**	.187	.083	.625 (5x)	1/8	2-1/2	716208	61.80	716208-C3	67.70
	.187	.285	.127	1.000 (5x)	3/16	2-1/2	716212	66.60	716212-C3	73.30
	.250	.375	.175	1.250 (5x)	1/4	2-1/2	716216	74.80	716216-C3	82.90

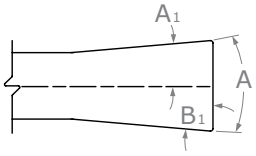
BACKDRAFT CUTTERS

Corner Radius





- Designed to clean up bottom corner of pockets while backdraft angle minimizes rubbing
- Corner radius for improved strength and wear resistance
- 4 helical flutes (20° helix)
- Center cutting
- Solid carbide
- CNC ground in the USA

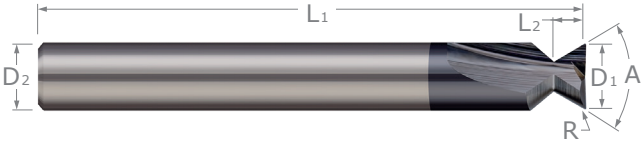


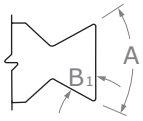
A = 180 - 2B1
B1 = 90 - (A/2)
B1= 90 - A1
A1= 90 - B1
A1= A/2
A= 2A1

ANGLES PER SIDE	CUTTER DIA.	CORNER RADIUS	LOC	NECK DIA.	OVERALL REACH	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A_1 +0°15' −0°15'	D_1 +.0005″ −.0005″	R +001″ −001″	L_2 +.010″ −.000″		L_3 +.010″ −.000″	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
0.5°	**.062**	.005	.093	.058	.312 (5x)	1/8	2-1/2	780962	62.60	780962-C3	68.50
	.093	.005	.139	.088	.500 (5x)	1/8	2-1/2	780993	60.80	780993-C3	66.70
1°	**.062**	.005	.093	.056	.312 (5x)	1/8	2-1/2	780362	63.80	780362-C3	69.80
	.093	.005	.139	.086	.500 (5x)	1/8	2-1/2	780393	63.20	780393-C3	69.10
2°	**.062**	.005	.093	.053	.312 (5x)	1/8	2-1/2	779762	63.80	779762-C3	69.80
	.093	.005	.139	.081	.500 (5x)	1/8	2-1/2	779793	63.80	779793-C3	69.80
3°	**.062**	.005	.093	.049	.312 (5x)	1/8	2-1/2	779162	63.20	779162-C3	69.10
	.093	.005	.139	.075	.500 (5x)	1/8	2-1/2	779193	63.20	779193-C3	69.10
5°	**.062**	.005	.093	.042	.312 (5x)	1/8	2-1/2	715962	63.20	715962-C3	69.10
	.093	.005	.139	.065	.500 (5x)	1/8	2-1/2	715993	63.20	715993-C3	69.10

A_1 +0°15' −0°15'	D_1 +.000″ −.002″	R +001″ −001″	L_2 +.030″ −.000″		L_3 +.030″ −.000″	D_2 (h6)	L_1	4 FL	USD$	4 FL	USD$
0.5°	**.125**	.010	.187	.117	.625 (5x)	1/8	2-1/2	781208	63.80	781208-C3	69.80
	.187	.010	.285	.177	1.000 (5x)	3/16	2-1/2	781212	68.80	781212-C3	75.50
	.250	.010	.375	.238	1.250 (5x)	1/4	2-1/2	781216	77.60	781216-C3	85.70
1°	**.125**	.010	.187	.113	.625 (5x)	1/8	2-1/2	780608	63.80	780608-C3	69.80
	.187	.010	.285	.172	1.000 (5x)	3/16	2-1/2	780612	68.80	780612-C3	75.50
	.250	.010	.375	.231	1.250 (5x)	1/4	2-1/2	780616	77.60	780616-C3	85.70
2°	**.125**	.010	.187	.105	.625 (5x)	1/8	2-1/2	780008	63.80	780008-C3	69.80
	.187	.010	.285	.160	1.000 (5x)	3/16	2-1/2	780012	68.30	780012-C3	74.90
	.250	.010	.375	.217	1.250 (5x)	1/4	2-1/2	780016	77.60	780016-C3	85.70
3°	**.125**	.010	.187	.098	.625 (5x)	1/8	2-1/2	779408	63.20	779408-C3	69.10
	.187	.010	.285	.149	1.000 (5x)	3/16	2-1/2	779412	68.30	779412-C3	74.90
	.250	.010	.375	.203	1.250 (5x)	1/4	2-1/2	779416	76.80	779416-C3	85.80
5°	**.125**	.010	.187	.083	.625 (5x)	1/8	2-1/2	715808	63.20	715808-C3	69.10
	.187	.010	.285	.127	1.000 (5x)	3/16	2-1/2	715812	68.30	715812-C3	74.90
	.250	.010	.375	.175	1.250 (5x)	1/4	2-1/2	715816	76.80	715816-C3	84.90

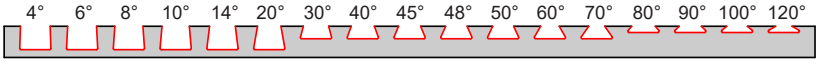
DOVETAIL CUTTERS





B1 = 90 - (A / 2)
A = 180 - 2B1

- Offered with sharp corner, .003", .005", .010", .015", or .030" Corner Radius
- Solid carbide
- CNC ground in the USA



Stocked in Seventeen Included Angles!

INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000"}_{-.002"}$	L_2 $^{+.020"}_{-.000"}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
4°	1/16	.125	.054	.005	2	1/8	1-1/2	930004	118.00	930004-C3	123.90
	3/32	.187	.081	.010	2	1/8	1-1/2	991406	114.30	991406-C3	120.20
	1/8	.250	.108	**SHARP!**	2	1/8	1-1/2	883608	118.00	883608-C3	123.90
	1/8	.250	.108	.010	2	1/8	1-1/2	991408	120.00	991408-C3	125.90
	3/16	.375	.161	**SHARP!**	2	3/16	2	883612	121.40	883612-C3	128.10
	3/16	.375	.162	.010	2	3/16	2	991412	123.40	991412-C3	130.10
	1/4	.500	.215	**SHARP!**	2	1/4	2	883616	152.00	883616-C3	161.00
	1/4	.500	.216	.010	2	1/4	2	991416	154.80	991416-C3	163.60
	3/8	.750	.323	**SHARP!**	3	3/8	2-1/2	883624	175.90	883624-C3	187.40
	3/8	.750	.323	.010	3	3/8	2-1/2	991424	178.80	991424-C3	190.30
	1/2	1.000	.431	.010	3	1/2	3	991432	242.40	991432-C3	260.10
6°	1/16	.125	.049	.005	2	1/8	1-1/2	932304	118.00	932304-C3	123.90
	3/32	.187	.074	.010	2	1/8	1-1/2	989206	114.30	989206-C3	120.20
	1/8	.250	.099	**SHARP!**	2	1/8	1-1/2	891208	115.90	891208-C3	121.90
	1/8	.250	.100	.010	2	1/8	1-1/2	989208	118.00	989208-C3	123.90
	3/16	.375	.148	**SHARP!**	2	3/16	2	891212	119.20	891212-C3	125.40
	3/16	.375	.149	.010	2	3/16	2	989212	121.10	989212-C3	127.90
	1/4	.500	.198	**SHARP!**	2	1/4	2	891216	150.50	891216-C3	159.50
	1/4	.500	.199	.010	2	1/4	2	989216	153.00	989216-C3	161.90
	3/8	.750	.296	**SHARP!**	3	3/8	2-1/2	891224	173.70	891224-C3	185.10
	3/8	.750	.297	.010	3	3/8	2-1/2	989224	176.40	989224-C3	187.80
	1/2	1.000	.396	.010	3	1/2	3	989232	239.10	989232-C3	254.60
8°	1/8	.218	.096	.010	2	1/8	1-1/2	984808	114.30	984808-C3	120.20
	3/16	.281	.150	.010	2	3/16	2	984812	117.80	984812-C3	124.50
	1/4	.375	.199	.010	2	1/4	2	984816	149.50	984816-C3	158.50
10°	1/32	.047	.023	**SHARP!**	2	1/8	1-1/2	990102	108.70	990102-C3	114.60
	1/16	.093	.046	**SHARP!**	2	1/8	1-1/2	990104	108.70	990104-C3	114.60
	1/16	.093	.047	.005	2	1/8	1-1/2	61504	110.80	61504-C3	116.70
	5/64	.109	.060	.005	2	1/8	1-1/2	61505	110.80	61505-C3	116.70
	3/32	.125	.071	**SHARP!**	2	1/8	1-1/2	990106	105.30	990106-C3	111.20
	3/32	.125	.073	.010	2	1/8	1-1/2	27006	107.20	27006-C3	113.10

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
10°	1/8	.187	.092	SHARP!	2	1/8	1-1/2	990108	105.30	990108-C3	111.20
	1/8	.187	.094	.010	2	1/8	1-1/2	27008	107.20	27008-C3	113.10
	3/16	.250	.144	SHARP!	2	3/16	2	990112	108.40	990112-C3	115.10
	3/16	.250	.146	.010	2	3/16	2	27012	110.50	27012-C3	117.20
	1/4	.312	.195	SHARP!	2	1/4	2	990116	137.60	990116-C3	146.50
	1/4	.312	.197	.010	2	1/4	2	27016	140.30	27016-C3	149.30
	5/16	.375	.247	SHARP!	3	5/16	2-1/2	990120	145.60	990120-C3	155.30
	5/16	.375	.249	.010	3	5/16	2-1/2	27020	148.00	27020-C3	158.60
	3/8	.500	.288	SHARP!	3	3/8	2-1/2	990124	156.60	990124-C3	168.10
	3/8	.500	.289	.010	3	3/8	2-1/2	27024	159.40	27024-C3	170.90
	1/2	.625	.391	SHARP!	3	1/2	3	990132	217.30	990132-C3	235.00
	1/2	.625	.392	.010	3	1/2	3	27032	221.00	27032-C3	238.60
14°	1/16	.093	.040	.005	2	1/8	1-1/2	873404	110.80	873404-C3	116.70
	3/32	.125	.065	.010	2	1/8	1-1/2	979406	107.20	979406-C3	113.10
	1/8	.187	.082	.010	2	1/8	1-1/2	979408	107.20	979408-C3	113.10
	3/16	.250	.129	.010	2	3/16	2	979412	110.50	979412-C3	117.20
	1/4	.312	.176	.010	2	1/4	2	979416	140.30	979416-C3	149.30
	5/16	.375	.223	.010	3	5/16	2-1/2	979420	149.50	979420-C3	159.90
	3/8	.500	.255	.010	3	3/8	2-1/2	979424	159.40	979424-C3	170.90
	1/2	.625	.349	.010	3	1/2	3	979432	221.00	979432-C3	236.60
20°	1/32	.031	.020	SHARP!	2	1/8	1-1/2	986002	89.20	986002-C3	95.10
	1/16	.062	.040	SHARP!	2	1/8	1-1/2	986004	89.20	986004-C3	95.10
	1/16	.062	.042	.005	2	1/8	1-1/2	62304	90.80	62304-C3	96.70
	5/64	.078	.052	.005	2	1/8	1-1/2	62305	90.80	62305-C3	96.70
	3/32	.093	.060	SHARP!	2	1/8	1-1/2	986006	85.30	986006-C3	91.20
	3/32	.093	.064	.010	2	1/8	1-1/2	16406	87.30	16406-C3	93.20
	1/8	.125	.081	SHARP!	2	1/8	1-1/2	986008	85.60	986008-C3	91.60
	1/8	.125	.085	.010	2	1/8	1-1/2	16408	87.30	16408-C3	93.20
	3/16	.187	.122	SHARP!	2	3/16	2	986012	89.10	986012-C3	95.40
	3/16	.187	.125	.010	2	3/16	2	16412	90.30	16412-C3	96.90
	1/4	.250	.162	SHARP!	2	1/4	2	986016	112.10	986016-C3	120.90
	1/4	.250	.163	.005	2	1/4	2	62316	114.20	62316-C3	123.00
	1/4	.250	.166	.010	2	1/4	2	16416	114.20	16416-C3	123.00
	5/16	.312	.202	SHARP!	3	5/16	2-1/2	986020	122.50	986020-C3	132.70
	5/16	.312	.206	.010	3	5/16	2-1/2	16420	124.90	16420-C3	135.20
	3/8	.375	.243	SHARP!	3	3/8	2-1/2	986024	129.10	986024-C3	140.50
	3/8	.375	.247	.010	3	3/8	2-1/2	16424	131.20	16424-C3	142.60
	1/2	.500	.324	SHARP!	3	1/2	3	986032	177.60	986032-C3	194.90
	1/2	.500	.328	.010	3	1/2	3	16432	180.90	16432-C3	198.30
	5/8	.625	.409	.010	4	5/8	3	16440	207.30	16440-C3	224.60
	3/4	.750	.489	.010	4	3/4	3	16448	218.90	16448-C3	237.40

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
30°	1/32	.020	.020	SHARP!	2	1/8	1-1/2	983302	90.80	983302-C3	96.70
	1/16	.040	.041	SHARP!	2	1/8	1-1/2	983304	89.20	983304-C3	95.10
	1/16	.045	.041	.005	2	1/8	1-1/2	63404	90.80	63404-C3	96.70
	5/64	.055	.052	.005	2	1/8	1-1/2	63405	90.80	63405-C3	96.70
	3/32	.062	.060	SHARP!	2	1/8	1-1/2	983306	85.30	983306-C3	91.20
	3/32	.078	.057	.010	2	1/8	1-1/2	16506	87.30	16506-C3	93.20
	1/8	.082	.081	SHARP!	2	1/8	1-1/2	983308	85.60	983308-C3	91.60
	1/8	.093	.081	.010	2	1/8	1-1/2	16508	87.30	16508-C3	93.20
	3/16	.125	.121	SHARP!	2	3/16	2	983312	87.00	983312-C3	93.40
	3/16	.125	.127	.010	2	3/16	2	16512	88.60	16512-C3	95.10
	1/4	.156	.166	SHARP!	2	1/4	2	983316	110.10	983316-C3	119.00
	1/4	.156	.172	.010	2	1/4	2	16516	112.10	16516-C3	120.90
	5/16	.218	.196	SHARP!	3	5/16	2-1/2	983320	122.60	983320-C3	132.80
	5/16	.187	.218	.010	3	5/16	2-1/2	16520	122.60	16520-C3	132.80
	3/8	.250	.241	SHARP!	3	3/8	2-1/2	983324	126.70	983324-C3	138.20
	3/8	.250	.243	.005	3	3/8	2-1/2	63424	129.10	63424-C3	140.50
	3/8	.250	.247	.010	3	3/8	2-1/2	16524	129.10	16524-C3	140.50
	1/2	.312	.333	SHARP!	3	1/2	3	983332	174.50	983332-C3	191.80
	1/2	.312	.339	.010	3	1/2	3	16532	177.60	16532-C3	194.90
	5/8	.375	.430	.010	4	5/8	3	16540	204.10	16540-C3	221.20
	3/4	.500	.488	.010	4	3/4	3	16548	215.80	16548-C3	234.40
40°	1/16	.035	.037	SHARP!	2	1/8	1-1/2	977804	89.20	977804-C3	95.10
	1/16	.040	.037	.005	2	1/8	1-1/2	64604	90.80	64604-C3	96.70
	5/64	.050	.046	.005	2	1/8	1-1/2	64605	90.80	64605-C3	96.70
	3/32	.062	.056	.010	2	1/8	1-1/2	28506	87.30	28506-C3	93.20
	1/8	.078	.068	SHARP!	2	1/8	1-1/2	977808	85.60	977808-C3	91.60
	1/8	.093	.066	.010	2	1/8	1-1/2	28508	87.30	28508-C3	93.20
	3/16	.109	.108	SHARP!	2	3/16	2	977812	89.10	977812-C3	95.40
	3/16	.125	.101	.005	2	3/16	2	64612	90.30	64612-C3	96.90
	3/16	.125	.105	.010	2	3/16	2	28512	90.30	28512-C3	96.90
	1/4	.156	.136	SHARP!	2	1/4	2	977816	112.10	977816-C3	120.90
	1/4	.156	.145	.010	2	1/4	2	28516	114.20	28516-C3	123.00
	5/16	.187	.176	SHARP!	3	5/16	2-1/2	977820	122.50	977820-C3	132.70
	5/16	.187	.185	.010	3	5/16	2-1/2	28520	124.90	28520-C3	135.20
	3/8	.218	.216	SHARP!	3	3/8	2-1/2	977824	129.10	977824-C3	140.50
	3/8	.250	.202	.010	3	3/8	2-1/2	28524	131.20	28524-C3	142.60
	1/2	.312	.273	SHARP!	3	1/2	3	977832	177.60	977832-C3	194.90
	1/2	.312	.281	.010	3	1/2	3	28532	180.90	28532-C3	198.30
	5/8	.375	.361	.010	4	5/8	3	28540	207.30	28540-C3	225.30
	3/4	.500	.395	.010	4	3/4	3	28548	218.90	28548-C3	237.40
45°	1/8	.093	.058	.010	2	1/8	1-1/2	928408	97.70	928408-C3	103.60
	3/16	.125	.094	.010	2	3/16	2	928412	101.00	928412-C3	107.60
	1/4	.156	.121	SHARP!	2	1/4	2	874516	124.20	874516-C3	133.10
	1/4	.156	.131	.010	2	1/4	2	928416	126.10	928416-C3	135.10
	3/8	.250	.168	SHARP!	3	3/8	2-1/2	874524	143.70	874524-C3	155.10
	3/8	.250	.178	.010	3	3/8	2-1/2	928424	145.60	928424-C3	157.00
	1/2	.312	.242	SHARP!	3	1/2	3	874532	197.10	874532-C3	214.60
	1/2	.312	.251	.010	3	1/2	3	928432	200.20	928432-C3	217.80

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
48°	1/16	.035	.036	.005	2	1/8	1-1/2	896504	88.60	896504-C3	94.60
	5/64	.045	.043	.005	2	1/8	1-1/2	896505	88.60	896505-C3	94.60
	3/32	.050	.059	.010	2	1/8	1-1/2	16606	84.30	16606-C3	90.20
	1/8	.070	.063	**SHARP!**	2	1/8	1-1/2	973108	82.50	973108-C3	88.40
	1/8	.093	.053	.010	2	1/8	1-1/2	16608	84.30	16608-C3	90.20
	3/16	.109	.090	**SHARP!**	2	3/16	2	973112	86.80	973112-C3	93.20
	3/16	.125	.087	.010	2	3/16	2	16612	88.30	16612-C3	94.90
	1/4	.156	.111	**SHARP!**	2	1/4	2	973116	109.20	973116-C3	116.70
	1/4	.156	.122	.010	2	1/4	2	16616	111.30	16616-C3	119.90
	5/16	.187	.157	.010	3	5/16	2-1/2	16620	122.10	16620-C3	132.30
	3/8	.250	.152	**SHARP!**	3	3/8	2-1/2	973124	128.50	973124-C3	139.90
	3/8	.250	.163	.010	3	3/8	2-1/2	16624	128.20	16624-C3	139.60
	1/2	.312	.222	**SHARP!**	3	1/2	3	973132	177.20	973132-C3	192.80
	1/2	.312	.233	.010	3	1/2	3	16632	176.80	16632-C3	192.30
50°	1/8	.093	.050	.010	2	1/8	1-1/2	926208	88.70	926208-C3	94.70
	3/16	.125	.082	.010	2	3/16	2	926212	93.20	926212-C3	99.90
	1/4	.156	.116	.010	2	1/4	2	926216	120.80	926216-C3	129.80
	3/8	.250	.153	.010	3	3/8	2-1/2	926224	138.40	926224-C3	149.80
	1/2	.312	.220	.010	3	1/2	3	926232	192.20	926232-C3	209.80
60°	1/32	.014	.015	**SHARP!**	2	1/8	1-1/2	995202	85.00	995202-C3	90.90
	1/16	.028	.030	**SHARP!**	2	1/8	1-1/2	995204	87.00	995204-C3	92.90
	1/16	.032	.028	.003	2	1/8	1-1/2	811404	90.30	811404-C3	96.20
	1/16	.032	.032	.005	2	1/8	1-1/2	65104	88.60	65104-C3	94.60
	5/64	.035	.038	**SHARP!**	2	1/8	1-1/2	995205	87.00	995205-C3	92.90
	5/64	.040	.039	.005	2	1/8	1-1/2	65105	88.60	65105-C3	94.60
	3/32	.040	.047	**SHARP!**	2	1/8	1-1/2	995206	82.50	995206-C3	88.40
	3/32	.045	.056	.010	2	1/8	1-1/2	16706	84.30	16706-C3	90.20
	.118 (3 mm)	.053	.057	**SHARP!**	2	1/8	1-1/2	995296	87.90	995296-C3	93.80
	.118 (3 mm)	.059	.065	.010	2	1/8	1-1/2	16796	89.90	16796-C3	95.80
	1/8	.056	.060	**SHARP!**	2	1/8	1-1/2	995208	82.50	995208-C3	88.40
	1/8	.062	.056	.003	2	1/8	1-1/2	811408	84.30	811408-C3	90.20
	1/8	.062	.061	**.005**	2	1/8	1-1/2	65108	84.30	65108-C3	90.20
	1/8	.062	.068	.010	2	1/8	1-1/2	16708	84.30	16708-C3	90.20
	9/64	.063	.063	**SHARP!**	2	3/16	2	995209	92.10	995209-C3	98.30
	9/64	.070	.074	.010	2	3/16	2	16709	93.90	16709-C3	100.20
	5/32	.070	.075	**SHARP!**	2	3/16	2	995210	86.80	995210-C3	93.00
	5/32	.078	.073	.005	2	3/16	2	65110	90.10	65110-C3	96.60
	5/32	.078	.081	.010	2	3/16	2	16710	88.30	16710-C3	94.90
	3/16	.085	.089	**SHARP!**	2	3/16	2	995212	86.80	995212-C3	93.20
	3/16	.093	.083	.003	2	3/16	2	811412	88.30	811412-C3	94.90
	3/16	.093	.087	.005	2	3/16	2	65112	88.30	65112-C3	94.90
	3/16	.093	.095	.010	2	3/16	2	16712	88.30	16712-C3	94.90
	3/16	.109	.104	.030	2	3/16	2	845112	88.30	845112-C3	94.90

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

(cont.)

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INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
60°	1/4	.118	.114	SHARP!	2	1/4	2	995216	107.20	995216-C3	116.00
	1/4	.125	.109	.003	2	1/4	2	811416	109.20	811416-C3	117.90
	1/4	.125	.113	.005	2	1/4	2	65116	109.20	65116-C3	117.90
	1/4	.125	.120	.010	2	1/4	2	16716	109.20	16716-C3	117.90
	1/4	.125	.126	.015	2	1/4	2	738016	109.20	738016-C3	117.90
	1/4	.140	.131	.030	2	1/4	2	845116	109.20	845116-C3	117.90
	5/16	.141	.150	SHARP!	3	5/16	2-1/2	995220	117.50	995220-C3	127.70
	5/16	.156	.138	.005	3	5/16	2-1/2	65120	119.60	65120-C3	129.20
	5/16	.156	.147	.010	3	5/16	2-1/2	16720	119.60	16720-C3	129.80
	3/8	.156	.195	SHARP!	3	3/8	2-1/2	995224	122.60	995224-C3	134.00
	3/8	.187	.166	.005	3	3/8	2-1/2	65124	125.20	65124-C3	136.60
	3/8	.187	.174	.010	3	3/8	2-1/2	16724	125.20	16724-C3	136.60
	3/8	.187	.181	.015	3	3/8	2-1/2	738024	125.20	738024-C3	136.60
	3/8	.187	.203	.030	3	3/8	2-1/2	845124	125.00	845124-C3	136.40
	7/16	.187	.222	SHARP!	3	7/16	2-3/4	995228	132.70	995228-C3	145.90
	7/16	.218	.200	.010	3	7/16	2-3/4	16728	135.80	16728-C3	150.30
	1/2	.218	.248	SHARP!	3	1/2	3	995232	170.50	995232-C3	187.80
	1/2	.250	.219	.005	3	1/2	3	65132	173.90	65132-C3	188.10
	1/2	.250	.226	.010	3	1/2	3	16732	173.90	16732-C3	191.10
	1/2	.250	.233	.015	3	1/2	3	738032	173.90	738032-C3	191.10
	1/2	.250	.255	.030	3	1/2	3	845132	171.30	845132-C3	185.50
	5/8	.281	.301	SHARP!	4	5/8	3	995240	255.00	995240-C3	273.10
	5/8	.312	.279	.010	4	5/8	3	16740	258.30	16740-C3	276.30
	3/4	.343	.354	SHARP!	4	3/4	3	995248	306.40	995248-C3	327.80
	3/4	.375	.332	.010	4	3/4	3	16748	309.60	16748-C3	328.30
	1	.500	.437	.010	4	1	4	16764	559.70	16764-C3	592.90
70°	1/4	.109	.116	.010	2	1/4	2	832316	120.80	832316-C3	129.80
	1/2	.218	.213	.010	3	1/2	3	832332	192.20	832332-C3	209.80
80°	1/4	.093	.117	.010	2	1/4	2	827916	120.80	827916-C3	129.80
	1/2	.187	.209	.010	3	1/2	3	827932	192.20	827932-C3	209.80
90°	1/32	.008	.015	SHARP!	2	1/8	1-1/2	992002	88.60	992002-C3	94.60
	1/16	.023	.030	.005	2	1/8	1-1/2	66304	88.60	66304-C3	94.60
	5/64	.027	.038	.005	2	1/8	1-1/2	66305	88.60	66305-C3	94.60
	3/32	.025	.043	SHARP!	2	1/8	1-1/2	992006	82.50	992006-C3	88.40
	3/32	.031	.059	.010	2	1/8	1-1/2	16806	84.30	16806-C3	90.20
	1/8	.034	.057	SHARP!	2	1/8	1-1/2	992008	81.20	992008-C3	87.10
	1/8	.040	.059	.005	2	1/8	1-1/2	66308	83.00	66308-C3	89.00
	1/8	.040	.073	.010	2	1/8	1-1/2	16808	83.00	16808-C3	89.00
	5/32	.047	.090	.010	2	3/16	2	16810	88.30	16810-C3	94.90
	3/16	.052	.084	SHARP!	2	3/16	2	992012	86.80	992012-C3	93.20
	3/16	.047	.122	.010	2	3/16	2	16812	88.30	16812-C3	94.90
	1/4	.068	.114	SHARP!	2	1/4	2	992016	107.20	992016-C3	116.00
	1/4	.062	.140	.005	2	1/4	2	66316	109.20	66316-C3	117.90
	1/4	.063	.154	.010	2	1/4	2	16816	109.20	16816-C3	117.90
	5/16	.085	.143	SHARP!	3	5/16	2-1/2	992020	117.50	992020-C3	127.70
	5/16	.093	.155	.010	3	5/16	2-1/2	16820	119.60	16820-C3	129.80

*Diameter measured over radii (not to theoretical sharp corner).

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DOVETAIL CUTTERS

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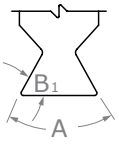
INCLUDED ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	CORNER RADIUS	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
90°	3/8	.105	.165	**SHARP!**	3	3/8	2-1/2	992024	122.60	992024-C3	134.00
	3/8	.109	.171	.005	3	3/8	2-1/2	66324	125.20	66324-C3	136.60
	3/8	.125	.153	.010	3	3/8	2-1/2	16824	125.20	16824-C3	136.60
	3/8	.125	.164	.015	3	3/8	2-1/2	737924	125.20	737924-C3	136.60
	7/16	.141	.185	.010	3	7/16	2-3/4	16828	135.80	16828-C3	150.30
	1/2	.141	.218	**SHARP!**	3	1/2	3	992032	170.50	992032-C3	187.80
	1/2	.156	.202	.005	3	1/2	3	66332	173.90	66332-C3	188.10
	1/2	.156	.216	.010	3	1/2	3	16832	173.90	16832-C3	191.10
	1/2	.156	.227	.015	3	1/2	3	737932	173.90	737932-C3	191.10
	1/2	.172	.241	.030	3	1/2	3	833932	173.90	833932-C3	188.10
	5/8	.187	.279	.010	4	5/8	3	16840	258.30	16840-C3	276.30
	3/4	.218	.342	.010	4	3/4	3	16848	309.60	16848-C3	328.30
100°	1/8	.040	.065	.010	2	1/8	1-1/2	964408	92.20	964408-C3	98.10
	3/16	.047	.110	.010	2	3/16	2	964412	96.80	964412-C3	103.10
	1/4	.062	.137	.010	2	1/4	2	964416	120.80	964416-C3	128.30
	3/8	.093	.188	.010	3	3/8	2-1/2	964424	138.20	964424-C3	149.60
	1/2	.125	.237	.010	3	1/2	3	964432	193.80	964432-C3	211.50
120°	1/8	.031	.042	**SHARP!**	2	1/8	1-1/2	721708	89.10	721708-C3	95.00
	1/8	.039	.045	.010	2	1/8	1-1/2	959908	91.20	959908-C3	97.20
	3/16	.047	.079	.010	2	3/16	2	959912	95.90	959912-C3	102.50
	1/4	.062	.090	.010	2	1/4	2	959916	120.80	959916-C3	129.80
	3/8	.082	.104	**SHARP!**	3	3/8	2-1/2	721724	136.00	721724-C3	147.40
	3/8	.093	.107	.010	3	3/8	2-1/2	959924	138.20	959924-C3	149.60
	1/2	.100	.174	**SHARP!**	3	1/2	3	721732	189.90	721732-C3	205.40
	1/2	.109	.177	.010	3	1/2	3	959932	192.00	959932-C3	209.60

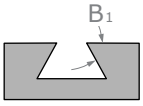
*Diameter measured over radii (not to theoretical sharp corner).

DOVETAIL CUTTERS

Sight Groove Dovetail Cutters

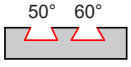






Off the Shoulder Angle
$B_1 = 90 - (A / 2)$
$A = 180 - 2B_1$

- Designed for milling dovetail grooves for Sight Attachments
- Diameters match common brand standards
- Offered with sharp corner
- Solid carbide
- CNC ground in the USA

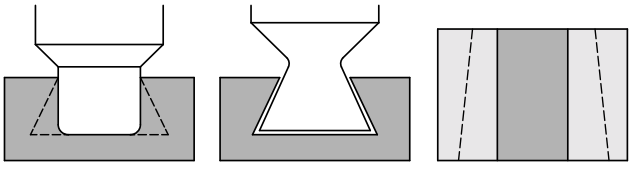


Stocked in Two Included Angles!

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$			D_2	L_1	TOOL #	USD$	TOOL #	USD$
50°	.330	.093	.242	3	3/8	2-1/2	806833	137.00	806833-C3	148.40
	.344	.125	.226	3	3/8	2-1/2	806834	135.80	806834-C3	147.20
	.495	.250	.261	3	1/2	3	806849	191.30	806849-C3	206.90
60°	.300	.093	.191	3	5/16	2-1/2	806730	120.80	806730-C3	131.30
	.359	.125	.213	3	3/8	2-1/2	806735	126.20	806735-C3	137.60

RECOMMENDED SIGHT GROOVE DOVETAIL MILLING TECHNIQUES

- Use an endmill that is smaller than the top of the groove width to slot.
- With required dovetail, mill groove down the centerline of slot to shape the rest of the dovetail groove
- Since most sights are press fitted, filing or additional adjustments may be required to ensure proper sight fit.
  - Angle the dovetail cutter slightly to create a slightly larger width on one side of the groove.
  - Dovetail should finish on same location on other side of the groove to create a trapezoidal shaped slot.
  - The sight itself can be adjusted by using an appropriate file to shape male dovetail until desired fitting.

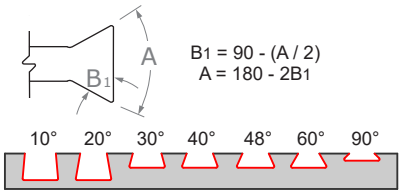


Mill Slot | Mill on Center | Angle Dovetail to Widen One Side

DOVETAIL CUTTERS

Long Reach





Stocked in Seven Included Angles!

- Reduced neck for long reach machining
- Corner radius for improved strength
- Solid carbide • CNC ground in the USA

INCL. ANGLE	CUTTER DIA.*	LENGTH OF CUT	NECK DIA.	NECK LENGTH	CORNER RADIUS	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
A $^{+1°}_{-1°}$	D_1 $^{+.000″}_{-.002″}$	L_2 $^{+.020″}_{-.000″}$		L_3 $^{+.030″}_{-.000″}$	R		D_2	L_1	TOOL #	USD$	TOOL #	USD$
10°	1/8	.187	.094	.125	.010	2	1/8	1-1/2	899108	122.40	899108-C3	128.30
	1/4	.312	.197	.250	.010	2	1/4	2	899116	155.70	899116-C3	164.80
	1/2	.625	.392	.250	.010	3	1/2	3	899132	236.40	899132-C3	251.90
20°	1/8	.125	.085	.125	.010	2	1/8	1-1/2	877408	107.10	877408-C3	113.00
	1/4	.250	.166	.250	.010	2	1/4	2	877416	135.80	877416-C3	144.60
	1/2	.500	.328	.250	.010	3	1/2	3	877432	208.20	877432-C3	223.80
30°	1/16	.045	.041	.062	.005	2	1/8	1-1/2	849904	110.80	849904-C3	116.70
	3/32	.078	.057	.093	.010	2	1/8	1-1/2	914806	107.10	914806-C3	113.00
	1/8	.093	.081	.125	.010	2	1/8	1-1/2	914808	107.10	914808-C3	113.00
	3/16	.125	.127	.187	.010	2	3/16	2	914812	111.00	914812-C3	117.70
	1/4	.156	.172	.250	.010	2	1/4	2	914816	133.50	914816-C3	142.40
	3/8	.250	.247	.250	.010	3	3/8	2-1/2	914824	199.60	914824-C3	211.00
	1/2	.312	.339	.250	.010	3	1/2	3	914832	202.90	914832-C3	218.50
40°	1/8	.093	.066	.125	.010	2	1/8	1-1/2	864008	110.80	864008-C3	116.70
	1/4	.156	.145	.250	.010	2	1/4	2	864016	133.50	864016-C3	142.40
	1/2	.312	.281	.250	.010	3	1/2	3	864032	202.90	864032-C3	220.40
48°	1/8	.093	.053	.125	.010	2	1/8	1-1/2	760108	111.90	760108-C3	117.80
60°	1/16	.032	.032	.062	.005	2	1/8	1-1/2	865504	107.50	865504-C3	113.50
	3/32	.045	.056	.093	.010	2	1/8	1-1/2	925306	103.70	925306-C3	109.60
	1/8	.056	.060	.125	**SHARP!**	2	1/8	1-1/2	865908	102.00	865908-C3	108.00
	1/8	.062	.068	.125	.010	2	1/8	1-1/2	925308	103.70	925308-C3	109.60
	3/16	.093	.095	.187	.010	2	3/16	2	925312	108.30	925312-C3	115.00
	1/4	.118	.114	.250	**SHARP!**	2	1/4	2	865916	128.60	865916-C3	137.50
	1/4	.125	.120	.250	.010	2	1/4	2	925316	130.50	925316-C3	139.50
	3/8	.156	.194	.250	**SHARP!**	3	3/8	2-1/2	721624	143.70	721624-C3	155.10
	3/8	.187	.174	.250	.010	3	3/8	2-1/2	925324	145.60	925324-C3	157.00
	1/2	.218	.248	.250	**SHARP!**	3	1/2	3	865932	194.90	865932-C3	212.40
	1/2	.250	.226	.250	.010	3	1/2	3	925332	197.90	925332-C3	215.60
90°	1/16	.023	.030	.062	.005	2	1/8	1-1/2	885704	107.50	885704-C3	113.50
	3/32	.031	.059	.093	.010	2	1/8	1-1/2	931006	103.70	931006-C3	109.60
	1/8	.034	.057	.125	**SHARP!**	2	1/8	1-1/2	884608	102.00	884608-C3	108.00
	1/8	.040	.073	.125	.010	2	1/8	1-1/2	931008	102.20	931008-C3	108.20
	3/16	.052	.084	.187	**SHARP!**	2	3/16	2	884612	106.30	884612-C3	113.00
	3/16	.047	.122	.187	.010	2	3/16	2	931012	108.30	931012-C3	115.00
	1/4	.068	.114	.250	**SHARP!**	2	1/4	2	884616	128.60	884616-C3	137.50
	1/4	.062	.154	.250	.010	2	1/4	2	931016	130.50	931016-C3	139.50
	1/4	.068	.111	.375	**SHARP!**	2	1/4	2	721416	131.50	721416-C3	139.00
	3/8	.105	.165	.250	**SHARP!**	3	3/8	2-1/2	884624	143.70	884624-C3	155.10
	3/8	.109	.171	.250	.005	3	3/8	2-1/2	885724	145.60	885724-C3	157.00
	3/8	.125	.153	.250	.010	3	3/8	2-1/2	931024	145.60	931024-C3	157.00
	1/2	.141	.218	.250	**SHARP!**	3	1/2	3	884632	194.90	884632-C3	212.40
	1/2	.156	.202	.250	.005	3	1/2	3	885732	197.90	885732-C3	213.50
	1/2	.156	.216	.250	.010	3	1/2	3	931032	197.90	931032-C3	215.60
	1/2	.156	.216	.375	.010	3	1/2	3	721532	199.00	721532-C3	214.60

*Diameter measured over radii (not to theoretical sharp corner).

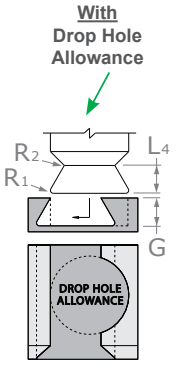
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

With Drop Hole Allowance

Designed to Parker Hannifin O-Ring Standards





- **Designed for milling full dovetail grooves with drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (ORD 5700/USA, ORD 5700)
- Undersized cutter design allows climb milling on both faces of groove for improved finish
- Mills both top and bottom radii
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

O-RING X-SECTION	CUTTER DIA.*	GLAND DEPTH	CORNER RADIUS	NECK DIA.*	NECK RADIUS	RADIUS CENTER	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.000''}_{-.002''}$	G	R_1 $^{+.001''}_{-.001''}$		R_2 $^{+.001''}_{-.001''}$	L_4 $^{+.001''}_{-.001''}$	D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.070	.079	.051	.015	.054	.005	.047	1/8	1-1/2	23807†	86.60	23807-C3†	92.50	23807-C8†	95.20
.070	.084	.054	.015	.056	.005	.050	1/8	1-1/2	56307Δ	86.60	56307-C3Δ	92.50	56307-C8Δ	95.20
.103	.135	.082	.015	.088	.010	.073	3/16	2	23814	90.00	23814-C3	96.50	23814-C8	98.60
.139	.172	.112	.031	.116	.010	.103	3/16	2	23821	90.00	23821-C3	96.50	23821-C8	98.60
.210	.284	.172	.031	.179	.015	.158	5/16	2-1/2	23828	119.10	23828-C3	129.40	23828-C8	138.90
.275	.362	.232	.062	.237	.015	.219	3/8	2-1/2	23835	137.80	23835-C3	149.30	23835-C8	162.10
.375	.488	.317	.093	.327	.020	.299	1/2	3	23842	176.80	23842-C3	194.10	23842-C8	195.10

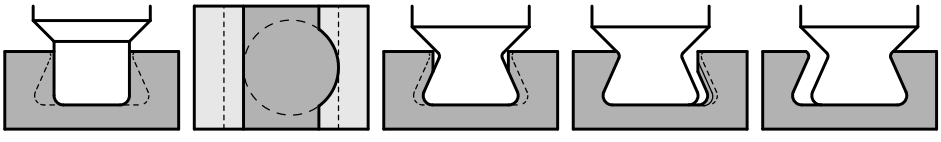
*Diameter measured over radii (not to theoretical sharp corner). †Meets ORD 5700/USA spec. ΔMeets ORD 5700 spec. All other tools meet BOTH specifications.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

With Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Mill off-center drop hole.
- Insert O-Ring Cutter through drop hole at full axial depth and mill single pass down center of groove. Please note that cutter is contacting both sides of part and it may be necessary to reduce the feed rate (up to 40%).
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.

For Radial Calculations, scan the QR code or visit harveytool.com/resources



O-Ring Slotting End Mills



See page 461

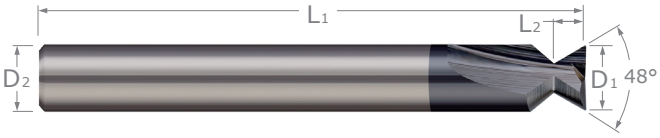
- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

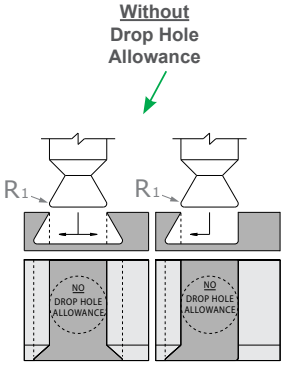
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Cutters

Without Drop Hole Allowance

Designed to Parker Hannifin O-Ring Standards





- **Designed for milling half dovetails or full dovetails with no drop hole allowance**
- Designed to the standards suggested by the O-Ring Division of Parker Hannifin Corporation (tools meet both specs: ORD 5700/USA, ORD 5700)
- Mills bottom radius only
- 24° per side, 48° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

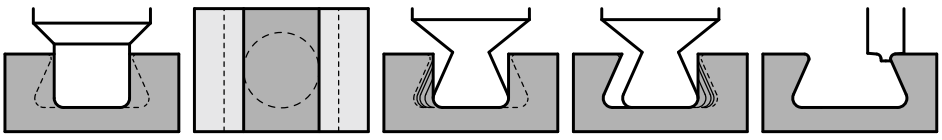
O-RING X-SECTION	CUTTER DIA.*	LOC	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 +.000″ −.002″	L_2 +.020″ −.000″	R_1 +.001″ −.001″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.070	.055	.054	.015	.023	1/8	1-1/2	23907	84.50	23907-C3	90.40	23907-C8	93.20
.103	.083	.085	.015	.024	1/8	1-1/2	23914	84.50	23914-C3	90.40	23914-C8	93.20
.139	.113	.115	.031	.044	1/8	1-1/2	23921	84.50	23921-C3	90.40	23921-C8	93.20
.210	.171	.176	.031	.048	3/16	2	23928	87.90	23928-C3	94.50	23928-C8	96.50
.275	.231	.238	.062	.086	1/4	2	23935	115.40	23935-C3	124.10	23935-C8	124.90
.375	.315	.323	.093	.128	3/8	2-1/2	23942	134.70	23942-C3	146.20	23942-C8	150.50

*Diameter measured over radii (not to theoretical sharp corner). **Diameter at length of cut.

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- **Tools are very fragile. Reduced neck profile and small o-ring groove size result in weakened tool for this difficult application. Always reconsider the potential to use the WITH drop hole allowance.**
- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Cutter into slot at full axial depth.
- Mill multiple passes with descending radial stepover on one side of part.
- Mill multiple passes with descending radial stepover on other side of part.
- These tools are able to mill both Full and Half O-Ring grooves. As such, a corner radius at the top of the part must be machined for final groove form (see series 170xx).



O-Ring Corner Rounding End Mills



See page 461

- Ideal for creating radius on top part of o-ring dovetail groove!
- Design ensures smooth, blended form on part!

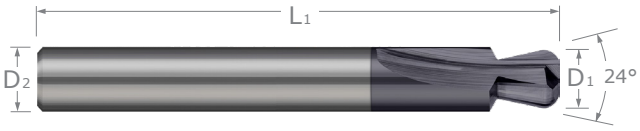
For Radial Calculations, scan the QR code or visit harveytool.com/resources

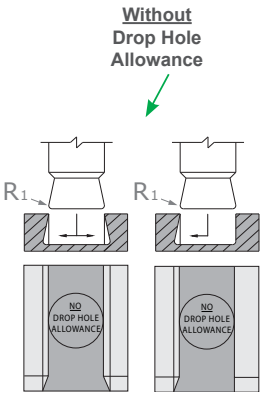
DOVETAIL CUTTERS

Parker Hannifin O-Ring Dovetail Roughers

Without Drop Hole Allowan

Designed to Parker Hannifin O-Ring Standards





- **Designed for <u>partial</u> milling of half dovetails or full dovetails <u>with no</u> drop hole allowance**
- Designed to reduce stress and minimize breakage when milling O-Ring grooves without drop hole allowance
- Over 90% increase in neck diameter thickness compared to standard O-Ring Dovetails
- 12° per side, 24° included
- 2 straight flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

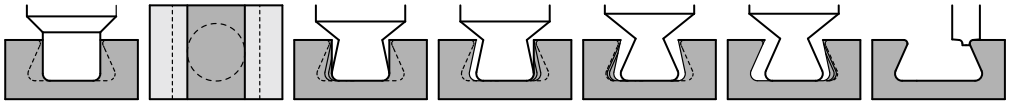
O-RING X-SECTION	CUTTER DIA.*	LENGTH OF CUT	CORNER RADIUS	NECK DIA.**	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.020''}_{-.001''}$	R_1 $^{+.001''}_{-.001''}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
.070	.055	.054	.015	.039	1/8	1-1/2	715207	87.00	715207-C3	92.90	715207-C8	94.70
.103	.083	.085	.015	.054	1/8	1-1/2	715214	87.00	715214-C3	92.90	715214-C8	94.70
.139	.113	.115	.031	.079	1/8	1-1/2	715221	87.00	715221-C3	92.90	715221-C8	94.70
.210	.171	.176	.031	.111	3/16	2	715228	90.50	715228-C3	96.70	715228-C8	99.10
.275	.231	.238	.062	.159	1/4	2	715235	118.90	715235-C3	126.30	715235-C8	129.30
.375	.315	.323	.093	.221	3/8	2-1/2	715242	138.80	715242-C3	150.20	715242-C8	154.60

*Diameter measured over radii (not to theoretical sharp corner). ** Diameter at Length of Cut

RECOMMENDED O-RING DOVETAIL MILLING TECHNIQUES

Without Drop Hole Allowance

- Rough out slot with appropriate O-Ring Slotting End Mill (see series 565xx) or with other comparable end mill.
- Insert O-Ring Rougher into slot at full axial depth.
- Mill multiple passes with descending radial stepover on both sides of part.
- Insert O-Ring Cutter (see series 239xx) into roughed out slot at full axial depth.
- Proceed with standard O-Ring milling technique.



O-Ring Slotting End Mills



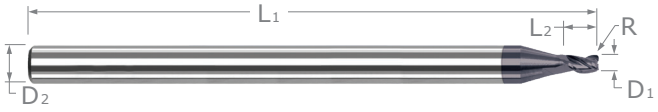
See page 458

- Ideal for slotting o-ring dovetail grooves!
- Achieve the right slot width and shape without radial stepovers!

For Radial Calculations, scan the QR code or visit harveytool.com/resources

DOVETAIL CUTTERS

O-Ring Slotting End Mills



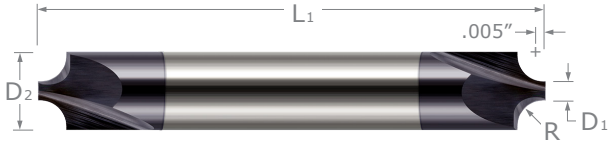
Ideal for Slotting O-Ring Dovetail Grooves!

- Optimized for O-Ring grooves
- Diameters designed to gland width opening
- Stub flute length for improved strength
- Corner radius to match Parker Hannifin standards
- High helix and optimized geometry for improved performance
- 3 Flutes • Center cutting
- Solid carbide • CNC ground in the USA

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
D_1 $^{+.000''}_{-.001''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_2	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.055	.015	.065	1/8	1-1/2	56510	31.10	56510-C3	37.10	56510-C8	40.20
.085	.015	.100	1/8	1-1/2	56520	31.10	56520-C3	37.10	56520-C8	40.20
.115	.031	.140	1/8	1-1/2	56530	31.10	56530-C3	37.10	56530-C8	40.20
D_1 $^{+.000''}_{-.002''}$	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	3 FL	USD$	3 FL	USD$	3 FL	USD$
.176	.031	.210	3/16	2	56540	34.70	56540-C3	41.40	56540-C8	43.30
.236	.062	.280	1/4	2-1/2	56550	46.10	56550-C3	54.90	56550-C8	57.20
.323	.093	.380	3/8	2-1/2	56560	65.70	56560-C3	77.10	56560-C8	81.50

DOVETAIL CUTTERS

O-Ring Corner Rounding End Mills



For Creating Radius on Top Part of O-Ring Dovetail Groove

- Radius matches Parker Hannifin standards
- Double-ended
- Flares are tangent to radius
- Design ensures smooth, blended form on part
- Depth of cut = radius plus .005"
- 2 flutes
- Solid carbide
- CNC ground in the USA

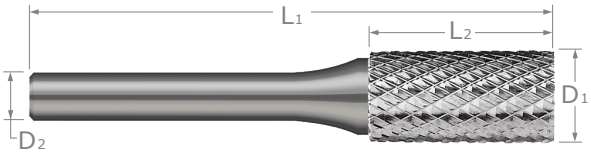


5° Flares At Shoulder and Pilot to Avoid Steps in Workpiece

O-RING X-SECTION	RADIUS	PILOT DIAMETER	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	R $^{+.0005''}_{-.0005''}$	D_1	D_2	L_1	2 FL	USD$	2 FL	USD$
.070	.005	.046	1/8	1-1/2	17005	50.90	17005-C3	58.40
.103	.010	.046	1/8	1-1/2	17010	50.90	17010-C3	58.40
.139	.010	.046	1/8	1-1/2	17010	50.90	17010-C3	58.40
.210	.015	.046	1/8	1-1/2	17015	50.90	17015-C3	58.40
.275	.015	.046	1/8	1-1/2	17015	50.90	17015-C3	58.40
.375	.020	.046	1/8	1-1/2	17020	50.90	17020-C3	58.40

BURS

Cylindrical – SA Double Cut

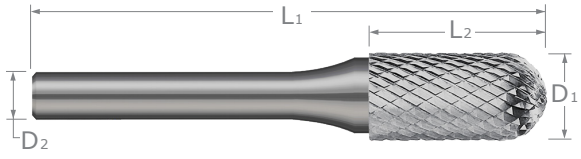


- General purpose cylindrical shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	USD$
SA-41	.062 (1/16)	1/4	1/8	1-1/2	710704	7.70
SA-11	.125 (1/8)	1/2	1/4	2	710708	15.10
SA-43	.125 (1/8)	9/16	1/8	1-1/2	710608	7.70
SA-14	.187 (3/16)	5/8	1/4	2	710712	18.10
SA-51	.250 (1/4)	1/2	1/8	2	710816	11.20
SA-1	.250 (1/4)	5/8	1/4	2	710716	12.80
SA-2	.312 (5/16)	3/4	1/4	2-1/2	710720	23.60
SA-3	.375 (3/8)	3/4	1/4	2-1/2	710824	15.80
SA-5	.500 (1/2)	1	1/4	2-3/4	710832	25.20
SA-6	.625 (5/8)	1	1/4	2-3/4	710840	36.30

BURS

Cylindrical Ball Nose – SC Double Cut

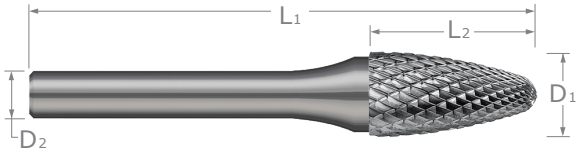


- General purpose cylindrical ball nose shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	USD$
SC-42	.125 (1/8)	9/16	1/8	1-1/2	708008	7.70
SC-53	.187 (3/16)	1/2	1/8	2	708112	16.60
SC-14	.187 (3/16)	5/8	1/4	2	708012	20.90
SC-51	.250 (1/4)	1/2	1/8	2	708216	11.40
SC-1	.250 (1/4)	5/8	1/4	1-3/4	708116	15.30
SC-2	.312 (5/16)	3/4	1/4	2-1/2	708120	25.40
SC-3	.375 (3/8)	3/4	1/4	2-1/2	708224	18.30
SC-3L	.375 (3/8)	1	1/4	2-1/2	708124	26.60
SC-5	.500 (1/2)	1	1/4	2-3/4	708232	28.60
SC-6	.625 (5/8)	1	1/4	2-3/4	708240	42.50

BURS

Round Nose Tree – SF Double Cut

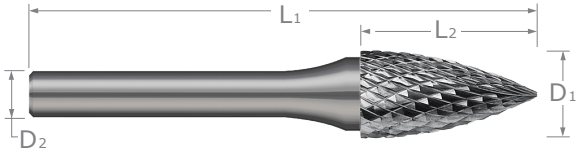


- General purpose round nose tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	USD$
SF-42	.125 (1/8)	1/2	1/8	1-1/2	707708	7.70
SF-53	.187 (3/16)	1/2	1/8	2	707812	16.60
SF-51	.250 (1/4)	1/2	1/8	2	707816	11.20
SF-1	.250 (1/4)	5/8	1/4	2	707716	16.40
SF-3	.375 (3/8)	3/4	1/4	2-1/2	707824	18.30
SF-13	.500 (1/2)	3/4	1/4	2-1/2	707932	40.80
SF-5	.500 (1/2)	1	1/4	2-3/4	707832	27.60

BURS

Pointed Tree – SG Double Cut



- General purpose pointed tree shaped hand burs
- Double cut design for superior operator control and enhanced finishes on both ferrous and non-ferrous metals
- Solid carbide head brazed onto a high speed steel shank
- CNC ground in the USA

STANDARD SIZE	CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
	D_1 $^{+.010''}_{-.010''}$	L_2 $^{+.060''}_{-.060''}$	D_2	L_1	TOOL #	USD$
SG-43	.125 (1/8)	3/8	1/8	1-1/2	707408	7.70
SG-44	.125 (1/8)	1/2	1/8	1-1/2	707308	10.50
SG-51	.250 (1/4)	1/2	1/8	2	707516	11.20
SG-1	.250 (1/4)	5/8	1/4	2	707416	16.70
SG-2	.312 (5/16)	3/4	1/4	2-1/2	707520	26.60
SG-3	.375 (3/8)	3/4	1/4	2-1/2	707524	18.80
SG-13	.500 (1/2)	3/4	1/4	2-1/2	707632	40.30
SG-5	.500 (1/2)	1	1/4	2-3/4	707532	27.60

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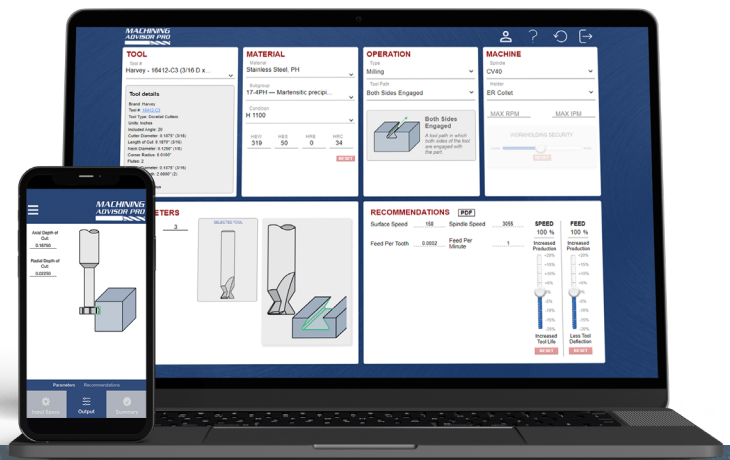
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Miniature High Performance Drills 466

Hardened Steels mm & in 466

Prehardened Steels mm & in New Sizes! 479

Aluminum Alloys mm & in 495

PCD Diamond – Double Angle – Metric 509

Composites – Double Angle mm & in 510

Composites - Brad Point – Metric 514

Flat Bottom mm & in 516

Deep Hole – Coolant Through – Metric 520

Miniature Drills New Sizes! 522

Spotting Drills 526

Miniature Reamers mm & in 530

Flat Bottom Counterbores 541

Combined Drill & Countersinks 545

Combination Drill/Thread Mill 546

Combination Drill/Counterbore 547

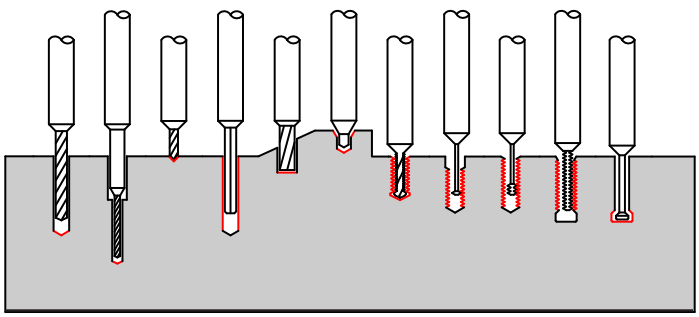
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- Solid carbide • CNC ground in the USA



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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0100	#87	.254 mm		1.20 mm	(3x)	3 mm	50 mm	CSG0100-C6	47.00
.0100	#87	.254 mm	.048		(3x)	1/8	1-1/2	FDW0100-C6	47.00
.0100	#87	.254 mm		1.70 mm	(5x)	3 mm	50 mm	BGN0100-C6	50.10
.0100	#87	.254 mm	.068		(5x)	1/8	1-1/2	GBS0100-C6	50.10
.0100	#87	.254 mm	.096		(8x)	1/8	2	HGD0100-C6	52.20
.0110	#85	.279 mm		1.35 mm	(3x)	3 mm	50 mm	CSG0110-C6	47.00
.0120	#83	.304 mm		1.45 mm	(3x)	3 mm	50 mm	CSG0120-C6	47.00
.0130	#81	.330 mm		1.55 mm	(3x)	3 mm	50 mm	CSG0130-C6	47.00
.0144	#79	.368 mm		1.75 mm	(3x)	3 mm	50 mm	CSG0144-C6	47.00
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	CSG0150-C6	47.00
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BGN0150-C6	50.10
.0150		.381 mm		3.70 mm	(8x)	3 mm	50 mm	ARY0150-C6	52.20
.0156 (1/64)		.396 mm	.074		(3x)	1/8	1-1/2	FDW0156-C6	47.00
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	CSG0156-C6	47.00
.0156 (1/64)		.396 mm	.104		(5x)	1/8	2	GBS0156-C6	50.10
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BGN0156-C6	50.10
.0156 (1/64)		.396 mm	.152		(8x)	1/8	2	HGD0156-C6	52.20
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	ARY0156-C6	52.20
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	DXT0156-C6	55.20
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	EFG0156-C6	58.40
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	CSG0160-C6	47.00
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BGN0160-C6	50.10
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	ARY0160-C6	52.20
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	EFG0160-C6	58.40
.0170		.431 mm		2.10 mm	(3x)	3 mm	50 mm	CSG0170-C6	47.00
.0170		.431 mm		4.20 mm	(8x)	3 mm	50 mm	ARY0170-C6	52.20
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	CSG0180-C6	47.00
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BGN0180-C6	50.10
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	ARY0180-C6	52.20
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	EFG0180-C6	58.40
.0190		.482 mm		2.30 mm	(3x)	3 mm	50 mm	CSG0190-C6	45.50
.0190		.482 mm		4.70 mm	(8x)	3 mm	50 mm	ARY0190-C6	50.60
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	CSG0196-C6	45.50
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BGN0196-C6	47.90
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	ARY0196-C6	50.60
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	DXT0196-C6	53.60
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	EFG0196-C6	56.60

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.005" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	CSG0200-C6	45.50
.0200	#76	.508 mm	.096		(3x)	1/8	2	FDW0200-C6	45.50
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BGN0200-C6	47.90
.0200	#76	.508 mm	.136		(5x)	1/8	2	GBS0200-C6	47.90
.0200	#76	.508 mm	.192		(8x)	1/8	2	HGD0200-C6	50.60
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	ARY0200-C6	50.60
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	DXT0200-C6	53.60
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	EFG0200-C6	56.60
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	CSG0210-C6	45.50
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BGN0210-C6	47.90
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	ARY0210-C6	50.60
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	EFG0210-C6	56.60
.0220		.558 mm		2.70 mm	(3x)	3 mm	50 mm	CSG0220-C6	45.50
.0220		.558 mm		5.40 mm	(8x)	3 mm	50 mm	ARY0220-C6	50.60
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	CSG0225-C6	45.50
.0225	#74	.571 mm	.108		(3x)	1/8	2	FDW0225-C6	45.50
.0225	#74	.571 mm	.152		(5x)	1/8	2	GBS0225-C6	47.90
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BGN0225-C6	47.90
.0225	#74	.571 mm	.216		(8x)	1/8	2	HGD0225-C6	50.60
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	ARY0225-C6	50.60
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	EFG0225-C6	56.60
.0230		.584 mm		2.80 mm	(3x)	3 mm	50 mm	CSG0230-C6	45.50
.0230		.584 mm		5.60 mm	(8x)	3 mm	50 mm	ARY0230-C6	50.60
.0236		.600 mm		2.90 mm	(3x)	3 mm	50 mm	CSG0236-C6	45.50
.0236		.600 mm		5.80 mm	(8x)	3 mm	50 mm	ARY0236-C6	50.60
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	CSG0240-C6	45.50
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BGN0240-C6	47.90
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	ARY0240-C6	50.60
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	EFG0240-C6	56.60
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	CSG0250-C6	45.50
.0250	#72	.635 mm	.120		(3x)	1/8	2	FDW0250-C6	45.50
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BGN0250-C6	47.90
.0250	#72	.635 mm	.168		(5x)	1/8	2	GBS0250-C6	47.90
.0250	#72	.635 mm	.240		(8x)	1/8	2	HGD0250-C6	50.60
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	ARY0250-C6	50.60
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	EFG0250-C6	56.60
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	CSG0260-C6	45.50
.0260	#71	.660 mm	.124		(3x)	1/8	2	FDW0260-C6	45.50
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BGN0260-C6	47.90
.0260	#71	.660 mm	.176		(5x)	1/8	2	GBS0260-C6	47.90
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	ARY0260-C6	50.60
.0260	#71	.660 mm	.256		(8x)	1/8	2	HGD0260-C6	50.60
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	EFG0260-C6	56.60
.0270		.685 mm		3.30 mm	(3x)	3 mm	50 mm	CSG0270-C6	45.50
.0270		.685 mm		6.60 mm	(8x)	3 mm	50 mm	ARY0270-C6	50.60
.0275		.700 mm		3.30 mm	(3x)	3 mm	50 mm	CSG0275-C6	45.50
.0275		.700 mm		6.80 mm	(8x)	3 mm	50 mm	ARY0275-C6	50.60

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	CSG0280-C6	45.50
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BGN0280-C6	47.90
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	ARY0280-C6	50.60
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	EFG0280-C6	56.60
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	CSG0292-C6	45.50
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BGN0292-C6	47.90
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	ARY0292-C6	50.60
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	EFG0292-C6	56.60
.0300		.762 mm		3.60 mm	(3x)	3 mm	50 mm	CSG0300-C6	46.10
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BGN0300-C6	48.60
.0300		.762 mm		7.40 mm	(8x)	3 mm	50 mm	ARY0300-C6	50.60
.0300		.762 mm		9.00 mm	(10x)	3 mm	50 mm	DXT0300-C6	53.60
.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	CSG0310-C6	46.10
.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0310-C6	48.60
.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	ARY0310-C6	50.60
.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0310-C6	57.80
.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FDW0312-C6	46.10
.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	CSG0312-C6	46.10
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GBS0312-C6	48.60
.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0312-C6	48.60
.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HGD0312-C6	51.50
.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	ARY0312-C6	51.50
.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	DXT0312-C6	54.60
.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0312-C6	57.80
.0315		.800 mm		3.80 mm	(3x)	3 mm	50 mm	CSG0315-C6	46.10
.0315		.800 mm		7.80 mm	(8x)	3 mm	50 mm	ARY0315-C6	51.50
.0320	#67	.812 mm	.152		(3x)	1/8	2	FDW0320-C6	46.10
.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	CSG0320-C6	46.10
.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BGN0320-C6	48.60
.0320	#67	.812 mm	.216		(5x)	1/8	2	GBS0320-C6	48.60
.0320	#67	.812 mm	.312		(8x)	1/8	2	HGD0320-C6	51.50
.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	ARY0320-C6	51.50
.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	EFG0320-C6	57.80
.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	CSG0330-C6	46.10
.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BGN0330-C6	48.60
.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	ARY0330-C6	51.50
.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	EFG0330-C6	57.80
.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	CSG0350-C6	46.10
.0350	#65	.889 mm	.168		(3x)	1/8	2	FDW0350-C6	46.10
.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BGN0350-C6	48.60
.0350	#65	.889 mm	.240		(5x)	1/8	2	GBS0350-C6	48.60
.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	ARY0350-C6	51.50
.0350	#65	.889 mm	.340		(8x)	1/8	2	HGD0350-C6	51.50
.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	DXT0350-C6	54.60
.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	EFG0350-C6	57.80

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.005" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0354		.900 mm		4.20 mm	(3x)	3 mm	50 mm	CSG0354-C6	46.10
.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BGN0354-C6	48.60
.0354		.900 mm		8.80 mm	(8x)	3 mm	50 mm	ARY0354-C6	51.50
.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	CSG0360-C6	46.10
.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BGN0360-C6	48.60
.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	ARY0360-C6	51.50
.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	EFG0360-C6	57.80
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	CSG0370-C6	46.10
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BGN0370-C6	48.60
.0370	#63	.939 mm		7.40 mm	(6x)	3 mm	50 mm	CZS0370-C6	49.50
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	ARY0370-C6	51.50
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	EFG0370-C6	57.80
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	CSG0380-C6	46.10
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BGN0380-C6	48.60
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	ARY0380-C6	51.50
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	EFG0380-C6	57.80
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0390-C6	46.10
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BGN0390-C6	48.60
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	ARY0390-C6	51.50
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	EFG0390-C6	57.80
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0393-C6	50.20
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BGN0393-C6	52.80
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	ARY0393-C6	55.10
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	DXT0393-C6	58.60
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	EFG0393-C6	62.10
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	CSG0400-C6	50.20
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FDW0400-C6	50.20
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BGN0400-C6	52.80
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GBS0400-C6	52.80
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	ARY0400-C6	55.10
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HGD0400-C6	55.10
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	EFG0400-C6	62.10
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	CSG0410-C6	50.20
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BGN0410-C6	52.80
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	ARY0410-C6	55.10
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	EFG0410-C6	62.10
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	CSG0420-C6	50.20
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BGN0420-C6	52.80
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	ARY0420-C6	55.10
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	EFG0420-C6	62.10
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	CSG0430-C6	50.20
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BGN0430-C6	52.80
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	ARY0430-C6	55.10
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	EFG0430-C6	62.10
.0450		1.143 mm		5.40 mm	(3x)	3 mm	50 mm	CSG0450-C6	50.20
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BGN0450-C6	52.80
.0450		1.143 mm		11.00 mm	(8x)	3 mm	50 mm	ARY0450-C6	55.10

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	CSG0465-C6	50.20
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FDW0465-C6	50.20
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GBS0465-C6	52.80
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BGN0465-C6	52.80
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	ARY0465-C6	55.10
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HGD0465-C6	55.10
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	DXT0465-C6	58.60
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	EFG0465-C6	62.10
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	CSG0468-C6	50.20
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FDW0468-C6	50.20
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BGN0468-C6	52.80
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GBS0468-C6	52.80
.0468 (3/64)		1.190 mm		9.00 mm	(6x)	3 mm	50 mm	CZS0468-C6	53.70
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	ARY0468-C6	55.10
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HGD0468-C6	55.10
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	DXT0468-C6	58.60
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	EFG0468-C6	62.10
.0492		1.250 mm		6.00 mm	(3x)	3 mm	50 mm	CSG0492-C6	50.20
.0492		1.250 mm		12.00 mm	(8x)	3 mm	50 mm	ARY0492-C6	59.10
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	EFG0492-C6	63.50
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	CSG0500-C6	50.20
.0500		1.270 mm	.240		(3x)	1/8	2	FDW0500-C6	50.20
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BGN0500-C6	52.80
.0500		1.270 mm	.340		(5x)	1/8	2	GBS0500-C6	52.80
.0500		1.270 mm	.480		(8x)	1/8	2	HGD0500-C6	55.10
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	ARY0500-C6	55.10
.0500		1.270 mm		15.00 mm	(10x)	3 mm	50 mm	DXT0500-C6	58.60
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	EFG0500-C6	62.10
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	CSG0520-C6	50.20
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FDW0520-C6	50.20
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BGN0520-C6	52.80
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GBS0520-C6	52.80
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HGD0520-C6	55.10
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	ARY0520-C6	55.10
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	EFG0520-C6	62.10
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	CSG0550-C6	50.20
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FDW0550-C6	50.20
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BGN0550-C6	52.80
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GBS0550-C6	52.80
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	ARY0550-C6	55.10
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HGD0550-C6	55.10
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	DXT0550-C6	60.40
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	EFG0550-C6	62.10
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0590-C6	54.10
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BGN0590-C6	56.70
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	ARY0590-C6	59.10
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	DXT0590-C6	62.50
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	EFG0590-C6	66.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.005" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0595-C6	54.10
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BGN0595-C6	56.70
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	ARY0595-C6	59.10
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	EFG0595-C6	66.00
.0600		1.524 mm		7.20 mm	(3x)	3 mm	50 mm	CSG0600-C6	54.10
.0600		1.524 mm		10.50 mm	(5x)	3 mm	50 mm	BGN0600-C6	56.70
.0600		1.524 mm		15.00 mm	(8x)	3 mm	50 mm	ARY0600-C6	59.10
.0600		1.524 mm		21.00 mm	(12x)	3 mm	63 mm	EFG0600-C6	66.00
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FDW0625-C6	54.10
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	CSG0625-C6	54.10
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BGN0625-C6	56.70
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GBS0625-C6	56.70
.0625 (1/16)		1.587 mm		12.50 mm	(6x)	3 mm	50 mm	CZS0625-C6	57.50
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HGD0625-C6	59.10
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	ARY0625-C6	59.10
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	DXT0625-C6	62.50
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	EFG0625-C6	66.00
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	CSG0635-C6	54.10
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BGN0635-C6	56.70
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	ARY0635-C6	59.10
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	EFG0635-C6	66.00
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	CSG0670-C6	54.10
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BGN0670-C6	56.70
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	ARY0670-C6	59.10
.0670	#51	1.701 mm		20.00 mm	(10x)	3 mm	63 mm	DXT0669-C6	62.60
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	EFG0670-C6	66.00
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	CSG0700-C6	54.10
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FDW0700-C6	54.10
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BGN0700-C6	56.70
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GBS0700-C6	56.70
.0700	#50	1.778 mm		14.00 mm	(6x)	3 mm	50 mm	CZS0700-C6	57.50
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HGD0700-C6	59.10
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	ARY0700-C6	59.10
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	DXT0700-C6	62.60
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	EFG0700-C6	66.00
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	CSG0730-C6	54.10
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BGN0730-C6	56.70
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	ARY0730-C6	59.10
.0730	#49	1.854 mm		22.00 mm	(10x)	3 mm	63 mm	DXT0729-C6	62.60
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	EFG0730-C6	66.00
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	CSG0760-C6	54.10
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BGN0760-C6	56.70
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	ARY0760-C6	59.10
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0760-C6	66.00
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	CSG0781-C6	54.10
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FDW0781-C6	54.10
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GBS0781-C6	56.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BGN0781-C6	56.70
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HGD0781-C6	59.10
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	ARY0781-C6	59.10
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	DXT0781-C6	62.50
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0781-C6	66.00
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	CSG0785-C6	57.90
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BGN0785-C6	61.20
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	ARY0785-C6	59.10
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	EFG0785-C6	71.50
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	CSG0787-C6	57.90
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BGN0787-C6	61.20
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	ARY0787-C6	64.40
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	DXT0787-C6	68.00
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	EFG0787-C6	71.50
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	CSG0800-C6	57.90
.0800		2.032 mm	.380		(3x)	3/16	2	FDW0800-C6	57.90
.0800		2.032 mm		13.50 mm	(5x)	4 mm	50 mm	BGN0800-C6	61.20
.0800		2.032 mm	.540		(5x)	3/16	2	GBS0800-C6	61.20
.0800		2.032 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0800-C6	64.40
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HGD0800-C6	64.40
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	CSG0810-C6	57.90
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BGN0810-C6	61.20
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0810-C6	64.40
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	EFG0810-C6	71.50
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	CSG0820-C6	57.90
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BGN0820-C6	61.20
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	ARY0820-C6	64.40
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	EFG0820-C6	71.50
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FDW0860-C6	57.90
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	CSG0860-C6	57.90
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BGN0860-C6	61.20
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GBS0860-C6	61.20
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	ARY0860-C6	64.40
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HGD0860-C6	64.40
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	EFG0860-C6	71.50
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	CSG0890-C6	57.90
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FDW0890-C6	57.90
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BGN0890-C6	61.20
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GBS0890-C6	61.20
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	ARY0890-C6	64.40
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HGD0890-C6	64.40
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	EFG0890-C6	71.50
.0900		2.286 mm		11.00 mm	(3x)	4 mm	50 mm	CSG0900-C6	57.90
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BGN0900-C6	61.20
.0900		2.286 mm		22.00 mm	(8x)	4 mm	63 mm	ARY0900-C6	64.40

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0935-C6	57.90
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0935-C6	61.20
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	ARY0935-C6	64.40
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	EFG0935-C6	71.50
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FDW0937-C6	57.90
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0937-C6	57.90
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0937-C6	61.20
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GBS0937-C6	61.20
.0937 (3/32)		2.381 mm		18.00 mm	(6x)	4 mm	63 mm	CZS0937-C6	62.30
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	ARY0937-C6	64.40
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HGD0937-C6	64.40
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	DXT0937-C6	68.00
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	EFG0937-C6	71.50
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	CSG0960-C6	57.90
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FDW0960-C6	57.90
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BGN0960-C6	61.20
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GBS0960-C6	61.20
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HGD0960-C6	64.40
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0960-C6	64.40
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0960-C6	71.50
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0980-C6	57.90
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0980-C6	61.20
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0980-C6	64.40
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0980-C6	71.50
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0984-C6	61.30
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0984-C6	65.10
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	ARY0984-C6	68.50
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	EFG0984-C6	73.90
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	CSG0995-C6	61.30
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FDW0995-C6	61.30
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BGN0995-C6	65.10
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GBS0995-C6	65.10
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HGD0995-C6	68.50
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	ARY0995-C6	68.50
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	EFG0995-C6	75.90
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	CSG1000-C6	61.30
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BGN1000-C6	65.10
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	ARY1000-C6	68.50
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	CSG1015-C6	61.30
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BGN1015-C6	65.10
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	ARY1015-C6	68.50
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	EFG1015-C6	75.90
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	CSG1040-C6	61.30
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BGN1040-C6	65.10
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	ARY1040-C6	68.50
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	EFG1040-C6	75.90

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.005"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	CSG1065-C6	61.30
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BGN1065-C6	65.10
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	ARY1065-C6	68.50
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	EFG1065-C6	75.90
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	CSG1093-C6	61.30
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1093-C6	65.10
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1093-C6	68.50
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	DXT1093-C6	72.10
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	EFG1093-C6	75.90
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FDW1100-C6	61.30
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1100-C6	61.30
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1100-C6	65.10
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GBS1100-C6	65.10
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HGD1100-C6	68.50
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1100-C6	68.50
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	EFG1100-C6	75.90
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1110-C6	61.30
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1110-C6	65.10
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	ARY1110-C6	68.50
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	EFG1110-C6	75.90
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	CSG1130-C6	61.30
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BGN1130-C6	65.10
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	ARY1130-C6	68.50
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	EFG1130-C6	75.90
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	CSG1160-C6	61.30
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FDW1160-C6	61.30
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BGN1160-C6	65.10
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GBS1160-C6	65.10
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HGD1160-C6	68.50
.1160	#32	2.946 mm		29.00 mm	(8x)	4 mm	63 mm	ARY1160-C6	68.50
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	EFG1160-C6	75.90
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	CSG1181-C6	62.80
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BGN1181-C6	66.10
.1181		3.000 mm		23.00 mm	(6x)	4 mm	63 mm	CZS1181-C6	67.40
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	ARY1181-C6	69.90
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	DXT1181-C6	73.30
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	EFG1181-C6	77.20

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	CSG1200-C6	70.40
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FDW1200-C6	70.40
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GBS1200-C6	61.10
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BGN1200-C6	61.10
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	ARY1200-C6	78.50
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HGD1200-C6	78.50
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	EFG1200-C6	86.10
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	CSG1250-C6	70.40
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FDW1250-C6	70.40
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BGN1250-C6	73.90
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GBS1250-C6	73.90
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HGD1250-C6	78.50
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	ARY1250-C6	78.50
.1250 (1/8)		3.175 mm		37.00 mm	(10x)	6 mm	100 mm	DXT1250-C6	82.20
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	EFG1250-C6	86.10
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FDW1285-C6	70.40
.1285	#30	3.263 mm		16.00 mm	(3x)	6 mm	63 mm	CSG1285-C6	70.40
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GBS1285-C6	73.90
.1285	#30	3.263 mm		32.00 mm	(8x)	6 mm	75 mm	ARY1285-C6	78.50
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HGD1285-C6	78.50
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	CSG1360-C6	70.40
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BGN1360-C6	73.90
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	ARY1360-C6	78.50
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	EFG1360-C6	86.10
.1405	#28	3.568 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1405-C6	70.40
.1405	#28	3.568 mm		35.00 mm	(8x)	6 mm	75 mm	ARY1405-C6	78.50
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1406-C6	70.40
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BGN1406-C6	73.90
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	ARY1406-C6	78.50
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	EFG1406-C6	86.10
.1440	#27	3.657 mm		17.00 mm	(3x)	6 mm	63 mm	CSG1440-C6	70.40
.1440	#27	3.657 mm		36.00 mm	(8x)	6 mm	100 mm	ARY1440-C6	78.50
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1470-C6	70.40
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BGN1470-C6	73.90
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	ARY1470-C6	78.50
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	EFG1470-C6	86.10
.1495	#25	3.797 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1495-C6	70.40
.1495	#25	3.797 mm		37.00 mm	(8x)	6 mm	100 mm	ARY1495-C6	78.50
.1520	#24	3.860 mm		18.00 mm	(3x)	6 mm	63 mm	CSG1520-C6	70.40
.1520	#24	3.860 mm		38.00 mm	(8x)	6 mm	100 mm	ARY1520-C6	78.50
.1540	#23	3.911 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1540-C6	70.40
.1540	#23	3.911 mm		38.00 mm	(8x)	6 mm	100 mm	ARY1540-C6	78.50
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1562-C6	70.40
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BGN1562-C6	73.90
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1562-C6	78.50
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	EFG1562-C6	86.10

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.1570	#22	3.987 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1570-C6	70.40
.1570	#22	3.987 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1570-C6	78.50
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1574-C6	70.40
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BGN1574-C6	73.90
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1574-C6	78.50
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1590-C6	70.40
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BGN1590-C6	73.90
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	ARY1590-C6	78.50
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	EFG1590-C6	86.10
.1610	#20	4.089 mm		19.00 mm	(3x)	6 mm	63 mm	CSG1610-C6	70.40
.1610	#20	4.089 mm		40.00 mm	(8x)	6 mm	100 mm	ARY1610-C6	78.50
.1660	#19	4.216 mm		20.00 mm	(3x)	6 mm	63 mm	CSG1660-C6	70.40
.1660	#19	4.216 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1660-C6	78.50
.1695	#18	4.305 mm		20.00 mm	(3x)	6 mm	63 mm	CSG1695-C6	70.40
.1695	#18	4.305 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1695-C6	78.50
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1718-C6	70.40
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1718-C6	73.90
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1718-C6	78.50
.1730	#17	4.394 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1730-C6	70.40
.1730	#17	4.394 mm		42.00 mm	(8x)	6 mm	100 mm	ARY1730-C6	78.50
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	CSG1770-C6	70.40
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1770-C6	73.90
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	ARY1770-C6	78.50
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	EFG1770-C6	86.10
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1800-C6	70.40
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BGN1800-C6	73.90
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	ARY1800-C6	78.50
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	EFG1800-C6	86.10
.1820	#14	4.622 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1820-C6	70.40
.1820	#14	4.622 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1820-C6	78.50
.1850	#13	4.700 mm		22.00 mm	(3x)	6 mm	63 mm	CSG1850-C6	70.40
.1850	#13	4.700 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1850-C6	78.50
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FDW1875-C6	70.40
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1875-C6	70.40
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BGN1875-C6	73.90
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GBS1875-C6	73.90
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1875-C6	78.50
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HGD1875-C6	78.50
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	EFG1875-C6	86.10
.1890	#12	4.800 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1890-C6	70.40
.1890	#12	4.800 mm		46.00 mm	(8x)	6 mm	100 mm	ARY1890-C6	78.50
.1910	#11	4.851 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1910-C6	70.40
.1910	#11	4.851 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1910-C6	78.50
.1935	#10	4.914 mm		23.00 mm	(3x)	6 mm	63 mm	CSG1935-C6	70.40
.1935	#10	4.914 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1935-C6	78.50

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Hardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.1960	#9	4.978 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1960-C6	70.40
.1960	#9	4.978 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1960-C6	78.50
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1968-C6	70.40
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BGN1968-C6	73.90
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	ARY1968-C6	78.50
.1990	#8	5.054 mm		24.00 mm	(3x)	6 mm	63 mm	CSG1990-C6	70.40
.1990	#8	5.054 mm		50.00 mm	(8x)	6 mm	100 mm	ARY1990-C6	78.50
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2009-C6	70.40
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BGN2009-C6	73.90
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2009-C6	78.50
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2031-C6	70.40
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BGN2031-C6	73.90
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2031-C6	78.50
.2040	#6	5.181 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2040-C6	70.40
.2040	#6	5.181 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2040-C6	78.50
.2055	#5	5.219 mm		24.00 mm	(3x)	6 mm	63 mm	CSG2055-C6	70.40
.2055	#5	5.219 mm		50.00 mm	(8x)	6 mm	100 mm	ARY2055-C6	78.50
.2090	#4	5.308 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2090-C6	70.40
.2090	#4	5.308 mm		52.00 mm	(8x)	6 mm	100 mm	ARY2090-C6	78.50
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2129-C6	70.40
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BGN2129-C6	73.90
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	ARY2129-C6	78.50
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2187-C6	70.40
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BGN2187-C6	73.90
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	ARY2187-C6	78.50
.2210	#2	5.613 mm		26.00 mm	(3x)	6 mm	75 mm	CSG2210-C6	70.40
.2210	#2	5.613 mm		54.00 mm	(8x)	6 mm	100 mm	ARY2210-C6	78.50
.2280	#1	5.791 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2280-C6	70.40
.2280	#1	5.791 mm		56.00 mm	(8x)	6 mm	100 mm	ARY2280-C6	78.50
.2340	A	5.943 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2340-C6	70.40
.2340	A	5.943 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2340-C6	78.50
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2343-C6	70.40
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BGN2343-C6	73.90
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2343-C6	78.50
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	CSG2362-C6	70.40
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BGN2362-C6	73.90
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	ARY2362-C6	78.50
.2380	B	6.045 mm		28.00 mm	(3x)	8 mm	75 mm	CSG2380-C6	72.90
.2380	B	6.045 mm		58.00 mm	(8x)	8 mm	100 mm	ARY2380-C6	80.70
.2420	C	6.146 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2420-C6	72.90
.2420	C	6.146 mm		60.00 mm	(8x)	8 mm	100 mm	ARY2420-C6	80.70
.2460	D	6.248 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2460-C6	72.90
.2460	D	6.248 mm		60.00 mm	(8x)	8 mm	100 mm	ARY2460-C6	80.70

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MINIATURE HIGH PERFORMANCE DRILLS

Hardened Steels (cont.)

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH inch	metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED 2 FL	USD$
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1		
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	CSG2500-C6	72.90
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FDW2500-C6	72.90
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BGN2500-C6	76.30
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GBS2500-C6	76.30
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HGD2500-C6	80.70
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	ARY2500-C6	80.70
.2570	F	6.528 mm		32.00 mm	(3x)	8 mm	75 mm	CSG2570-C6	81.00
.2812		7.142 mm		34.00 mm	(3x)	8 mm	75 mm	CSG2812-C6	81.00
.3125 (5/16)		7.937 mm		38.00 mm	(3x)	8 mm	100 mm	CSG3125-C6	81.00
.3150		8.000 mm		38.00 mm	(3x)	8 mm	100 mm	CSG3150-C6	81.00
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	CSG3750-C6	133.50

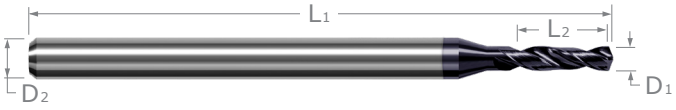
SPEEDS & FEEDS (Miniature High Performance Drills – Hardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%. For 12x, reduce to 65%). Pecking cycles are recommended to avoid chip pacing and breakage. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For higher hardness materials, peck depths should be .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Hardness	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Hardened Steels	38-45 Rc	150	.00029	.00060	.00090	.00119	.00150	.00179	.00240	.00359	.00480	.00720
	46-55 Rc	90	.00022	.00045	.00068	.00089	.00112	.00134	.00180	.00269	.00360	.00540
	56-68 Rc	40	.00014	.00030	.00045	.00060	.00075	.00089	.00120	.00180	.00240	.00360

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels



Available for 3x, 5x, 8x 10x, and 12x Hole Depths!

- Optimized for drilling prehardened medium alloy steels, stainless steels, and tool steels up to 45Rc
- Specialized flute shape for improved chip evacuation and maximum rigidity
- 140° point angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Specialized Flute Shape for Improved Chip Evacuation

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0078		.200 mm		.95 mm	(3x)	3 mm	50 mm	DHE0078-C3	47.00
.0078		.200 mm		1.35 mm	(5x)	3 mm	50 mm	BVT0078-C3	49.90
.0079	#92	.201 mm		1.35 mm	(5x)	3 mm	50 mm	BVT0079-C3	49.90
.0083	#91	.210 mm		1.00 mm	(3x)	3 mm	50 mm	DHE0083-C3	47.00
.0083	#91	.210 mm		1.40 mm	(5x)	3 mm	50 mm	BVT0083-C3	49.90
.0087	#90	.221 mm		1.05 mm	(3x)	3 mm	50 mm	DHE0087-C3	47.00
.0087	#90	.221 mm		1.50 mm	(5x)	3 mm	50 mm	BVT0087-C3	49.90
.0091	#89	.231 mm		1.10 mm	(3x)	3 mm	50 mm	DHE0091-C3	47.00
.0091	#89	.231 mm		1.55 mm	(5x)	3 mm	50 mm	BVT0091-C3	49.90
.0095	#88	.241 mm		1.15 mm	(3x)	3 mm	50 mm	DHE0095-C3	47.00
.0095	#88	.241 mm		1.65 mm	(5x)	3 mm	50 mm	BVT0095-C3	49.90
.0100	#87	.254 mm		1.20 mm	(3x)	3 mm	50 mm	DHE0100-C3	45.90
.0100	#87	.254 mm	.048		(3x)	1/8	2	FKB0100-C3	45.90
.0100	#87	.254 mm		1.70 mm	(5x)	3 mm	50 mm	BVT0100-C3	48.40
.0100	#87	.254 mm	.068		(5x)	1/8	1-1/2	GKT0100-C3	48.40
.0100	#87	.254 mm	.096		(8x)	1/8	2	HDV0100-C3	53.50
.0100	#87	.254 mm		2.50 mm	(8x)	3 mm	50 mm	ADS0100-C3	53.50
.0100	#87	.254 mm		3.00 mm	(10x)	3 mm	50 mm	EXP0100-C3	56.60
.0100	#87	.254 mm		3.50 mm	(12x)	3 mm	50 mm	CHT0100-C3	60.20
.0105	#86	.266 mm		1.25 mm	(3x)	3 mm	50 mm	DHE0105-C3	45.90
.0105	#86	.266 mm		1.80 mm	(5x)	3 mm	50 mm	BVT0105-C3	48.40
.0105	#86	.266 mm		2.60 mm	(8x)	3 mm	50 mm	ADS0105-C3	53.50
.0105	#86	.266 mm		3.70 mm	(12x)	3 mm	50 mm	CHT0105-C3	60.20
.0110	#85	.279 mm		1.35 mm	(3x)	3 mm	50 mm	DHE0110-C3	45.90
.0110	#85	.279 mm		1.90 mm	(5x)	3 mm	50 mm	BVT0110-C3	48.40
.0110	#85	.279 mm		2.70 mm	(8x)	3 mm	50 mm	ADS0110-C3	53.50
.0110	#85	.279 mm		3.30 mm	(10x)	3 mm	50 mm	EXP0110-C3	56.60
.0110	#85	.279 mm		3.80 mm	(12x)	3 mm	50 mm	CHT0110-C3	60.20
.0115	#84	.292 mm		1.40 mm	(3x)	3 mm	50 mm	DHE0115-C3	45.90
.0115	#84	.292 mm		2.00 mm	(5x)	3 mm	50 mm	BVT0115-C3	48.40
.0115	#84	.292 mm		2.80 mm	(8x)	3 mm	50 mm	ADS0115-C3	53.50
.0115	#84	.292 mm		4.00 mm	(12x)	3 mm	50 mm	CHT0115-C3	60.20
.0118		.300 mm		2.00 mm	(5x)	3 mm	50 mm	BVT0118-C3	48.40
.0118		.300 mm		4.10 mm	(12x)	3 mm	50 mm	CHT0118-C3	60.20

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NEW SIZES!

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0120	#83	.304 mm		1.45 mm	(3x)	3 mm	50 mm	DHE0120-C3	45.90
.0120	#83	.304 mm		2.10 mm	(5x)	3 mm	50 mm	BVT0120-C3	48.40
.0120	#83	.304 mm		3.00 mm	(8x)	3 mm	50 mm	ADS0120-C3	53.50
.0120	#83	.304 mm		3.60 mm	(10x)	3 mm	50 mm	EXP0120-C3	56.60
.0120	#83	.304 mm		4.20 mm	(12x)	3 mm	50 mm	CHT0120-C3	60.20
.0125	#82	.317 mm		1.50 mm	(3x)	3 mm	50 mm	DHE0125-C3	45.90
.0125	#82	.317 mm		2.10 mm	(5x)	3 mm	50 mm	BVT0125-C3	48.40
.0125	#82	.317 mm		3.10 mm	(8x)	3 mm	50 mm	ADS0125-C3	53.50
.0125	#82	.317 mm		4.40 mm	(12x)	3 mm	50 mm	CHT0125-C3	60.20
.0130	#81	.330 mm		1.55 mm	(3x)	3 mm	50 mm	DHE0130-C3	45.90
.0130	#81	.330 mm		2.20 mm	(5x)	3 mm	50 mm	BVT0130-C3	48.40
.0130	#81	.330 mm		3.20 mm	(8x)	3 mm	50 mm	ADS0130-C3	53.50
.0130	#81	.330 mm		3.90 mm	(10x)	3 mm	50 mm	EXP0130-C3	56.60
.0130	#81	.330 mm		4.50 mm	(12x)	3 mm	50 mm	CHT0130-C3	60.20
.0135	#80	.342 mm		1.65 mm	(3x)	3 mm	50 mm	DHE0135-C3	45.90
.0135	#80	.342 mm		2.30 mm	(5x)	3 mm	50 mm	BVT0135-C3	48.40
.0135	#80	.342 mm		3.30 mm	(8x)	3 mm	50 mm	ADS0135-C3	53.50
.0135	#80	.342 mm		4.70 mm	(12x)	3 mm	50 mm	CHT0135-C3	60.20
.0140		.355 mm		1.70 mm	(3x)	3 mm	50 mm	DHE0140-C3	45.90
.0140		.355 mm		2.40 mm	(5x)	3 mm	50 mm	BVT0140-C3	48.40
.0140		.355 mm		3.50 mm	(8x)	3 mm	50 mm	ADS0140-C3	53.50
.0140		.355 mm		4.90 mm	(12x)	3 mm	50 mm	CHT0140-C3	60.20
.0144	#79	.368 mm		1.75 mm	(3x)	3 mm	50 mm	DHE0144-C3	45.90
.0144	#79	.368 mm		2.50 mm	(5x)	3 mm	50 mm	BVT0144-C3	48.40
.0144	#79	.368 mm		3.60 mm	(8x)	3 mm	50 mm	ADS0144-C3	53.50
.0144	#79	.368 mm		4.30 mm	(10x)	3 mm	50 mm	EXP0144-C3	56.60
.0144	#79	.368 mm		5.00 mm	(12x)	3 mm	50 mm	CHT0144-C3	60.20
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	DHE0150-C3	45.90
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BVT0150-C3	48.40
.0150		.381 mm		3.70 mm	(8x)	3 mm	50 mm	ADS0150-C3	53.50
.0150		.381 mm		5.20 mm	(12x)	3 mm	50 mm	CHT0150-C3	60.20
.0156 (1/64)		.396 mm	.074		(3x)	1/8	1-1/2	FKB0156-C3	45.90
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	DHE0156-C3	45.90
.0156 (1/64)		.396 mm	.104		(5x)	1/8	2	GKT0156-C3	48.40
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0156-C3	48.40
.0156 (1/64)		.396 mm	.152		(8x)	1/8	2	HDV0156-C3	53.50
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	ADS0156-C3	53.50
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	EXP0156-C3	56.60
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	CHT0156-C3	60.20
.0157		.400 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0157-C3	48.40
.0157		.400 mm		5.60 mm	(12x)	3 mm	50 mm	CHT0157-C3	60.20
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	DHE0160-C3	45.90
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BVT0160-C3	48.40
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	ADS0160-C3	53.50
.0160	#78	.406 mm		4.80 mm	(10x)	3 mm	50 mm	EXP0160-C3	56.60
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	CHT0160-C3	60.20

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0170		.431 mm		2.10 mm	(3x)	3 mm	50 mm	DHE0170-C3	45.90
.0170		.431 mm		2.90 mm	(5x)	3 mm	50 mm	BVT0170-C3	48.40
.0170		.431 mm		4.20 mm	(8x)	3 mm	50 mm	ADS0170-C3	53.50
.0170		.431 mm		6.00 mm	(12x)	3 mm	50 mm	CHT0170-C3	60.20
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	DHE0180-C3	45.90
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BVT0180-C3	48.40
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	ADS0180-C3	53.90
.0180	#77	.457 mm		5.40 mm	(10x)	3 mm	50 mm	EXP0180-C3	56.60
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	CHT0180-C3	60.20
.0190		.482 mm		2.30 mm	(3x)	3 mm	50 mm	DHE0190-C3	45.90
.0190		.482 mm		3.30 mm	(5x)	3 mm	50 mm	BVT0190-C3	48.40
.0190		.482 mm		4.70 mm	(8x)	3 mm	50 mm	ADS0190-C3	53.50
.0190		.482 mm		6.60 mm	(12x)	3 mm	50 mm	CHT0190-C3	60.20
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	DHE0196-C3	45.30
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BVT0196-C3	47.70
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	ADS0196-C3	53.90
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	EXP0196-C3	56.80
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	CHT0196-C3	58.80
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	DHE0200-C3	45.30
.0200	#76	.508 mm	.096		(3x)	1/8	2	FKB0200-C3	45.30
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BVT0200-C3	47.70
.0200	#76	.508 mm	.136		(5x)	1/8	2	GKT0200-C3	47.70
.0200	#76	.508 mm	.192		(8x)	1/8	2	HDV0200-C3	53.90
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	ADS0200-C3	53.90
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	EXP0200-C3	56.80
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	CHT0200-C3	58.80
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	DHE0210-C3	45.30
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BVT0210-C3	47.70
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	ADS0210-C3	53.90
.0210	#75	.533 mm		6.20 mm	(10x)	3 mm	50 mm	EXP0210-C3	56.80
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	CHT0210-C3	58.80
.0220		.558 mm		2.70 mm	(3x)	3 mm	50 mm	DHE0220-C3	45.30
.0220		.558 mm		3.80 mm	(5x)	3 mm	50 mm	BVT0220-C3	47.70
.0220		.558 mm		5.40 mm	(8x)	3 mm	50 mm	ADS0220-C3	53.90
.0220		.558 mm		7.60 mm	(12x)	3 mm	50 mm	CHT0220-C3	58.80
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	DHE0225-C3	45.30
.0225	#74	.571 mm	.108		(3x)	1/8	2	FKB0225-C3	45.30
.0225	#74	.571 mm	.152		(5x)	1/8	2	GKT0225-C3	47.70
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BVT0225-C3	47.70
.0225	#74	.571 mm	.216		(8x)	1/8	2	HDV0225-C3	53.90
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	ADS0225-C3	53.90
.0225	#74	.571 mm		6.80 mm	(10x)	3 mm	50 mm	EXP0225-C3	56.80
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	CHT0225-C3	58.80
.0230		.584 mm		2.80 mm	(3x)	3 mm	50 mm	DHE0230-C3	45.30
.0230		.584 mm		3.90 mm	(5x)	3 mm	50 mm	BVT0230-C3	47.70
.0230		.584 mm		5.60 mm	(8x)	3 mm	50 mm	ADS0230-C3	53.90
.0230		.584 mm		8.00 mm	(12x)	3 mm	50 mm	CHT0230-C3	58.80

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NEW SIZES!

MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0236		.600 mm		4.00 mm	(5x)	3 mm	50 mm	BVT0236-C3	47.70
.0236		.600 mm		8.20 mm	(12x)	3 mm	50 mm	CHT0236-C3	58.80
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	DHE0240-C3	45.30
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BVT0240-C3	47.70
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	ADS0240-C3	53.90
.0240	#73	.609 mm		7.20 mm	(10x)	3 mm	50 mm	EXP0240-C3	56.80
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	CHT0240-C3	58.80
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	DHE0250-C3	45.30
.0250	#72	.635 mm	.120		(3x)	1/8	2	FKB0250-C3	45.30
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BVT0250-C3	47.70
.0250	#72	.635 mm	.168		(5x)	1/8	2	GKT0250-C3	47.70
.0250	#72	.635 mm	.240		(8x)	1/8	2	HDV0250-C3	53.90
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	ADS0250-C3	53.90
.0250	#72	.635 mm		7.40 mm	(10x)	3 mm	50 mm	EXP0250-C3	56.80
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	CHT0250-C3	58.80
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	DHE0260-C3	45.30
.0260	#71	.660 mm	.124		(3x)	1/8	2	FKB0260-C3	45.30
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BVT0260-C3	47.70
.0260	#71	.660 mm	.176		(5x)	1/8	2	GKT0260-C3	47.70
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	ADS0260-C3	53.90
.0260	#71	.660 mm	.256		(8x)	1/8	2	HDV0260-C3	53.90
.0260	#71	.660 mm		7.80 mm	(10x)	3 mm	50 mm	EXP0260-C3	56.80
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	CHT0260-C3	58.80
.0270		.685 mm		3.30 mm	(3x)	3 mm	50 mm	DHE0270-C3	45.30
.0270		.685 mm		4.60 mm	(5x)	3 mm	50 mm	BVT0270-C3	47.70
.0270		.685 mm		6.60 mm	(8x)	3 mm	50 mm	ADS0270-C3	53.90
.0270		.685 mm		9.40 mm	(12x)	3 mm	50 mm	CHT0270-C3	58.80
.0275		.700 mm		4.80 mm	(5x)	3 mm	50 mm	BVT0275-C3	47.70
.0275		.700 mm		9.60 mm	(12x)	3 mm	50 mm	CHT0275-C3	58.80
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	DHE0280-C3	45.30
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BVT0280-C3	47.70
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	ADS0280-C3	53.90
.0280	#70	.711 mm		8.40 mm	(10x)	3 mm	50 mm	EXP0280-C3	56.80
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	CHT0280-C3	58.80
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	DHE0292-C3	45.30
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BVT0292-C3	47.70
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	ADS0292-C3	53.90
.0292	#69	.741 mm		8.80 mm	(10x)	3 mm	50 mm	EXP0292-C3	56.80
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	CHT0292-C3	58.80
.0300		.762 mm		3.60 mm	(3x)	3 mm	50 mm	DHE0300-C3	45.30
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BVT0300-C3	47.70
.0300		.762 mm		7.40 mm	(8x)	3 mm	50 mm	ADS0300-C3	53.90
.0300		.762 mm		10.50 mm	(12x)	3 mm	50 mm	CHT0300-C3	58.80

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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	DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
	inch	wire	metric	inch	metric	hole depth				
	D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
	.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	DHE0310-C3	45.90
	.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0310-C3	48.20
	.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	ADS0310-C3	53.90
	.0310	#68	.787 mm		9.20 mm	(10x)	3 mm	50 mm	EXP0310-C3	56.80
	.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0310-C3	60.30
	.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FKB0312-C3	45.90
	.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	DHE0312-C3	45.90
	.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GKT0312-C3	48.20
	.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0312-C3	48.20
	.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HDV0312-C3	53.90
	.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	ADS0312-C3	53.90
	.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	EXP0312-C3	56.80
	.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0312-C3	60.30
NEW	.0315		.800 mm		3.80 mm	(3x)	3 mm	50 mm	DHE0315-C3	45.90
	.0315		.800 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0315-C3	48.20
	.0315		.800 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0315-C3	60.30
	.0320	#67	.812 mm	.152		(3x)	1/8	2	FKB0320-C3	45.90
	.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	DHE0320-C3	45.90
	.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BVT0320-C3	48.20
	.0320	#67	.812 mm	.216		(5x)	1/8	2	GKT0320-C3	48.20
	.0320	#67	.812 mm	.312		(8x)	1/8	2	HDV0320-C3	53.90
	.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	ADS0320-C3	53.90
	.0320	#67	.812 mm		9.60 mm	(10x)	3 mm	50 mm	EXP0320-C3	56.80
	.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	CHT0320-C3	60.30
	.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	DHE0330-C3	45.90
	.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BVT0330-C3	48.20
	.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	ADS0330-C3	53.90
	.0330	#66	.838 mm		9.80 mm	(10x)	3 mm	50 mm	EXP0330-C3	56.80
	.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	CHT0330-C3	60.30
	.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	DHE0350-C3	45.90
	.0350	#65	.889 mm	.168		(3x)	1/8	2	FKB0350-C3	45.90
	.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BVT0350-C3	48.20
	.0350	#65	.889 mm	.240		(5x)	1/8	2	GKT0350-C3	48.20
	.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	ADS0350-C3	53.90
	.0350	#65	.889 mm	.340		(8x)	1/8	2	HDV0350-C3	53.90
	.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	EXP0350-C3	56.80
	.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	CHT0350-C3	60.30
NEW	.0354		.900 mm		4.20 mm	(3x)	3 mm	50 mm	DHE0354-C3	45.90
	.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BVT0354-C3	45.90
	.0354		.900 mm		12.50 mm	(12x)	3 mm	50 mm	CHT0354-C3	60.30
	.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	DHE0360-C3	45.90
	.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BVT0360-C3	48.20
	.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	ADS0360-C3	53.90
	.0360	#64	.914 mm		10.50 mm	(10x)	3 mm	50 mm	EXP0360-C3	56.80
	.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	CHT0360-C3	60.30

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	DHE0370-C3	45.90
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BVT0370-C3	48.20
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	ADS0370-C3	53.90
.0370	#63	.939 mm		11.00 mm	(10x)	3 mm	50 mm	EXP0370-C3	56.80
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	CHT0370-C3	60.30
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	DHE0380-C3	45.90
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BVT0380-C3	48.20
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	ADS0380-C3	53.90
.0380	#62	.965 mm		11.50 mm	(10x)	3 mm	50 mm	EXP0380-C3	56.80
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	CHT0380-C3	60.30
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0390-C3	45.90
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BVT0390-C3	48.20
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	ADS0390-C3	53.90
.0390	#61	.990 mm		11.50 mm	(10x)	3 mm	50 mm	EXP0390-C3	56.80
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	CHT0390-C3	60.30
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0393-C3	50.20
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BVT0393-C3	52.80
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	ADS0393-C3	57.70
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0393-C3	61.00
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	CHT0393-C3	64.70
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	DHE0400-C3	50.20
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FKB0400-C3	50.20
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BVT0400-C3	52.80
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GKT0400-C3	52.80
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	ADS0400-C3	57.70
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HDV0400-C3	57.70
.0400	#60	1.016 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0400-C3	61.00
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	CHT0400-C3	64.70
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	DHE0410-C3	50.20
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BVT0410-C3	52.80
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	ADS0410-C3	57.70
.0410	#59	1.041 mm		12.00 mm	(10x)	3 mm	50 mm	EXP0410-C3	61.00
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	CHT0410-C3	64.70
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	DHE0420-C3	50.20
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BVT0420-C3	52.80
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	ADS0420-C3	57.70
.0420	#58	1.066 mm		12.50 mm	(10x)	3 mm	50 mm	EXP0420-C3	61.00
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	CHT0420-C3	64.70
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	DHE0430-C3	50.20
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BVT0430-C3	52.80
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	ADS0430-C3	57.70
.0430	#57	1.092 mm		13.00 mm	(10x)	3 mm	50 mm	EXP0430-C3	61.00
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	CHT0430-C3	64.70
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BVT0450-C3	52.80
.0450		1.143 mm		15.50 mm	(12x)	3 mm	50 mm	CHT0450-C3	64.70

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	DHE0465-C3	50.20
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FKB0465-C3	50.20
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GKT0465-C3	52.80
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BVT0465-C3	52.80
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	ADS0465-C3	57.70
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HDV0465-C3	57.70
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	EXP0465-C3	61.00
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	CHT0465-C3	64.70
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	DHE0468-C3	50.20
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FKB0468-C3	50.20
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BVT0468-C3	52.80
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GKT0468-C3	52.80
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	ADS0468-C3	57.70
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HDV0468-C3	57.70
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	EXP0468-C3	61.00
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	CHT0468-C3	64.70
.0492		1.250 mm		8.50 mm	(5x)	3 mm	50 mm	BVT0492-C3	52.80
.0492		1.250 mm		12.00 mm	(8x)	3 mm	50 mm	ADS0492-C3	57.70
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	CHT0492-C3	64.70
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	DHE0500-C3	50.20
.0500		1.270 mm	.240		(3x)	1/8	2	FKB0500-C3	50.20
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BVT0500-C3	52.80
.0500		1.270 mm	.340		(5x)	1/8	2	GKT0500-C3	52.80
.0500		1.270 mm	.480		(8x)	1/8	2	HDV0500-C3	57.70
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	ADS0500-C3	57.70
.0500		1.270 mm		15.00 mm	(10x)	3 mm	50 mm	EXP0500-C3	61.00
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	CHT0500-C3	64.70
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	DHE0520-C3	50.20
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FKB0520-C3	50.20
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BVT0520-C3	52.80
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GKT0520-C3	52.80
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HDV0520-C3	57.70
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	ADS0520-C3	57.70
.0520	#55	1.320 mm		15.50 mm	(10x)	3 mm	50 mm	EXP0520-C3	61.00
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	CHT0520-C3	64.70
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	DHE0550-C3	50.20
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FKB0550-C3	50.20
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BVT0550-C3	52.80
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GKT0550-C3	52.80
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	ADS0550-C3	57.70
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HDV0550-C3	57.70
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	EXP0550-C3	61.00
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	CHT0550-C3	64.70

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		
inch	wire	metric	inch	metric	hole depth					
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$	
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	DHE0590-C3	54.40	
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BVT0590-C3	56.80	
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	ADS0590-C3	61.90	
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	EXP0590-C3	65.60	
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0590-C3	69.20	
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	DHE0595-C3	54.40	
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BVT0595-C3	56.80	
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	ADS0595-C3	61.90	
.0595	#53	1.511 mm		18.00 mm	(10x)	3 mm	63 mm	EXP0595-C3	65.60	
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0595-C3	69.20	
.0600		1.524 mm		7.20 mm	(3x)	3 mm	50 mm	DHE0600-C3	54.40	NEW
.0600		1.524 mm		10.50 mm	(5x)	3 mm	50 mm	BVT0600-C3	56.80	
.0600		1.524 mm		15.00 mm	(8x)	3 mm	50 mm	ADS0600-C3	61.90	NEW
.0600		1.524 mm		21.00 mm	(12x)	3 mm	63 mm	CHT0600-C3	69.20	
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FKB0625-C3	54.40	
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	DHE0625-C3	54.40	
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BVT0625-C3	56.80	
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GKT0625-C3	56.80	
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HDV0625-C3	61.90	
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	ADS0625-C3	61.90	
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	EXP0625-C3	65.60	
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	CHT0625-C3	69.20	
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	DHE0635-C3	54.40	
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BVT0635-C3	56.80	
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	ADS0635-C3	61.90	
.0635	#52	1.612 mm		19.00 mm	(10x)	3 mm	63 mm	EXP0635-C3	65.60	
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	CHT0635-C3	69.20	
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	DHE0670-C3	54.40	
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BVT0670-C3	56.80	
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	ADS0670-C3	61.90	
.0670	#51	1.701 mm		20.00 mm	(10x)	3 mm	63 mm	EXP0670-C3	65.60	
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	CHT0670-C3	69.20	
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	DHE0700-C3	54.40	
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FKB0700-C3	54.40	
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BVT0700-C3	56.80	
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GKT0700-C3	56.80	
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HDV0700-C3	61.90	
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	ADS0700-C3	61.90	
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	EXP0700-C3	65.60	
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	CHT0700-C3	69.20	
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	DHE0730-C3	54.40	
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BVT0730-C3	56.80	
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	ADS0730-C3	61.90	
.0730	#49	1.854 mm		22.00 mm	(10x)	3 mm	63 mm	EXP0730-C3	65.60	
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	CHT0730-C3	69.20	

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	DHE0760-C3	54.40
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BVT0760-C3	56.80
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	ADS0760-C3	61.90
.0760	#48	1.930 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0760-C3	65.60
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0760-C3	69.20
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	DHE0781-C3	54.40
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FKB0781-C3	54.40
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GKT0781-C3	56.80
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BVT0781-C3	56.80
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HDV0781-C3	61.90
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	ADS0781-C3	61.90
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0781-C3	63.80
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0781-C3	69.20
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	DHE0785-C3	54.40
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BVT0785-C3	56.80
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	ADS0785-C3	61.90
.0785	#47	1.993 mm		23.00 mm	(10x)	3 mm	63 mm	EXP0785-C3	65.60
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	CHT0785-C3	69.20
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	DHE0787-C3	54.40
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BVT0787-C3	61.40
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	ADS0787-C3	66.40
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0787-C3	70.40
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0787-C3	74.10
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	DHE0800-C3	54.40
.0800		2.032 mm	.380		(3x)	3/16	2	FKB0800-C3	54.40
.0800		2.032 mm		13.50 mm	(5x)	4 mm	50 mm	BVT0800-C3	61.40
.0800		2.032 mm	.540		(5x)	3/16	2	GKT0800-C3	61.40
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HDV0800-C3	66.40
.0800		2.032 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0800-C3	74.10
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	DHE0810-C3	54.40
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BVT0810-C3	61.40
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	ADS0810-C3	66.40
.0810	#46	2.057 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0810-C3	70.40
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	CHT0810-C3	74.10
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	DHE0820-C3	54.40
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BVT0820-C3	61.40
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	ADS0820-C3	66.40
.0820	#45	2.082 mm		24.00 mm	(10x)	4 mm	63 mm	EXP0820-C3	70.40
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	CHT0820-C3	74.10
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FKB0860-C3	54.40
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	DHE0860-C3	54.40
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BVT0860-C3	61.40
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GKT0860-C3	61.40
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	ADS0860-C3	66.40
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HDV0860-C3	66.40
.0860	#44	2.184 mm		26.00 mm	(10x)	4 mm	63 mm	EXP0860-C3	70.40
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	CHT0860-C3	74.10

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	DHE0890-C3	54.40
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FKB0890-C3	54.40
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BVT0890-C3	61.40
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GKT0890-C3	61.40
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	ADS0890-C3	66.40
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HDV0890-C3	66.40
.0890	#43	2.260 mm		27.00 mm	(10x)	4 mm	63 mm	EXP0890-C3	70.40
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	CHT0890-C3	74.10
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BVT0900-C3	61.40
.0900		2.286 mm		31.00 mm	(12x)	4 mm	75 mm	CHT0900-C3	74.10
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0935-C3	54.40
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0935-C3	61.40
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	ADS0935-C3	66.40
.0935	#42	2.374 mm		28.00 mm	(10x)	4 mm	63 mm	EXP0935-C3	70.40
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	CHT0935-C3	74.10
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FKB0937-C3	58.20
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0937-C3	58.20
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0937-C3	61.40
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GKT0937-C3	61.40
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	ADS0937-C3	66.40
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HDV0937-C3	66.40
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	EXP0937-C3	70.40
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	CHT0937-C3	73.90
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	DHE0960-C3	58.20
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FKB0960-C3	58.20
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BVT0960-C3	61.40
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GKT0960-C3	61.40
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HDV0960-C3	66.40
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0960-C3	66.40
.0960	#41	2.438 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0960-C3	70.40
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0960-C3	73.90
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0980-C3	58.20
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0980-C3	61.40
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0980-C3	66.40
.0980	#40	2.489 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0980-C3	70.40
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0980-C3	73.90
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0984-C3	61.60
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0984-C3	65.40
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	ADS0984-C3	70.50
.0984		2.500 mm		29.00 mm	(10x)	4 mm	75 mm	EXP0984-C3	74.10
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	CHT0984-C3	78.00
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	DHE0995-C3	61.60
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FKB0995-C3	61.60
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BVT0995-C3	65.40
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GKT0995-C3	65.40
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HDV0995-C3	70.50

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	ADS0995-C3	70.50
.0995	#39	2.527 mm		30.00 mm	(10x)	4 mm	75 mm	EXP0995-C3	74.10
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	CHT0995-C3	78.00
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	DHE1000-C3	61.60
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BVT1000-C3	65.40
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	ADS1000-C3	70.50
.1000		2.540 mm		30.00 mm	(10x)	4 mm	75 mm	EXP1000-C3	74.10
.1000		2.540 mm		35.00 mm	(12x)	4 mm	75 mm	CHT1000-C3	78.00
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	DHE1015-C3	61.60
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BVT1015-C3	65.40
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	ADS1015-C3	70.50
.1015	#38	2.578 mm		30.00 mm	(10x)	4 mm	75 mm	EXP1015-C3	74.10
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	CHT1015-C3	78.00
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	DHE1040-C3	61.60
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BVT1040-C3	65.40
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	ADS1040-C3	70.50
.1040	#37	2.641 mm		31.00 mm	(10x)	4 mm	75 mm	EXP1040-C3	74.10
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	CHT1040-C3	78.00
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	DHE1065-C3	61.60
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BVT1065-C3	65.40
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	ADS1065-C3	70.50
.1065	#36	2.705 mm		32.00 mm	(10x)	4 mm	75 mm	EXP1065-C3	74.10
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	CHT1065-C3	78.00
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	DHE1093-C3	61.60
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1093-C3	65.40
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1093-C3	70.50
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1093-C3	74.10
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	CHT1093-C3	78.00
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FKB1100-C3	61.60
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1100-C3	61.60
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1100-C3	65.40
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GKT1100-C3	65.40
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HDV1100-C3	70.50
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1100-C3	70.50
.1100	#35	2.794 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1100-C3	74.10
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	CHT1100-C3	78.00
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1110-C3	61.60
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1110-C3	65.40
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	ADS1110-C3	70.50
.1110	#34	2.819 mm		33.00 mm	(10x)	4 mm	75 mm	EXP1110-C3	74.10
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	CHT1110-C3	78.00
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	DHE1130-C3	61.60
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BVT1130-C3	65.40
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	ADS1130-C3	70.50
.1130	#33	2.870 mm		34.00 mm	(10x)	4 mm	75 mm	EXP1130-C3	74.10
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	CHT1130-C3	78.00

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	DHE1160-C3	61.60
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FKB1160-C3	61.60
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BVT1160-C3	65.40
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GKT1160-C3	65.40
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HDV1160-C3	78.60
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	CHT1160-C3	78.00
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	DHE1181-C3	61.60
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BVT1181-C3	65.40
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	ADS1181-C3	70.50
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	EXP1181-C3	74.10
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	CHT1181-C3	78.00
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	DHE1200-C3	69.00
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FKB1200-C3	69.00
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GKT1200-C3	73.10
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1200-C3	73.10
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	ADS1200-C3	78.60
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HDV1200-C3	78.60
.1200	#31	3.048 mm		36.00 mm	(10x)	6 mm	100 mm	EXP1200-C3	82.40
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	CHT1200-C3	86.20
.1240		3.149 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1240-C3	73.10
.1240		3.149 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1240-C3	86.20
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	DHE1250-C3	69.00
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FKB1250-C3	69.00
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BVT1250-C3	73.10
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GKT1250-C3	73.10
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HDV1250-C3	78.60
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	ADS1250-C3	78.60
.1250 (1/8)		3.175 mm		37.00 mm	(10x)	6 mm	100 mm	EXP1250-C3	82.40
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1250-C3	86.20
.1260		3.200 mm		22.00 mm	(5x)	6 mm	63 mm	BVT1260-C3	73.10
.1260		3.200 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1260-C3	86.20
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FKB1285-C3	69.00
.1285	#30	3.263 mm		22.00 mm	(5x)	6 mm	63 mm	BVT1285-C3	73.10
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GKT1285-C3	73.10
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HDV1285-C3	78.60
.1285	#30	3.263 mm		44.00 mm	(12x)	6 mm	100 mm	CHT1285-C3	86.20
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	DHE1360-C3	69.00
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BVT1360-C3	73.10
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	ADS1360-C3	78.60
.1360	#29	3.454 mm		40.00 mm	(10x)	6 mm	100 mm	EXP1360-C3	82.40
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	CHT1360-C3	86.20
.1405	#28	3.568 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1405-C3	73.10
.1405	#28	3.568 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1405-C3	86.20

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	2 FL	USD$
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	DHE1406-C3	69.00
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1406-C3	73.10
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	ADS1406-C3	78.60
.1406 (9/64)		3.571 mm		42.00 mm	(10x)	6 mm	100 mm	EXP1406-C3	82.40
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1406-C3	86.20
.1417		3.600 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1417-C3	73.10
.1417		3.600 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1417-C3	86.20
.1440	#27	3.657 mm		24.00 mm	(5x)	6 mm	75 mm	BVT1440-C3	73.10
.1440	#27	3.657 mm		50.00 mm	(12x)	6 mm	100 mm	CHT1440-C3	86.20
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	DHE1470-C3	69.00
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1470-C3	73.10
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	ADS1470-C3	78.60
.1470	#26	3.733 mm		44.00 mm	(10x)	6 mm	100 mm	EXP1470-C3	82.40
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	CHT1470-C3	86.20
.1495	#25	3.797 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1495-C3	73.10
.1495	#25	3.797 mm		52.00 mm	(12x)	6 mm	100 mm	CHT1495-C3	86.20
.1520	#24	3.860 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1520-C3	73.10
.1520	#24	3.860 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1520-C3	86.20
.1540	#23	3.911 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1540-C3	73.10
.1540	#23	3.911 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1540-C3	86.20
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1562-C3	69.00
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1562-C3	73.10
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1562-C3	78.60
.1562 (5/32)		3.968 mm		46.00 mm	(10x)	6 mm	100 mm	EXP1562-C3	82.40
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1562-C3	86.20
.1570	#22	3.987 mm		26.00 mm	(5x)	6 mm	75 mm	BVT1570-C3	73.10
.1570	#22	3.987 mm		54.00 mm	(12x)	6 mm	100 mm	CHT1570-C3	86.20
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1574-C3	69.00
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1574-C3	73.10
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1574-C3	78.60
.1574		4.000 mm		48.00 mm	(10x)	6 mm	100 mm	EXP1574-C3	82.40
.1574		4.000 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1574-C3	86.20
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	DHE1590-C3	69.00
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1590-C3	73.10
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	ADS1590-C3	78.60
.1590	#21	4.038 mm		48.00 mm	(10x)	6 mm	100 mm	EXP1590-C3	82.40
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1590-C3	86.20
.1610	#20	4.089 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1610-C3	73.10
.1610	#20	4.089 mm		56.00 mm	(12x)	6 mm	100 mm	CHT1610-C3	86.20
.1660	#19	4.216 mm		28.00 mm	(5x)	6 mm	75 mm	BVT1660-C3	73.10
.1660	#19	4.216 mm		58.00 mm	(12x)	6 mm	100 mm	CHT1660-C3	86.20
.1695	#18	4.305 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1695-C3	73.10
.1695	#18	4.305 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1695-C3	86.20

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MINIATURE HIGH PERFORMANCE DRILLS

Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	DHE1718-C3	69.00
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1718-C3	73.10
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	ADS1718-C3	78.60
.1718 (11/64)		4.365 mm		52.00 mm	(10x)	6 mm	100 mm	EXP1718-C3	82.40
.1718 (11/64)		4.365 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1718-C3	86.20
.1730	#17	4.394 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1730-C3	73.10
.1730	#17	4.394 mm		60.00 mm	(12x)	6 mm	100 mm	CHT1730-C3	86.20
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	DHE1770-C3	69.00
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1770-C3	73.10
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	ADS1770-C3	78.60
.1770	#16	4.495 mm		52.00 mm	(10x)	6 mm	100 mm	EXP1770-C3	82.40
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	CHT1770-C3	86.20
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	DHE1800-C3	69.00
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BVT1800-C3	73.10
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	ADS1800-C3	78.60
.1800	#15	4.572 mm		54.00 mm	(10x)	6 mm	100 mm	EXP1800-C3	82.40
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	CHT1800-C3	86.20
.1820	#14	4.622 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1820-C3	73.10
.1820	#14	4.622 mm		64.00 mm	(12x)	6 mm	125 mm	CHT1820-C3	86.20
.1850	#13	4.700 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1850-C3	73.10
.1850	#13	4.700 mm		64.00 mm	(12x)	6 mm	125 mm	CHT1850-C3	86.20
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FKB1875-C3	69.00
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	DHE1875-C3	69.00
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1875-C3	73.10
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GKT1875-C3	73.10
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	ADS1875-C3	78.60
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HDV1875-C3	78.60
.1875 (3/16)		4.762 mm		56.00 mm	(10x)	6 mm	100 mm	EXP1875-C3	82.40
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1875-C3	86.20
.1890	#12	4.800 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1890-C3	73.10
.1890	#12	4.800 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1890-C3	86.20
.1910	#11	4.851 mm		32.00 mm	(5x)	6 mm	75 mm	BVT1910-C3	73.10
.1910	#11	4.851 mm		66.00 mm	(12x)	6 mm	125 mm	CHT1910-C3	86.20
.1935	#10	4.914 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1935-C3	73.10
.1935	#10	4.914 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1935-C3	86.20
.1960	#9	4.978 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1960-C3	73.10
.1960	#9	4.978 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1960-C3	86.20
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	DHE1968-C3	69.00
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1968-C3	73.10
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	ADS1968-C3	78.60
.1968		5.000 mm		58.00 mm	(10x)	6 mm	100 mm	EXP1968-C3	82.40
.1968		5.000 mm		68.00 mm	(12x)	6 mm	125 mm	CHT1968-C3	86.20
.1990	#8	5.054 mm		34.00 mm	(5x)	6 mm	75 mm	BVT1990-C3	73.10
.1990	#8	5.054 mm		70.00 mm	(12x)	6 mm	125 mm	CHT1990-C3	86.20

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Prehardened Steels (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	2 FL	USD$
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	DHE2009-C3	69.00
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2009-C3	73.10
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	ADS2009-C3	78.60
.2009	#7	5.105 mm		60.00 mm	(10x)	6 mm	100 mm	EXP2009-C3	82.40
.2009	#7	5.105 mm		70.00 mm	(12x)	6 mm	125 mm	CHT2009-C3	86.20
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	DHE2031-C3	69.00
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2031-C3	73.10
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	ADS2031-C3	78.60
.2031 (13/64)		5.159 mm		60.00 mm	(10x)	6 mm	100 mm	EXP2031-C3	82.40
.2031 (13/64)		5.159 mm		70.00 mm	(12x)	6 mm	125 mm	CHT2031-C3	86.20
.2040	#6	5.181 mm		34.00 mm	(5x)	6 mm	75 mm	BVT2040-C3	73.10
.2040	#6	5.181 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2040-C3	86.20
.2055	#5	5.219 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2055-C3	73.10
.2055	#5	5.219 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2055-C3	86.20
.2090	#4	5.308 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2090-C3	73.10
.2090	#4	5.308 mm		72.00 mm	(12x)	6 mm	125 mm	CHT2090-C3	86.20
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	DHE2129-C3	69.00
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BVT2129-C3	73.10
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	ADS2129-C3	78.60
.2129	#3	5.410 mm		64.00 mm	(10x)	6 mm	125 mm	EXP2129-C3	82.40
.2129	#3	5.410 mm		74.00 mm	(12x)	6 mm	125 mm	CHT2129-C3	86.20
.2165		5.500 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2165-C3	73.10
.2165		5.500 mm		76.00 mm	(12x)	6 mm	125 mm	CHT2165-C3	86.20
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	DHE2187-C3	69.00
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2187-C3	73.10
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	ADS2187-C3	78.60
.2187 (7/32)		5.556 mm		66.00 mm	(10x)	6 mm	125 mm	EXP2187-C3	82.40
.2187 (7/32)		5.556 mm		76.00 mm	(12x)	6 mm	125 mm	CHT2187-C3	86.20
.2205		5.600 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2205-C3	73.10
.2205		5.600 mm		78.00 mm	(12x)	6 mm	125 mm	CHT2205-C3	86.20
.2210	#2	5.613 mm		38.00 mm	(5x)	6 mm	100 mm	BVT2210-C3	73.10
.2210	#2	5.613 mm		78.00 mm	(12x)	6 mm	125 mm	CHT2210-C3	86.20
.2280	#1	5.791 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2280-C3	73.10
.2280	#1	5.791 mm		80.00 mm	(12x)	6 mm	125 mm	CHT2280-C3	86.20
.2340	A	5.943 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2340-C3	73.10
.2340	A	5.943 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2340-C3	86.20
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	DHE2343-C3	69.00
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2343-C3	73.10
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	ADS2343-C3	78.60
.2343 (15/64)		5.953 mm		70.00 mm	(10x)	6 mm	125 mm	EXP2343-C3	82.40
.2343 (15/64)		5.953 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2343-C3	86.20
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	DHE2362-C3	69.00
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BVT2362-C3	73.10
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	ADS2362-C3	78.60
.2362		6.000 mm		70.00 mm	(10x)	6 mm	125 mm	EXP2362-C3	82.40
.2362		6.000 mm		82.00 mm	(12x)	6 mm	125 mm	CHT2362-C3	86.20

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Prehardened Steels (cont.)

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH inch	metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED 2 FL	USD$	
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1			
.2380	B	6.045 mm		40.00 mm	(5x)	8 mm	100 mm	BVT2380-C3	75.70	
.2380	B	6.045 mm		84.00 mm	(12x)	8 mm	125 mm	CHT2380-C3	89.00	
.2420	C	6.146 mm		30.00 mm	(3x)	8 mm	75 mm	DHE2420-C3	71.60	NEW
.2420	C	6.146 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2420-C3	75.70	
.2420	C	6.146 mm		84.00 mm	(12x)	8 mm	125 mm	CHT2420-C3	89.00	
.2460	D	6.248 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2460-C3	75.70	
.2460	D	6.248 mm		86.00 mm	(12x)	8 mm	150 mm	CHT2460-C3	89.00	
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	DHE2500-C3	69.00	
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FKB2500-C3	69.00	
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BVT2500-C3	73.10	
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GKT2500-C3	73.10	
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HDV2500-C3	78.60	
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	ADS2500-C3	78.60	
.2500 (1/4)	E	6.350 mm		74.00 mm	(10x)	8 mm	125 mm	EXP2500-C3	82.40	
.2500 (1/4)	E	6.350 mm		88.00 mm	(12x)	8 mm	150 mm	CHT2500-C3	86.20	
.2570	F	6.528 mm		32.00 mm	(3x)	8 mm	75 mm	DHE2570-C3	69.00	
.2812 (9/32)		7.142 mm		34.00 mm	(3x)	8 mm	75 mm	DHE2812-C3	69.00	
.3125 (5/16)		7.937 mm		38.00 mm	(3x)	8 mm	100 mm	DHE3125-C3	70.90	
.3150		8.000 mm		38.00 mm	(3x)	8 mm	100 mm	DHE3150-C3	70.90	
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	DHE3750-C3	85.50	

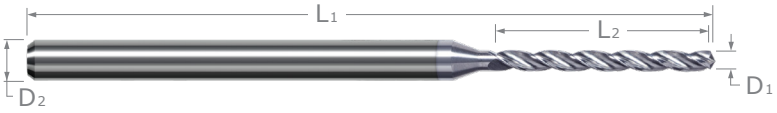
SPEEDS & FEEDS (Miniature High Performance Drills – Prehardened Steels)

Important Note: Values in table are in inches and are based on 3x and 5x drill lengths and a material hardness of 29-37 Rc. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). For ferrous materials at 38-45 Rc, reduce IPR (for 3x and 5x, reduce to 80%; for 8x and 10x, reduce to 60%; for 12x, reduce to 52%). Pecking cycles are recommended to avoid chip packing and breakage. For materials at 29-37 Rc, initial peck depth should be 2-3x Diameter with each subsequent peck at 1-2x Diameter. For materials at 38-45 Rc, initial peck depth should be 1-2x Diameter with each subsequent peck at .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050	.01575
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050	.01575
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960	.01440
D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600	.00900

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys



Available for 3x, 5x, 8x 10x, and 12x Hole Depths!

- Optimized for drilling aluminum and aluminum alloys with excellent performance in unfilled plastics, copper, brass, and bronze alloys
- Specialized 3 flute design for maximized chip flow, hole accuracy, and finish
- 130° point angle
- Polished flute valleys and TiB2 coating prevent built-up edge and extend tool life
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Special 3 Flute Design to Maximize Chip Flow, Hole Accuracy, and Finish

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	3 FL	USD$
.0150		.381 mm		1.80 mm	(3x)	3 mm	50 mm	AVA0150-C8	49.70
.0150		.381 mm		2.60 mm	(5x)	3 mm	50 mm	BAF0150-C8	53.90
.0150		.381 mm		5.20 mm	(12x)	3 mm	50 mm	DQW0150-C8	65.90
.0156 (1/64)		.396 mm		1.90 mm	(3x)	3 mm	50 mm	AVA0156-C8	49.70
.0156 (1/64)		.396 mm		2.70 mm	(5x)	3 mm	50 mm	BAF0156-C8	53.90
.0156 (1/64)		.396 mm		3.90 mm	(8x)	3 mm	50 mm	CBG0156-C8	59.10
.0156 (1/64)		.396 mm		4.70 mm	(10x)	3 mm	50 mm	ERY0156-C8	62.50
.0156 (1/64)		.396 mm		5.40 mm	(12x)	3 mm	50 mm	DQW0156-C8	65.90
.0160	#78	.406 mm		2.00 mm	(3x)	3 mm	50 mm	AVA0160-C8	49.70
.0160	#78	.406 mm		2.70 mm	(5x)	3 mm	50 mm	BAF0160-C8	53.90
.0160	#78	.406 mm		4.00 mm	(8x)	3 mm	50 mm	CBG0160-C8	59.10
.0160	#78	.406 mm		4.80 mm	(10x)	3 mm	50 mm	ERY0160-C8	62.50
.0160	#78	.406 mm		5.60 mm	(12x)	3 mm	50 mm	DQW0160-C8	65.90
.0170		.431 mm		2.90 mm	(5x)	3 mm	50 mm	BAF0170-C8	53.90
.0170		.431 mm		6.00 mm	(12x)	3 mm	50 mm	DQW0170-C8	65.90
.0180	#77	.457 mm		2.20 mm	(3x)	3 mm	50 mm	AVA0180-C8	49.70
.0180	#77	.457 mm		3.10 mm	(5x)	3 mm	50 mm	BAF0180-C8	53.90
.0180	#77	.457 mm		4.50 mm	(8x)	3 mm	50 mm	CBG0180-C8	59.10
.0180	#77	.457 mm		5.40 mm	(10x)	3 mm	50 mm	ERY0180-C8	62.50
.0180	#77	.457 mm		6.20 mm	(12x)	3 mm	50 mm	DQW0180-C8	65.90
.0190		.482 mm		3.30 mm	(5x)	3 mm	50 mm	BAF0190-C8	53.90
.0190		.482 mm		6.60 mm	(12x)	3 mm	50 mm	DQW0190-C8	65.90
.0196		.500 mm		2.40 mm	(3x)	3 mm	50 mm	AVA0196-C8	49.00
.0196		.500 mm		3.40 mm	(5x)	3 mm	50 mm	BAF0196-C8	53.20
.0196		.500 mm		4.90 mm	(8x)	3 mm	50 mm	CBG0196-C8	58.50
.0196		.500 mm		5.80 mm	(10x)	3 mm	50 mm	ERY0196-C8	61.60
.0196		.500 mm		6.80 mm	(12x)	3 mm	50 mm	DQW0196-C8	65.10
.0200	#76	.508 mm		2.40 mm	(3x)	3 mm	50 mm	AVA0200-C8	49.00
.0200	#76	.508 mm		3.40 mm	(5x)	3 mm	50 mm	BAF0200-C8	53.20
.0200	#76	.508 mm		5.00 mm	(8x)	3 mm	50 mm	CBG0200-C8	58.50
.0200	#76	.508 mm		6.00 mm	(10x)	3 mm	50 mm	ERY0200-C8	61.60
.0200	#76	.508 mm		7.00 mm	(12x)	3 mm	50 mm	DQW0200-C8	65.10

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0210	#75	.533 mm		2.50 mm	(3x)	3 mm	50 mm	AVA0210-C8	49.00
.0210	#75	.533 mm		3.60 mm	(5x)	3 mm	50 mm	BAF0210-C8	53.20
.0210	#75	.533 mm		5.20 mm	(8x)	3 mm	50 mm	CBG0210-C8	58.50
.0210	#75	.533 mm		6.20 mm	(10x)	3 mm	50 mm	ERY0210-C8	61.60
.0210	#75	.533 mm		7.40 mm	(12x)	3 mm	50 mm	DQW0210-C8	65.10
.0220		.558 mm		3.80 mm	(5x)	3 mm	50 mm	BAF0220-C8	53.20
.0220		.558 mm		7.60 mm	(12x)	3 mm	50 mm	DQW0220-C8	65.10
.0225	#74	.571 mm		2.70 mm	(3x)	3 mm	50 mm	AVA0225-C8	50.60
.0225	#74	.571 mm		3.90 mm	(5x)	3 mm	50 mm	BAF0225-C8	53.20
.0225	#74	.571 mm		5.60 mm	(8x)	3 mm	50 mm	CBG0225-C8	58.50
.0225	#74	.571 mm		6.80 mm	(10x)	3 mm	50 mm	ERY0225-C8	61.60
.0225	#74	.571 mm		7.80 mm	(12x)	3 mm	50 mm	DQW0225-C8	65.10
.0230		.584 mm		3.90 mm	(5x)	3 mm	50 mm	BAF0230-C8	53.20
.0230		.584 mm		8.00 mm	(12x)	3 mm	50 mm	DQW0230-C8	65.10
.0236		.600 mm		4.00 mm	(5x)	3 mm	50 mm	BAF0236-C8	53.20
.0236		.600 mm		8.20 mm	(12x)	3 mm	50 mm	DQW0236-C8	65.10
.0236		.600 mm		10.00 mm	(15x)	3 mm	50 mm	FAE0236-C8	76.70
.0240	#73	.609 mm		2.90 mm	(3x)	3 mm	50 mm	AVA0240-C8	49.00
.0240	#73	.609 mm		4.20 mm	(5x)	3 mm	50 mm	BAF0240-C8	53.20
.0240	#73	.609 mm		6.00 mm	(8x)	3 mm	50 mm	CBG0240-C8	58.50
.0240	#73	.609 mm		7.20 mm	(10x)	3 mm	50 mm	ERY0240-C8	61.60
.0240	#73	.609 mm		8.40 mm	(12x)	3 mm	50 mm	DQW0240-C8	65.10
.0250	#72	.635 mm		3.00 mm	(3x)	3 mm	50 mm	AVA0250-C8	49.00
.0250	#72	.635 mm		4.20 mm	(5x)	3 mm	50 mm	BAF0250-C8	53.20
.0250	#72	.635 mm		6.20 mm	(8x)	3 mm	50 mm	CBG0250-C8	58.50
.0250	#72	.635 mm		7.40 mm	(10x)	3 mm	50 mm	ERY0250-C8	61.60
.0250	#72	.635 mm		8.80 mm	(12x)	3 mm	50 mm	DQW0250-C8	65.10
.0260	#71	.660 mm		3.10 mm	(3x)	3 mm	50 mm	AVA0260-C8	49.00
.0260	#71	.660 mm		4.40 mm	(5x)	3 mm	50 mm	BAF0260-C8	53.20
.0260	#71	.660 mm		6.40 mm	(8x)	3 mm	50 mm	CBG0260-C8	58.50
.0260	#71	.660 mm		7.80 mm	(10x)	3 mm	50 mm	ERY0260-C8	61.60
.0260	#71	.660 mm		9.00 mm	(12x)	3 mm	50 mm	DQW0260-C8	65.10
.0270		.685 mm		4.60 mm	(5x)	3 mm	50 mm	BAF0270-C8	53.20
.0270		.685 mm		9.40 mm	(12x)	3 mm	50 mm	DQW0270-C8	65.10
.0270		.685 mm		11.40 mm	(15x)	3 mm	50 mm	FAE0270-C8	76.70
.0275		.700 mm		4.80 mm	(5x)	3 mm	50 mm	BAF0275-C8	53.20
.0275		.700 mm		9.60 mm	(12x)	3 mm	50 mm	DQW0275-C8	65.10
.0280	#70	.711 mm		3.40 mm	(3x)	3 mm	50 mm	AVA0280-C8	49.00
.0280	#70	.711 mm		4.80 mm	(5x)	3 mm	50 mm	BAF0280-C8	53.20
.0280	#70	.711 mm		7.00 mm	(8x)	3 mm	50 mm	CBG0280-C8	58.50
.0280	#70	.711 mm		8.40 mm	(10x)	3 mm	50 mm	ERY0280-C8	61.60
.0280	#70	.711 mm		9.80 mm	(12x)	3 mm	50 mm	DQW0280-C8	65.10

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0292	#69	.741 mm		3.50 mm	(3x)	3 mm	50 mm	AVA0292-C8	50.60
.0292	#69	.741 mm		5.00 mm	(5x)	3 mm	50 mm	BAF0292-C8	53.20
.0292	#69	.741 mm		7.20 mm	(8x)	3 mm	50 mm	CBG0292-C8	58.50
.0292	#69	.741 mm		8.80 mm	(10x)	3 mm	50 mm	ERY0292-C8	61.60
.0292	#69	.741 mm		10.00 mm	(12x)	3 mm	50 mm	DQW0292-C8	65.10
.0300		.762 mm		5.20 mm	(5x)	3 mm	50 mm	BAF0300-C8	53.20
.0300		.762 mm		10.50 mm	(12x)	3 mm	50 mm	DQW0300-C8	65.10
.0310	#68	.787 mm		3.70 mm	(3x)	3 mm	50 mm	AVA0310-C8	49.00
.0310	#68	.787 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0310-C8	53.20
.0310	#68	.787 mm		7.60 mm	(8x)	3 mm	50 mm	CBG0310-C8	58.50
.0310	#68	.787 mm		9.20 mm	(10x)	3 mm	50 mm	ERY0310-C8	62.20
.0310	#68	.787 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0310-C8	65.90
.0310	#68	.787 mm		13.20 mm	(15x)	3 mm	50 mm	FAE0310-C8	77.10
.0312 (1/32)		.793 mm	.148		(3x)	1/8	2	FSD0312-C8	49.00
.0312 (1/32)		.793 mm		3.80 mm	(3x)	3 mm	50 mm	AVA0312-C8	49.00
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	GNB0312-C8	53.20
.0312 (1/32)		.793 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0312-C8	53.20
.0312 (1/32)		.793 mm	.304		(8x)	1/8	2	HYX0312-C8	58.50
.0312 (1/32)		.793 mm		7.80 mm	(8x)	3 mm	50 mm	CBG0312-C8	58.50
.0312 (1/32)		.793 mm		9.40 mm	(10x)	3 mm	50 mm	ERY0312-C8	62.20
.0312 (1/32)		.793 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0312-C8	65.90
.0315		.800 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0315-C8	53.20
.0315		.800 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0315-C8	65.90
.0320	#67	.812 mm	.152		(3x)	1/8	2	FSD0320-C8	49.00
.0320	#67	.812 mm		3.90 mm	(3x)	3 mm	50 mm	AVA0320-C8	49.00
.0320	#67	.812 mm		5.40 mm	(5x)	3 mm	50 mm	BAF0320-C8	53.20
.0320	#67	.812 mm	.216		(5x)	1/8	2	GNB0320-C8	53.20
.0320	#67	.812 mm	.312		(8x)	1/8	2	HYX0320-C8	58.50
.0320	#67	.812 mm		8.00 mm	(8x)	3 mm	50 mm	CBG0320-C8	58.50
.0320	#67	.812 mm		9.60 mm	(10x)	3 mm	50 mm	ERY0320-C8	62.20
.0320	#67	.812 mm		11.00 mm	(12x)	3 mm	50 mm	DQW0320-C8	65.90
.0330	#66	.838 mm		4.00 mm	(3x)	3 mm	50 mm	AVA0330-C8	49.00
.0330	#66	.838 mm		5.60 mm	(5x)	3 mm	50 mm	BAF0330-C8	53.20
.0330	#66	.838 mm		8.20 mm	(8x)	3 mm	50 mm	CBG0330-C8	58.50
.0330	#66	.838 mm		9.80 mm	(10x)	3 mm	50 mm	ERY0330-C8	62.20
.0330	#66	.838 mm		11.50 mm	(12x)	3 mm	50 mm	DQW0330-C8	65.90
.0350	#65	.889 mm		4.20 mm	(3x)	3 mm	50 mm	AVA0350-C8	49.00
.0350	#65	.889 mm	.168		(3x)	1/8	2	FSD0350-C8	49.00
.0350	#65	.889 mm		6.00 mm	(5x)	3 mm	50 mm	BAF0350-C8	53.20
.0350	#65	.889 mm	.240		(5x)	1/8	2	GNB0350-C8	53.20
.0350	#65	.889 mm		8.60 mm	(8x)	3 mm	50 mm	CBG0350-C8	58.50
.0350	#65	.889 mm	.340		(8x)	1/8	2	HYX0350-C8	58.50
.0350	#65	.889 mm		10.50 mm	(10x)	3 mm	50 mm	ERY0350-C8	62.20
.0350	#65	.889 mm		12.00 mm	(12x)	3 mm	50 mm	DQW0350-C8	65.90

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0354		.900 mm		6.00 mm	(5x)	3 mm	50 mm	BAF0354-C8	53.20
.0354		.900 mm		12.50 mm	(12x)	3 mm	50 mm	DQW0354-C8	65.90
.0360	#64	.914 mm		4.40 mm	(3x)	3 mm	50 mm	AVA0360-C8	49.00
.0360	#64	.914 mm		6.20 mm	(5x)	3 mm	50 mm	BAF0360-C8	53.20
.0360	#64	.914 mm		9.00 mm	(8x)	3 mm	50 mm	CBG0360-C8	58.50
.0360	#64	.914 mm		10.50 mm	(10x)	3 mm	50 mm	ERY0360-C8	62.20
.0360	#64	.914 mm		12.50 mm	(12x)	3 mm	50 mm	DQW0360-C8	65.90
.0370	#63	.939 mm		4.40 mm	(3x)	3 mm	50 mm	AVA0370-C8	50.60
.0370	#63	.939 mm		6.40 mm	(5x)	3 mm	50 mm	BAF0370-C8	53.20
.0370	#63	.939 mm		9.20 mm	(8x)	3 mm	50 mm	CBG0370-C8	58.50
.0370	#63	.939 mm		11.00 mm	(10x)	3 mm	50 mm	ERY0370-C8	62.20
.0370	#63	.939 mm		13.00 mm	(12x)	3 mm	50 mm	DQW0370-C8	65.90
.0380	#62	.965 mm		4.60 mm	(3x)	3 mm	50 mm	AVA0380-C8	49.00
.0380	#62	.965 mm		6.60 mm	(5x)	3 mm	50 mm	BAF0380-C8	53.20
.0380	#62	.965 mm		9.40 mm	(8x)	3 mm	50 mm	CBG0380-C8	58.50
.0380	#62	.965 mm		11.50 mm	(10x)	3 mm	50 mm	ERY0380-C8	62.20
.0380	#62	.965 mm		13.50 mm	(12x)	3 mm	50 mm	DQW0380-C8	65.90
.0390	#61	.990 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0390-C8	49.00
.0390	#61	.990 mm		6.60 mm	(5x)	3 mm	50 mm	BAF0390-C8	53.20
.0390	#61	.990 mm		9.60 mm	(8x)	3 mm	50 mm	CBG0390-C8	58.50
.0390	#61	.990 mm		11.50 mm	(10x)	3 mm	50 mm	ERY0390-C8	62.20
.0390	#61	.990 mm		13.50 mm	(12x)	3 mm	50 mm	DQW0390-C8	65.90
.0393		1.000 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0393-C8	52.60
.0393		1.000 mm		6.80 mm	(5x)	3 mm	50 mm	BAF0393-C8	55.50
.0393		1.000 mm		9.80 mm	(8x)	3 mm	50 mm	CBG0393-C8	60.00
.0393		1.000 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0393-C8	63.60
.0393		1.000 mm		14.00 mm	(12x)	3 mm	50 mm	DQW0393-C8	67.20
.0400	#60	1.016 mm		4.80 mm	(3x)	3 mm	50 mm	AVA0400-C8	51.20
.0400	#60	1.016 mm	.192		(3x)	1/8	2	FSD0400-C8	51.20
.0400	#60	1.016 mm		6.80 mm	(5x)	3 mm	50 mm	BAF0400-C8	55.50
.0400	#60	1.016 mm	.272		(5x)	1/8	2	GNB0400-C8	55.50
.0400	#60	1.016 mm		10.00 mm	(8x)	3 mm	50 mm	CBG0400-C8	60.00
.0400	#60	1.016 mm	.400		(8x)	1/8	2	HYX0400-C8	60.00
.0400	#60	1.016 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0400-C8	63.60
.0400	#60	1.016 mm		14.00 mm	(12x)	3 mm	50 mm	DQW0400-C8	67.20
.0410	#59	1.041 mm		5.00 mm	(3x)	3 mm	50 mm	AVA0410-C8	51.20
.0410	#59	1.041 mm		7.00 mm	(5x)	3 mm	50 mm	BAF0410-C8	55.50
.0410	#59	1.041 mm		10.00 mm	(8x)	3 mm	50 mm	CBG0410-C8	60.00
.0410	#59	1.041 mm		12.00 mm	(10x)	3 mm	50 mm	ERY0410-C8	63.60
.0410	#59	1.041 mm		14.50 mm	(12x)	3 mm	50 mm	DQW0410-C8	67.20
.0420	#58	1.066 mm		5.00 mm	(3x)	3 mm	50 mm	AVA0420-C8	51.20
.0420	#58	1.066 mm		7.20 mm	(5x)	3 mm	50 mm	BAF0420-C8	55.50
.0420	#58	1.066 mm		10.50 mm	(8x)	3 mm	50 mm	CBG0420-C8	60.00
.0420	#58	1.066 mm		12.50 mm	(10x)	3 mm	50 mm	ERY0420-C8	63.60
.0420	#58	1.066 mm		14.50 mm	(12x)	3 mm	50 mm	DQW0420-C8	67.20

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	3 FL	USD$
.0430	#57	1.092 mm		5.20 mm	(3x)	3 mm	50 mm	AVA0430-C8	51.20
.0430	#57	1.092 mm		7.40 mm	(5x)	3 mm	50 mm	BAF0430-C8	55.50
.0430	#57	1.092 mm		10.50 mm	(8x)	3 mm	50 mm	CBG0430-C8	60.00
.0430	#57	1.092 mm		13.00 mm	(10x)	3 mm	50 mm	ERY0430-C8	63.60
.0430	#57	1.092 mm		15.00 mm	(12x)	3 mm	50 mm	DQW0430-C8	67.20
.0450		1.143 mm		7.80 mm	(5x)	3 mm	50 mm	BAF0450-C8	55.50
.0450		1.143 mm		15.50 mm	(12x)	3 mm	50 mm	DQW0450-C8	67.20
.0465	#56	1.181 mm		5.60 mm	(3x)	3 mm	50 mm	AVA0465-C8	52.60
.0465	#56	1.181 mm	.224		(3x)	1/8	2	FSD0465-C8	52.60
.0465	#56	1.181 mm	.312		(5x)	1/8	2	GNB0465-C8	55.50
.0465	#56	1.181 mm		8.00 mm	(5x)	3 mm	50 mm	BAF0465-C8	55.50
.0465	#56	1.181 mm		11.50 mm	(8x)	3 mm	50 mm	CBG0465-C8	60.00
.0465	#56	1.181 mm	.460		(8x)	1/8	2	HYX0465-C8	60.00
.0465	#56	1.181 mm		14.00 mm	(10x)	3 mm	50 mm	ERY0465-C8	63.60
.0465	#56	1.181 mm		16.00 mm	(12x)	3 mm	63 mm	DQW0465-C8	67.20
.0468 (3/64)		1.190 mm		5.60 mm	(3x)	3 mm	50 mm	AVA0468-C8	51.20
.0468 (3/64)		1.190 mm	.224		(3x)	1/8	2	FSD0468-C8	51.20
.0468 (3/64)		1.190 mm		8.00 mm	(5x)	3 mm	50 mm	BAF0468-C8	55.50
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	GNB0468-C8	55.50
.0468 (3/64)		1.190 mm		11.50 mm	(8x)	3 mm	50 mm	CBG0468-C8	60.00
.0468 (3/64)		1.190 mm	.460		(8x)	1/8	2	HYX0468-C8	60.00
.0468 (3/64)		1.190 mm		14.00 mm	(10x)	3 mm	50 mm	ERY0468-C8	63.60
.0468 (3/64)		1.190 mm		16.50 mm	(12x)	3 mm	63 mm	DQW0468-C8	67.20
.0492		1.250 mm		8.50 mm	(5x)	3 mm	50 mm	BAF0492-C8	55.50
.0492		1.250 mm		17.00 mm	(12x)	3 mm	63 mm	DQW0492-C8	67.20
.0500		1.270 mm		6.00 mm	(3x)	3 mm	50 mm	AVA0500-C8	51.20
.0500		1.270 mm	.240		(3x)	1/8	2	FSD0500-C8	51.20
.0500		1.270 mm		8.50 mm	(5x)	3 mm	50 mm	BAF0500-C8	55.50
.0500		1.270 mm	.340		(5x)	1/8	2	GNB0500-C8	55.50
.0500		1.270 mm	.480		(8x)	1/8	2	HYX0500-C8	60.00
.0500		1.270 mm		12.50 mm	(8x)	3 mm	50 mm	CBG0500-C8	60.00
.0500		1.270 mm		15.00 mm	(10x)	3 mm	50 mm	ERY0500-C8	63.60
.0500		1.270 mm		17.50 mm	(12x)	3 mm	63 mm	DQW0500-C8	67.20
.0520	#55	1.320 mm		6.20 mm	(3x)	3 mm	50 mm	AVA0520-C8	52.60
.0520	#55	1.320 mm	.248		(3x)	1/8	2	FSD0520-C8	52.60
.0520	#55	1.320 mm		9.00 mm	(5x)	3 mm	50 mm	BAF0520-C8	55.50
.0520	#55	1.320 mm	.360		(5x)	1/8	2	GNB0520-C8	55.50
.0520	#55	1.320 mm	.500		(8x)	1/8	2	HYX0520-C8	60.00
.0520	#55	1.320 mm		13.00 mm	(8x)	3 mm	50 mm	CBG0520-C8	60.00
.0520	#55	1.320 mm		15.50 mm	(10x)	3 mm	50 mm	ERY0520-C8	63.60
.0520	#55	1.320 mm		18.00 mm	(12x)	3 mm	63 mm	DQW0520-C8	67.20

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L1	3 FL	USD$
.0550	#54	1.397 mm		6.60 mm	(3x)	3 mm	50 mm	AVA0550-C8	52.60
.0550	#54	1.397 mm	.264		(3x)	1/8	2	FSD0550-C8	52.60
.0550	#54	1.397 mm		9.50 mm	(5x)	3 mm	50 mm	BAF0550-C8	55.50
.0550	#54	1.397 mm	.380		(5x)	1/8	2	GNB0550-C8	55.50
.0550	#54	1.397 mm		13.50 mm	(8x)	3 mm	50 mm	CBG0550-C8	60.00
.0550	#54	1.397 mm	.540		(8x)	1/8	2	HYX0550-C8	60.00
.0550	#54	1.397 mm		16.50 mm	(10x)	3 mm	63 mm	ERY0550-C8	63.60
.0550	#54	1.397 mm		19.00 mm	(12x)	3 mm	63 mm	DQW0550-C8	67.20
.0590		1.500 mm		7.20 mm	(3x)	3 mm	50 mm	AVA0590-C8	51.70
.0590		1.500 mm		10.00 mm	(5x)	3 mm	50 mm	BAF0590-C8	56.10
.0590		1.500 mm		14.50 mm	(8x)	3 mm	50 mm	CBG0590-C8	60.00
.0590		1.500 mm		17.50 mm	(10x)	3 mm	63 mm	ERY0590-C8	64.30
.0590		1.500 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0590-C8	68.50
.0595	#53	1.511 mm		7.20 mm	(3x)	3 mm	50 mm	AVA0595-C8	51.70
.0595	#53	1.511 mm		10.00 mm	(5x)	3 mm	50 mm	BAF0595-C8	56.10
.0595	#53	1.511 mm		14.50 mm	(8x)	3 mm	50 mm	CBG0595-C8	60.00
.0595	#53	1.511 mm		18.00 mm	(10x)	3 mm	63 mm	ERY0595-C8	64.30
.0595	#53	1.511 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0595-C8	68.50
.0600		1.524 mm		10.50 mm	(5x)	3 mm	50 mm	BAF0600-C8	56.10
.0600		1.524 mm		21.00 mm	(12x)	3 mm	63 mm	DQW0600-C8	68.50
.0625 (1/16)		1.587 mm	.296		(3x)	1/8	2	FSD0625-C8	51.70
.0625 (1/16)		1.587 mm		7.60 mm	(3x)	3 mm	50 mm	AVA0625-C8	51.70
.0625 (1/16)		1.587 mm		10.50 mm	(5x)	3 mm	50 mm	BAF0625-C8	56.10
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	GNB0625-C8	56.10
.0625 (1/16)		1.587 mm	.600		(8x)	1/8	2	HYX0625-C8	61.20
.0625 (1/16)		1.587 mm		15.50 mm	(8x)	3 mm	50 mm	CBG0625-C8	61.20
.0625 (1/16)		1.587 mm		18.50 mm	(10x)	3 mm	63 mm	ERY0625-C8	64.80
.0625 (1/16)		1.587 mm		22.00 mm	(12x)	3 mm	63 mm	DQW0625-C8	68.50
.0625 (1/16)		1.587 mm		26.50 mm	(15x)	3 mm	63 mm	FAE0625-C8	77.90
.0635	#52	1.612 mm		7.60 mm	(3x)	3 mm	50 mm	AVA0635-C8	53.10
.0635	#52	1.612 mm		11.00 mm	(5x)	3 mm	50 mm	BAF0635-C8	56.10
.0635	#52	1.612 mm		15.50 mm	(8x)	3 mm	50 mm	CBG0635-C8	61.20
.0635	#52	1.612 mm		19.00 mm	(10x)	3 mm	63 mm	ERY0635-C8	64.80
.0635	#52	1.612 mm		22.00 mm	(12x)	3 mm	63 mm	DQW0635-C8	68.50
.0670	#51	1.701 mm		8.00 mm	(3x)	3 mm	50 mm	AVA0670-C8	51.70
.0670	#51	1.701 mm		11.50 mm	(5x)	3 mm	50 mm	BAF0670-C8	56.10
.0670	#51	1.701 mm		16.50 mm	(8x)	3 mm	63 mm	CBG0670-C8	61.20
.0670	#51	1.701 mm		20.00 mm	(10x)	3 mm	63 mm	ERY0670-C8	64.80
.0670	#51	1.701 mm		23.00 mm	(12x)	3 mm	63 mm	DQW0670-C8	68.50
.0700	#50	1.778 mm		8.50 mm	(3x)	3 mm	50 mm	AVA0700-C8	51.70
.0700	#50	1.778 mm	.340		(3x)	1/8	2	FSD0700-C8	51.70
.0700	#50	1.778 mm		12.00 mm	(5x)	3 mm	50 mm	BAF0700-C8	56.10
.0700	#50	1.778 mm	.480		(5x)	1/8	2	GNB0700-C8	56.10
.0700	#50	1.778 mm	.680		(8x)	1/8	2-1/2	HYX0700-C8	61.20
.0700	#50	1.778 mm		17.50 mm	(8x)	3 mm	63 mm	CBG0700-C8	61.20
.0700	#50	1.778 mm		21.00 mm	(10x)	3 mm	63 mm	ERY0700-C8	64.80
.0700	#50	1.778 mm		24.00 mm	(12x)	3 mm	63 mm	DQW0700-C8	68.50

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0730	#49	1.854 mm		9.00 mm	(3x)	3 mm	50 mm	AVA0730-C8	51.70
.0730	#49	1.854 mm		12.50 mm	(5x)	3 mm	50 mm	BAF0730-C8	56.10
.0730	#49	1.854 mm		18.00 mm	(8x)	3 mm	63 mm	CBG0730-C8	61.20
.0730	#49	1.854 mm		22.00 mm	(10x)	3 mm	63 mm	ERY0730-C8	64.80
.0730	#49	1.854 mm		25.00 mm	(12x)	3 mm	63 mm	DQW0730-C8	68.50
.0760	#48	1.930 mm		9.00 mm	(3x)	3 mm	50 mm	AVA0760-C8	51.70
.0760	#48	1.930 mm		13.00 mm	(5x)	3 mm	50 mm	BAF0760-C8	56.10
.0760	#48	1.930 mm		19.00 mm	(8x)	3 mm	63 mm	CBG0760-C8	61.20
.0760	#48	1.930 mm		23.00 mm	(10x)	3 mm	63 mm	ERY0760-C8	64.80
.0760	#48	1.930 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0760-C8	68.50
.0781 (5/64)		1.984 mm		9.50 mm	(3x)	3 mm	50 mm	AVA0781-C8	51.70
.0781 (5/64)		1.984 mm	.380		(3x)	1/8	2	FSD0781-C8	51.70
.0781 (5/64)		1.984 mm	.520		(5x)	1/8	2	GNB0781-C8	56.10
.0781 (5/64)		1.984 mm		13.50 mm	(5x)	3 mm	50 mm	BAF0781-C8	56.10
.0781 (5/64)		1.984 mm	.760		(8x)	1/8	2-1/2	HYX0781-C8	61.20
.0781 (5/64)		1.984 mm		19.50 mm	(8x)	3 mm	63 mm	CBG0781-C8	61.20
.0781 (5/64)		1.984 mm		23.00 mm	(10x)	3 mm	63 mm	ERY0781-C8	64.80
.0781 (5/64)		1.984 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0781-C8	68.50
.0785	#47	1.993 mm		9.50 mm	(3x)	3 mm	50 mm	AVA0785-C8	51.70
.0785	#47	1.993 mm		13.50 mm	(5x)	3 mm	50 mm	BAF0785-C8	56.10
.0785	#47	1.993 mm		19.50 mm	(8x)	3 mm	63 mm	CBG0785-C8	61.20
.0785	#47	1.993 mm		27.00 mm	(12x)	3 mm	63 mm	DQW0785-C8	68.50
.0787		2.000 mm		9.50 mm	(3x)	4 mm	50 mm	AVA0787-C8	53.10
.0787		2.000 mm		13.50 mm	(5x)	4 mm	50 mm	BAF0787-C8	57.60
.0787		2.000 mm		19.50 mm	(8x)	4 mm	63 mm	CBG0787-C8	62.60
.0787		2.000 mm		24.00 mm	(10x)	4 mm	63 mm	ERY0787-C8	66.00
.0787		2.000 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0787-C8	69.80
.0800		2.032 mm		9.50 mm	(3x)	4 mm	50 mm	AVA0800-C8	53.10
.0800		2.032 mm	.380		(3x)	3/16	2	FSD0800-C8	53.10
.0800		2.032 mm		13.50 mm	(5x)	4 mm	50 mm	BAF0800-C8	57.60
.0800		2.032 mm	.540		(5x)	3/16	2	GNB0800-C8	57.60
.0800		2.032 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0800-C8	62.60
.0800		2.032 mm	.800		(8x)	3/16	2-1/2	HYX0800-C8	62.60
.0800		2.032 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0800-C8	69.80
.0810	#46	2.057 mm		10.00 mm	(3x)	4 mm	50 mm	AVA0810-C8	53.10
.0810	#46	2.057 mm		14.00 mm	(5x)	4 mm	50 mm	BAF0810-C8	57.60
.0810	#46	2.057 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0810-C8	62.60
.0810	#46	2.057 mm		24.00 mm	(10x)	4 mm	63 mm	ERY0810-C8	66.00
.0810	#46	2.057 mm		28.00 mm	(12x)	4 mm	63 mm	DQW0810-C8	69.80
.0820	#45	2.082 mm		10.00 mm	(3x)	4 mm	50 mm	AVA0820-C8	53.10
.0820	#45	2.082 mm		14.00 mm	(5x)	4 mm	50 mm	BAF0820-C8	57.60
.0820	#45	2.082 mm		20.00 mm	(8x)	4 mm	63 mm	CBG0820-C8	62.60
.0820	#45	2.082 mm		29.00 mm	(12x)	4 mm	75 mm	DQW0820-C8	69.80

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0860	#44	2.184 mm	.400		(3x)	3/16	2	FSD0860-C8	53.10
.0860	#44	2.184 mm		10.50 mm	(3x)	4 mm	50 mm	AVA0860-C8	53.10
.0860	#44	2.184 mm		14.50 mm	(5x)	4 mm	50 mm	BAF0860-C8	57.60
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	GNB0860-C8	57.60
.0860	#44	2.184 mm		21.00 mm	(8x)	4 mm	63 mm	CBG0860-C8	62.60
.0860	#44	2.184 mm	.840		(8x)	3/16	2-1/2	HYX0860-C8	62.60
.0860	#44	2.184 mm		26.00 mm	(10x)	4 mm	63 mm	ERY0860-C8	66.00
.0860	#44	2.184 mm		30.00 mm	(12x)	4 mm	75 mm	DQW0860-C8	69.80
.0890	#43	2.260 mm		10.50 mm	(3x)	4 mm	50 mm	AVA0890-C8	54.80
.0890	#43	2.260 mm	.420		(3x)	3/16	2	FSD0890-C8	54.80
.0890	#43	2.260 mm		15.00 mm	(5x)	4 mm	50 mm	BAF0890-C8	57.60
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	GNB0890-C8	57.60
.0890	#43	2.260 mm		22.00 mm	(8x)	4 mm	63 mm	CBG0890-C8	62.60
.0890	#43	2.260 mm	.880		(8x)	3/16	2-1/2	HYX0890-C8	62.60
.0890	#43	2.260 mm		27.00 mm	(10x)	4 mm	63 mm	ERY0890-C8	66.00
.0890	#43	2.260 mm		31.00 mm	(12x)	4 mm	75 mm	DQW0890-C8	69.80
.0900		2.286 mm		11.00 mm	(3x)	4 mm	50 mm	AVA0900-C8	53.10
.0900		2.286 mm		15.00 mm	(5x)	4 mm	50 mm	BAF0900-C8	57.60
.0900		2.286 mm		22.00 mm	(8x)	4 mm	63 mm	CBG0900-C8	62.60
.0900		2.286 mm		31.00 mm	(12x)	4 mm	75 mm	DQW0900-C8	69.80
.0935	#42	2.374 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0935-C8	53.10
.0935	#42	2.374 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0935-C8	57.60
.0935	#42	2.374 mm		23.00 mm	(8x)	4 mm	63 mm	CBG0935-C8	62.60
.0935	#42	2.374 mm		28.00 mm	(10x)	4 mm	63 mm	ERY0935-C8	66.00
.0935	#42	2.374 mm		33.00 mm	(12x)	4 mm	75 mm	DQW0935-C8	69.80
.0937 (3/32)		2.381 mm	.440		(3x)	3/16	2	FSD0937-C8	53.10
.0937 (3/32)		2.381 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0937-C8	53.10
.0937 (3/32)		2.381 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0937-C8	57.60
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	GNB0937-C8	57.60
.0937 (3/32)		2.381 mm		23.00 mm	(8x)	4 mm	63 mm	CBG0937-C8	62.60
.0937 (3/32)		2.381 mm	.920		(8x)	3/16	2-1/2	HYX0937-C8	62.60
.0937 (3/32)		2.381 mm		28.00 mm	(10x)	4 mm	63 mm	ERY0937-C8	66.00
.0937 (3/32)		2.381 mm		33.00 mm	(12x)	4 mm	75 mm	DQW0937-C8	69.80
.0960	#41	2.438 mm		11.50 mm	(3x)	4 mm	50 mm	AVA0960-C8	53.10
.0960	#41	2.438 mm	.460		(3x)	3/16	2	FSD0960-C8	53.10
.0960	#41	2.438 mm		16.00 mm	(5x)	4 mm	63 mm	BAF0960-C8	57.60
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	GNB0960-C8	57.60
.0960	#41	2.438 mm	.920		(8x)	3/16	2-1/2	HYX0960-C8	62.60
.0960	#41	2.438 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0960-C8	62.60
.0960	#41	2.438 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0960-C8	66.00
.0960	#41	2.438 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0960-C8	69.80
.0980	#40	2.489 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0980-C8	53.10
.0980	#40	2.489 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0980-C8	57.60
.0980	#40	2.489 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0980-C8	62.60
.0980	#40	2.489 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0980-C8	66.00
.0980	#40	2.489 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0980-C8	69.80

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.0984		2.500 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0984-C8	53.70
.0984		2.500 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0984-C8	58.00
.0984		2.500 mm		24.00 mm	(8x)	4 mm	63 mm	CBG0984-C8	63.00
.0984		2.500 mm		29.00 mm	(10x)	4 mm	75 mm	ERY0984-C8	66.60
.0984		2.500 mm		34.00 mm	(12x)	4 mm	75 mm	DQW0984-C8	70.20
.0995	#39	2.527 mm		12.00 mm	(3x)	4 mm	50 mm	AVA0995-C8	53.70
.0995	#39	2.527 mm	.480		(3x)	3/16	2	FSD0995-C8	53.70
.0995	#39	2.527 mm		17.00 mm	(5x)	4 mm	63 mm	BAF0995-C8	58.00
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	GNB0995-C8	58.00
.0995	#39	2.527 mm	.960		(8x)	3/16	2-1/2	HYX0995-C8	63.00
.0995	#39	2.527 mm		25.00 mm	(8x)	4 mm	63 mm	CBG0995-C8	63.00
.0995	#39	2.527 mm		30.00 mm	(10x)	4 mm	75 mm	ERY0995-C8	66.60
.0995	#39	2.527 mm		35.00 mm	(12x)	4 mm	75 mm	DQW0995-C8	70.20
.1000		2.540 mm		12.00 mm	(3x)	4 mm	50 mm	AVA1000-C8	53.70
.1000		2.540 mm		17.00 mm	(5x)	4 mm	63 mm	BAF1000-C8	58.00
.1000		2.540 mm		25.00 mm	(8x)	4 mm	63 mm	CBG1000-C8	63.00
.1000		2.540 mm		35.00 mm	(12x)	4 mm	75 mm	DQW1000-C8	70.20
.1015	#38	2.578 mm		12.00 mm	(3x)	4 mm	50 mm	AVA1015-C8	53.70
.1015	#38	2.578 mm		17.00 mm	(5x)	4 mm	63 mm	BAF1015-C8	58.00
.1015	#38	2.578 mm		25.00 mm	(8x)	4 mm	63 mm	CBG1015-C8	63.00
.1015	#38	2.578 mm		30.00 mm	(10x)	4 mm	75 mm	ERY1015-C8	66.60
.1015	#38	2.578 mm		35.00 mm	(12x)	4 mm	75 mm	DQW1015-C8	70.20
.1040	#37	2.641 mm		12.50 mm	(3x)	4 mm	50 mm	AVA1040-C8	53.70
.1040	#37	2.641 mm		18.00 mm	(5x)	4 mm	63 mm	BAF1040-C8	58.00
.1040	#37	2.641 mm		26.00 mm	(8x)	4 mm	63 mm	CBG1040-C8	63.00
.1040	#37	2.641 mm		31.00 mm	(10x)	4 mm	75 mm	ERY1040-C8	66.60
.1040	#37	2.641 mm		36.00 mm	(12x)	4 mm	75 mm	DQW1040-C8	70.20
.1065	#36	2.705 mm		13.00 mm	(3x)	4 mm	50 mm	AVA1065-C8	53.70
.1065	#36	2.705 mm		18.00 mm	(5x)	4 mm	63 mm	BAF1065-C8	58.00
.1065	#36	2.705 mm		26.00 mm	(8x)	4 mm	63 mm	CBG1065-C8	63.00
.1065	#36	2.705 mm		32.00 mm	(10x)	4 mm	75 mm	ERY1065-C8	66.60
.1065	#36	2.705 mm		37.00 mm	(12x)	4 mm	75 mm	DQW1065-C8	70.20
.1093 (7/64)		2.778 mm		13.00 mm	(3x)	4 mm	50 mm	AVA1093-C8	53.70
.1093 (7/64)		2.778 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1093-C8	58.00
.1093 (7/64)		2.778 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1093-C8	63.00
.1093 (7/64)		2.778 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1093-C8	66.60
.1093 (7/64)		2.778 mm		38.00 mm	(12x)	4 mm	75 mm	DQW1093-C8	70.20
.1100	#35	2.794 mm	.520		(3x)	3/16	2	FSD1100-C8	53.70
.1100	#35	2.794 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1100-C8	53.70
.1100	#35	2.794 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1100-C8	58.00
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	GNB1100-C8	58.00
.1100	#35	2.794 mm	1.040		(8x)	3/16	2-1/2	HYX1100-C8	63.00
.1100	#35	2.794 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1100-C8	63.00
.1100	#35	2.794 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1100-C8	66.60
.1100	#35	2.794 mm		38.00 mm	(12x)	4 mm	75 mm	DQW1100-C8	70.20
.1110	#34	2.819 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1110-C8	53.70

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Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB$_2$ COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.1110	#34	2.819 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1110-C8	58.00
.1110	#34	2.819 mm		27.00 mm	(8x)	4 mm	63 mm	CBG1110-C8	63.00
.1110	#34	2.819 mm		33.00 mm	(10x)	4 mm	75 mm	ERY1110-C8	66.60
.1110	#34	2.819 mm		39.00 mm	(12x)	4 mm	75 mm	DQW1110-C8	70.20
.1130	#33	2.870 mm		13.50 mm	(3x)	4 mm	50 mm	AVA1130-C8	53.70
.1130	#33	2.870 mm		19.00 mm	(5x)	4 mm	63 mm	BAF1130-C8	58.00
.1130	#33	2.870 mm		28.00 mm	(8x)	4 mm	63 mm	CBG1130-C8	63.00
.1130	#33	2.870 mm		34.00 mm	(10x)	4 mm	75 mm	ERY1130-C8	66.60
.1130	#33	2.870 mm		39.00 mm	(12x)	4 mm	75 mm	DQW1130-C8	70.20
.1160	#32	2.946 mm		14.00 mm	(3x)	4 mm	50 mm	AVA1160-C8	53.70
.1160	#32	2.946 mm	.560		(3x)	3/16	2	FSD1160-C8	53.70
.1160	#32	2.946 mm		20.00 mm	(5x)	4 mm	63 mm	BAF1160-C8	58.00
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	GNB1160-C8	58.00
.1160	#32	2.946 mm	1.120		(8x)	3/16	3	HYX1160-C8	63.00
.1160	#32	2.946 mm		29.00 mm	(8x)	4 mm	63 mm	CBG1160-C8	63.00
.1160	#32	2.946 mm		40.00 mm	(12x)	4 mm	75 mm	DQW1160-C8	70.20
.1181		3.000 mm		14.50 mm	(3x)	4 mm	50 mm	AVA1181-C8	54.80
.1181		3.000 mm		20.00 mm	(5x)	4 mm	63 mm	BAF1181-C8	59.60
.1181		3.000 mm		29.00 mm	(8x)	4 mm	63 mm	CBG1181-C8	64.30
.1181		3.000 mm		35.00 mm	(10x)	4 mm	75 mm	ERY1181-C8	68.00
.1181		3.000 mm		42.00 mm	(12x)	4 mm	100 mm	DQW1181-C8	71.50
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.1200	#31	3.048 mm		14.50 mm	(3x)	6 mm	63 mm	AVA1200-C8	67.90
.1200	#31	3.048 mm	.580		(3x)	3/16	2-1/2	FSD1200-C8	67.90
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	GNB1200-C8	73.40
.1200	#31	3.048 mm		21.00 mm	(5x)	6 mm	63 mm	BAF1200-C8	73.40
.1200	#31	3.048 mm		30.00 mm	(8x)	6 mm	75 mm	CBG1200-C8	77.10
.1200	#31	3.048 mm	1.200		(8x)	3/16	3	HYX1200-C8	77.10
.1200	#31	3.048 mm		42.00 mm	(12x)	6 mm	100 mm	DQW1200-C8	84.70
.1250 (1/8)		3.175 mm		15.00 mm	(3x)	6 mm	63 mm	AVA1250-C8	67.90
.1250 (1/8)		3.175 mm	.600		(3x)	3/16	2-1/2	FSD1250-C8	67.90
.1250 (1/8)		3.175 mm		21.00 mm	(5x)	6 mm	63 mm	BAF1250-C8	73.40
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	GNB1250-C8	73.40
.1250 (1/8)		3.175 mm	1.200		(8x)	3/16	3	HYX1250-C8	77.10
.1250 (1/8)		3.175 mm		31.00 mm	(8x)	6 mm	75 mm	CBG1250-C8	77.10
.1250 (1/8)		3.175 mm		44.00 mm	(12x)	6 mm	100 mm	DQW1250-C8	84.70
.1250 (1/8)		3.175 mm		53.00 mm	(15x)	6 mm	100 mm	FAE1250-C8	97.90
.1260		3.200 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1260-C8	73.40
.1260		3.200 mm		31.00 mm	(8x)	6 mm	75 mm	CBG1260-C8	80.20
.1285	#30	3.263 mm	.610		(3x)	1/4	2-1/2	FSD1285-C8	67.90
.1285	#30	3.263 mm		16.00 mm	(3x)	6 mm	63 mm	AVA1285-C8	67.90
.1285	#30	3.263 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1285-C8	73.40
.1285	#30	3.263 mm	.880		(5x)	1/4	2-1/2	GNB1285-C8	73.40
.1285	#30	3.263 mm		32.00 mm	(8x)	6 mm	75 mm	CBG1285-C8	77.10
.1285	#30	3.263 mm	1.280		(8x)	1/4	3	HYX1285-C8	77.10
.1285	#30	3.263 mm		44.00 mm	(12x)	6 mm	100 mm	DQW1285-C8	84.70

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.1299		3.300 mm		22.00 mm	(5x)	6 mm	63 mm	BAF1299-C8	73.40
.1360	#29	3.454 mm		16.00 mm	(3x)	6 mm	63 mm	AVA1360-C8	69.90
.1360	#29	3.454 mm		23.00 mm	(5x)	6 mm	63 mm	BAF1360-C8	73.40
.1360	#29	3.454 mm		34.00 mm	(8x)	6 mm	75 mm	CBG1360-C8	77.10
.1360	#29	3.454 mm		40.00 mm	(10x)	6 mm	100 mm	ERY1360-C8	80.80
.1360	#29	3.454 mm		48.00 mm	(12x)	6 mm	100 mm	DQW1360-C8	84.70
.1405	#28	3.568 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1405-C8	73.40
.1405	#28	3.568 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1405-C8	84.70
.1406 (9/64)		3.571 mm		17.00 mm	(3x)	6 mm	63 mm	AVA1406-C8	67.90
.1406 (9/64)		3.571 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1406-C8	73.40
.1406 (9/64)		3.571 mm		35.00 mm	(8x)	6 mm	75 mm	CBG1406-C8	77.10
.1406 (9/64)		3.571 mm		42.00 mm	(10x)	6 mm	100 mm	ERY1406-C8	80.80
.1406 (9/64)		3.571 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1406-C8	84.70
.1440	#27	3.657 mm		24.00 mm	(5x)	6 mm	75 mm	BAF1440-C8	73.40
.1440	#27	3.657 mm		50.00 mm	(12x)	6 mm	100 mm	DQW1440-C8	84.70
.1470	#26	3.733 mm		18.00 mm	(3x)	6 mm	63 mm	AVA1470-C8	67.90
.1470	#26	3.733 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1470-C8	73.40
.1470	#26	3.733 mm		36.00 mm	(8x)	6 mm	100 mm	CBG1470-C8	77.10
.1470	#26	3.733 mm		44.00 mm	(10x)	6 mm	100 mm	ERY1470-C8	80.80
.1470	#26	3.733 mm		52.00 mm	(12x)	6 mm	100 mm	DQW1470-C8	84.70
.1495	#25	3.797 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1495-C8	73.40
.1495	#25	3.797 mm		52.00 mm	(12x)	6 mm	100 mm	DQW1495-C8	84.70
.1520	#24	3.860 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1520-C8	73.40
.1520	#24	3.860 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1520-C8	84.70
.1540	#23	3.911 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1540-C8	73.40
.1540	#23	3.911 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1540-C8	84.70
.1562 (5/32)		3.968 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1562-C8	67.90
.1562 (5/32)		3.968 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1562-C8	73.40
.1562 (5/32)		3.968 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1562-C8	77.10
.1562 (5/32)		3.968 mm		46.00 mm	(10x)	6 mm	100 mm	ERY1562-C8	80.80
.1562 (5/32)		3.968 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1562-C8	84.70
.1570	#22	3.987 mm		26.00 mm	(5x)	6 mm	75 mm	BAF1570-C8	73.40
.1570	#22	3.987 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1570-C8	77.10
.1570	#22	3.987 mm		54.00 mm	(12x)	6 mm	100 mm	DQW1570-C8	84.70
.1574		4.000 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1574-C8	67.90
.1574		4.000 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1574-C8	73.40
.1574		4.000 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1574-C8	77.10
.1574		4.000 mm		48.00 mm	(10x)	6 mm	100 mm	ERY1574-C8	80.80
.1574		4.000 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1574-C8	84.70
.1590	#21	4.038 mm		19.00 mm	(3x)	6 mm	63 mm	AVA1590-C8	67.90
.1590	#21	4.038 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1590-C8	73.40
.1590	#21	4.038 mm		39.00 mm	(8x)	6 mm	100 mm	CBG1590-C8	77.10
.1590	#21	4.038 mm		48.00 mm	(10x)	6 mm	100 mm	ERY1590-C8	80.80
.1590	#21	4.038 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1590-C8	84.70
.1610	#20	4.089 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1610-C8	73.40
.1610	#20	4.089 mm		56.00 mm	(12x)	6 mm	100 mm	DQW1610-C8	84.70

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	3 FL	USD$
.1660	#19	4.216 mm		28.00 mm	(5x)	6 mm	75 mm	BAF1660-C8	73.40
.1660	#19	4.216 mm		58.00 mm	(12x)	6 mm	100 mm	DQW1660-C8	84.70
.1695	#18	4.305 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1695-C8	73.40
.1695	#18	4.305 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1695-C8	84.70
.1718 (11/64)		4.365 mm		21.00 mm	(3x)	6 mm	63 mm	AVA1718-C8	67.90
.1718 (11/64)		4.365 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1718-C8	73.40
.1718 (11/64)		4.365 mm		42.00 mm	(8x)	6 mm	100 mm	CBG1718-C8	77.10
.1718 (11/64)		4.365 mm		52.00 mm	(10x)	6 mm	100 mm	ERY1718-C8	80.80
.1718 (11/64)		4.365 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1718-C8	84.70
.1730	#17	4.394 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1730-C8	73.40
.1730	#17	4.394 mm		60.00 mm	(12x)	6 mm	100 mm	DQW1730-C8	84.70
.1770	#16	4.495 mm		21.00 mm	(3x)	6 mm	63 mm	AVA1770-C8	67.90
.1770	#16	4.495 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1770-C8	73.40
.1770	#16	4.495 mm		44.00 mm	(8x)	6 mm	100 mm	CBG1770-C8	77.10
.1770	#16	4.495 mm		52.00 mm	(10x)	6 mm	100 mm	ERY1770-C8	80.80
.1770	#16	4.495 mm		62.00 mm	(12x)	6 mm	125 mm	DQW1770-C8	84.70
.1800	#15	4.572 mm		22.00 mm	(3x)	6 mm	63 mm	AVA1800-C8	67.90
.1800	#15	4.572 mm		30.00 mm	(5x)	6 mm	75 mm	BAF1800-C8	73.40
.1800	#15	4.572 mm		44.00 mm	(8x)	6 mm	100 mm	CBG1800-C8	77.10
.1800	#15	4.572 mm		54.00 mm	(10x)	6 mm	100 mm	ERY1800-C8	80.80
.1800	#15	4.572 mm		62.00 mm	(12x)	6 mm	125 mm	DQW1800-C8	84.70
.1820	#14	4.622 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1820-C8	73.40
.1820	#14	4.622 mm		64.00 mm	(12x)	6 mm	125 mm	DQW1820-C8	84.70
.1850	#13	4.700 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1850-C8	73.40
.1850	#13	4.700 mm		64.00 mm	(12x)	6 mm	125 mm	DQW1850-C8	84.70
.1875 (3/16)		4.762 mm	.890		(3x)	1/4	2-1/2	FSD1875-C8	67.90
.1875 (3/16)		4.762 mm		23.00 mm	(3x)	6 mm	63 mm	AVA1875-C8	67.90
.1875 (3/16)		4.762 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1875-C8	73.40
.1875 (3/16)		4.762 mm	1.280		(5x)	1/4	3	GNB1875-C8	73.40
.1875 (3/16)		4.762 mm		46.00 mm	(8x)	6 mm	100 mm	CBG1875-C8	77.10
.1875 (3/16)		4.762 mm	1.840		(8x)	1/4	3-1/2	HYX1875-C8	77.10
.1875 (3/16)		4.762 mm		56.00 mm	(10x)	6 mm	100 mm	ERY1875-C8	80.80
.1875 (3/16)		4.762 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1875-C8	84.70
.1890	#12	4.800 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1890-C8	73.40
.1890	#12	4.800 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1890-C8	84.70
.1910	#11	4.851 mm		32.00 mm	(5x)	6 mm	75 mm	BAF1910-C8	73.40
.1910	#11	4.851 mm		66.00 mm	(12x)	6 mm	125 mm	DQW1910-C8	84.70
.1935	#10	4.914 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1935-C8	73.40
.1935	#10	4.914 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1935-C8	84.70
.1960	#9	4.978 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1960-C8	73.40
.1960	#9	4.978 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1960-C8	84.70
.1968		5.000 mm		24.00 mm	(3x)	6 mm	63 mm	AVA1968-C8	67.90
.1968		5.000 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1968-C8	73.40
.1968		5.000 mm		48.00 mm	(8x)	6 mm	100 mm	CBG1968-C8	77.10
.1968		5.000 mm		58.00 mm	(10x)	6 mm	100 mm	ERY1968-C8	80.80
.1968		5.000 mm		68.00 mm	(12x)	6 mm	125 mm	DQW1968-C8	84.70

continued on next page

MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.030"}_{-.000"}$	L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L1	3 FL	USD$
.1990	#8	5.054 mm		34.00 mm	(5x)	6 mm	75 mm	BAF1990-C8	73.40
.1990	#8	5.054 mm		70.00 mm	(12x)	6 mm	125 mm	DQW1990-C8	84.70
.2009	#7	5.105 mm		24.00 mm	(3x)	6 mm	63 mm	AVA2009-C8	67.90
.2009	#7	5.105 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2009-C8	73.40
.2009	#7	5.105 mm		50.00 mm	(8x)	6 mm	100 mm	CBG2009-C8	77.10
.2009	#7	5.105 mm		60.00 mm	(10x)	6 mm	100 mm	ERY2009-C8	80.80
.2009	#7	5.105 mm		70.00 mm	(12x)	6 mm	125 mm	DQW2009-C8	84.70
.2031 (13/64)		5.159 mm		24.00 mm	(3x)	6 mm	63 mm	AVA2031-C8	69.90
.2031 (13/64)		5.159 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2031-C8	73.40
.2031 (13/64)		5.159 mm		50.00 mm	(8x)	6 mm	100 mm	CBG2031-C8	77.10
.2031 (13/64)		5.159 mm		60.00 mm	(10x)	6 mm	100 mm	ERY2031-C8	80.80
.2031 (13/64)		5.159 mm		70.00 mm	(12x)	6 mm	125 mm	DQW2031-C8	84.70
.2040	#6	5.181 mm		34.00 mm	(5x)	6 mm	75 mm	BAF2040-C8	73.40
.2040	#6	5.181 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2040-C8	84.70
.2055	#5	5.219 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2055-C8	73.40
.2055	#5	5.219 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2055-C8	84.70
.2090	#4	5.308 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2090-C8	73.40
.2090	#4	5.308 mm		72.00 mm	(12x)	6 mm	125 mm	DQW2090-C8	84.70
.2129	#3	5.410 mm		26.00 mm	(3x)	6 mm	75 mm	AVA2129-C8	67.90
.2129	#3	5.410 mm		36.00 mm	(5x)	6 mm	75 mm	BAF2129-C8	73.40
.2129	#3	5.410 mm		52.00 mm	(8x)	6 mm	100 mm	CBG2129-C8	77.10
.2129	#3	5.410 mm		64.00 mm	(10x)	6 mm	125 mm	ERY2129-C8	80.80
.2129	#3	5.410 mm		74.00 mm	(12x)	6 mm	125 mm	DQW2129-C8	84.70
.2187 (7/32)		5.556 mm		26.00 mm	(3x)	6 mm	75 mm	AVA2187-C8	67.90
.2187 (7/32)		5.556 mm		38.00 mm	(5x)	6 mm	100 mm	BAF2187-C8	73.40
.2187 (7/32)		5.556 mm		54.00 mm	(8x)	6 mm	100 mm	CBG2187-C8	77.10
.2187 (7/32)		5.556 mm		66.00 mm	(10x)	6 mm	125 mm	ERY2187-C8	80.80
.2187 (7/32)		5.556 mm		76.00 mm	(12x)	6 mm	125 mm	DQW2187-C8	84.70
.2210	#2	5.613 mm		38.00 mm	(5x)	6 mm	100 mm	BAF2210-C8	73.40
.2210	#2	5.613 mm		78.00 mm	(12x)	6 mm	125 mm	DQW2210-C8	84.70
.2280	#1	5.791 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2280-C8	73.40
.2280	#1	5.791 mm		80.00 mm	(12x)	6 mm	125 mm	DQW2280-C8	84.70
.2340	A	5.943 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2340-C8	73.40
.2340	A	5.943 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2340-C8	84.70
.2343 (15/64)		5.953 mm		28.00 mm	(3x)	6 mm	75 mm	AVA2343-C8	67.90
.2343 (15/64)		5.953 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2343-C8	73.40
.2343 (15/64)		5.953 mm		58.00 mm	(8x)	6 mm	100 mm	CBG2343-C8	77.10
.2343 (15/64)		5.953 mm		70.00 mm	(10x)	6 mm	125 mm	ERY2343-C8	80.80
.2343 (15/64)		5.953 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2343-C8	84.70
.2362		6.000 mm		28.00 mm	(3x)	6 mm	75 mm	AVA2362-C8	67.90
.2362		6.000 mm		40.00 mm	(5x)	6 mm	100 mm	BAF2362-C8	73.40
.2362		6.000 mm		58.00 mm	(8x)	6 mm	100 mm	CBG2362-C8	77.10
.2362		6.000 mm		70.00 mm	(10x)	6 mm	125 mm	ERY2362-C8	80.80
.2362		6.000 mm		82.00 mm	(12x)	6 mm	125 mm	DQW2362-C8	84.70
.2380	B	6.045 mm		40.00 mm	(5x)	8 mm	100 mm	BAF2380-C8	75.90
.2380	B	6.045 mm		84.00 mm	(12x)	8 mm	125 mm	DQW2380-C8	87.50

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MINIATURE HIGH PERFORMANCE DRILLS

Aluminum Alloys (cont.)

continued from previous page

DRILL DIAMETER inch	wire	DRILL DIAMETER metric	FLUTE LENGTH inch	FLUTE LENGTH metric	hole depth	SHANK DIAMETER	OVERALL LENGTH	TiB_2 COATED	
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L1	3 FL	USD$
.2420	C	6.146 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2420-C8	75.90
.2420	C	6.146 mm		84.00 mm	(12x)	8 mm	125 mm	DQW2420-C8	87.50
.2460	D	6.248 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2460-C8	75.90
.2460	D	6.248 mm		86.00 mm	(12x)	8 mm	150 mm	DQW2460-C8	87.50
.2500 (1/4)	E	6.350 mm		30.00 mm	(3x)	8 mm	75 mm	AVA2500-C8	67.90
.2500 (1/4)	E	6.350 mm	1.188		(3x)	1/4	3	FSD2500-C8	67.90
.2500 (1/4)	E	6.350 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2500-C8	73.40
.2500 (1/4)	E	6.350 mm	1.680		(5x)	1/4	3-1/2	GNB2500-C8	73.40
.2500 (1/4)	E	6.350 mm	2.400		(8x)	1/4	4	HYX2500-C8	77.10
.2500 (1/4)	E	6.350 mm		62.00 mm	(8x)	8 mm	125 mm	CBG2500-C8	77.10
.2500 (1/4)	E	6.350 mm		74.00 mm	(10x)	8 mm	125 mm	ERY2500-C8	80.80
.2500 (1/4)	E	6.350 mm		88.00 mm	(12x)	8 mm	150 mm	DQW2500-C8	84.70
.2510		6.375 mm		42.00 mm	(5x)	8 mm	100 mm	BAF2510-C8	83.40
.2570	F	6.528 mm		44.00 mm	(5x)	8 mm	100 mm	BAF2570-C8	83.40
.2812 (9/32)		7.142 mm		48.00 mm	(5x)	8 mm	100 mm	BAF2812-C8	83.40
.3125 (5/16)		7.937 mm		54.00 mm	(5x)	8 mm	100 mm	BAF3125-C8	83.40
.3150		8.000 mm		54.00 mm	(5x)	8 mm	100 mm	BAF3150-C8	83.40
.3750 (3/8)		9.525 mm		46.00 mm	(3x)	10 mm	100 mm	AVA3750-C8	131.90
.3750 (3/8)		9.525 mm		64.00 mm	(5x)	10 mm	125 mm	BAF3750-C8	143.10
.3770	V	9.575 mm		46.00 mm	(3x)	10 mm	100 mm	AVA3770-C8	131.90
.3770	V	9.575 mm		64.00 mm	(5x)	10 mm	125 mm	BAF3770-C8	143.10
.3937		10.000 mm		68.00 mm	(5x)	10 mm	125 mm	BAF3937-C8	143.10
.4375 (7/16)		11.112 mm		76.00 mm	(5x)	12 mm	125 mm	BAF4375-C8	181.90
.4724		12.000 mm		82.00 mm	(5x)	12 mm	125 mm	BAF4724-C8	181.90
.5000 (1/2)		12.700 mm		86.00 mm	(5x)	16 mm	150 mm	BAF5000-C8	319.70

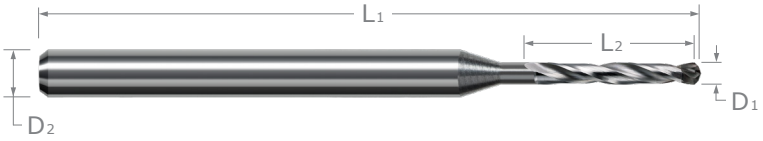
SPEEDS & FEEDS (Miniature High Performance Drills – Aluminum Alloys)

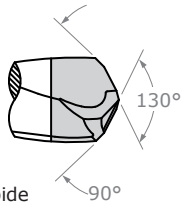
Important Note: Values in table are in inches and are based on 3x and 5x drill lengths. For longer lengths, table values of IPR must be reduced (for 8x and 10x, reduce to 75%; for 12x, reduce to 65%). Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x diameter with each subsequent peck at 2-3x diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material (Hardness: ≤ 28 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter .015	.031	.047	.062	.078	.093	.125	.187	.250	.375	.500
Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx)	450	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01980	.02640
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600											
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00071	.00147	.00223	.00295	.00371	.00442	.00594	.00889	.01188	.00889	.02376
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420											
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390											
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350											
Wrought - 5%-8% Si (4xxx)	600											
Wrought - 8%-12% Si (4xxx)	480											
Magnesium Alloys	900	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01782	.02640
Zinc Alloys	480											
Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00063	.00131	.00199	.00262	.00329	.00393	.00528	.00790	.01056	.01980	.02112
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375											
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170											
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375											
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375											
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170											
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400											
Plastics: Unfilled Plastics	500	.00079	.00164	.00248	.00327	.00412	.00491	.00660	.00987	.01320	.01584	.02640
Reinforced Plastics	350	.00063	.00131	.00199	.00329	.00393	.00528	.00790	.01056	.01584	.02112	.02640

MINIATURE HIGH PERFORMANCE DRILLS

PCD Diamond – Double Angle – Metric





- PCD diamond nib brazed on entire end of solid carbide body allows for increased tool life over carbide
- Full PCD tip allows for positive cutting geometry
- Double angle point geometry for superior performance in preventing push-out and delamination in layered composites
- Recommended work piece material: aluminum, copper, brass, bronze, plastic, graphite, carbon, carbon fiber materials, green carbide, gold, silver, magnesium, zinc, green ceramics
- h6 shank tolerance for high precision tool holders

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	PCD DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BCF0937	683.60
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BCF1181	683.60
		D_1 +.000mm −.013mm		L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	USD$
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BCF1250	628.90
.1299		3.300 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BCF1299	628.90
.1650		4.190 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BCF1650	695.10
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1875	695.10
.1910	#11	4.851 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BCF1910	695.10
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2500	800.50
.2510		6.375 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BCF2510	800.50

For PCD End Mills, see pages 265, 266, 267, 268

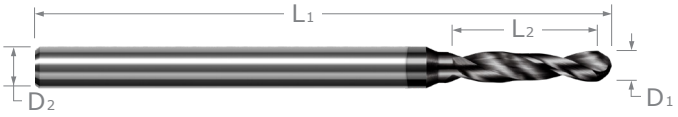
SPEEDS & FEEDS (Miniature High Performance Drills – PCD Diamond – Metric)

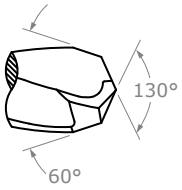
Important Note: Values in table are in inches and are based on 5x drill lengths. Since the melting point varies greatly from in plastics, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. For Metal Matrix Composites with aluminum, pecking should begin when part thickness is more than 1x Diameter and a feed reduction of 30%. For titanium, pecking should begin when part thickness is more than .5x Diameter and a feed reduction of 50% with a subsequent peck .5-1x Diameter. For complete speeds and feeds charts, please go to www.harveytool.com.

Material	Type	Hardness	SFM	Chip Load (IPR) By Drill Diameter				
				.078	.093	.125	.187	.250
Unfilled Plastics ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
Filled Plastics Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, (55 < 85 Shore D)	800 - 1200	.0037	.0045	.0060	.0090	.0120
Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500 - 800	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400 - 600	.0041	.0049	.0066	.0099	.0132
	Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350 - 500	.0034	.0040	.0054	.0081	.0108
Fiber Reinforced Plastics FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350 - 500	.0041	.0049	.0066	.0099	.0132
G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200 - 300	.0034	.0040	.0054	.0081	.0108
Metal Matrix Composites	Aluminum/Composite Layered		320 - 500	.0041	.0049	.0066	.0099	.0132
	Titanium/Composite Layered		160 - 260	.0030	.0036	.0048	.0072	.0096
Graphite POCO 3			400 - 600	.0043	.0051	.0069	.0103	.0138
Green Ceramic & Green Carbide			100 - 300	.0039	.0047	.0063	.0094	.0126

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle





- Optimized for drilling layered composites with excellent performance in virgin plastics and other composite materials
- Double angle geometry for superior performance in preventing push-out and delamination in layered composites
- Amorphous diamond coated for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



Double Angle Point Geometry Prevents Delamination

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	DDB0312-C4	67.50
.0312 (1/32)		.793 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0312-C4	68.50
.0314		.800 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0315-C4	68.50
.0320	#67	.812 mm		**5.40 mm**	(5x)	3 mm	50 mm	DDA0320-C4	68.50
.0320	#67	.812 mm	.216		(5x)	1/8	2	DDB0320-C4	67.50
.0330	#66	.838 mm		**5.60 mm**	(5x)	3 mm	50 mm	DDA0330-C4	68.50
.0350	#65	.889 mm		**6.00 mm**	(5x)	3 mm	50 mm	DDA0350-C4	68.50
.0350	#65	.889 mm	.240		(5x)	1/8	2	DDB0350-C4	67.50
.0354		.900 mm		**6.00 mm**	(5x)	3 mm	50 mm	DDA0354-C4	68.50
.0360	#64	.914 mm		**6.20 mm**	(5x)	3 mm	50 mm	DDA0360-C4	68.50
.0370	#63	.939 mm		**6.40 mm**	(5x)	3 mm	50 mm	DDA0370-C4	68.50
.0380	#62	.965 mm		**6.60 mm**	(5x)	3 mm	50 mm	DDA0380-C4	68.50
.0390	#61	.990 mm		**6.60 mm**	(5x)	3 mm	50 mm	DDA0390-C4	68.50
.0393		1.000 mm		**6.80 mm**	(5x)	3 mm	50 mm	DDA0393-C4	70.20
.0400	#60	1.016 mm		**6.80 mm**	(5x)	3 mm	50 mm	DDA0400-C4	70.20
.0400	#60	1.016 mm	.272		(5x)	1/8	2	DDB0400-C4	69.10
.0410	#59	1.041 mm		**7.00 mm**	(5x)	3 mm	50 mm	DDA0410-C4	70.20
.0420	#58	1.066 mm		**7.20 mm**	(5x)	3 mm	50 mm	DDA0420-C4	70.20
.0430	#57	1.092 mm		**7.40 mm**	(5x)	3 mm	50 mm	DDA0430-C4	70.20
.0450		1.143 mm		**7.80 mm**	(5x)	3 mm	50 mm	DDA0450-C4	70.20
.0465	#56	1.181 mm	.312		(5x)	1/8	2	DDB0465-C4	69.10
.0465	#56	1.181 mm		**8.00 mm**	(5x)	3 mm	50 mm	DDA0465-C4	70.20
.0468 (3/64)		1.190 mm		**8.00 mm**	(5x)	3 mm	50 mm	DDA0468-C4	70.20
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	DDB0468-C4	69.10
.0492		1.250 mm		**8.50 mm**	(5x)	3 mm	50 mm	DDA0492-C4	70.20
.0500		1.270 mm		**8.50 mm**	(5x)	3 mm	50 mm	DDA0500-C4	70.20
.0500		1.270 mm	.340		(5x)	1/8	2	DDB0500-C4	69.10
.0520	#55	1.320 mm		**9.00 mm**	(5x)	3 mm	50 mm	DDA0520-C4	70.20
.0520	#55	1.320 mm	.360		(5x)	1/8	2	DDB0520-C4	69.10
.0550	#54	1.397 mm		**9.50 mm**	(5x)	3 mm	50 mm	DDA0550-C4	70.20
.0550	#54	1.397 mm	.380		(5x)	1/8	2	DDB0550-C4	69.10
.0590		1.500 mm		**10.00 mm**	(5x)	3 mm	50 mm	DDA0590-C4	71.20

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

continued from previous page

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 $^{+.0000"}_{-.0005"}$		D_1 $^{+.000mm}_{-.013mm}$	L_2 $^{+.010"}_{-.000"}$	L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	USD$
.0595	#53	1.511 mm		**10.00 mm**	(5x)	3 mm	50 mm	DDA0595-C4	71.20
.0600		1.524 mm		**10.50 mm**	(5x)	3 mm	50 mm	DDA0600-C4	71.20
.0625 (1/16)		1.587 mm		**10.50 mm**	(5x)	3 mm	50 mm	DDA0625-C4	71.20
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	DDB0625-C4	70.20
.0635	#52	1.612 mm		**11.00 mm**	(5x)	3 mm	50 mm	DDA0635-C4	71.20
.0670	#51	1.701 mm		**11.50 mm**	(5x)	3 mm	50 mm	DDA0670-C4	71.20
.0700	#50	1.778 mm		**12.00 mm**	(5x)	3 mm	50 mm	DDA0700-C4	71.20
.0730	#49	1.854 mm		**12.50 mm**	(5x)	3 mm	50 mm	DDA0730-C4	71.20
.0760	#48	1.930 mm		**13.00 mm**	(5x)	3 mm	50 mm	DDA0760-C4	71.20
.0781 (5/64)		1.984 mm		**13.50 mm**	(5x)	3 mm	50 mm	DDA0781-C4	71.20
.0785	#47	1.993 mm		**13.50 mm**	(5x)	3 mm	50 mm	DDA0785-C4	71.20
.0787		2.000 mm		**13.50 mm**	(5x)	4 mm	50 mm	DDA0787-C4	72.50
.0800		2.032 mm		**13.50 mm**	(5x)	4 mm	50 mm	DDA0800-C4	72.50
.0810	#46	2.057 mm		**14.00 mm**	(5x)	4 mm	50 mm	DDA0810-C4	72.50
.0820	#45	2.082 mm		**14.00 mm**	(5x)	4 mm	50 mm	DDA0820-C4	72.50
.0860	#44	2.184 mm		**14.50 mm**	(5x)	4 mm	50 mm	DDA0860-C4	72.50
.0890	#43	2.260 mm		**15.00 mm**	(5x)	4 mm	50 mm	DDA0890-C4	72.50
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	DDB0890-C4	71.40
.0900		2.286 mm		**15.00 mm**	(5x)	4 mm	50 mm	DDA0900-C4	72.50
.0935	#42	2.374 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0935-C4	72.50
.0937 (3/32)		2.381 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0937-C4	72.50
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	DDB0937-C4	71.40
.0937 (3/32)		2.381 mm		**23.00 mm**	(8x)	4 mm	63 mm	AWS0937-C4	76.50
.0960	#41	2.438 mm		**16.00 mm**	(5x)	4 mm	63 mm	DDA0960-C4	72.50
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	DDB0960-C4	71.40
.0980	#40	2.489 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0980-C4	72.50
.0984		2.500 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0984-C4	73.00
.0995	#39	2.527 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA0995-C4	73.00
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	DDB0995-C4	72.00
.1000		2.540 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA1000-C4	73.00
.1000		2.540 mm		**25.00 mm**	(8x)	4 mm	63 mm	AWS1000-C4	76.50
.1015	#38	2.578 mm		**17.00 mm**	(5x)	4 mm	63 mm	DDA1015-C4	73.00
.1040	#37	2.641 mm		**18.00 mm**	(5x)	4 mm	63 mm	DDA1040-C4	73.00
.1065	#36	2.705 mm		**18.00 mm**	(5x)	4 mm	63 mm	DDA1065-C4	73.00
.1093 (7/64)		2.778 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1093-C4	73.00
.1100	#35	2.794 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1100-C4	73.00
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	DDB1100-C4	72.00
.1110	#34	2.819 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1110-C4	73.00
.1130	#33	2.870 mm		**19.00 mm**	(5x)	4 mm	63 mm	DDA1130-C4	73.00
.1160	#32	2.946 mm		**20.00 mm**	(5x)	4 mm	63 mm	DDA1160-C4	73.00
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	DDB1160-C4	72.00
.1181		3.000 mm		**20.00 mm**	(5x)	4 mm	63 mm	DDA1181-C4	74.70
.1181		3.000 mm		**29.00 mm**	(8x)	4 mm	63 mm	AWS1181-C4	78.80

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	USD$
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	DDB1200-C4	87.20
.1200	#31	3.048 mm		**21.00 mm**	(5x)	6 mm	63 mm	DDA1200-C4	88.30
.1250 (1/8)		3.175 mm		**15.00 mm**	(3x)	6 mm	63 mm	BAA1250-C4	84.30
.1250 (1/8)		3.175 mm		**21.00 mm**	(5x)	6 mm	63 mm	DDA1250-C4	88.30
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	DDB1250-C4	87.20
.1250 (1/8)		3.175 mm		**31.00 mm**	(8x)	6 mm	75 mm	AWS1250-C4	93.40
.1285	#30	3.263 mm		**22.00 mm**	(5x)	6 mm	63 mm	DDA1285-C4	88.30
.1360	#29	3.454 mm		**23.00 mm**	(5x)	6 mm	63 mm	DDA1360-C4	88.30
.1406 (9/64)		3.571 mm		**24.00 mm**	(5x)	6 mm	75 mm	DDA1406-C4	88.30
.1470	#26	3.733 mm		**26.00 mm**	(5x)	6 mm	75 mm	DDA1470-C4	88.30
.1562 (5/32)		3.968 mm		**26.00 mm**	(5x)	6 mm	75 mm	DDA1562-C4	88.30
.1574		4.000 mm		**28.00 mm**	(5x)	6 mm	75 mm	DDA1574-C4	88.30
.1590	#21	4.038 mm		**28.00 mm**	(5x)	6 mm	75 mm	DDA1590-C4	88.30
.1718 (11/64)		4.365 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1718-C4	88.30
.1770	#16	4.495 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1770-C4	88.30
.1800	#15	4.572 mm		**30.00 mm**	(5x)	6 mm	75 mm	DDA1800-C4	88.30
.1875 (3/16)		4.762 mm		**32.00 mm**	(5x)	6 mm	75 mm	DDA1875-C4	88.30
.1875 (3/16)		4.762 mm		**46.00 mm**	(8x)	6 mm	100 mm	AWS1875-C4	93.40
.1909		4.851 mm		**23.00 mm**	(3x)	6 mm	63 mm	BAA1909-C4	84.30
.1909		4.851 mm		**32.00 mm**	(5x)	6 mm	75 mm	DDA1909-C4	88.30
.1968		5.000 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA1968-C4	88.30
.2009	#7	5.105 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA2009-C4	88.30
.2031 (13/64)		5.159 mm		**34.00 mm**	(5x)	6 mm	75 mm	DDA2031-C4	88.30
.2129	#3	5.410 mm		**36.00 mm**	(5x)	6 mm	75 mm	DDA2129-C4	88.30
.2187 (7/32)		5.556 mm		**38.00 mm**	(5x)	6 mm	100 mm	DDA2187-C4	88.30
.2343 (15/64)		5.953 mm		**40.00 mm**	(5x)	6 mm	100 mm	DDA2343-C4	88.30
.2362		6.000 mm		**40.00 mm**	(5x)	6 mm	100 mm	DDA2362-C4	88.30
.2500 (1/4)	E	6.350 mm		**30.00 mm**	(3x)	8 mm	75 mm	BAA2500-C4	84.30
.2500 (1/4)	E	6.350 mm		**42.00 mm**	(5x)	8 mm	100 mm	DDA2500-C4	88.30
.2500 (1/4)	E	6.350 mm		**62.00 mm**	(8x)	8 mm	125 mm	AWS2500-C4	93.40
.2570		6.528 mm		**32.00 mm**	(3x)	8 mm	75 mm	BAA2570-C4	115.10
.2812		7.142 mm		**34.00 mm**	(3x)	8 mm	75 mm	BAA2812-C4	115.10
.3125 (5/16)		7.937 mm		**38.00 mm**	(3x)	8 mm	100 mm	BAA3125-C4	115.10
.3150		8.000 mm		**38.00 mm**	(3x)	8 mm	100 mm	BAA3150-C4	115.10
.3750 (3/8)		9.525 mm		**46.00 mm**	(3x)	10 mm	100 mm	BAA3750-C4	150.70

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Double Angle (cont.)

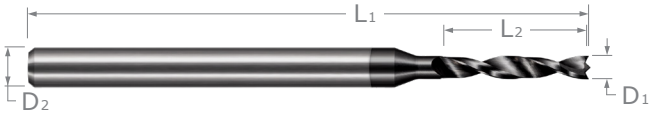
SPEEDS & FEEDS (Miniature High Performance Drills – Composites)

Important Note: Posted chiploads are for the double angle drills. For brad point drills, reduce chiploads by approx. 10%. Since the melting point varies greatly from plastic to plastic, the speed (RPM) used should be closely supervised. An additional reduction in RPM may be necessary to avoid excessive fraying, splitting and tear out of fibers. Pecking cycles are recommended to avoid chip packing and breakage. The initial peck depth should be 3-5x Diameter with each subsequent peck at 2-3x Diameter. Look at our online speeds and feeds for more information. For complete speeds and feeds charts, please go to www.harveytool.com.

Material Type		Type	Hardness	SFM	Chip Load Per Revolution (IPR) By Cutter Diameter									
					.015	.031	.047	.062	.078	.093	.125	.187	.250	.375
Unfilled Plastics	ETFE, FEP, HDPE, LDPE, PFA, Polyurethane, PTFE, Rulon, Teflon, UHMW	Unfilled	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108	.0162
	Acrylic, Acetal, Delrin, Lucite, Nylon 6, Nylon 6/6, PAI, PI, PEEK, Plexiglas, PS, PSU, Torlon 4203, Ultem 1000	Unfilled	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
Filled Plastics	Vespel SP-3	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	50 < 100 Rr, 55 < 85 Shore D	800-1200	.0006	.0013	.0020	.0027	.0034	.0040	.0054	.0081	.0108	.0162
	Nyoil, Nylatron, Plavis MS, Torlon 4301	Lubricant Filled (Oil, Moly, Graphite, Teflon, PTFE)	100 > 150 Rr	500-800	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
		Carbon/Glass Filled 5% < 20%	100 > 150 Rr	400-600	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	0178
		Carbon/Glass Filled 21% < 40%	100 > 150 Rr	350-500	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097	.0146
Fiber Reinforced	FR4, G10, G11	Carbon/Glass Fiber 5% < 20%	100 > 150 Rr	350-500	.0007	.0015	.0022	.0029	.0037	.0044	.0059	.0089	.0119	.0178
	G30	Carbon/Glass Fiber 21% < 40%	100 > 150 Rr	200-300	.0006	.0012	.0018	.0024	.0030	.0036	.0049	.0073	.0097	.0146

MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point – Metric



- Optimized for drilling glass or carbon fiber filled and reinforced composites with excellent performance in other filled, layered, and woven composite materials
- Center and OD spur point geometry for accurate scoring action, prevents fraying, uncut fibers, and tear out
- Amorphous diamond coating for increased abrasion resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA



Brad Point Prevents Fraying & Tear Out

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$
.0312 (1/32)		.793 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0312-C4	59.00
.0315		.800 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0315-C4	59.00
.0320	#67	.812 mm	.213	**5.40 mm**	(5x)	3 mm	50 mm	BSW0320-C4	59.00
.0330	#66	.838 mm	.220	**5.60 mm**	(5x)	3 mm	50 mm	BSW0330-C4	59.00
.0350	#65	.889 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0350-C4	59.00
.0354		.900 mm	.236	**6.00 mm**	(5x)	3 mm	50 mm	BSW0354-C4	59.00
.0360	#64	.914 mm	.244	**6.20 mm**	(5x)	3 mm	50 mm	BSW0360-C4	59.00
.0370	#63	.939 mm	.252	**6.40 mm**	(5x)	3 mm	50 mm	BSW0370-C4	59.00
.0380	#62	.965 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0380-C4	59.00
.0390	#61	.990 mm	.260	**6.60 mm**	(5x)	3 mm	50 mm	BSW0390-C4	59.00
.0393		1.000 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0393-C4	61.70
.0400	#60	1.016 mm	.268	**6.80 mm**	(5x)	3 mm	50 mm	BSW0400-C4	61.70
.0410	#59	1.041 mm	.276	**7.00 mm**	(5x)	3 mm	50 mm	BSW0410-C4	61.70
.0420	#58	1.066 mm	.283	**7.20 mm**	(5x)	3 mm	50 mm	BSW0420-C4	61.70
.0430	#57	1.092 mm	.291	**7.40 mm**	(5x)	3 mm	50 mm	BSW0430-C4	61.70
.0450		1.143 mm	.307	**7.80 mm**	(5x)	3 mm	50 mm	BSW0450-C4	61.70
.0465	#56	1.181 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0465-C4	61.70
.0468 (3/64)		1.190 mm	.315	**8.00 mm**	(5x)	3 mm	50 mm	BSW0468-C4	61.70
.0492		1.250 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0492-C4	61.70
.0500		1.270 mm	.335	**8.50 mm**	(5x)	3 mm	50 mm	BSW0500-C4	61.70
.0520	#55	1.320 mm	.354	**9.00 mm**	(5x)	3 mm	50 mm	BSW0520-C4	61.70
.0550	#54	1.397 mm	.374	**9.50 mm**	(5x)	3 mm	50 mm	BSW0550-C4	61.70
.0590		1.500 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0590-C4	61.70
.0595	#53	1.511 mm	.394	**10.00 mm**	(5x)	3 mm	50 mm	BSW0595-C4	61.70
.0600		1.524 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0600-C4	61.70
.0625 (1/16)		1.587 mm	.413	**10.50 mm**	(5x)	3 mm	50 mm	BSW0625-C4	61.70
.0635	#52	1.612 mm	.433	**11.00 mm**	(5x)	3 mm	50 mm	BSW0635-C4	61.70
.0670	#51	1.701 mm	.453	**11.50 mm**	(5x)	3 mm	50 mm	BSW0670-C4	61.70
.0700	#50	1.778 mm	.472	**12.00 mm**	(5x)	3 mm	50 mm	BSW0700-C4	61.70
.0730	#49	1.854 mm	.492	**12.50 mm**	(5x)	3 mm	50 mm	BSW0730-C4	61.70
.0760	#48	1.930 mm	.512	**13.00 mm**	(5x)	3 mm	50 mm	BSW0760-C4	61.70
.0781 (5/64)		1.984 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0781-C4	61.70
.0785	#47	1.993 mm	.531	**13.50 mm**	(5x)	3 mm	50 mm	BSW0785-C4	61.70
.0787		2.000 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0787-C4	64.10
.0800		2.032 mm	.531	**13.50 mm**	(5x)	4 mm	50 mm	BSW0800-C4	64.10
.0810	#46	2.057 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0810-C4	64.10
.0820	#45	2.082 mm	.551	**14.00 mm**	(5x)	4 mm	50 mm	BSW0820-C4	64.10

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MINIATURE HIGH PERFORMANCE DRILLS

Composites – Brad Point – Metric (cont.)

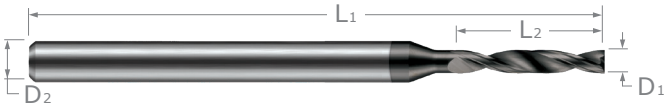
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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AMORPHOUS DIAMOND	
inch	wire	metric	inch	metric	hole depth				
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.25mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	USD$
.0860	#44	2.184 mm	.571	**14.50 mm**	(5x)	4 mm	50 mm	BSW0860-C4	64.10
.0890	#43	2.260 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0890-C4	64.10
.0900		2.286 mm	.591	**15.00 mm**	(5x)	4 mm	50 mm	BSW0900-C4	64.10
.0935	#42	2.374 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0935-C4	65.00
.0937 (3/32)		2.381 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0937-C4	65.00
.0960	#41	2.438 mm	.630	**16.00 mm**	(5x)	4 mm	63 mm	BSW0960-C4	65.00
.0980	#40	2.489 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0980-C4	65.00
.0984		2.500 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0984-C4	65.50
.0995	#39	2.527 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW0995-C4	65.50
.1000		2.540 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1000-C4	65.50
.1015	#38	2.578 mm	.669	**17.00 mm**	(5x)	4 mm	63 mm	BSW1015-C4	65.50
.1040	#37	2.641 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1040-C4	65.50
.1065	#36	2.705 mm	.709	**18.00 mm**	(5x)	4 mm	63 mm	BSW1065-C4	65.50
.1093 (7/64)		2.778 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1093-C4	65.50
.1100	#35	2.794 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1100-C4	65.50
.1110	#34	2.819 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1110-C4	65.50
.1130	#33	2.870 mm	.748	**19.00 mm**	(5x)	4 mm	63 mm	BSW1130-C4	65.50
.1160	#32	2.946 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1160-C4	65.50
.1181		3.000 mm	.787	**20.00 mm**	(5x)	4 mm	63 mm	BSW1181-C4	65.50
		D_1 $^{+.000mm}_{-.013mm}$		L_2 $^{+.75mm}_{-.00mm}$		D_2 (h6)	L_1	2 FL	USD$
.1200	#31	3.048 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1200-C4	75.60
.1250 (1/8)		3.175 mm	.827	**21.00 mm**	(5x)	6 mm	63 mm	BSW1250-C4	75.60
.1285	#30	3.263 mm	.866	**22.00 mm**	(5x)	6 mm	63 mm	BSW1285-C4	75.60
.1360	#29	3.454 mm	.906	**23.00 mm**	(5x)	6 mm	63 mm	BSW1360-C4	75.60
.1406 (9/64)		3.571 mm	.945	**24.00 mm**	(5x)	6 mm	75 mm	BSW1406-C4	75.60
.1470	#26	3.733 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1470-C4	75.60
.1562 (5/32)		3.968 mm	1.024	**26.00 mm**	(5x)	6 mm	75 mm	BSW1562-C4	75.60
.1574		4.000 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1574-C4	75.60
.1590	#21	4.038 mm	1.102	**28.00 mm**	(5x)	6 mm	75 mm	BSW1590-C4	75.60
.1718 (11/64)		4.365 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1718-C4	75.60
.1770	#16	4.495 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1770-C4	75.60
.1800	#15	4.572 mm	1.181	**30.00 mm**	(5x)	6 mm	75 mm	BSW1800-C4	75.60
.1875 (3/16)		4.762 mm	1.260	**32.00 mm**	(5x)	6 mm	75 mm	BSW1875-C4	75.60
.1909		4.851 mm	1.259	**32.00 mm**	(5x)	6 mm	75 mm	BSW1909-C4	75.60
.1968		5.000 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW1968-C4	75.60
.2009	#7	5.105 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2009-C4	75.60
.2031 (13/64)		5.159 mm	1.339	**34.00 mm**	(5x)	6 mm	75 mm	BSW2031-C4	75.60
.2129	#3	5.410 mm	1.417	**36.00 mm**	(5x)	6 mm	75 mm	BSW2129-C4	75.60
.2187 (7/32)		5.556 mm	1.496	**38.00 mm**	(5x)	6 mm	100 mm	BSW2187-C4	75.60
.2343 (15/64)		5.953 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2343-C4	75.60
.2362		6.000 mm	1.575	**40.00 mm**	(5x)	6 mm	100 mm	BSW2362-C4	75.60
.2500 (1/4)	E	6.350 mm	1.654	**42.00 mm**	(5x)	8 mm	100 mm	BSW2500-C4	75.60
.2570		6.528 mm	1.259	**32.00 mm**	(3x)	8 mm	75 mm	BSX2570-C4	115.70
.2812		7.142 mm	1.338	**34.00 mm**	(3x)	8 mm	75 mm	BSX2812-C4	126.40
.3125 (5/16)		7.937 mm	1.496	**38.00 mm**	(3x)	8 mm	100 mm	BSX3125-C4	126.40
.3150		8.000 mm	1.496	**38.00 mm**	(3x)	8 mm	100 mm	BSX3150-C4	150.90
.3750 (3/8)		9.525 mm	1.811	**46.00 mm**	(3x)	10 mm	100 mm	BSX3750-C4	157.90

PLEASE SEE SPEEDS & FEEDS ON PAGE 509

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom



Ideal for Inclined & Rounded Surfaces



No Point Angle & No Dish Allows for Drilling On Irregular Surfaces

- Flat bottom design (no point angle and no dish) allows for drilling on irregular surfaces and reduces burrs on break through
- Ideal for drilling on inclined and rounded surfaces, creating flat bottom holes, tilted drilling for angled holes, and drilling intersecting holes, half holes, shoulders, or thin plates
- AlTiN coating for improved lubricity and heat resistance
- TiB2 coating for added lubricity and improved tool life in aluminum
- h6 tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.0312 (1/32)		.793 mm	.208		(5x)	1/8	2	FBG0312-C3	54.30	FBG0312-C8	58.00
.0312 (1/32)		.793 mm		**3.80 mm**	(3x)	3 mm	50 mm	FBF0312-C3	53.00	FBF0312-C8	54.80
.0312 (1/32)		.793 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0312-C3	56.40	FBD0312-C8	60.20
.0314		.800 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0315-C3	56.40	FBD0315-C8	60.20
.0320	#67	.812 mm		**5.40 mm**	(5x)	3 mm	50 mm	FBD0320-C3	56.40	FBD0320-C8	60.20
.0320	#67	.812 mm	.216		(5x)	1/8	2	FBG0320-C3	54.30	FBG0320-C8	58.00
.0330	#66	.838 mm		**5.60 mm**	(5x)	3 mm	50 mm	FBD0330-C3	56.40	FBD0330-C8	60.20
.0350	#65	.889 mm		**6.00 mm**	(5x)	3 mm	50 mm	FBD0350-C3	56.40	FBD0350-C8	60.20
.0350	#65	.889 mm	.240		(5x)	1/8	2	FBG0350-C3	54.30	FBG0350-C8	58.00
.0354		.900 mm		**6.00 mm**	(5x)	3 mm	50 mm	FBD0354-C3	56.40	FBD0354-C8	60.20
.0360	#64	.914 mm		**6.20 mm**	(5x)	3 mm	50 mm	FBD0360-C3	56.40	FBD0360-C8	60.20
.0370	#63	.939 mm		**6.40 mm**	(5x)	3 mm	50 mm	FBD0370-C3	56.40	FBD0370-C8	60.20
.0380	#62	.965 mm		**6.60 mm**	(5x)	3 mm	50 mm	FBD0380-C3	56.40	FBD0380-C8	60.20
.0390	#61	.990 mm		**6.60 mm**	(5x)	3 mm	50 mm	FBD0390-C3	56.40	FBD0390-C8	60.20
.0393		1.000 mm		**6.80 mm**	(5x)	3 mm	50 mm	FBD0393-C3	61.90	FBD0393-C8	65.80
.0400	#60	1.016 mm		**6.80 mm**	(5x)	3 mm	50 mm	FBD0400-C3	61.90	FBD0400-C8	65.80
.0400	#60	1.016 mm	.272		(5x)	1/8	2	FBG0400-C3	59.60	FBG0400-C8	63.30
.0410	#59	1.041 mm		**7.00 mm**	(5x)	3 mm	50 mm	FBD0410-C3	61.90	FBD0410-C8	65.80
.0420	#58	1.066 mm		**7.20 mm**	(5x)	3 mm	50 mm	FBD0420-C3	61.90	FBD0420-C8	65.80
.0430	#57	1.092 mm		**7.40 mm**	(5x)	3 mm	50 mm	FBD0430-C3	61.90	FBD0430-C8	65.80
.0450		1.143 mm		**7.80 mm**	(5x)	3 mm	50 mm	FBD0450-C3	61.90	FBD0450-C8	65.80
.0465	#56	1.181 mm		**8.00 mm**	(5x)	3 mm	50 mm	FBD0465-C3	61.90	FBD0465-C8	65.80
.0465	#56	1.181 mm	.312		(5x)	1/8	2	FBG0465-C3	59.60	FBG0465-C8	63.30
.0468 (3/64)		1.190 mm		**5.60 mm**	(3x)	3 mm	50 mm	FBF0468-C3	58.40	FBF0468-C8	60.10
.0468 (3/64)		1.190 mm		**8.00 mm**	(5x)	3 mm	50 mm	FBD0468-C3	61.90	FBD0468-C8	65.80
.0468 (3/64)		1.190 mm	.320		(5x)	1/8	2	FBG0468-C3	59.60	FBG0468-C8	63.30
.0492		1.250 mm		**8.50 mm**	(5x)	3 mm	50 mm	FBD0492-C3	61.90	FBD0492-C8	65.80
.0500		1.270 mm		**8.50 mm**	(5x)	3 mm	50 mm	FBD0500-C3	61.90	FBD0500-C8	65.80
.0500		1.270 mm	.340		(5x)	1/8	2	FBG0500-C3	59.60	FBG0500-C8	63.30
.0520	#55	1.320 mm		**9.00 mm**	(5x)	3 mm	50 mm	FBD0520-C3	61.90	FBD0520-C8	65.80
.0520	#55	1.320 mm	.360		(5x)	1/8	2	FBG0520-C3	59.60	FBG0520-C8	63.30
.0550	#54	1.397 mm		**9.50 mm**	(5x)	3 mm	50 mm	FBD0550-C3	61.90	FBD0550-C8	65.80
.0550	#54	1.397 mm	.380		(5x)	1/8	2	FBG0550-C3	59.60	FBG0550-C8	63.30

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.0590		1.500 mm		**10.00 mm**	(5x)	3 mm	50 mm	FBD0590-C3	66.50	FBD0590-C8	70.50
.0595	#53	1.511 mm		**10.00 mm**	(5x)	3 mm	50 mm	FBD0595-C3	66.50	FBD0595-C8	70.50
.0600		1.524 mm		**10.50 mm**	(5x)	3 mm	50 mm	FBD0600-C3	66.50	FBD0600-C8	70.50
.0625 (1/16)		1.587 mm		**7.60 mm**	(3x)	3 mm	50 mm	FBF0625-C3	63.20	FBF0625-C8	66.80
.0625 (1/16)		1.587 mm		**10.50 mm**	(5x)	3 mm	50 mm	FBD0625-C3	66.50	FBD0625-C8	70.50
.0625 (1/16)		1.587 mm	.420		(5x)	1/8	2	FBG0625-C3	63.90	FBG0625-C8	67.90
.0635	#52	1.612 mm		**11.00 mm**	(5x)	3 mm	50 mm	FBD0635-C3	66.50	FBD0635-C8	70.50
.0670	#51	1.701 mm		**11.50 mm**	(5x)	3 mm	50 mm	FBD0670-C3	66.50	FBD0670-C8	70.50
.0700	#50	1.778 mm		**8.50 mm**	(3x)	3 mm	50 mm	FBF0700-C3	63.20	FBF0700-C8	66.80
.0700	#50	1.778 mm		**12.00 mm**	(5x)	3 mm	50 mm	FBD0700-C3	66.50	FBD0700-C8	70.50
.0700	#50	1.778 mm	.480		(5x)	1/8	2	FBG0700-C3	63.90	FBG0700-C8	67.90
.0730	#49	1.854 mm		**12.50 mm**	(5x)	3 mm	50 mm	FBD0730-C3	66.50	FBD0730-C8	70.50
.0760	#48	1.930 mm		**13.00 mm**	(5x)	3 mm	50 mm	FBD0760-C3	66.50	FBD0760-C8	70.50
.0781		1.984 mm	.520		(5x)	1/8	2	FBG0781-C3	63.90	FBG0781-C8	67.90
.0781 (5/64)		1.984 mm		**13.50 mm**	(5x)	3 mm	50 mm	FBD0781-C3	66.50	FBD0781-C8	70.50
.0785	#47	1.993 mm		**13.50 mm**	(5x)	3 mm	50 mm	FBD0785-C3	66.50	FBD0785-C8	70.50
.0787		2.000 mm		**13.50 mm**	(5x)	4 mm	50 mm	FBD0787-C3	71.90	FBD0787-C8	75.60
.0800		2.032 mm		**9.50 mm**	(3x)	4 mm	50 mm	FBF0800-C3	68.50	FBF0800-C8	69.50
.0800		2.032 mm		**13.50 mm**	(5x)	4 mm	50 mm	FBD0800-C3	71.90	FBD0800-C8	75.60
.0810	#46	2.057 mm		**14.00 mm**	(5x)	4 mm	50 mm	FBD0810-C3	71.90	FBD0810-C8	75.60
.0820	#45	2.082 mm		**14.00 mm**	(5x)	4 mm	50 mm	FBD0820-C3	71.90	FBD0820-C8	75.60
.0860	#44	2.184 mm		**14.50 mm**	(5x)	4 mm	50 mm	FBD0860-C3	71.90	FBD0860-C8	75.60
.0860	#44	2.184 mm	.580		(5x)	3/16	2-1/2	FBG0860-C3	69.10	FBG0860-C8	72.80
.0890	#43	2.260 mm		**10.50 mm**	(3x)	4 mm	50 mm	FBF0890-C3	68.50	FBF0890-C8	69.50
.0890	#43	2.260 mm		**15.00 mm**	(5x)	4 mm	50 mm	FBD0890-C3	71.90	FBD0890-C8	75.60
.0890	#43	2.260 mm	.600		(5x)	3/16	2-1/2	FBG0890-C3	69.10	FBG0890-C8	72.80
.0900		2.286 mm		**11.00 mm**	(3x)	4 mm	50 mm	FBF0900-C3	68.50	FBF0900-C8	69.50
.0900		2.286 mm		**15.00 mm**	(5x)	4 mm	50 mm	FBD0900-C3	71.90	FBD0900-C8	75.60
.0935	#42	2.374 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0935-C3	71.90	FBD0935-C8	75.60
.0937 (3/32)		2.381 mm		**11.50 mm**	(3x)	4 mm	50 mm	FBF0937-C3	68.50	FBF0937-C8	69.50
.0937 (3/32)		2.381 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0937-C3	71.90	FBD0937-C8	75.60
.0937 (3/32)		2.381 mm	.640		(5x)	3/16	2-1/2	FBG0937-C3	69.10	FBG0937-C8	72.80
.0960	#41	2.438 mm		**16.00 mm**	(5x)	4 mm	63 mm	FBD0960-C3	71.90	FBD0960-C8	75.60
.0960	#41	2.438 mm	.640		(5x)	3/16	2-1/2	FBG0960-C3	69.10	FBG0960-C8	72.80
.0980	#40	2.489 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0980-C3	71.90	FBD0980-C8	75.60
.0984		2.500 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0984-C3	76.10	FBD0984-C8	80.00
.0995	#39	2.527 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD0995-C3	76.10	FBD0995-C8	80.00
.0995	#39	2.527 mm	.680		(5x)	3/16	2-1/2	FBG0995-C3	73.30	FBG0995-C8	77.10
.1000		2.540 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD1000-C3	76.10	FBD1000-C8	80.00
.1015	#38	2.578 mm		**17.00 mm**	(5x)	4 mm	63 mm	FBD1015-C3	76.10	FBD1015-C8	80.00
.1040	#37	2.641 mm		**18.00 mm**	(5x)	4 mm	63 mm	FBD1040-C3	76.10	FBD1040-C8	80.00
.1065	#36	2.705 mm		**18.00 mm**	(5x)	4 mm	63 mm	FBD1065-C3	76.10	FBD1065-C8	80.00
.1093 (7/64)		2.778 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1093-C3	76.10	FBD1093-C8	80.00
.1100	#35	2.794 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1100-C3	76.10	FBD1100-C8	80.00

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MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

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DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		TiB_2 COATED	
inch	wire	metric	inch	metric	hole depth						
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.010" −.000"	L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.1100	#35	2.794 mm	.760		(5x)	3/16	2-1/2	FBG1100-C3	73.30	FBG1100-C8	77.10
.1110	#34	2.819 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1110-C3	76.10	FBD1110-C8	80.00
.1130	#33	2.870 mm		**19.00 mm**	(5x)	4 mm	63 mm	FBD1130-C3	76.10	FBD1130-C8	80.00
.1160	#32	2.946 mm		**20.00 mm**	(5x)	4 mm	63 mm	FBD1160-C3	76.10	FBD1160-C8	80.00
.1160	#32	2.946 mm	.800		(5x)	3/16	2-1/2	FBG1160-C3	73.30	FBG1160-C8	77.10
.1181		3.000 mm		**14.50 mm**	(3x)	4 mm	50 mm	FBF1181-C3	72.80	FBF1181-C8	73.80
.1181		3.000 mm		**20.00 mm**	(5x)	4 mm	63 mm	FBD1181-C3	76.10	FBD1181-C8	80.00
D_1 +.0000" −.0005"		D_1 +.000mm −.013mm	L_2 +.030" −.000"	L_2 +.75mm −.00mm		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.1200	#31	3.048 mm		**14.50 mm**	(3x)	6 mm	63 mm	FBF1200-C3	81.40	FBF1200-C8	85.10
.1200	#31	3.048 mm		**21.00 mm**	(5x)	6 mm	63 mm	FBD1200-C3	85.30	FBD1200-C8	89.10
.1200	#31	3.048 mm	.800		(5x)	3/16	2-1/2	FBG1200-C3	82.20	FBG1200-C8	85.80
.1250 (1/8)		3.175 mm		**15.00 mm**	(3x)	6 mm	63 mm	FBF1250-C3	81.40	FBF1250-C8	85.10
.1250 (1/8)		3.175 mm		**21.00 mm**	(5x)	6 mm	63 mm	FBD1250-C3	85.30	FBD1250-C8	89.10
.1250 (1/8)		3.175 mm	.840		(5x)	3/16	2-1/2	FBG1250-C3	82.20	FBG1250-C8	85.80
.1285	#30	3.264 mm	.880		(5x)	1/4	2-1/2	FBG1285-C3	82.20	FBG1285-C8	85.80
.1360	#29	3.454 mm		**16.00 mm**	(3x)	6 mm	63 mm	FBF1360-C3	81.40	FBF1360-C8	85.10
.1360	#29	3.454 mm		**23.00 mm**	(5x)	6 mm	63 mm	FBD1360-C3	85.30	FBD1360-C8	89.10
.1360	#29	3.454 mm	.920		(5x)	1/4	3	FBG1360-C3	82.20	FBG1360-C8	85.80
.1405	#28	3.571 mm	.960		(5x)	1/4	3	FBG1405-C3	82.20	FBG1405-C8	85.80
.1406 (9/64)		3.571 mm		**17.00 mm**	(3x)	6 mm	63 mm	FBF1406-C3	81.90	FBF1406-C8	82.60
.1406 (9/64)		3.571 mm		**24.00 mm**	(5x)	6 mm	75 mm	FBD1406-C3	85.30	FBD1406-C8	89.10
.1470	#26	3.733 mm		**26.00 mm**	(5x)	6 mm	75 mm	FBD1470-C3	85.30	FBD1470-C8	89.10
.1562 (5/32)		3.968 mm		**26.00 mm**	(5x)	6 mm	75 mm	FBD1562-C3	85.30	FBD1562-C8	89.10
.1574		4.000 mm		**28.00 mm**	(5x)	6 mm	75 mm	FBD1574-C3	85.30	FBD1574-C8	89.10
.1590	#21	4.038 mm		**19.00 mm**	(3x)	6 mm	75 mm	FBF1590-C3	81.40	FBF1590-C8	85.10
.1590	#21	4.038 mm		**28.00 mm**	(5x)	6 mm	75 mm	FBD1590-C3	85.30	FBD1590-C8	89.10
.1718 (11/64)		4.365 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1718-C3	85.30	FBD1718-C8	89.10
.1770	#16	4.495 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1770-C3	85.30	FBD1770-C8	89.10
.1800	#15	4.572 mm		**30.00 mm**	(5x)	6 mm	75 mm	FBD1800-C3	85.30	FBD1800-C8	89.10
.1875 (3/16)		4.762 mm		**32.00 mm**	(5x)	6 mm	75 mm	FBD1875-C3	85.30	FBD1875-C8	89.10
.1968		5.000 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD1968-C3	85.30	FBD1968-C8	89.10
.2009	#7	5.105 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD2009-C3	85.30	FBD2009-C8	89.10
.2031 (13/64)		5.159 mm		**34.00 mm**	(5x)	6 mm	75 mm	FBD2031-C3	85.30	FBD2031-C8	89.10
.2129	#3	5.410 mm		**36.00 mm**	(5x)	6 mm	75 mm	FBD2129-C3	85.30	FBD2129-C8	89.10
.2187 (7/32)		5.556 mm		**38.00 mm**	(5x)	6 mm	100 mm	FBD2187-C3	85.30	FBD2187-C8	89.10
.2343 (15/64)		5.953 mm		**40.00 mm**	(5x)	6 mm	100 mm	FBD2343-C3	85.30	FBD2343-C8	89.10
.2362		6.000 mm		**40.00 mm**	(5x)	6 mm	100 mm	FBD2362-C3	85.30	FBD2362-C8	89.10
.2500 (1/4)	E	6.350 mm		**30.00 mm**	(3x)	8 mm	100 mm	FBF2500-C3	81.40	FBF2500-C8	85.10
.2500 (1/4)	E	6.350 mm		**42.00 mm**	(5x)	8 mm	100 mm	FBD2500-C3	85.30	FBD2500-C8	89.10

MINIATURE HIGH PERFORMANCE DRILLS

Flat Bottom (cont.)

SPEEDS & FEEDS (Miniature High Performance Drills – Flat Bottom)

Important Note: Values in table are for a fully enclosed tool that is 1x diameter into the workpiece. A starting hole is required on a flat surface. For drilling on inclined or rounded surfaces please refer to the complete speeds and feeds chart available online at www.harveytool.com. Values in table are also based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For Ferrous materials at 38-45 Rc reduce IPR to 80% of the chart value. Pecking cycles are recommended to avoid chip packing and breakage. Initial Peck must fully submerge the drill point into the material. Do not use a pecking cycle for half-hole drilling or any situation where the drill is not fully enclosed in the material during the drilling operation. For steels at 29-37 Rc, an initial peck should be 2-3x Diameter, and each subsequent peck should be 1-2x Diameter. For harder steels at 38-45 Rc, 1-2x Diameter is recommended for an initial peck, and each subsequent peck should be .5-1x Diameter. For Non-Ferrous Materials, an initial peck should be 3-5x Diameter, and each subsequent peck should be 2-3x Diameter.

Coating	Material	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter								
			.015	.031	.047	.062	.078	.093	.125	.187	.250
AlTiN Hardness: 29-37 Rc (279-344 HBn)	**Carbon Steels** Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00063	.00130	.00197	.00260	.00328	.00391	.00525	.00785	.01050
	201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Tool Steels A, L, O, P, W series	125	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	D, H, M, T, S series	90	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	Titanium Alloys	100	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
	High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00036	.00074	.00113	.00149	.00187	.00223	.00300	.00449	.00600
TiB_2 Hardness: ≤ 28 Rc (≤ 271 HBn)	**Aluminum Alloys:** Casting (2xx, 5xx, 7xx, 8xx)	450	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600									
	Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00065	.00134	.00203	.00268	.00337	.00402	.00540	.00808	.01080
	Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420									
	Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390									
	Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350									
	Wrought - 5%-8% Si (4xxx)	600									
	Wrought - 8%-12% Si (4xxx)	480									
	Magnesium Alloys	900	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Zinc Alloys	480									
	Copper Alloys: High Coppers - 90%+ (C1xxx)	170	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375									
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170									
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375									
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375									
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170									
	Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400									
	Plastics: Unfilled Plastics	500	.00072	.00149	.00226	.00298	.00374	.00446	.00600	.00898	.01200
	Reinforced Plastics	350	.00058	.00119	.00180	.00238	.00300	.00357	.00480	.00718	.00960

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through – Metric



Available in 12x & 20x Flute Lengths!

- Drill up to 20x diameter in depth
- Coolant through design for improved chip removal and heat reduction at the drill tip
- 140° point angle
- Specialized flute shape for improved chip evacuation and maximum rigidity
- h6 shank tolerance for high precision tool holders
- AlTiN coated for improved lubricity and heat resistance
- CNC ground in Germany
- Solid carbide



Coolant Through Design for Improved Chip Removal

COOLANT-THROUGH

DRILL DIAMETER			FLUTE LENGTH			SHANK DIAMETER	OVERALL LENGTH	AlTiN COATED		AlTiN NANO COATED	
inch	wire	metric	inch	metric	hole depth						
		D_1 +.000mm −.013mm		L_2 +.25mm −.00mm		D_2 (h6)	L_1	2 FL	USD$	2 FL	USD$
.0520	#55	1.320 mm	.709	**18.00 mm**	(12x)	3 mm	63 mm	ACD0520-C3	213.80	ACD0520-C6	217.80
.0550	#54	1.397 mm	.748	**19.00 mm**	(12x)	3 mm	63 mm	ACD0550-C3	213.80		
.0590		1.500 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0590-C3	213.80		
.0590		1.500 mm	1.280	**32.50 mm**	(20x)	3 mm	75 mm	CXZ0590-C3	260.40		
.0595	#53	1.511 mm	.827	**21.00 mm**	(12x)	3 mm	63 mm	ACD0595-C3	213.80		
.0625 (1/16)		1.587 mm	.866	**22.00 mm**	(12x)	3 mm	63 mm	ACD0625-C3	213.80	ACD0625-C6	217.80
.0625 (1/16)		1.587 mm	1.358	**34.50 mm**	(20x)	3 mm	75 mm	CXZ0625-C3	260.40	CXZ0625-C6	264.50
.0700	#50	1.778 mm	.945	**24.00 mm**	(12x)	3 mm	63 mm	ACD0700-C3	213.80		
.0781 (5/64)		1.984 mm	1.063	**27.00 mm**	(12x)	3 mm	63 mm	ACD0781-C3	213.80	ACD0781-C6	217.80
.0781 (5/64)		1.984 mm	1.693	**43.00 mm**	(20x)	3 mm	100 mm	CXZ0781-C3	260.40	CXZ0781-C6	264.50
.0787		2.000 mm	1.102	**28.00 mm**	(12x)	4 mm	63 mm	ACD0787-C3	221.40		
.0787		2.000 mm	1.732	**44.00 mm**	(20x)	4 mm	100 mm	CXZ0787-C3	288.90		
.0890	#43	2.260 mm	1.220	**31.00 mm**	(12x)	4 mm	75 mm	ACD0890-C3	221.40		
.0937 (3/32)		2.381 mm	1.299	**33.00 mm**	(12x)	4 mm	75 mm	ACD0937-C3	221.40	ACD0937-C6	225.70
.0937 (3/32)		2.381 mm	2.047	**52.00 mm**	(20x)	4 mm	100 mm	CXZ0937-C3	288.90	CXZ0937-C6	293.50
.1015	#38	2.578 mm	1.378	**35.00 mm**	(12x)	4 mm	75 mm	ACD1015-C3	221.40		
.1065	#36	2.705 mm	1.457	**37.00 mm**	(12x)	4 mm	75 mm	ACD1065-C3	221.40		
.1093 (7/64)		2.778 mm	1.496	**38.00 mm**	(12x)	4 mm	75 mm	ACD1093-C3	221.40		
.1093 (7/64)		2.778 mm	2.362	**60.00 mm**	(20x)	4 mm	100 mm	CXZ1093-C3	288.90		
.1181		3.000 mm	1.654	**42.00 mm**	(12x)	4 mm	100 mm	ACD1181-C3	221.40	ACD1181-C6	226.10
.1181		3.000 mm	2.559	**65.00 mm**	(20x)	4 mm	100 mm	CXZ1181-C3	288.90		

MINIATURE HIGH PERFORMANCE DRILLS

Deep Hole – Coolant-Through– Metric (cont.)

SPEEDS & FEEDS (Miniature High Performance Drills – Deep Hole – Metric)

Important Note: Values in table are in inches and are based on 12x length drills and a material hardness of 29-37 Rc. For longer lengths and higher hardness materials, table values of IPR must be reduced (for 20x, reduce to 75%). For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

Material (Hardness: 29-37 Rc)	SFM	Chip Load IPR (Inches Per Revolution) By Drill Diameter							
		.031	.047	.062	.078	.093	.125	.187	.250
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00110	.00167	.00220	.00277	.00330	.00444	.00664	.00887
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Tool Steels A, L, O, P, W series	125	.00101	.00153	.00201	.00253	.00302	.00406	.00607	.00811
D, H, M, T, S series	90	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
Titanium Alloys	100	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00063	.00095	.00126	.00158	.00189	.00254	.00379	.00507

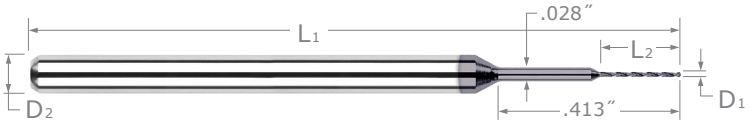
Deep Hole Drilling Guidelines

For best results, the following steps are recommended:

- For hole depths of 12x Diameter or greater, drill a pilot hole up to 1.5x D in depth using a drill with 3x LOF or shorter.
- Insert primary drill at low speed (~500 rpm) and start coolant flow.
- Increase speed and feed to recommended parameters.
- Under optimal conditions, it is possible to feed to full hole depth without pecking. If necessary, use 2-4 pecks to get to full hole depth.
- After reaching desired hole depth, reduce speed (~500 RPM) before retracting the drill.
- Cutting oil is recommended. As an alternative, it is possible to use emulsions with EP additives. Use a fine mesh prefilter (=5µm) on spindle through coolant to prevent a blockage of the coolant hole. A minimum coolant pressure of 600-800 PSI is recommended.

NEW SIZES!

MINIATURE DRILLS



Miniature Drills Down to .002″

- For tools .020″ and smaller, there is an intermediate neck diameter as pictured above
- 130° drill point
- Carbide
- CNC ground in Germany

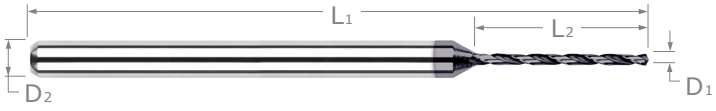
DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
inch	wire	metric									
D_1 $^{+.0000″}_{-.0003″}$ *			L_2	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
.0020		.050 mm	.014	1/8	1-1/2	810020**	43.80				
.0020		.050 mm	.028	1/8	1-1/2	20020	43.80				
.0039	#102	.100 mm	.026	1/8	1-1/2	810039**	31.00				
.0039	#102	.100 mm	.039	1/8	1-1/2	20039	31.00				
.0043	#101		.056	1/8	1-1/2	20043	31.00				
.0047	#100		.056	1/8	1-1/2	20047	31.00				
.0051	#99	.130 mm	.034	1/8	1-1/2	810051**	30.00				
.0051	#99	.130 mm	.056	1/8	1-1/2	20051	30.30				
.0055	#98		.056	1/8	1-1/2	20055	27.90				
.0059	#97	.150 mm	.040	1/8	1-1/2	810059**	27.90				
.0059	#97	.150 mm	.066	1/8	1-1/2	20059	27.90				
.0063	#96		.042	1/8	1-1/2	810063	27.90				
.0063	#96		.066	1/8	1-1/2	20063	27.90				
.0067	#95		.066	1/8	1-1/2	20067	27.90				
.0069		.175 mm	.066	1/8	1-1/2	20069	27.90				
.0071	#94		.106	1/8	1-1/2	20071	25.40				
.0075	#93		.106	1/8	1-1/2	20075	25.40				
.0079	#92	.200 mm	.054	1/8	1-1/2	810079**	21.20	810079-C3**	27.10		
.0079	#92	.200 mm	.160	1/8	1-1/2	20079	21.20	20079-C3	27.10	20079-C4	36.10
.0083	#91		.160	1/8	1-1/2	20083	21.20	20083-C3	27.10		
.0087	#90		.126	1/8	1-1/2	20087	21.20	20087-C3	27.10		
.0089		.225 mm	.160	1/8	1-1/2	20089	21.20	20089-C3	27.10		
.0091	#89		.160	1/8	1-1/2	20091	20.80	20091-C3	26.70		
.0095	#88		.064	1/8	1-1/2	810095**	20.80	810095-C3**	26.70		
.0095	#88		.160	1/8	1-1/2	20095	20.80	20095-C3	26.70		
.0098		.250 mm	.066	1/8	1-1/2	810098**	20.80	810098-C3**	26.70		
.0098		.250 mm	.160	1/8	1-1/2	20098	20.80	20098-C3	26.70	20098-C4	35.70
.0100	#87		.068	1/8	1-1/2	810100**	20.80	810100-C3**	26.70		
.0100	#87		.160	1/8	1-1/2	20100	20.80	20100-C3	26.70	20100-C4	35.70
.0105	#86		.160	1/8	1-1/2	20105	20.80	20105-C3	26.70		
.0108		.275 mm	.160	1/8	1-1/2	20108	20.80	20108-C3	26.70		
.0110	#85		.160	1/8	1-1/2	20110	20.80	20110-C3	26.70	20110-C4	35.70
.0115	#84		.180	1/8	1-1/2	20115	20.80	20115-C3	26.70		
.0118		.300 mm	.080	1/8	1-1/2	810118	20.80	810118-C3	26.70		
.0118		.300 mm	.180	1/8	1-1/2	20118	20.80	20118-C3	26.70	20118-C4	35.70

* Tolerance for all AlTiN coating is +.0002"/–.0003". ** Total overhang from shank transition is .250"

continued on next page

MINIATURE DRILLS

(cont.)



continued from previous page

	DRILL DIAMETER			FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	inch	wire	metric									
	D_1 +.0000″ −.0003″ *			L_2	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
	.0120	#83		.080	1/8	1-1/2	810120**	18.70	810120-C3**	24.60		
	.0120	#83		.230	1/8	1-1/2	20120	18.70	20120-C3	24.60	20120-C4	33.60
	.0125	#82		.230	1/8	1-1/2	20125	18.70	20125-C3	24.60		
	.0130	#81		.090	1/8	1-1/2	810130	18.70	810130-C3	24.60		
	.0130	#81		.230	1/8	1-1/2	20130	18.70	20130-C3	24.60	20130-C4	33.60
	.0135	#80		.090	1/8	1-1/2	810135	18.70	810135-C3	24.60		
	.0135	#80		.270	1/8	1-1/2	20135	18.30	20135-C3	24.20	20135-C4	33.20
	.0138		.350 mm	.270	1/8	1-1/2	20138	18.30	20138-C3	24.20		
	.0145	#79		.100	1/8	1-1/2	810145**	18.30	810145-C3**	24.20	20157-C4	33.20
	.0160	#78		.110	1/8	1-1/2	810160	18.30	810160-C3	24.20	810160-C4	33.20
	.0145	#79		.270	1/8	1-1/2	20145	18.30	20145-C3	24.20	20145-C4	33.20
	.0157		.400 mm	.105	1/8	1-1/2	810157**	18.30	810157-C3**	24.20		
	.0157		.400 mm	.270	1/8	1-1/2	20157	18.30	20157-C3	24.20		
	.0160	#78		.270	1/8	1-1/2	20160	18.30	20160-C3	24.20	20160-C4	33.20
	.0168			.270	1/8	1-1/2	20168	18.30	20168-C3	24.20		
	.0177		.450 mm	.270	1/8	1-1/2	20177	18.30	20177-C3	24.20		
	.0180	#77		.120	1/8	1-1/2	810180**	16.90	810180-C3**	22.80		
	.0180	#77		.270	1/8	1-1/2	20180	16.90	20180-C3	22.80	20180-C4	31.90
	.0197		.500 mm	.135	1/8	1-1/2	810197	17.50	810197-C3	23.50		
	.0197		.500 mm	.275	1/8	1-1/2	20197	16.90	20197-C3	22.80	20197-C4	31.90
	.0200	#76		.135	1/8	1-1/2	810200**	16.90	810200-C3**	22.80		
	.0200	#76		.275	1/8	1-1/2	20200	16.90	20200-C3	22.80	20200-C4	31.90
	.0210	#75		.140	1/8	1-1/2	810205	16.90	810205-C3	22.80	810205-C4	31.90
	.0210	#75		.275	1/8	1-1/2	20205	16.90	20205-C3	22.80	20205-C4	31.90
	.0225	#74		.150	1/8	1-1/2	810210	16.90	810210-C3	22.80		
	.0225	#74		.275	1/8	1-1/2	20210	16.90	20210-C3	22.80		
	.0236		.600 mm	.275	1/8	1-1/2	20214	16.90	20214-C3	22.80		
	.0240	#73		.275	1/8	1-1/2	20215	16.90	20215-C3	22.80		
	.0250	#72		.170	1/8	1-1/2	810220	16.90	810220-C3	22.80		
	.0250	#72		.275	1/8	1-1/2	20220	16.90	20220-C3	22.80	20220-C4	31.90
	.0260	#71		.275	1/8	1-1/2	20225	16.90	20225-C3	22.80		
	.0270			.335	1/8	1-1/2	20227	16.90	20227-C3	22.80		
	.0276		.700 mm	.335	1/8	1-1/2	20229	16.90	20229-C3	22.80		
	.0280	#70		.190	1/8	1-1/2	810230	16.90	810230-C3	22.80		
NEW	.0280	#70		.335	1/8	1-1/2	20230	16.90	20230-C3	22.80	20230-C4	31.90
	.0292	#69		.200	1/8	1-1/2	810235	17.50	810235-C3	23.50		
	.0292	#69		.335	1/8	1-1/2	20235	16.90	20235-C3	22.80	20235-C4	31.90
	.0302			.395	1/8	1-1/2	20240	16.90	20240-C3	22.80		
	.0310	#68		.210	1/8	1-1/2	810245	15.90	810245-C3	21.80		
	.0310	#68		.395	1/8	1-1/2	20245	15.90	20245-C3	21.80	20245-C4	30.80

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

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NEW SIZES!

MINIATURE DRILLS

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DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND		
D_1 +.0000" −.0003" *			L_2	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$	
.0312 (1/32)			.210	1/8	1-1/2	810250	15.90	810250-C3	21.80			
.0312 (1/32)			.395	1/8	1-1/2	20250	15.90	20250-C3	21.80	20250-C4	30.80	
.0315		.800 mm	.395	1/8	1-1/2	20253	15.90	20253-C3	21.80			
.0320	#67		.395	1/8	1-1/2	20255	15.90	20255-C3	21.80	20255-C4	30.80	
.0330	#66		.395	1/8	1-1/2	20260	15.90	20260-C3	21.80			
.0350	#65		.240	1/8	1-1/2	810265	16.50	810265-C3	22.40			
.0350	#65		.395	1/8	1-1/2	20265	15.90	20265-C3	21.80	20265-C4	30.80	
.0354		.900 mm	.395	1/8	1-1/2	20267	15.90	20267-C3	21.80			
.0360	#64		.395	1/8	1-1/2	20270	15.90	20270-C3	21.80			
.0370	#63		.395	1/8	1-1/2	20275	15.90	20275-C3	21.80			
.0380	#62		.395	1/8	1-1/2	20280	15.90	20280-C3	21.80			
.0390	#61		.395	1/8	1-1/2	20285	15.90	20285-C3	21.80			
.0394		1.000 mm	.395	1/8	1-1/2	20290	15.90	20290-C3	21.80	20290-C4	30.80	
.0400	#60		.270	1/8	1-1/2	810295	16.50	810295-C3	22.40			
.0400	#60		.395	1/8	1-1/2	20295	15.90	20295-C3	21.80	20295-C4	30.80	NEW
.0410	#59		.280	1/8	1-1/2	810300	15.90	810300-C3	21.80			
.0410	#59		.395	1/8	1-1/2	20300	15.90	20300-C3	21.80			
.0420	#58		.395	1/8	1-1/2	20305	15.90	20305-C3	21.80			
.0430	#57		.395	1/8	1-1/2	20310	15.90	20310-C3	21.80			
.0433		1.100 mm	.395	1/8	1-1/2	20311	15.90	20311-C3	21.80			
.0440			.210	1/8	1-1/2	703915	15.90	703915-C3	21.80			
.0440			.395	1/8	1-1/2	20315	15.90	20315-C3	21.80			
.0465	#56		.220	1/8	1-1/2	703920	15.90	703920-C3	21.80			
.0465	#56		.395	1/8	1-1/2	20320	15.90	20320-C3	21.80			
.0469 (3/64)			.325	1/8	1-1/2	810325	16.50	810325-C3	22.40			
.0469 (3/64)			.395	1/8	1-1/2	20325	15.90	20325-C3	21.80	20325-C4	30.80	NEW
.0472		1.200 mm	.395	1/8	1-1/2	20327	15.90	20327-C3	21.80			
.0492		1.250 mm	.395	1/8	1-1/2	20330	15.90	20330-C3	21.80			
.0500		1.270 mm	.395	1/8	1-1/2	20332	15.90	20332-C3	21.80			
.0512		1.300 mm	.413	1/8	1-1/2	20335	15.90	20335-C3	21.80			
.0520	#55		.413	1/8	1-1/2	20340	15.90	20340-C3	21.80	20340-C4	30.80	NEW
.0520	#55		.500	1/8	1-1/2	815340	15.90	815340-C3	21.80			
.0531		1.350 mm	.413	1/8	1-1/2	20345	15.90	20345-C3	21.80			
.0550	#54		.413	1/8	1-1/2	20350	15.90	20350-C3	21.80	20350-C4	30.80	
.0550	#54		.525	1/8	1-1/2	815350	15.90	815350-C3	21.80			
.0571		1.450 mm	.375	1/8	1-1/2	810302	16.50	810302-C3	22.40			
.0571		1.450 mm	.413	1/8	1-1/2	20355	15.90	20355-C3	21.80			
.0591		1.500 mm	.413	1/8	1-1/2	20360	15.90	20360-C3	21.80			
.0595	#53		.413	1/8	1-1/2	20365	15.90	20365-C3	21.80			
.0595	#53		.575	1/8	2	815365	16.70	815365-C3	22.60			
.0610		1.550 mm	.413	1/8	1-1/2	20370	15.90	20370-C3	21.80			
.0625 (1/16)			.413	1/8	1-1/2	20375	15.90	20375-C3	21.80	20375-C4	30.80	
.0625 (1/16)			.600	1/8	2	815375	16.70	815375-C3	22.60			

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250"

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MINIATURE DRILLS

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	DRILL DIAMETER inch	wire	metric	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.0000″ −.0005″ ***			L_2	D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
	.0630		1.600 mm	.413	1/8	1-1/2	20376	15.90	20376-C3	21.80		
	.0635	#52		.413	1/8	1-1/2	20377	15.90	20377-C3	21.80		
	.0635	#52		.600	1/8	2	815377	16.70	815377-C3	22.60		
	.0670	#51		.413	1/8	1-1/2	20384	15.90	20384-C3	21.80		
	.0670	#51		.650	1/8	2	815384	16.70	815384-C3	22.60		
	.0700	#50		.413	1/8	1-1/2	20390	15.90	20390-C3	21.80	20390-C4	30.80
	.0700	#50		.700	1/8	2	815390	16.70	815390-C3	22.60		
	.0730	#49		.413	1/8	1-1/2	20396	15.90	20396-C3	21.80		
	.0760	#48		.413	1/8	1-1/2	20402	15.90	20402-C3	21.80		
	.0760	#48		.750	1/8	2	815402	16.70	815402-C3	22.60		
	.0781 (5/64)			.413	1/8	1-1/2	20407	15.90	20407-C3	21.80		
	.0781 (5/64)			.750	1/8	2	815407	16.70	815407-C3	22.60		
	.0785	#47		.413	1/8	1-1/2	20408	15.90	20408-C3	21.80		
	.0787		2.000 mm	.413	1/8	1-1/2	20409	15.90	20409-C3	21.80		
NEW	.0810	#46		.413	1/8	1-1/2	20414	15.90	20414-C3	21.80	20414-C4	30.80
	.0810	#46		.800	1/8	2	815414	16.70	815414-C3	22.60		
	.0820	#45		.413	1/8	1-1/2	20416	15.90	20416-C3	21.80		
	.0860	#44		.413	1/8	1-1/2	20424	15.90	20424-C3	21.80		
	.0890	#43		.413	1/8	1-1/2	20430	15.90	20430-C3	21.80		
	.0890	#43		.850	1/8	2	815430	16.70	815430-C3	22.60		
	.0935	#42		.413	1/8	1-1/2	20439	15.90	20439-C3	21.80		
	.0938 (3/32)			.413	1/8	1-1/2	20440	15.90	20440-C3	21.80	20440-C4	30.80
	.0938 (3/32)			.900	1/8	2	815440	16.70	815440-C3	22.60		
	.0960	#41		.413	1/8	1-1/2	20445	15.90	20445-C3	21.80		
	.0980	#40		.413	1/8	1-1/2	20449	15.90	20449-C3	21.80		
	.0984		2.500 mm	.413	1/8	1-1/2	20450	15.90	20450-C3	21.80		
	.0995	#39		.413	1/8	1-1/2	20453	15.90	20453-C3	21.80		
	.1015	#38		.413	1/8	1-1/2	20457	15.90	20457-C3	21.80		
	.1040	#37		.413	1/8	1-1/2	20462	15.90	20462-C3	21.80		
	.1065	#36		.413	1/8	1-1/2	20467	15.90	20467-C3	21.80		
	.1094 (7/64)			.413	1/8	1-1/2	20473	15.90	20473-C3	21.80		
	.1094 (7/64)			1.100	1/8	2-1/2	815473	16.70	815473-C3	22.60		
	.1100	#35		.413	1/8	1-1/2	20475	15.90	20475-C3	21.80		
	.1110	#34		.413	1/8	1-1/2	20477	15.90	20477-C3	21.80		
	.1130	#33		.413	1/8	1-1/2	20481	15.90	20481-C3	21.80		
	.1160	#32		.413	1/8	1-1/2	20487	15.90	20487-C3	21.80		
	.1181		3.000 mm	.413	1/8	1-1/2	20491	15.90	20491-C3	21.80		
	.1200	#31		.413	1/8	1-1/2	20493	15.90	20493-C3	21.80		
	.1200	#31		1.200	1/8	2-1/2	815493	15.90	815493-C3	21.80		
NEW	.1250 (1/8)			.413	1/8	1-1/2	20498	15.90	20498-C3	21.80	20498-C4	30.80
	.1250 (1/8)			1.200	1/8	2-1/2	815498	16.70	815498-C3	22.60		
	.1875 (3/16)			.480	3/16	2	20623	30.20	20623-C3	36.40		
	.2500 (1/4)			.480	1/4	2	20748	40.60	20748-C3	48.10		

* Tolerance for all AlTiN coating is +.0002"/−.0003". ** Total overhang from shank transition is .250". *** Tolerance for AlTiN coating is +.0002"/−.0005".

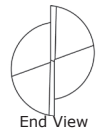
MINIATURE DRILLS

Spotting Drills



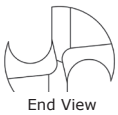
- Thinned web to reduce walking
- Self-centering point geometry
- 2 flutes
- Solid carbide
- CNC ground in the USA

▲ **Stocked in 10 Included Angles**



TYPE I

On center design reduces walking and minimizes flat at bottom of spot. Ideally suited for starting smaller diameter drills and shallow spots.



TYPE II

Ahead of center design improves tip strength. Ideally suited for larger diameter drills and tougher materials.

INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH		UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1	L_2			D_2	L_1		2 FL	USD$	2 FL	USD$	2 FL	USD$
60°	.020	.060 (3x)	.0020	I	1/8	1-1/2		932720	34.60	932720-C3	40.50		
	.030	.090 (3x)	.0030	I	1/8	1-1/2		932730	33.80	932730-C3	39.80		
	.031 (1/32)	.093 (3x)	.0030	I	1/8	1-1/2		932731	33.80	932731-C3	39.80		
	.045	.135 (3x)	.0030	I	1/8	1-1/2		932745	29.30	932745-C3	35.20		
	.060	.180 (3x)	.0050	I	1/8	1-1/2		932760	33.80	932760-C3	39.80		
	.062 (1/16)	.186 (3x)	.0050	I	1/8	1-1/2		932762	33.80	932762-C3	39.80		
	.090	.270 (3x)	.0050	I	1/8	1-1/2		932790	33.80	932790-C3	39.80		
	.093 (3/32)	.279 (3x)	.0060	I	1/8	1-1/2		932793	33.80	932793-C3	39.80		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		932808	33.80	932808-C3	39.80		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		932811	33.80	932811-C3	39.80		
	.187 (3/16)	.312 (1.5x)	.0130	II	3/16	2		715612	30.30	715612-C3	36.50		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2		932812	30.30	932812-C3	36.70		
	.250 (1/4)	.375 (1.5x)	.0180	II	1/4	2-1/2		715616	36.60	715616-C3	44.70		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		932816	36.60	932816-C3	45.30		
	.375 (3/8)	1.000 (3x)	.0270	II	3/8	2-1/2		932824	65.00	932824-C3	76.40		
82°	.010	.030 (3x)	.0015	I	1/8	1-1/2		983110	41.60	983110-C3	47.50		
	.020	.060 (3x)	.0020	I	1/8	1-1/2		983120	35.70	983120-C3	41.60		
	.030	.090 (3x)	.0030	I	1/8	1-1/2		983130	32.70	983130-C3	38.60		
	.045	.135 (3x)	.0030	I	1/8	1-1/2		983145	29.30	983145-C3	35.20		
	.060	.180 (3x)	.0050	I	1/8	1-1/2		983160	29.00	983160-C3	34.90		
	.090	.270 (3x)	.0050	I	1/8	1-1/2		983190	27.70	983190-C3	33.60		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		983208	26.20	983208-C3	32.10		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		965208	26.20	965208-C3	32.10		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2		965212	30.30	965212-C3	36.70		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		965216	38.20	965216-C3	46.90		
90°	.008	.024 (3x)	.0015	I	1/8	1-1/2		11408	49.20	11408-C3	55.10		
	.010	.030 (3x)	.0015	I	1/8	1-1/2		11410	39.20	11410-C3	45.20		
	.010	.030 (3x)	.0015	I	1/8	3	LONG!	987910	48.40	987910-C3	54.30		
	.012	.036 (3x)	.0015	I	1/8	1-1/2		11412	49.20	11412-C3	55.10		
	.015 (1/64)	.045 (3x)	.0015	I	1/8	1-1/2		11415	39.20	11415-C3	45.20	11415-C8	46.90
	.020	.030 (1.5x)	.0020	I	1/8	1-1/2		816020	33.80	816020-C3	39.80		
	.020	.060 (3x)	.0020	I	1/8	1-1/2		11420	33.80	11420-C3	39.80	11420-C8	41.50
	.020	.060 (3x)	.0020	I	1/8	3	LONG!	987920	41.60	987920-C3	47.50		
	.025	.075 (3x)	.0020	I	1/8	1-1/2		11425	33.80	11425-C3	39.80		
	.030	.045 (1.5x)	.0030	I	1/8	1-1/2		816030	31.20	816030-C3	37.90		
	.030	.090 (3x)	.0030	I	1/8	1-1/2		11430	31.20	11430-C3	37.20	11430-C8	38.90
	.030	.090 (3x)	.0030	I	1/8	3	LONG!	987930	40.70	987930-C3	46.60		
	.031 (1/32)	.093 (3x)	.0030	I	1/8	1-1/2		11431	31.20	11431-C3	37.20		
	.035	.105 (3x)	.0030	I	1/8	1-1/2		11435	31.20	11435-C3	37.20		
	.039 (1 mm)	.117 (3x)	.0030	I	1/8	1-1/2		11439	31.20	11439-C3	37.20		
	.040	.120 (3x)	.0030	I	1/8	1-1/2		11440	28.60	11440-C3	34.60	11440-C8	36.30
	.045	.068 (1.5x)	.0030	I	1/8	1-1/2		816045	28.60	816045-C3	34.60		
	.045	.135 (3x)	.0030	I	1/8	1-1/2		11445	28.60	11445-C3	34.60	11445-C8	36.30

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MINIATURE DRILLS

Spotting Drills (cont.)

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INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH		UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1	L_2			D_2	L_1		2 FL	USD$	2 FL	USD$	2 FL	USD$
	.045	.135 (3x)	.0030	I	1/8	3	LONG!	987945	36.60	987945-C3	42.60		
	.047 (3/64)	.141 (3x)	.0040	I	1/8	1-1/2		11447	28.60	11447-C3	34.60		
	.050	.150 (3x)	.0040	I	1/8	1-1/2		11450	28.60	11450-C3	34.60		
	.055	.165 (3x)	.0040	I	1/8	1-1/2		11455	28.60	11455-C3	34.60		
	.060	.090 (1.5x)	.0050	I	1/8	1-1/2		816060	28.20	816060-C3	34.20		
	.060	.180 (3x)	.0050	I	1/8	1-1/2		11460	28.20	11460-C3	34.20	11460-C8	35.90
	.060	.180 (3x)	.0050	I	1/8	3	LONG!	987960	36.20	987960-C3	42.10		
	.062 (1/16)	.093 (1.5x)	.0050	I	1/8	1-1/2		816062	28.20	816062-C3	34.20		
	.062 (1/16)	.186 (3x)	.0050	I	1/8	1-1/2		11462	28.20	11462-C3	34.20	11462-C8	35.90
	.070	.210 (3x)	.0050	I	1/8	1-1/2		11470	28.20	11470-C3	34.20		
	.075	.225 (3x)	.0050	I	1/8	1-1/2		11475	28.20	11475-C3	34.20		
	.078 (5/64)	.117 (1.5x)	.0050	I	1/8	1-1/2		816078	28.20	816078-C3	34.20		
	.078 (5/64)	.234 (3x)	.0050	I	1/8	1-1/2		11478	28.20	11478-C3	34.20	11478-C8	35.90
	.080	.240 (3x)	.0050	I	1/8	1-1/2		11480	28.20	11480-C3	34.20		
	.090	.135 (1.5x)	.0050	I	1/8	1-1/2		816090	26.50	816090-C3	32.40		
	.090	.270 (3x)	.0050	I	1/8	1-1/2		11490	26.50	11490-C3	32.40	11490-C8	34.20
	.090	.270 (3x)	.0050	I	1/8	3	LONG!	987990	34.90	987990-C3	40.80		
	.093 (3/32)	.140 (1.5x)	.0060	I	1/8	1-1/2		816093	26.50	816093-C3	32.40		
	.093 (3/32)	.279 (3x)	.0060	I	1/8	1-1/2		11493	26.50	11493-C3	32.40	11493-C8	34.20
	.100	.300 (3x)	.0060	I	1/8	1-1/2		11500	26.50	11500-C3	32.40		
	.109 (7/64)	.327 (3x)	.0080	I	1/8	1-1/2		11509	26.50	11509-C3	32.40		
	.118 (3 mm)	.354 (3x)	.0080	I	1/8	1-1/2		1153M	26.50	1153M-C3	32.40		
90°	.125 (1/8)	.188 (1.5x)	.0100	I	1/8	1-1/2		816108	24.80	816108-C3	30.70		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		11525	24.80	11525-C3	30.70	11525-C8	32.50
	.125 (1/8)	.375 (3x)	.0100	I	1/8	3	LONG!	988008	33.80	988008-C3	39.80		
	.125 (1/8)	.188 (1.5x)	.0100	II	1/8	1-1/2		787708	24.80	787708-C3	30.70		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		37508	24.80	37508-C3	30.70		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	4	LONG!	55808	36.00	55808-C3	42.40		
	.140 (9/64)	.375 (2.5x)	.0100	II	3/16	2		37509	35.50	37509-C3	42.00		
	.156 (5/32)	.187 (1.5x)	.0110	II	3/16	2		787710	29.50	787710-C3	35.70		
	.156 (5/32)	.375 (2.5x)	.0110	II	3/16	2		37510	29.50	37510-C3	35.90		
	.187 (3/16)	.625 (3.5x)	.0130	I	3/16	2		803912	28.60	803912-C3	35.00		
	.187 (3/16)	.312 (1.5x)	.0130	II	3/16	2		787712	28.60	787712-C3	35.00		
	.187 (3/16)	.625 (3.5x)	.0130	II	3/16	2		37512	28.60	37512-C3	35.00	37512-C8	37.30
	.187 (3/16)	.625 (3.5x)	.0130	II	3/16	4	LONG!	55812	44.20	55812-C3	51.40		
	.218 (7/32)	.750 (3.5x)	.0150	II	1/4	2-1/2		37514	45.50	37514-C3	54.10		
	.236 (6 mm)	.750 (3x)	.0160	II	1/4	2-1/2		37515	45.50	37515-C3	54.10		
	.250 (1/4)	.750 (3x)	.0180	I	1/4	2-1/2		803916	35.70	803916-C3	44.30		
	.250 (1/4)	.375 (1.5x)	.0180	II	1/4	2-1/2		787716	35.70	787716-C3	44.30		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		37516	36.00	37516-C3	44.70	37516-C8	47.10
	.250 (1/4)	.750 (3x)	.0180	II	1/4	6	LONG!	55816	59.90	55816-C3	71.40		
	.312 (5/16)	.750 (2.5x)	.0220	II	5/16	2-1/2		37520	61.30	37520-C3	71.50		
	.375 (3/8)	.500 (1.5x)	.0270	II	3/8	2-1/2		787724	65.00	787724-C3	76.40		
	.375 (3/8)	1.000 (2.5x)	.0270	II	3/8	2-1/2		37524	65.00	37524-C3	76.40		
	.500 (1/2)	1.000 (2x)	.0350	II	1/2	3		37532	112.40	37532-C3	129.40		
	.030	.090 (3x)	.0030	I	1/8	1-1/2		975830	33.60	975830-C3	39.50		
	.060	.180 (3x)	.0050	I	1/8	1-1/2		975860	29.00	975860-C3	34.90		
	.090	.270 (3x)	.0050	I	1/8	1-1/2		975890	29.30	975890-C3	35.20		
100°	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2		975908	26.20	975908-C3	32.10		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2		955908	26.20	955908-C3	32.10		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2		955912	30.30	955912-C3	36.70		
	.250 (1/4)	.375 (1.5x)	.0180	II	1/4	2-1/2		703516	37.80	703516-C3	45.90		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2		955916	37.80	955916-C3	46.50		

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MINIATURE DRILLS

Spotting Drills (cont.)

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INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH		WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1	L_2				D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
	.010	.030	(3x)	.0015	I	1/8	1-1/2	11610	39.20	11610-C3	45.20		
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	11615	39.20	11615-C3	45.20		
	.020	.060	(3x)	.0020	I	1/8	1-1/2	11620	33.80	11620-C3	39.80		
	.025	.075	(3x)	.0020	I	1/8	1-1/2	11625	33.80	11625-C3	39.80		
	.030	.090	(3x)	.0030	I	1/8	1-1/2	11630	31.20	11630-C3	37.20		
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	11631	31.20	11631-C3	37.20		
	.040	.120	(3x)	.0030	I	1/8	1-1/2	11640	28.60	11640-C3	34.60		
	.045	.135	(3x)	.0030	I	1/8	1-1/2	11645	28.60	11645-C3	34.60		
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	11647	28.60	11647-C3	34.60		
	.050	.150	(3x)	.0040	I	1/8	1-1/2	11650	28.60	11650-C3	34.60		
	.055	.165	(3x)	.0040	I	1/8	1-1/2	11655	28.60	11655-C3	34.60		
	.060	.180	(3x)	.0050	I	1/8	1-1/2	11660	28.20	11660-C3	34.20		
	.062 (1/16)	.186	(3x)	.0050	I	1/8	1-1/2	11662	28.20	11662-C3	34.20		
	.070	.210	(3x)	.0050	I	1/8	1-1/2	11670	28.20	11670-C3	34.20		
	.078 (5/64)	.234	(3x)	.0050	I	1/8	1-1/2	11678	28.20	11678-C3	34.20		
120°	.090	.135	(1.5x)	.0050	I	1/8	1-1/2	703290	26.50	703290-C3	32.40		
	.090	.270	(3x)	.0050	I	1/8	1-1/2	11690	26.50	11690-C3	32.40		
	.093 (3/32)	.279	(3x)	.0060	I	1/8	1-1/2	11693	26.50	11693-C3	32.40		
	.100	.300	(3x)	.0060	I	1/8	1-1/2	11700	26.50	11700-C3	32.40		
	.118 (3 mm)	.354	(3x)	.0080	I	1/8	1-1/2	1173M	26.50	1173M-C3	32.40		
	.125 (1/8)	.188	(1.5x)	.0100	I	1/8	1-1/2	703308	24.80	703308-C3	30.70		
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	11725	24.80	11725-C3	30.70		
	.125 (1/8)	.375	(3x)	.0100	II	1/8	1-1/2	38208	24.80	38208-C3	30.70		
	.156 (5/32)	.375	(2.5x)	.0110	II	3/16	2	38210	55.50	38210-C3	61.90		
	.187 (3/16)	.625	(3.5x)	.0130	I	3/16	2	804012	28.60	804012-C3	35.00		
	.187 (3/16)	.625	(3.5x)	.0130	II	3/16	2	38212	28.60	38212-C3	35.00		
	.250 (1/4)	.375	(1.5x)	.0180	II	1/4	2-1/2	703116	35.70	703116-C3	43.80		
	.250 (1/4)	.750	(3x)	.0180	I	1/4	2-1/2	804016	35.70	804016-C3	44.30		
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	38216	36.00	38216-C3	44.70		
	.375 (3/8)	1.000	(2.5x)	.0270	II	3/8	2-1/2	38224	65.00	38224-C3	76.40		
	.030	.090	(3x)	.0030	I	1/8	1-1/2	839530	37.00	839530-C3	41.30		
	.060	.180	(3x)	.0050	I	1/8	1-1/2	839560	36.00	839560-C3	41.30		
130°	.090	.270	(3x)	.0050	I	1/8	1-1/2	839590	36.00	839590-C3	41.30		
	.125 (1/8)	.375	(3x)	.0100	I	1/8	1-1/2	839608	37.80	839608-C3	43.10		
	.250 (1/4)	.750	(3x)	.0180	II	1/4	2-1/2	847016	39.40	847016-C3	48.00		
	.010	.030	(3x)	.0015	I	1/8	1-1/2	39810	40.50	39810-C3	46.40		
	.015 (1/64)	.045	(3x)	.0015	I	1/8	1-1/2	39815	40.50	39815-C3	46.40		
	.020	.030	(1.5x)	.0020	I	1/8	1-1/2	815820	34.60	815820-C3	40.50		
	.020	.060	(3x)	.0020	I	1/8	1-1/2	39820	34.60	39820-C3	40.50	39820-C8	42.20
	.025	.075	(3x)	.0020	I	1/8	1-1/2	39825	34.60	39825-C3	40.50		
	.030	.045	(1.5x)	.0030	I	1/8	1-1/2	815830	32.70	815830-C3	38.60		
	.030	.090	(3x)	.0030	I	1/8	1-1/2	39830	32.70	39830-C3	38.60		
	.031 (1/32)	.093	(3x)	.0030	I	1/8	1-1/2	39831	32.70	39831-C3	38.60		
140°	.039	.117	(3x)	.0030	I	1/8	1-1/2	39839	29.30	39839-C3	35.20		
	.040	.060	(1.5x)	.0030	I	1/8	1-1/2	815840	29.30	815840-C3	35.20		
	.040	.120	(3x)	.0030	I	1/8	1-1/2	39840	29.30	39840-C3	35.20	39840-C8	37.00
	.045	.068	(1.5x)	.0030	I	1/8	1-1/2	815845	29.30	815845-C3	35.20		
	.045	.135	(3x)	.0030	I	1/8	1-1/2	39845	29.30	39845-C3	35.20		
	.047 (3/64)	.141	(3x)	.0040	I	1/8	1-1/2	39847	29.30	39847-C3	35.20		
	.050	.150	(3x)	.0040	I	1/8	1-1/2	39850	29.30	39850-C3	35.20		
	.055	.165	(3x)	.0040	I	1/8	1-1/2	39855	29.30	39855-C3	35.20		
	.060	.090	(1.5x)	.0050	I	1/8	1-1/2	815860	29.00	815860-C3	34.90		

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MINIATURE DRILLS

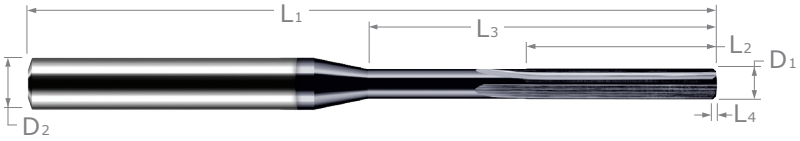
Spotting Drills (cont.)

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INCLUDED ANGLE	DRILL DIAMETER	FLUTE LENGTH	WEB THICKNESS	TYPE	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
A $^{+1°}_{-1°}$	D_1	L_2			D_2	L_1	2 FL	USD$	2 FL	USD$	2 FL	USD$
140°	.060	.180 (3x)	.0050	I	1/8	1-1/2	39860	29.00	39860-C3	34.90		
	.062 (1/16)	.093 (1.5x)	.0050	I	1/8	1-1/2	815862	29.00	815862-C3	34.90		
	.062 (1/16)	.186 (3x)	.0050	I	1/8	1-1/2	39862	29.00	39862-C3	34.90		
	.070	.210 (3x)	.0050	I	1/8	1-1/2	39870	29.00	39870-C3	34.90		
	.075	.225 (3x)	.0050	I	1/8	1-1/2	39875	29.00	39875-C3	34.90		
	.078 (5/64)	.117 (1.5x)	.0050	I	1/8	1-1/2	815878	29.00	815878-C3	34.90		
	.078 (5/64)	.234 (3x)	.0050	I	1/8	1-1/2	39878	29.00	39878-C3	34.90		
	.090	.135 (1.5x)	.0050	I	1/8	1-1/2	815890	27.70	815890-C3	33.60		
	.090	.270 (3x)	.0050	I	1/8	1-1/2	39890	27.70	39890-C3	33.60		
	.093 (3/32)	.140 (1.5x)	.0060	I	1/8	1-1/2	815893	27.70	815893-C3	33.60		
	.093 (3/32)	.279 (3x)	.0060	I	1/8	1-1/2	39893	27.70	39893-C3	33.60		
	.100	.300 (3x)	.0060	I	1/8	1-1/2	39900	27.70	39900-C3	33.60		
	.118 (3mm)	.354 (3x)	.0080	I	1/8	1-1/2	3993M	27.70	3993M-C3	33.60		
	.125 (1/8)	.188 (1.5x)	.0100	I	1/8	1-1/2	815908	26.20	815908-C3	32.10		
	.125 (1/8)	.188 (1.5x)	.0100	II	1/8	1-1/2	715408	26.20	715408-C3	32.10		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2	39925	26.20	39925-C3	32.10	39925-C8	33.80
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2	41008	26.20	41008-C3	32.10		
	.140 (9/64)	.375 (2.5x)	.0100	II	3/16	2	41009	30.30	41009-C3	36.70		
	.156 (5/32)	.375 (2.5x)	.0110	II	3/16	2	41010	30.60	41010-C3	37.00		
	.187 (3/16)	.312 (1.5x)	.0130	II	3/16	2	715412	30.30	715412-C3	36.50		
	.187 (3/16)	.625 (3x)	.0130	I	3/16	2	804112	30.30	804112-C3	36.70		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2	41012	30.30	41012-C3	36.70		
	.250 (1/4)	.375 (1.5x)	.0180	II	1/4	2-1/2	715416	37.80	715416-C3	45.90		
	.250 (1/4)	.750 (3x)	.0180	I	1/4	2-1/2	804116	37.80	804116-C3	46.50		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2	41016	37.80	41016-C3	46.50	41016-C8	48.90
	.375 (3/8)	.500 (1.5x)	.0270	II	3/8	2-1/2	715424	66.70	715424-C3	78.20		
	.375 (3/8)	1.000 (2.5x)	.0270	II	3/8	2-1/2	41024	66.70	41024-C3	78.20		
142°	.060	.180 (3x)	.005	I	1/8	1-1/2	752560	34.30	752560-C3	40.20		
	.090	.270 (3x)	.005	I	1/8	1-1/2	752590	35.00	752590-C3	40.90		
	.125 (1/8)	.375 (3x)	.010	I	1/8	1-1/2	752608	35.00	752608-C3	40.90		
	.125 (1/8)	.375 (3x)	.010	II	1/8	1-1/2	737808	34.30	737808-C3	40.20		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2	737812	37.10	737812-C3	43.30		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2	737816	43.40	737816-C3	52.40		
150°	.020	.060 (3x)	.0020	I	1/8	1-1/2	961120	33.60	961120-C3	39.50		
	.030	.090 (3x)	.0030	I	1/8	1-1/2	961130	32.70	961130-C3	38.60		
	.040	.120 (3x)	.0030	I	1/8	1-1/2	961140	29.30	961140-C3	35.20		
	.045	.135 (3x)	.0030	I	1/8	1-1/2	961145	29.30	961145-C3	35.20		
	.047	.141 (3x)	.0040	I	1/8	1-1/2	961147	30.20	961147-C3	36.10		
	.060	.180 (3x)	.0050	I	1/8	1-1/2	961160	29.00	961160-C3	34.90		
	.062 (1/16)	.186 (3x)	.0050	I	1/8	1-1/2	961162	29.30	961162-C3	35.20		
	.078 (5/64)	.234 (3x)	.0050	I	1/8	1-1/2	961178	29.30	961178-C3	35.20		
	.090	.270 (3x)	.0050	I	1/8	1-1/2	961190	29.30	961190-C3	35.20		
	.093 (3/32)	.279 (3x)	.0060	I	1/8	1-1/2	961193	29.30	961193-C3	35.20		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2	961208	26.20	961208-C3	32.10		
	.125 (1/8)	.375 (3x)	.0100	II	1/8	1-1/2	949508	26.20	949508-C3	32.10		
	.187 (3/16)	.625 (3x)	.0130	II	3/16	2	949512	30.30	949512-C3	36.70		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2	949516	37.80	949516-C3	46.50		
170°	.060	.180 (3x)	.0050	I	1/8	1-1/2	893660	30.20	893660-C3	36.10		
	.125 (1/8)	.375 (3x)	.0100	I	1/8	1-1/2	893708	30.20	893708-C3	36.10		
	.250 (1/4)	.750 (3x)	.0180	II	1/4	2-1/2	893716	38.20	893716-C3	46.30		

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MINIATURE REAMERS



	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy • 45° chamfer angle
- h6 shank tolerance for high precision tool holders • Solid carbide • CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.0080		.062	.100	.0013	4	1/8	1-1/2	RSB0080	59.70	RSB0080-C3	65.60
.0083	#91	.062	.100	.0014	4	1/8	1-1/2	RSB0083	59.70	RSB0083-C3	65.60
.0085		.062	.109	.0014	4	1/8	1-1/2	RSB0085	59.70	RSB0085-C3	65.60
.0087	#90	.062	.109	.0015	4	1/8	1-1/2	RSB0087	59.70	RSB0087-C3	65.60
.0090		.062	.118	.0015	4	1/8	1-1/2	RSB0090	59.70	RSB0090-C3	65.60
.0091	#89	.062	.118	.0015	4	1/8	1-1/2	RSB0091	59.70	RSB0091-C3	65.60
.0095	#88	.062	.118	.0016	4	1/8	1-1/2	RSB0095	59.70	RSB0095-C3	65.60
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RSB0100	59.70	RSB0100-C3	65.60
.0105	#86	.078	.125	.0018	4	1/8	1-1/2	RSB0105	59.70	RSB0105-C3	65.60
.0110	#85	.078	.141	.0018	4	1/8	1-1/2	RSB0110	59.70	RSB0110-C3	65.60
.0115	#84	.078	.141	.0019	4	1/8	1-1/2	RSB0115	59.70	RSB0115-C3	65.60
.0120	#83	.093	.156	.0020	4	1/8	1-1/2	RSB0120	59.70	RSB0120-C3	65.60
.0125	#82	.093	.172	.0021	4	1/8	1-1/2	RSB0125	59.70	RSB0125-C3	65.60
.0130	#81	.093	.172	.0022	4	1/8	1-1/2	RSB0130	59.70	RSB0130-C3	65.60
.0135	#80	.109	.187	.0023	4	1/8	1-1/2	RSB0135	59.70	RSB0135-C3	65.60
.0140		.109	.187	.0023	4	1/8	1-1/2	RSB0140	59.70	RSB0140-C3	65.60
.0145	#79	.109	.187	.0024	4	1/8	1-1/2	RSB0145	59.70	RSB0145-C3	65.60
.0150		.109	.187	.0025	4	1/8	1-1/2	RSB0150	59.70	RSB0150-C3	65.60
.0155		.109	.187	.0026	4	1/8	1-1/2	RSB0155	59.70	RSB0155-C3	65.60
.0160	#78	.125	.218	.0027	4	1/8	1-1/2	RSB0160	44.90	RSB0160-C3	50.90
.0165		.125	.218	.0019	4	1/8	1-1/2	RSB0165	44.90	RSB0165-C3	50.90
.0170		.125	.218	.0020	4	1/8	1-1/2	RSB0170	44.90	RSB0170-C3	50.90
.0175		.125	.218	.0020	4	1/8	1-1/2	RSB0175	44.90	RSB0175-C3	50.90
.0180	#77	.140	.250	.0021	4	1/8	1-1/2	RSB0180	44.90	RSB0180-C3	50.90
.0185		.140	.250	.0021	4	1/8	1-1/2	RSB0185	44.90	RSB0185-C3	50.90
.0190		.140	.250	.0022	4	1/8	1-1/2	RSB0190	44.90	RSB0190-C3	50.90
.0195		.140	.250	.0022	4	1/8	1-1/2	RSB0195	44.90	RSB0195-C3	50.90
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RSB0200	44.90	RSB0200-C3	50.90
.0205		.140	.250	.0024	4	1/8	1-1/2	RSB0205	44.90	RSB0205-C3	50.90
.0210	#75	.172	.281	.0024	4	1/8	1-1/2	RSB0210	44.90	RSB0210-C3	50.90
.0215		.172	.281	.0025	4	1/8	1-1/2	RSB0215	44.90	RSB0215-C3	50.90
.0220		.172	.281	.0025	4	1/8	1-1/2	RSB0220	44.90	RSB0220-C3	50.90
.0225	#74	.172	.281	.0026	4	1/8	1-1/2	RSB0225	44.90	RSB0225-C3	50.90
.0230		.172	.281	.0026	4	1/8	1-1/2	RSB0230	44.90	RSB0230-C3	50.90
.0235		.172	.281	.0027	4	1/8	1-1/2	RSB0235	44.90	RSB0235-C3	50.90
.0240	#73	.187	.312	.0028	4	1/8	1-1/2	RSB0240	44.90	RSB0240-C3	50.90
.0245		.187	.312	.0028	4	1/8	1-1/2	RSB0245	44.90	RSB0245-C3	50.90
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RSB0250	44.90	RSB0250-C3	50.90

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.0255		.187	.312	.0029	4	1/8	1-1/2	RSB0255	44.90	RSB0255-C3	50.90
.0260	#71	.187	.312	.0030	4	1/8	1-1/2	RSB0260	44.90	RSB0260-C3	50.90
.0265		.187	.312	.0030	4	1/8	1-1/2	RSB0265	44.90	RSB0265-C3	50.90
.0270		.218	.375	.0031	4	1/8	2	RSB0270	44.90	RSB0270-C3	50.90
.0275		.218	.375	.0032	4	1/8	2	RSB0275	44.90	RSB0275-C3	50.90
.0280	#70	.218	.375	.0032	4	1/8	2	RSB0280	44.90	RSB0280-C3	50.90
.0285		.218	.375	.0033	4	1/8	2	RSB0285	44.90	RSB0285-C3	50.90
.0290		.218	.375	.0033	4	1/8	2	RSB0290	44.90	RSB0290-C3	50.90
.0292	#69	.218	.375	.0034	4	1/8	2	RSB0292	44.90	RSB0292-C3	50.90
.0295 (.75 mm)		.218	.375	.0034	4	1/8	2	RSB0295	44.90	RSB0295-C3	50.90
.0300		.218	.375	.0035	4	1/8	2	RSB0300	44.90	RSB0300-C3	50.90
.0305		.218	.375	.0035	4	1/8	2	RSB0305	44.90	RSB0305-C3	50.90
.0310	#68	.218	.375	.0036	4	1/8	2	RSB0310	44.90	RSB0310-C3	50.90
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RSB0315	44.90	RSB0315-C3	50.90
.0320	#67	.250	.437	.0037	4	1/8	2	RSB0320	44.90	RSB0320-C3	50.90
.0325		.250	.437	.0037	4	1/8	2	RSB0325	44.90	RSB0325-C3	50.90
.0330	#66	.250	.437	.0038	4	1/8	2	RSB0330	44.90	RSB0330-C3	50.90
.0335 (.85 mm)		.250	.437	.0039	4	1/8	2	RSB0335	44.90	RSB0335-C3	50.90
.0340		.250	.437	.0039	4	1/8	2	RSB0340	44.90	RSB0340-C3	50.90
.0345		.250	.437	.0040	4	1/8	2	RSB0345	44.90	RSB0345-C3	50.90
.0350	#65	.250	.437	.0040	4	1/8	2	RSB0350	44.90	RSB0350-C3	50.90
.0355		.250	.437	.0041	4	1/8	2	RSB0355	44.90	RSB0355-C3	50.90
.0360	#64	.281	.500	.0041	4	1/8	2	RSB0360	44.90	RSB0360-C3	50.90
.0365		.281	.500	.0042	4	1/8	2	RSB0365	44.90	RSB0365-C3	50.90
.0370	#63	.281	.500	.0043	4	1/8	2	RSB0370	44.90	RSB0370-C3	50.90
.0375		.281	.500	.0043	4	1/8	2	RSB0375	44.90	RSB0375-C3	50.90
.0380	#62	.281	.500	.0044	4	1/8	2	RSB0380	44.90	RSB0380-C3	50.90
.0385		.281	.500	.0044	4	1/8	2	RSB0385	44.90	RSB0385-C3	50.90
.0390	#61	.281	.500	.0045	4	1/8	2	RSB0390	44.90	RSB0390-C3	50.90
.0395		.281	.500	.0045	4	1/8	2	RSB0395	44.90	RSB0395-C3	50.90
.0400	#60	.281	.500	.0046	4	1/8	2	RSB0400	44.90	RSB0400-C3	50.90
.0405		.281	.500	.0047	4	1/8	2	RSB0405	44.90	RSB0405-C3	50.90
.0410	#59	.281	.500	.0047	4	1/8	2	RSB0410	44.90	RSB0410-C3	50.90
.0415		.281	.500	.0048	4	1/8	2	RSB0415	44.90	RSB0415-C3	50.90
.0420	#58	.281	.500	.0048	4	1/8	2	RSB0420	44.90	RSB0420-C3	50.90
.0425		.312	.562	.0049	4	1/8	2	RSB0425	44.90	RSB0425-C3	50.90
.0430	#57	.312	.562	.0049	4	1/8	2	RSB0430	44.90	RSB0430-C3	50.90
.0435		.312	.562	.0050	4	1/8	2	RSB0435	44.90	RSB0435-C3	50.90
.0440		.312	.562	.0044	4	1/8	2	RSB0440	44.90	RSB0440-C3	50.90
.0445		.312	.562	.0045	4	1/8	2	RSB0445	44.90	RSB0445-C3	50.90
.0450		.312	.562	.0045	4	1/8	2	RSB0450	44.90	RSB0450-C3	50.90
.0455		.312	.562	.0046	4	1/8	2	RSB0455	44.90	RSB0455-C3	50.90
.0460		.312	.562	.0046	4	1/8	2	RSB0460	44.90	RSB0460-C3	50.90
.0465	#56	.312	.562	.0047	4	1/8	2	RSB0465	44.90	RSB0465-C3	50.90
.0469 (3/64)		.312	.562	.0047	4	1/8	2	RSB0469	38.10	RSB0469-C3	44.00
.0470		.312	.562	.0047	4	1/8	2	RSB0470	38.10	RSB0470-C3	44.00
.0475		.312	.562	.0048	4	1/8	2	RSB0475	38.10	RSB0475-C3	44.00

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020" −.000"	L_3 +.020" −.000"	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.0480		.375	.625	.0048	4	1/8	2	RSB0480	38.10	RSB0480-C3	44.00
.0485		.375	.625	.0049	4	1/8	2	RSB0485	38.10	RSB0485-C3	44.00
.0490		.375	.625	.0049	4	1/8	2	RSB0490	38.10	RSB0490-C3	44.00
.0495		.375	.625	.0050	4	1/8	2	RSB0495	38.10	RSB0495-C3	44.00
.0500		.375	.625	.0050	4	1/8	2	RSB0500	38.10	RSB0500-C3	44.00
.0505		.375	.625	.0051	4	1/8	2	RSB0505	38.10	RSB0505-C3	44.00
.0510		.375	.625	.0051	4	1/8	2	RSB0510	38.10	RSB0510-C3	44.00
.0515		.375	.625	.0052	4	1/8	2	RSB0515	38.10	RSB0515-C3	44.00
.0520	#55	.375	.625	.0052	4	1/8	2	RSB0520	38.10	RSB0520-C3	44.00
.0525		.375	.625	.0053	4	1/8	2	RSB0525	38.10	RSB0525-C3	44.00
.0530		.437	.687	.0053	4	1/8	2	RSB0530	38.10	RSB0530-C3	44.00
.0535		.437	.687	.0054	4	1/8	2	RSB0535	38.10	RSB0535-C3	44.00
.0540		.437	.687	.0054	4	1/8	2	RSB0540	38.10	RSB0540-C3	44.00
.0545		.437	.687	.0055	4	1/8	2	RSB0545	38.10	RSB0545-C3	44.00
.0550	#54	.437	.687	.0055	4	1/8	2	RSB0550	38.10	RSB0550-C3	44.00
.0555		.437	.750	.0056	4	1/8	2	RSB0555	38.10	RSB0555-C3	44.00
.0560		.437	.750	.0056	4	1/8	2	RSB0560	38.10	RSB0560-C3	44.00
.0565		.437	.750	.0057	4	1/8	2	RSB0565	38.10	RSB0565-C3	44.00
.0570		.437	.750	.0057	4	1/8	2	RSB0570	38.10	RSB0570-C3	44.00
.0575		.437	.750	.0058	4	1/8	2	RSB0575	38.10	RSB0575-C3	44.00
.0580		.437	.750	.0058	4	1/8	2	RSB0580	38.10	RSB0580-C3	44.00
.0585		.437	.750	.0059	4	1/8	2	RSB0585	38.10	RSB0585-C3	44.00
.0590		.437	.750	.0059	4	1/8	2	RSB0590	38.10	RSB0590-C3	44.00
.0595	#53	.437	.750	.0060	4	1/8	2	RSB0595	38.10	RSB0595-C3	44.00
.0600		.437	.812	.0060	4	1/8	2	RSB0600	37.70	RSB0600-C3	43.60
.0605		.437	.812	.0061	4	1/8	2	RSB0605	37.70	RSB0605-C3	43.60
.0610 (1.55 mm)		.437	.812	.0061	4	1/8	2	RSB0610	37.70	RSB0610-C3	43.60
.0615		.437	.812	.0062	4	1/8	2	RSB0615	37.70	RSB0615-C3	43.60
.0620		.437	.812	.0062	4	1/8	2	RSB0620	37.70	RSB0620-C3	43.60
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RSB0625	37.70	RSB0625-C3	43.60
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RSB0630	37.70	RSB0630-C3	43.60
.0635	#52	.437	.812	.0064	4	1/8	2	RSB0635	37.70	RSB0635-C3	43.60
.0640		.437	.812	.0064	4	1/8	2	RSB0640	37.70	RSB0640-C3	43.60
.0645		.437	.812	.0065	4	1/8	2	RSB0645	37.70	RSB0645-C3	43.60
.0650 (1.65 mm)		.437	.812	.0065	4	1/8	2	RSB0650	37.70	RSB0650-C3	43.60
.0660		.500	.875	.0066	4	1/8	2	RSB0660	37.70	RSB0660-C3	43.60
.0670	#51	.500	.875	.0067	4	1/8	2	RSB0670	37.70	RSB0670-C3	43.60
.0680		.500	.875	.0068	4	1/8	2	RSB0680	37.70	RSB0680-C3	43.60
.0690		.500	.875	.0062	4	1/8	2	RSB0690	37.70	RSB0690-C3	43.60
.0700	#50	.562	.937	.0063	4	1/8	2	RSB0700	37.70	RSB0700-C3	43.60
.0710		.562	.937	.0064	4	1/8	2	RSB0710	37.70	RSB0710-C3	43.60
.0720		.562	.937	.0065	4	1/8	2	RSB0720	37.70	RSB0720-C3	43.60
.0730	#49	.562	.937	.0066	4	1/8	2	RSB0730	37.70	RSB0730-C3	43.60
.0740		.562	.937	.0067	4	1/8	2	RSB0740	37.70	RSB0740-C3	43.60
.0750		.562	1.000	.0068	4	1/8	2	RSB0750	37.70	RSB0750-C3	43.60
.0760	#48	.562	1.000	.0068	4	1/8	2	RSB0760	37.70	RSB0760-C3	43.60
.0765		.562	1.000	.0069	4	1/8	2	RSB0765	37.70	RSB0765-C3	43.60

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.0770		.562	1.000	.0069	4	1/8	2	RSB0770	37.70	RSB0770-C3	43.60
.0775		.562	1.000	.0070	4	1/8	2	RSB0775	37.70	RSB0775-C3	43.60
.0780		.562	1.000	.0070	4	1/8	2	RSB0780	37.70	RSB0780-C3	43.60
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RSB0781	37.70	RSB0781-C3	43.60
.0785	#47	.562	1.000	.0071	4	1/8	2	RSB0785	37.70	RSB0785-C3	43.60
.0787 (2.00 mm)		.562	1.000	.0071	4	1/8	2	RSB0787	37.70	RSB0787-C3	43.60
.0790		.562	1.000	.0071	4	1/8	2	RSB0790	37.70	RSB0790-C3	43.60
.0795		.562	1.000	.0072	4	1/8	2	RSB0795	37.70	RSB0795-C3	43.60
.0800		.562	1.000	.0072	4	1/8	2	RSB0800	37.70	RSB0800-C3	43.60
.0805		.562	1.000	.0072	4	1/8	2	RSB0805	37.70	RSB0805-C3	43.60
.0810	#46	.562	1.000	.0073	4	1/8	2	RSB0810	37.70	RSB0810-C3	43.60
.0815		.562	1.000	.0073	4	1/8	2	RSB0815	37.70	RSB0815-C3	43.60
.0820	#45	.562	1.000	.0074	4	1/8	2	RSB0820	37.70	RSB0820-C3	43.60
.0830		.562	1.000	.0075	4	1/8	2	RSB0830	37.70	RSB0830-C3	43.60
.0840		.625	1.125	.0076	4	1/8	2-1/2	RSB0840	37.70	RSB0840-C3	43.60
.0850		.625	1.125	.0077	4	1/8	2-1/2	RSB0850	37.70	RSB0850-C3	43.60
.0860	#44	.625	1.125	.0077	4	1/8	2-1/2	RSB0860	37.70	RSB0860-C3	43.60
.0870		.625	1.125	.0078	4	1/8	2-1/2	RSB0870	37.70	RSB0870-C3	43.60
.0880		.625	1.125	.0079	4	1/8	2-1/2	RSB0880	37.70	RSB0880-C3	43.60
.0890	#43	.625	1.125	.0080	4	1/8	2-1/2	RSB0890	37.70	RSB0890-C3	43.60
.0900		.625	1.125	.0081	4	1/8	2-1/2	RSB0900	37.70	RSB0900-C3	43.60
.0910		.625	1.125	.0082	4	1/8	2-1/2	RSB0910	37.70	RSB0910-C3	43.60
.0920		.625	1.125	.0083	4	1/8	2-1/2	RSB0920	37.70	RSB0920-C3	43.60
.0925 (2.35 mm)		.687	1.250	.0083	4	1/8	2-1/2	RSB0925	37.70	RSB0925-C3	43.60
.0930		.687	1.250	.0084	4	1/8	2-1/2	RSB0930	37.70	RSB0930-C3	43.60
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RSB0935	37.70	RSB0935-C3	43.60
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RSB0937	37.70	RSB0937-C3	43.60
.0940		.687	1.250	.0085	4	1/8	2-1/2	RSB0940	37.70	RSB0940-C3	43.60
.0945 (2.40 mm)		.687	1.250	.0085	4	1/8	2-1/2	RSB0945	37.70	RSB0945-C3	43.60
.0950		.687	1.250	.0086	4	1/8	2-1/2	RSB0950	37.70	RSB0950-C3	43.60
.0960	#41	.687	1.250	.0086	4	1/8	2-1/2	RSB0960	37.70	RSB0960-C3	43.60
.0970		.687	1.250	.0087	4	1/8	2-1/2	RSB0970	37.70	RSB0970-C3	43.60
.0980	#40	.687	1.250	.0088	4	1/8	2-1/2	RSB0980	37.70	RSB0980-C3	43.60
.0990		.687	1.250	.0089	4	1/8	2-1/2	RSB0990	37.70	RSB0990-C3	43.60
.0995	#39	.687	1.250	.0090	4	1/8	2-1/2	RSB0995	37.70	RSB0995-C3	43.60
.1000		.750	1.375	.0090	4	1/8	2-1/2	RSB1000	37.70	RSB1000-C3	43.60
.1010		.750	1.375	.0091	4	1/8	2-1/2	RSB1010	37.70	RSB1010-C3	43.60
.1015	#38	.750	1.375	.0091	4	1/8	2-1/2	RSB1015	37.70	RSB1015-C3	43.60
.1020		.750	1.375	.0092	4	1/8	2-1/2	RSB1020	37.70	RSB1020-C3	43.60
.1030		.750	1.375	.0093	4	1/8	2-1/2	RSB1030	37.70	RSB1030-C3	43.60
.1040	#37	.750	1.375	.0094	4	1/8	2-1/2	RSB1040	37.70	RSB1040-C3	43.60
.1050		.750	1.375	.0095	4	1/8	2-1/2	RSB1050	37.70	RSB1050-C3	43.60
.1060		.750	1.375	.0095	4	1/8	2-1/2	RSB1060	37.70	RSB1060-C3	43.60
.1065	#36	.750	1.375	.0096	4	1/8	2-1/2	RSB1065	37.70	RSB1065-C3	43.60
.1070		.750	1.375	.0096	4	1/8	2-1/2	RSB1070	37.70	RSB1070-C3	43.60
.1080		.750	1.375	.0097	4	1/8	2-1/2	RSB1080	37.70	RSB1080-C3	43.60
.1083 (2.75 mm)		.750	1.375	.0097	4	1/8	2-1/2	RSB1083	37.70	RSB1083-C3	43.60

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.020''}_{-.000''}$	L_3 $^{+.020''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.1085		.750	1.375	.0098	4	1/8	2-1/2	RSB1085	37.70	RSB1085-C3	43.60
.1090		.750	1.375	.0098	4	1/8	2-1/2	RSB1090	37.70	RSB1090-C3	43.60
.1094 (7/64)		.750	1.375	.0098	4	1/8	2-1/2	RSB1094	37.70	RSB1094-C3	43.60
.1100	#35	.750	1.375	.0099	4	1/8	2-1/2	RSB1100	37.70	RSB1100-C3	43.60
.1105		.750	1.375	.0099	4	1/8	2-1/2	RSB1105	37.70	RSB1105-C3	43.60
.1110	#34	.750	1.375	.0100	4	1/8	2-1/2	RSB1110	37.70	RSB1110-C3	43.60
.1120		.750	1.375	.0101	4	1/8	2-1/2	RSB1120	37.70	RSB1120-C3	43.60
.1130	#33	.750	1.500	.0102	4	1/8	2-1/2	RSB1130	37.70	RSB1130-C3	43.60
.1140		.750	1.500	.0103	4	1/8	2-1/2	RSB1140	37.70	RSB1140-C3	43.60
.1150		.750	1.500	.0104	4	1/8	2-1/2	RSB1150	37.70	RSB1150-C3	43.60
.1160	#32	.750	1.500	.0104	4	1/8	2-1/2	RSB1160	37.70	RSB1160-C3	43.60
.1170		.750	1.500	.0105	4	1/8	2-1/2	RSB1170	37.70	RSB1170-C3	43.60
.1180		.750	1.500	.0106	4	1/8	2-1/2	RSB1180	37.70	RSB1180-C3	43.60
.1190		.750	1.500	.0107	4	1/8	2-1/2	RSB1190	37.70	RSB1190-C3	43.60
.1200	#31	.750	1.500	.0108	4	1/8	2-1/2	RSB1200	37.70	RSB1200-C3	43.60
.1210		.750	1.500	.0109	4	1/8	2-1/2	RSB1210	37.70	RSB1210-C3	43.60
.1220 (3.10 mm)		.750	1.500	.0110	4	1/8	2-1/2	RSB1220	37.70	RSB1220-C3	43.60

D_1*		L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.1230		.750	1.500	.0111	4	3/16	3	RSB1230	44.20	RSB1230-C3	50.90
.1235		.750	1.500	.0111	4	3/16	3	RSB1235	44.20	RSB1235-C3	50.90
.1240		.750	1.500	.0112	4	3/16	3	RSB1240	44.20	RSB1240-C3	50.90
.1245		.750	1.500	.0112	4	3/16	3	RSB1245	44.20	RSB1245-C3	50.90
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RSB1250	44.20	RSB1250-C3	50.90
.1255		.750	1.500	.0113	4	3/16	3	RSB1255	44.20	RSB1255-C3	50.90
.1260 (3.20 mm)		.750	1.500	.0113	4	3/16	3	RSB1260	44.20	RSB1260-C3	50.90
.1265		.750	1.500	.0114	4	3/16	3	RSB1265	44.20	RSB1265-C3	50.90
.1270		.750	1.500	.0114	4	3/16	3	RSB1270	44.20	RSB1270-C3	50.90
.1285	#30	.750	1.500	.0116	4	3/16	3	RSB1285	44.20	RSB1285-C3	50.90
.1360	#29	.750	1.625	.0122	4	3/16	3	RSB1360	44.20	RSB1360-C3	50.90
.1390		.750	1.625	.0125	4	3/16	3	RSB1390	44.20	RSB1390-C3	50.90
.1395		.750	1.625	.0126	4	3/16	3	RSB1395	44.20	RSB1395-C3	50.90
.1400		.750	1.625	.0126	4	3/16	3	RSB1400	44.20	RSB1400-C3	50.90
.1405	#28	.750	1.625	.0126	4	3/16	3	RSB1405	44.20	RSB1405-C3	50.90
.1406 (9/64)		.750	1.625	.0127	4	3/16	3	RSB1406	44.20	RSB1406-C3	50.90
.1410		.750	1.625	.0127	4	3/16	3	RSB1410	44.20	RSB1410-C3	50.90
.1415		.750	1.625	.0127	4	3/16	3	RSB1415	44.20	RSB1415-C3	50.90
.1420		.750	1.625	.0128	4	3/16	3	RSB1420	44.20	RSB1420-C3	50.90
.1440	#27	.750	1.625	.0130	4	3/16	3	RSB1440	44.20	RSB1440-C3	50.90
.1470	#26	.875	1.750	.0132	4	3/16	3	RSB1470	44.20	RSB1470-C3	50.90
.1495	#25	.875	1.750	.0135	4	3/16	3	RSB1495	44.20	RSB1495-C3	50.90
.1520	#24	.875	1.750	.0137	4	3/16	3	RSB1520	44.20	RSB1520-C3	50.90
.1540	#23	.875	1.750	.0139	4	3/16	3	RSB1540	44.20	RSB1540-C3	50.90
.1545		.875	1.750	.0139	4	3/16	3	RSB1545	44.20	RSB1545-C3	50.90
.1550		.875	1.750	.0140	4	3/16	3	RSB1550	44.20	RSB1550-C3	50.90
.1555		.875	1.750	.0140	4	3/16	3	RSB1555	44.20	RSB1555-C3	50.90

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.1560		.875	1.750	.0140	4	3/16	3	RSB1560	44.20	RSB1560-C3	50.90
.1562 (5/32)		.875	1.750	.0141	4	3/16	3	RSB1562	44.20	RSB1562-C3	50.90
.1565		.875	1.750	.0141	4	3/16	3	RSB1565	44.20	RSB1565-C3	50.90
.1570	#22	.875	1.750	.0141	4	3/16	3	RSB1570	44.20	RSB1570-C3	50.90
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RSB1575	44.20	RSB1575-C3	50.90
.1580		.875	1.875	.0142	4	3/16	3	RSB1580	44.20	RSB1580-C3	50.90
.1585		.875	1.875	.0143	4	3/16	3	RSB1585	44.20	RSB1585-C3	50.90
.1590	#21	.875	1.875	.0143	4	3/16	3	RSB1590	44.20	RSB1590-C3	50.90
.1610	#20	.875	1.875	.0145	4	3/16	3	RSB1610	44.20	RSB1610-C3	50.90
.1660	#19	.875	1.875	.0149	4	3/16	3	RSB1660	44.20	RSB1660-C3	50.90
.1695	#18	1.000	2.000	.0153	4	3/16	4	RSB1695	49.60	RSB1695-C3	56.80
.1705		1.000	2.000	.0153	4	3/16	4	RSB1705	49.60	RSB1705-C3	56.80
.1710		1.000	2.000	.0154	4	3/16	4	RSB1710	49.60	RSB1710-C3	56.80
.1715		1.000	2.000	.0154	4	3/16	4	RSB1715	49.60	RSB1715-C3	56.80
.1719 (11/64)		1.000	2.000	.0155	4	3/16	4	RSB1719	49.60	RSB1719-C3	56.80
.1725		1.000	2.000	.0155	4	3/16	4	RSB1725	49.60	RSB1725-C3	56.80
.1730	#17	1.000	2.000	.0156	4	3/16	4	RSB1730	49.60	RSB1730-C3	56.80
.1735		1.000	2.000	.0156	4	3/16	4	RSB1735	49.60	RSB1735-C3	56.80
.1770	#16	1.000	2.000	.0159	4	3/16	4	RSB1770	49.60	RSB1770-C3	56.80
.1800	#15	1.000	2.125	.0162	4	3/16	4	RSB1800	49.60	RSB1800-C3	56.80
.1820	#14	1.000	2.125	.0164	4	3/16	4	RSB1820	49.60	RSB1820-C3	56.80
.1850 (4.70 mm)	#13	1.000	2.125	.0167	4	1/4	4	RSB1850	59.90	RSB1850-C3	68.50
.1860		1.000	2.125	.0167	4	1/4	4	RSB1860	59.90	RSB1860-C3	68.50
.1865		1.000	2.125	.0168	4	1/4	4	RSB1865	59.90	RSB1865-C3	68.50
.1870		1.000	2.125	.0168	4	1/4	4	RSB1870	59.90	RSB1870-C3	68.50
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RSB1875	59.90	RSB1875-C3	68.50
.1880		1.000	2.125	.0169	4	1/4	4	RSB1880	59.90	RSB1880-C3	68.50
.1885		1.000	2.125	.0170	4	1/4	4	RSB1885	59.90	RSB1885-C3	68.50
.1890	#12	1.000	2.125	.0170	4	1/4	4	RSB1890	59.90	RSB1890-C3	68.50
.1910	#11	1.000	2.125	.0172	4	1/4	4	RSB1910	59.90	RSB1910-C3	68.50
.1935	#10	1.000	2.125	.0174	4	1/4	4	RSB1935	59.90	RSB1935-C3	68.50
.1960	#9	1.000	2.125	.0176	4	1/4	4	RSB1960	59.90	RSB1960-C3	68.50
.1969 (5.00 mm)		1.000	2.125	.0177	4	1/4	4	RSB1969	63.90	RSB1969-C3	72.60
.1990	#8	1.000	2.125	.0179	4	1/4	4	RSB1990	63.90	RSB1990-C3	72.60
.2010	#7	1.000	2.125	.0181	4	1/4	4	RSB2010	63.90	RSB2010-C3	72.60
.2015		1.000	2.125	.0181	4	1/4	4	RSB2015	63.90	RSB2015-C3	72.60
.2020		1.000	2.125	.0182	4	1/4	4	RSB2020	63.90	RSB2020-C3	72.60
.2025		1.000	2.125	.0182	4	1/4	4	RSB2025	63.90	RSB2025-C3	72.60
.2031 (13/64)		1.000	2.250	.0183	4	1/4	4	RSB2031	65.10	RSB2031-C3	73.70
.2035		1.000	2.250	.0183	4	1/4	4	RSB2035	65.10	RSB2035-C3	73.70
.2040	#6	1.000	2.250	.0184	4	1/4	4	RSB2040	65.10	RSB2040-C3	73.70
.2045		1.000	2.250	.0184	4	1/4	4	RSB2045	65.10	RSB2045-C3	73.70
.2055	#5	1.000	2.250	.0185	4	1/4	4	RSB2055	65.10	RSB2055-C3	73.70
.2090	#4	1.000	2.250	.0188	4	1/4	4	RSB2090	65.10	RSB2090-C3	73.70
.2130	#3	1.000	2.250	.0192	4	1/4	4	RSB2130	65.10	RSB2130-C3	73.70
.2170		1.000	2.375	.0195	4	1/4	4	RSB2170	65.10	RSB2170-C3	73.70

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

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MINIATURE REAMERS

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REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.030''}_{-.000''}$	L_3 $^{+.030''}_{-.000''}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.2175		1.000	2.375	.0196	4	1/4	4	RSB2175	65.10	RSB2175-C3	73.70
.2180		1.000	2.375	.0196	4	1/4	4	RSB2180	65.10	RSB2180-C3	73.70
.2185		1.000	2.375	.0197	4	1/4	4	RSB2185	65.10	RSB2185-C3	73.70
.2187 (7/32)		1.000	2.375	.0197	4	1/4	4	RSB2187	65.10	RSB2187-C3	73.70
.2190		1.000	2.375	.0197	4	1/4	4	RSB2190	65.10	RSB2190-C3	73.70
.2195		1.000	2.375	.0198	4	1/4	4	RSB2195	65.10	RSB2195-C3	73.70
.2200		1.000	2.375	.0198	4	1/4	4	RSB2200	65.10	RSB2200-C3	73.70
.2205 (5.60 mm)		1.000	2.375	.0198	4	1/4	4	RSB2205	65.10	RSB2205-C3	73.70
.2210	#2	1.000	2.375	.0199	4	1/4	4	RSB2210	65.10	RSB2210-C3	73.70
.2280	#1	1.125	2.500	.0182	6	1/4	4	RSB2280	70.50	RSB2280-C3	79.10
.2330		1.125	2.500	.0186	6	1/4	4	RSB2330	70.50	RSB2330-C3	79.10
.2335		1.125	2.500	.0187	6	1/4	4	RSB2335	70.50	RSB2335-C3	79.10
.2340	A	1.125	2.500	.0187	6	1/4	4	RSB2340	70.50	RSB2340-C3	79.10
.2344 (15/64)		1.125	2.500	.0188	6	1/4	4	RSB2344	70.50	RSB2344-C3	79.10
.2350		1.125	2.500	.0188	6	1/4	4	RSB2350	70.50	RSB2350-C3	79.10
.2355		1.125	2.500	.0188	6	1/4	4	RSB2355	70.50	RSB2355-C3	79.10
.2360		1.125	2.500	.0189	6	1/4	4	RSB2360	70.50	RSB2360-C3	79.10
.2362 (6.00 mm)		1.125	2.500	.0189	6	1/4	4	RSB2362	70.50	RSB2362-C3	79.10
.2380	B	1.125	2.500	.0190	6	1/4	4	RSB2380	70.50	RSB2380-C3	79.10
.2420	C	1.125	2.500	.0194	6	1/4	4	RSB2420	70.50	RSB2420-C3	79.10
.2460	D	1.125	2.500	.0197	6	1/4	4	RSB2460	70.50	RSB2460-C3	79.10
.2485		1.125	2.750	.0199	6	5/16	4	RSB2485	72.90	RSB2485-C3	83.20
.2490		1.125	2.750	.0199	6	5/16	4	RSB2490	72.90	RSB2490-C3	83.20
.2495		1.125	2.750	.0200	6	5/16	4	RSB2495	72.90	RSB2495-C3	83.20
.2500 (1/4)	E	1.125	2.750	.0200	6	5/16	4	RSB2500	72.90	RSB2500-C3	83.20
.2505		1.125	2.750	.0200	6	5/16	4	RSB2505	72.90	RSB2505-C3	83.20
.2510		1.125	2.750	.0201	6	5/16	4	RSB2510	72.90	RSB2510-C3	83.20
.2515		1.125	2.750	.0201	6	5/16	4	RSB2515	72.90	RSB2515-C3	83.20
.2570	F	1.125	2.750	.0206	6	5/16	4	RSB2570	72.90	RSB2570-C3	83.20
.2610	G	1.125	2.875	.0209	6	5/16	6	RSB2610	107.30	RSB2610-C3	119.30
.2660	H	1.125	2.875	.0213	6	5/16	6	RSB2660	107.30	RSB2660-C3	119.30
.2720	I	1.125	2.875	.0218	6	5/16	6	RSB2720	107.30	RSB2720-C3	119.30
.2770	J	1.125	2.875	.0222	6	5/16	6	RSB2770	107.30	RSB2770-C3	119.30
.2810	K	1.125	2.875	.0225	6	5/16	6	RSB2810	107.30	RSB2810-C3	119.30
.2812		1.125	2.875	.0225	6	5/16	6	RSB2812	107.30	RSB2812-C3	119.30
.2900	L	1.125	3.000	.0232	6	5/16	6	RSB2900	107.30	RSB2900-C3	119.30
.2950	M	1.125	3.000	.0236	6	5/16	6	RSB2950	107.30	RSB2950-C3	119.30
.3020	N	1.125	3.000	.0242	6	5/16	6	RSB3020	107.30	RSB3020-C3	119.30
.3125 (5/16)		1.125	3.000	.0250	6	3/8	6	RSB3125	131.50	RSB3125-C3	145.80
.3150		1.125	3.000	.0252	6	3/8	6	RSB3150	131.50	RSB3150-C3	145.80
.3745		1.250	3.500	.0300	6	1/2	6	RSB3745	169.00	RSB3745-C3	188.40
.3750 (3/8)		1.250	3.500	.0300	6	1/2	6	RSB3750	169.00	RSB3750-C3	188.40
.3755		1.250	3.500	.0300	6	1/2	6	RSB3755	169.00	RSB3755-C3	188.40
.3760		1.250	3.500	.0301	6	1/2	6	RSB3760	169.00	RSB3760-C3	188.40

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MINIATURE REAMERS

Metric



- Straight flutes for through and blind hole applications
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle
- AlTiN coating for improved lubricity and heat resistance
- h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.5mm −.0mm	L_3 +.5mm −.0mm	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.4570	#77	3.5 mm	5.5 mm	.0526	4	3 mm	50 mm	RSC0457	44.90	RSC0457-C3	50.90
.4800		3.5 mm	6 mm	.0552	4	3 mm	50 mm	RSC0480	44.90	RSC0480-C3	50.90
.5080	#76	4 mm	6 mm	.0584	4	3 mm	50 mm	RSC0508	44.90	RSC0508-C3	50.90
.6350	#72	5 mm	8 mm	.0730	4	3 mm	50 mm	RSC0635	44.90	RSC0635-C3	50.90
.6600	#71	5 mm	8 mm	.0759	4	3 mm	50 mm	RSC0660	44.90	RSC0660-C3	50.90
.7870	#68	6 mm	10 mm	.0905	4	3 mm	50 mm	RSC0787	44.90	RSC0787-C3	50.90
.8000		6 mm	10 mm	.0920	4	3 mm	50 mm	RSC0800	44.90	RSC0800-C3	50.90
.8120	#67	6.5 mm	10 mm	.0934	4	3 mm	50 mm	RSC0812	44.90	RSC0812-C3	50.90
.8300		6.5 mm	10 mm	.0955	4	3 mm	50 mm	RSC0830	44.90	RSC0830-C3	50.90
.8380	#66	6.5 mm	10 mm	.0964	4	3 mm	50 mm	RSC0838	44.90	RSC0838-C3	50.90
.8890	#65	7 mm	11 mm	.1022	4	3 mm	50 mm	RSC0889	44.90	RSC0889-C3	50.90
.9000		7 mm	11 mm	.1035	4	3 mm	50 mm	RSC0900	44.90	RSC0900-C3	50.90
.9500		7.5 mm	11 mm	.1093	4	3 mm	50 mm	RSC0950	44.90	RSC0950-C3	50.90
.9900	#61	7.5 mm	12 mm	.1139	4	3 mm	50 mm	RSC0990	44.90	RSC0990-C3	50.90
1.0000		8 mm	12 mm	.1150	4	3 mm	50 mm	RSC1000	44.90	RSC1000-C3	50.90
1.0160	#60	8 mm	12 mm	.1168	4	3 mm	50 mm	RSC1016	44.90	RSC1016-C3	50.90
1.0500		8 mm	13 mm	.1208	4	3 mm	50 mm	RSC1050	44.90	RSC1050-C3	50.90
1.0660	#58	8.5 mm	13 mm	.1226	4	3 mm	50 mm	RSC1066	44.90	RSC1066-C3	50.90
1.0920	#57	8.5 mm	13 mm	.1256	4	3 mm	50 mm	RSC1092	44.90	RSC1092-C3	50.90
1.1500		9 mm	14 mm	.1150	4	3 mm	50 mm	RSC1150	44.90	RSC1150-C3	50.90
1.2000		9 mm	14 mm	.1200	4	3 mm	50 mm	RSC1200	38.10	RSC1200-C3	44.00
1.3970	#54	10 mm	16 mm	.1397	4	3 mm	50 mm	RSC1397	38.10	RSC1397-C3	44.00
1.4000		10 mm	17 mm	.1400	4	3 mm	50 mm	RSC1400	38.10	RSC1400-C3	44.00
1.4500		10 mm	17 mm	.1450	4	3 mm	50 mm	RSC1450	38.10	RSC1450-C3	44.00
1.5000		10 mm	18 mm	.1500	4	3 mm	50 mm	RSC1500	37.70	RSC1500-C3	43.60
1.5110	#53	10 mm	18 mm	.1511	4	3 mm	50 mm	RSC1511	38.10	RSC1511-C3	44.00
1.5500		11 mm	18 mm	.1550	4	3 mm	50 mm	RSC1550	37.70	RSC1550-C3	43.60
1.6000		11 mm	20 mm	.1600	4	3 mm	50 mm	RSC1600	37.70	RSC1600-C3	43.60
1.6120	#52	11 mm	20 mm	.1612	4	3 mm	50 mm	RSC1612	37.70	RSC1612-C3	43.60
1.6500		11 mm	20 mm	.1650	4	3 mm	50 mm	RSC1650	37.70	RSC1650-C3	43.60
1.7010	#51	12 mm	20 mm	.1701	4	3 mm	50 mm	RSC1701	37.70	RSC1701-C3	43.60
1.7780	#50	12 mm	20 mm	.1600	4	3 mm	63 mm	RSC1778	37.70	RSC1778-C3	43.60
1.8540	#49	13 mm	22 mm	.1669	4	3 mm	63 mm	RSC1854	37.70	RSC1854-C3	43.60
1.9500		13 mm	22 mm	.1755	4	3 mm	63 mm	RSC1950	37.70	RSC1950-C3	43.60
1.9930	#47	14 mm	22 mm	.1794	4	3 mm	63 mm	RSC1993	37.70	RSC1993-C3	43.60
2.0000		14 mm	22 mm	.1800	4	4 mm	63 mm	RSC2000	37.70	RSC2000-C3	44.30

*Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.005mm/-.000mm
**Tolerance for Uncoated is +.000mm/-.005mm. Tolerance for AlTiN coating is +.008mm/-.000mm

continued on next page

MINIATURE REAMERS

Metric (cont.)

continued from previous page

REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 $^{+.5mm}_{-.0mm}$	L_3 $^{+.5mm}_{-.0mm}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
2.0500		14 mm	24 mm	.1845	4	4 mm	63 mm	RSC2050	37.70	RSC2050-C3	44.30
2.0570	#46	14 mm	24 mm	.1851	4	4 mm	63 mm	RSC2057	37.70	RSC2057-C3	44.30
2.0820	#45	14 mm	24 mm	.1874	4	4 mm	63 mm	RSC2082	37.70	RSC2082-C3	44.30
2.3500		16 mm	26 mm	.2115	4	4 mm	63 mm	RSC2350	37.70	RSC2350-C3	44.30
2.3740	#42	16 mm	26 mm	.2137	4	4 mm	63 mm	RSC2374	37.70	RSC2374-C3	44.30
2.4000		16 mm	28 mm	.2160	4	4 mm	63 mm	RSC2400	37.70	RSC2400-C3	44.30
2.4380	#41	16 mm	28 mm	.2194	4	4 mm	63 mm	RSC2438	37.70	RSC2438-C3	44.30
2.4890	#40	17 mm	28 mm	.2240	4	4 mm	63 mm	RSC2489	37.70	RSC2489-C3	44.30
2.5000		17 mm	28 mm	.2250	4	4 mm	63 mm	RSC2500	37.70	RSC2500-C3	44.30
2.9500		20 mm	35 mm	.2655	4	4 mm	75 mm	RSC2950	38.70	RSC2950-C3	45.40
3.0000		20 mm	35 mm	.2700	4	4 mm	75 mm	RSC3000	37.70	RSC3000-C3	44.30
3.0480	#31	20 mm	35 mm	.2743	4	6 mm	75 mm	RSC3048	37.70	RSC3048-C3	45.80
D_1*		L_2 $^{+.75mm}_{-.00mm}$	L_3 $^{+.75mm}_{-.00mm}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
3.1500		20 mm	35 mm	.2835	4	6 mm	75 mm	RSC3150	44.20	RSC3150-C3	52.30
3.2000		20 mm	35 mm	.2880	4	6 mm	75 mm	RSC3200	44.20	RSC3200-C3	52.30
3.2630	#30	20 mm	35 mm	.2937	4	6 mm	75 mm	RSC3263	44.70	RSC3263-C3	52.80
3.5000		20 mm	40 mm	.3150	4	6 mm	75 mm	RSC3500	44.70	RSC3500-C3	52.80
3.9500		22 mm	45 mm	.3555	4	6 mm	100 mm	RSC3950	44.70	RSC3950-C3	53.40
4.0000		22 mm	45 mm	.3600	4	6 mm	100 mm	RSC4000	44.20	RSC4000-C3	52.80
4.0500		24 mm	45 mm	.3645	4	6 mm	100 mm	RSC4050	44.70	RSC4050-C3	53.40
4.5000		26 mm	50 mm	.4050	4	6 mm	100 mm	RSC4500	49.60	RSC4500-C3	58.20
4.7500		26 mm	50 mm	.4275	4	6 mm	100 mm	RSC4750	59.90	RSC4750-C3	68.50
D_1**		L_2 $^{+.75mm}_{-.00mm}$	L_3 $^{+.75mm}_{-.00mm}$	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
5.9500		30 mm	60 mm	.4760	6	6 mm	100 mm	RSC5950	70.50	RSC5950-C3	79.10
6.0000		30 mm	60 mm	.4800	6	6 mm	125 mm	RSC6000	70.50	RSC6000-C3	79.60
6.0500		30 mm	60 mm	.4840	6	8 mm	125 mm	RSC6050	70.50	RSC6050-C3	83.80
6.3500	E	35 mm	70 mm	.5080	6	8 mm	125 mm	RSC6350	71.80	RSC6350-C3	85.10
8.0000		40 mm	80 mm	.6400	6	8 mm	125 mm	RSC8000	131.50	RSC8000-C3	144.80

MINIATURE REAMERS

(cont.)

SPEEDS & FEEDS (Miniature Reamers)

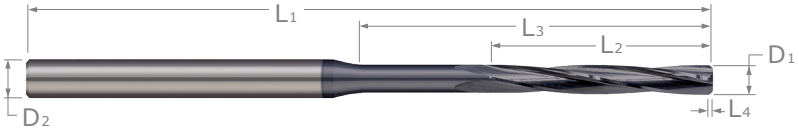
Important Note: Values in table are based on a material hardness of 29-37 Rc for Ferrous Materials and up to 28 Rc for Non-Ferrous Materials. For higher hardness materials, table values of IPR must be reduced. For ferrous materials at 38-45 Rc, reduce IPR to 80%. For complete speeds and feeds charts, please see www.harveytool.com.

In order to maintain appropriate stock removal amounts based on the reamer size, a hole should be pre-drilled at a diameter that is 90-94% of the finished reamed hole diameter. For example, for a finished reamed hole diameter of .0625", the pre-drilled hole diameter should be in the range of .056"-.058". The pre-drilled hole should not be smaller than 85% of the finished reamed hole diameter.

Material	SFM	Chip Load IPR (Inches Per Revolution) By Reamer Diameter									
		.015	.031	.047	.062	.078	.093	.125	.187	.250	. 375
Aluminum Alloys Casting (2xx, 5xx, 7xx, 8xx)	450	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675	.01013
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	600										
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	450	.00036	.00075	.00114	.00151	.00190	.00226	.00304	.00454	.00608	.00911
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	420										
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	390										
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	350										
Wrought - 5%-8% Si (4xxx)	600										
Wrought - 8%-12% Si (4xxx)	480										
Magnesium Alloys	900	.00041	.00084	.00127	.00167	.00211	.00251	.00338	.00505	.00675	.01013
Zinc Alloys	480										
Copper Alloys High Coppers - 90%+ (C1xxxx)	170	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	375										
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	170										
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	375										
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	375										
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	170										
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	400										
Carbon Steels Free Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	240	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591	.00886
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
Stainless Steels 203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	180	.00035	.00073	.00111	.00146	.00184	.00220	.00295	.00442	.00591	.00886
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	150	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	125	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
Tool Steels A, L, O, P, W series	125	.00032	.00067	.00102	.00134	.00168	.00201	.00270	.00404	.00540	.00810
D, H, M, T, S series	90	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
Titanium Alloys	100	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506
High Temp Alloys Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.00506

MINIATURE REAMERS

Right Hand Spiral



	D1 Tolerances
Uncoated	+.0000″ −.0002″
AlTiN Coated	+.0002″ −.0000″

- Helical flutes increase shearing action on chamfer for superior finish
- Right hand spiral flutes for increased chip evacuation in blind hole applications
- Available uncoated or with AlTiN coating for improved lubricity and heat resistance
- Oversized, common shanks to maintain strength, stiffness, and accuracy
- 45° chamfer angle • h6 shank tolerance for high precision tool holders
- Solid carbide • CNC ground in the USA

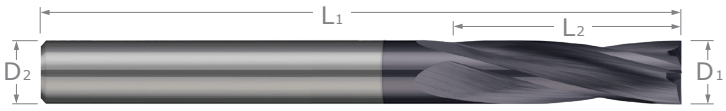
REAMER DIAMETER	WIRE	MARGIN LENGTH	OVERALL REACH	CHAMFER LENGTH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1*		L_2 +.020″ −.000″	L_3 +.020″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.0100	#87	.078	.125	.0017	4	1/8	1-1/2	RRH0100	65.20	RRH0100-C3	71.10
.0150		.109	.187	.0025	4	1/8	1-1/2	RRH0150	66.40	RRH0150-C3	72.30
.0200	#76	.140	.250	.0023	4	1/8	1-1/2	RRH0200	48.90	RRH0200-C3	54.80
.0250	#72	.187	.312	.0029	4	1/8	1-1/2	RRH0250	50.00	RRH0250-C3	55.90
.0300		.218	.375	.0035	4	1/8	2	RRH0300	50.00	RRH0300-C3	55.90
.0305		.218	.375	.0035	4	1/8	2	RRH0305	48.90	RRH0305-C3	54.80
.0310	#68	.218	.375	.0036	4	1/8	2	RRH0310	50.00	RRH0310-C3	55.90
.0315 (.80 mm)		.218	.375	.0036	4	1/8	2	RRH0315	48.90	RRH0315-C3	54.80
.0350	#65	.250	.437	.0040	4	1/8	2	RRH0350	50.00	RRH0350-C3	55.90
.0400	#60	.281	.500	.0046	4	1/8	2	RRH0400	48.90	RRH0400-C3	54.80
.0500		.375	.625	.0050	4	1/8	2	RRH0500	41.20	RRH0500-C3	47.10
.0600		.437	.812	.0060	4	1/8	2	RRH0600	41.20	RRH0600-C3	47.10
.0620		.437	.812	.0062	4	1/8	2	RRH0620	41.20	RRH0620-C3	47.10
.0625 (1/16)		.437	.812	.0063	4	1/8	2	RRH0625	41.20	RRH0625-C3	47.10
.0630 (1.60 mm)		.437	.812	.0063	4	1/8	2	RRH0630	41.20	RRH0630-C3	47.10
.0700	#50	.562	.937	.0063	4	1/8	2	RRH0700	41.20	RRH0700-C3	47.10
.0781 (5/64)		.562	1.000	.0070	4	1/8	2	RRH0781	41.20	RRH0781-C3	47.10
.0800		.562	1.000	.0072	4	1/8	2	RRH0800	41.20	RRH0800-C3	47.10
.0900		.625	1.125	.0081	4	1/8	2-1/2	RRH0900	41.20	RRH0900-C3	47.10
.0935	#42	.687	1.250	.0084	4	1/8	2-1/2	RRH0935	41.20	RRH0935-C3	47.10
.0937 (3/32)		.687	1.250	.0084	4	1/8	2-1/2	RRH0937	41.20	RRH0937-C3	47.10
.0940		.687	1.250	.0085	4	1/8	2-1/2	RRH0940	41.20	RRH0940-C3	47.10
.0950		.687	1.250	.0086	4	1/8	2-1/2	RRH0950	41.20	RRH0950-C3	47.10
.1000		.750	1.375	.0090	4	1/8	2-1/2	RRH1000	41.20	RRH1000-C3	47.10
D_1*		L_2 +.030″ −.000″	L_3 +.030″ −.000″	L_4		D_2 (h6)	L_1	TOOL #	USD$	TOOL #	USD$
.1245		.750	1.500	.0112	4	3/16	3	RRH1245	48.30	RRH1245-C3	54.90
.1250 (1/8)		.750	1.500	.0113	4	3/16	3	RRH1250	48.30	RRH1250-C3	54.90
.1255		.750	1.500	.0113	4	3/16	3	RRH1255	48.30	RRH1255-C3	54.90
.1285	#30	.750	1.500	.0116	4	3/16	3	RRH1285	48.30	RRH1285-C3	54.90
.1560		.875	1.750	.0140	4	3/16	3	RRH1560	48.30	RRH1560-C3	54.90
.1575 (4.00 mm)		.875	1.750	.0142	4	3/16	3	RRH1575	48.30	RRH1575-C3	54.90
.1870		1.000	2.125	.0168	4	1/4	4	RRH1870	64.90	RRH1870-C3	75.00
.1875 (3/16)		1.000	2.125	.0169	4	1/4	4	RRH1875	64.90	RRH1875-C3	75.00
.1880		1.000	2.125	.0169	4	1/4	4	RRH1880	64.90	RRH1880-C3	75.00

* Tolerance for Uncoated is +.0000"/−.0002". Tolerance for AlTiN coating is +.0002"/−.0000".

Please See Speeds & Feeds On Page 539

COUNTERBORES

Flat Bottom



For Spot Facing or Counterboring on Irregular Surfaces

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces • Center cutting
- Can be used for flat bottom reaming or straightening misaligned holes • 15° helix • 4 flutes • Solid carbide
- Ground with full cylindrical margin (not side cutting) • AlTiN coating for increased performance in ferrous materials
- AlTiN Nano coating for superior performance in ferrous and difficult to machine materials
- TiB2 coating prevents chip packing in non-abrasive aluminum alloys • CNC ground in the USA

CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ALTiN COATED		ALTiN NANO COATED		TiB_2 COATED	
D_1 +.0000"/−.0005"*	L_2 +.030"/−.000"	D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$	4 FL	USD$
.0200	.060	1/8	1-1/2	23320	36.10	23320-C3	42.00				
.0300	1/8	1/8	1-1/2	23330	35.40	23330-C3	41.30				
.0312 (1/32)	1/8	1/8	1-1/2	23331	35.10	23331-C3	41.00				
.0394 (1 mm)	5/32	1/8	1-1/2	2331M	35.10	2331M-C3	41.00			2331M-C8	42.80
.0400	5/32	1/8	1-1/2	23340	35.40	23340-C3	41.30				
.0469 (3/64)	3/16	1/8	1-1/2	23347	35.10	23347-C3	41.00				
.0500	3/16	1/8	1-1/2	23350	35.40	23350-C3	41.30				
.0550	1/4	1/8	1-1/2	23355	35.10	23355-C3	41.00				
.0600	1/4	1/8	1-1/2	23360	35.10	23360-C3	41.00				
.0625 (1/16)	1/4	1/8	1-1/2	23362	35.10	23362-C3	41.00	23362-C6	43.80	23362-C8	42.80
.0700	9/32	1/8	1-1/2	23370	35.10	23370-C3	41.00				
.0781 (5/64)	5/16	1/8	1-1/2	23378	35.10	23378-C3	41.00				
.0787 (2 mm)	5/16	1/8	1-1/2	2332M	35.10	2332M-C3	41.00				
.0800	5/16	1/8	1-1/2	23380	35.10	23380-C3	41.00				
.0900	3/8	1/8	1-1/2	23390	35.10	23390-C3	41.60				
.0937 (3/32)	3/8	1/8	1-1/2	23393	35.10	23393-C3	41.00	23393-C6	43.80		
.1094 (7/64)	3/8	1/8	1-1/2	23407	35.10	23407-C3	41.00				
.1181 (3 mm)	3/8	1/8	1-1/2	2343M	35.10	2343M-C3	41.00	2343M-C6	43.80	2343M-C8	42.80
.1250 (1/8)	1/2	1/8	1-1/2	23408	35.10	23408-C3	41.00	23408-C6	43.80	23408-C8	42.80
.1406 (9/64)	9/16	3/16	2	23409	33.50	23409-C3	39.90	23409-C6	41.20		
.1562 (5/32)	5/8	3/16	2	23410	33.50	23410-C3	39.90				
.1575 (4 mm)	5/8	3/16	2	2344M	33.50	2344M-C3	39.90				
.1719 (11/64)	5/8	3/16	2	23411	33.50	23411-C3	39.90	23411-C6	42.80		
.1750	5/8	3/16	2	23574	33.50	23574-C3	39.80				
.1875 (3/16)	3/4	3/16	2	23412	33.50	23412-C3	39.90	23412-C6	42.80	23412-C8	42.10
.1968 (5 mm)	3/4	1/4	2-1/2	2345M	45.90	2345M-C3	54.50	2345M-C6	55.60	2345M-C8	57.00
.2031 (13/64)	3/4	1/4	2-1/2	23413	45.90	23413-C3	54.50				
.2187 (7/32)	3/4	1/4	2-1/2	23414	45.90	23414-C3	54.50				
.2344 (15/64)	7/8	1/4	2-1/2	23415	45.90	23415-C3	54.50				
.2362 (6 mm)	7/8	1/4	2-1/2	2346M	45.90	2346M-C3	54.50	2346M-C6	55.60		
.2420	7/8	1/4	2-1/2	23641	45.90	23641-C3	54.00				
.2500 (1/4)	7/8	1/4	2-1/2	23416	45.90	23416-C3	54.50	23416-C6	56.10	23416-C8	56.40
.2656 (17/64)	7/8	5/16	2-1/2	23417	56.60	23417-C3	66.80				

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".

continued on next page

COUNTERBORES

Flat Bottom (cont.)

continued from previous page

CUTTER DIAMETER	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		AlTiN NANO COATED		TiB_2 COATED	
D_1 $^{+.0000''}_{-.0005''}$*	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	USD$	4 FL	USD$	4 FL	USD$	4 FL	USD$
.2812 (9/32)	7/8	5/16	2-1/2	23418	56.60	23418-C3	66.80				
.2900	7/8	5/16	2-1/2	23689	56.60	23689-C3	66.20				
.2969 (19/64)	7/8	5/16	2-1/2	23419	56.60	23419-C3	66.80				
.3125 (5/16)	1	5/16	2-1/2	23420	56.60	23420-C3	66.80	23420-C6	70.90	23420-C8	72.90
.3150 (8 mm)	1	3/8	2-1/2	2348M	67.80	2348M-C3	79.20				
.3281 (21/64)	1	3/8	2-1/2	23421	67.80	23421-C3	79.20				
.3320	1	3/8	2-1/2	23731	67.80	23731-C3	79.20				
.3437 (11/32)	1	3/8	2-1/2	23422	67.80	23422-C3	79.20				
.3594 (23/64)	1	3/8	2-1/2	23423	67.80	23423-C3	79.20				
.3750 (3/8)	1	3/8	2-1/2	23424	67.80	23424-C3	79.20	23424-C6	82.00	23424-C8	83.60
.3937 (10 mm)	1	7/16	2-3/4	2340M	83.60	2340M-C3	97.70				
.4062 (13/32)	1	7/16	2-3/4	23426	83.60	23426-C3	97.70				
.4220	1	7/16	2-3/4	23427	83.60	23427-C3	96.80				
.4375 (7/16)	1	7/16	2-3/4	23428	83.60	23428-C3	97.70				
.4687 (15/32)	1	1/2	3	23430	113.10	23430-C3	128.70				
.4724 (12 mm)	1	1/2	3	23476	109.90	23476-C3	127.00				
.5000 (1/2)	1	1/2	3	23432	109.90	23432-C3	127.00	23432-C6	128.80	23432-C8	128.30
.5625 (9/16)	1-1/2	5/8	3-1/2	23436	156.10	23436-C3	173.30				
.6250 (5/8)	1-1/2	5/8	3-1/2	23440	175.00	23440-C3	192.00				
.6875 (11/16)	1-1/2	3/4	4	23444	261.10	23444-C3	284.10				
.7500 (3/4)	1-1/2	3/4	4	23448	253.70	23448-C3	272.00				

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN and AlTiN Nano coating is +.0002"/−.0005".

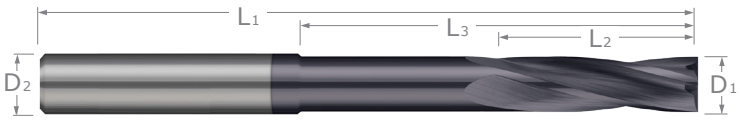


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COUNTERBORES

Flat Bottom – Long Reach



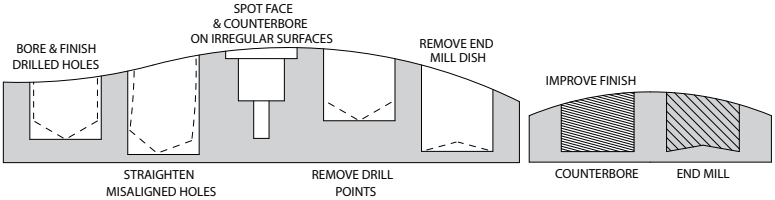
Undersized Neck to Avoid Heeling

- **Flat bottom (no dish)** design allows spot facing or counterboring on irregular surfaces
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes • Center cutting
- Ground with full cylindrical margin (not side cutting) • 15° helix • 4 flutes • Solid carbide
- CNC ground in the USA

CUTTER DIAMETER	FLUTE LENGTH	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 +.0000″ −.0005″*	L_2 +.030″ −.000″	L_3 +.030″ −.000″	D_2	L_1	4 FL	USD$	4 FL	USD$
.0312 (1/32)	1/8	1/4	1/8	2-1/2	25431	43.40	25431-C3	49.30
.0394 (1 mm)	5/32	5/16	1/8	2-1/2	2541M	42.50	2541M-C3	48.40
.0469 (3/64)	3/16	3/8	1/8	2-1/2	25447	42.50	25447-C3	48.40
.0625 (1/16)	1/4	1/2	1/8	2-1/2	25462	42.50	25462-C3	48.40
.0781 (5/64)	5/16	5/8	1/8	2-1/2	25478	42.50	25478-C3	48.40
.0787 (2 mm)	5/16	5/8	1/8	2-1/2	2542M	42.50	2542M-C3	48.40
.0937 (3/32)	3/8	3/4	1/8	2-1/2	25493	42.50	25493-C3	48.40
.1094 (7/64)	3/8	7/8	1/8	2-1/2	25507	42.50	25507-C3	48.40
.1181 (3 mm)	3/8	1	1/8	2-1/2	2553M	42.50	2553M-C3	48.40
.1250 (1/8)	1/2	1	1/8	2-1/2	25508	42.50	25508-C3	48.40
.1406 (9/64)	9/16	1-1/8	3/16	3	25509	51.80	25509-C3	58.30
.1562 (5/32)	5/8	1-1/4	3/16	3	25510	51.80	25510-C3	58.30
.1575 (4 mm)	5/8	1-1/4	3/16	3	2554M	51.80	2554M-C3	58.30
.1719 (11/64)	5/8	1-3/8	3/16	3	25511	51.80	25511-C3	58.30
.1875 (3/16)	3/4	1-1/2	3/16	3	25512	51.80	25512-C3	58.30
.1968 (5 mm)	3/4	1-9/16	1/4	4	2555M	71.80	2555M-C3	82.20
.2031 (13/64)	3/4	1-5/8	1/4	4	25513	68.80	25513-C3	79.00
.2187 (7/32)	3/4	1-3/4	1/4	4	25514	68.80	25514-C3	79.00
.2344 (15/64)	7/8	1-7/8	1/4	4	25515	68.80	25515-C3	79.00
.2362 (6 mm)	7/8	1-7/8	1/4	4	2556M	71.80	2556M-C3	82.20
.2500 (1/4)	7/8	2	1/4	4	25516	68.80	25516-C3	79.00
.2656 (17/64)	7/8	2-1/8	5/16	4	25517	87.30	25517-C3	99.50
.2812 (9/32)	7/8	2-1/4	5/16	4	25518	87.30	25518-C3	99.50
.2969 (19/64)	7/8	2-3/8	5/16	4	25519	87.30	25519-C3	99.50
.3125 (5/16)	1	2-1/2	5/16	4	25520	87.30	25520-C3	99.50
.3150 (8 mm)	1	2-1/2	3/8	4	2558M	112.60	2558M-C3	124.90
.3437 (11/32)	1	2-3/4	3/8	4	25522	105.40	25522-C3	117.60
.3750 (3/8)	1	3	3/8	4	25524	105.40	25524-C3	117.60
.3937 (10 mm)	1	3	7/16	4	2550M	131.00	2550M-C3	148.30
.4375 (7/16)	1	3	7/16	4	25528	122.30	25528-C3	139.60
.5000 (1/2)	1	3	1/2	4	25532	149.90	25532-C3	167.20

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

APPLICATIONS:



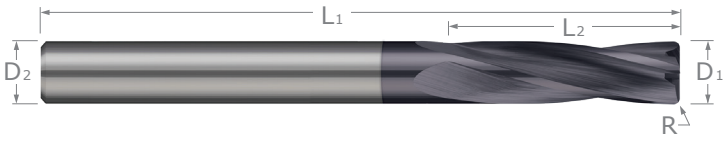
SPOT EFFECTIVELY. The flat bottom removes end mill dish or drill points while effectively spotting on irregular surfaces.

HOLD POSITION. The full cylindrical margin and back taper are not side cutting and won't grab or deflect.

CONTROL FINISH. The slow helix with a low rake avoids part engagement and helps to control finish.

COUNTERBORES

Flat Bottom – Corner Radius

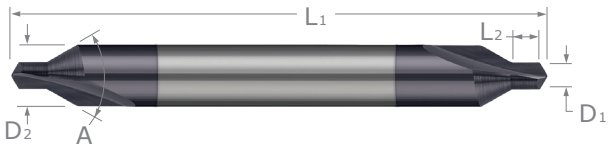


- For spot facing or counterboring on irregular surfaces
- Flat bottom (no dish) design allows spot facing or counterboring on irregular surfaces
- Corner Radius for improved strength
- Ideal for castings, rounded parts, concaved, or drafted surfaces
- Can be used for flat bottom reaming or straightening misaligned holes
- 4 flutes • 15° helix • Center cutting
- Ground with full cylindrical margin (not side cutting)
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide • CNC ground in the USA

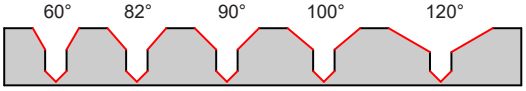
CUTTER DIAMETER	CORNER RADIUS	FLUTE LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
D_1 $^{+.0000''}_{-.0005''}$ *	R $^{+.001''}_{-.001''}$	L_2 $^{+.030''}_{-.000''}$	D_2	L_1	4 FL	USD$	4 FL	USD$
.0625	.010	.250	1/8	1-1/2	731562	38.50	731562-C3	44.40
.0937	.010	.375	1/8	1-1/2	731593	38.50	731593-C3	44.40
.1250	.010	.500	1/8	1-1/2	731608	38.50	731608-C3	44.40
.1562	.010	.625	3/16	2	731610	36.80	731610-C3	43.10
.1875	.010	.750	3/16	2	731612	36.80	731612-C3	43.10
.2187	.010	.750	1/4	2-1/2	731614	49.60	731614-C3	57.70
.2500	.010	.875	1/4	2-1/2	731616	49.60	731616-C3	57.70
.2812	.010	.875	5/16	2-1/2	731618	60.70	731618-C3	70.40
.3125	.010	1.000	5/16	2-1/2	731620	60.70	731620-C3	70.40
.3437	.010	1.000	3/8	2-1/2	731622	72.20	731622-C3	83.70
.3750	.010	1.000	3/8	2-1/2	731624	72.20	731624-C3	83.70
.4375	.010	1.000	7/16	2-3/4	731628	88.60	731628-C3	101.90
.5000	.010	1.000	1/2	3	731632	115.20	731632-C3	130.80

* Tolerance listed above refers to uncoated counterbores. Tolerance for AlTiN coating is +.0002"/−.0005".

COMBINED DRILL & COUNTERSINKS



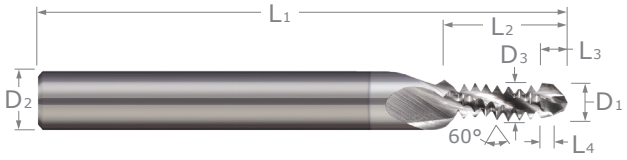
- 60°, 82°, 90°, 100°, and 120° included angles - plain type
- 2 flutes
- 118° included tip angle
- Double-ended
- Solid carbide
- CNC ground in the USA

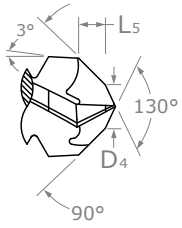


Stocked in *Five* Angles!

INCLUDED ANGLE	SIZE	DRILL DIAMETER	DRILL LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
A +1° −1°		D1 +.0015″ +.0005″	L2 +.005″ −.000″	D2	L1	2 FL	USD$	2 FL	USD$
60°	0000	1/64	1/64	1/8	1-1/2	11002	37.50	11002-C3	43.40
	000	.020	.020	1/8	1-1/2	11005	28.30	11005-C3	35.70
	00	.025	.025	1/8	1-1/2	11010	22.10	11010-C3	28.20
	0	1/32	1/32	1/8	1-1/2	11020	22.10	11020-C3	28.20
	1	3/64	3/64	1/8	1-1/2	11030	18.60	11030-C3	24.80
	2	5/64	5/64	3/16	2	11040	28.30	11040-C3	34.60
	3	7/64	7/64	1/4	2	11050	32.40	11050-C3	42.20
	4	1/8	1/8	5/16	2-1/2	11060	44.20	11060-C3	56.00
	5	3/16	3/16	7/16	2-3/4	11070	66.10	11070-C3	83.50
	6	7/32	7/32	1/2	3	11080	94.40	11080-C3	109.90
	7	1/4	1/4	1/2	3	11090	94.40	11090-C3	109.90
82°	00	.025	.025	1/8	1-1/2	25610	23.70	25610-C3	29.60
	0	1/32	1/32	1/8	1-1/2	25620	23.50	25620-C3	29.40
	1	3/64	3/64	1/8	1-1/2	25630	19.60	25630-C3	25.50
	2	5/64	5/64	3/16	2	25640	30.30	25640-C3	37.20
	3	7/64	7/64	1/4	2	25650	34.40	25650-C3	44.20
	4	1/8	1/8	5/16	2-1/2	25660	46.70	25660-C3	58.30
	5	3/16	3/16	7/16	2-3/4	25670	70.30	25670-C3	87.60
90°	0000	1/64	1/64	1/8	1-1/2	17902	38.60	17902-C3	44.50
	000	.020	.020	1/8	1-1/2	17905	29.30	17905-C3	36.60
	00	.025	.025	1/8	1-1/2	17910	22.90	17910-C3	30.20
	0	1/32	1/32	1/8	1-1/2	17920	22.90	17920-C3	30.20
	1	3/64	3/64	1/8	1-1/2	17930	19.20	17930-C3	25.40
	2	5/64	5/64	3/16	2	17940	29.30	17940-C3	36.30
	3	7/64	7/64	1/4	2	17950	33.30	17950-C3	43.10
	4	1/8	1/8	5/16	2-1/2	17960	45.40	17960-C3	57.00
	5	3/16	3/16	7/16	2-3/4	17970	68.20	17970-C3	85.50
	6	7/32	7/32	1/2	3	17980	96.40	17980-C3	112.00
	7	1/4	1/4	1/2	3	17990	96.40	17990-C3	112.00
100°	0	1/32	1/32	1/8	1-1/2	849520	26.30	849520-C3	32.20
	1	3/64	3/64	1/8	1-1/2	849530	22.30	849530-C3	28.20
	2	5/64	5/64	3/16	2	849540	33.50	849540-C3	40.50
	3	7/64	7/64	1/4	2	849550	38.10	849550-C3	45.60
	4	1/8	1/8	5/16	2-1/2	849560	51.80	849560-C3	62.60
120°	2	5/64	5/64	3/16	2	822540	33.50	822540-C3	39.40
	3	7/64	7/64	1/4	2	822550	38.10	822550-C3	45.40
	4	1/8	1/8	5/16	2-1/2	822560	51.80	822560-C3	59.30

COMBINATION DRILL / THREAD MILLS

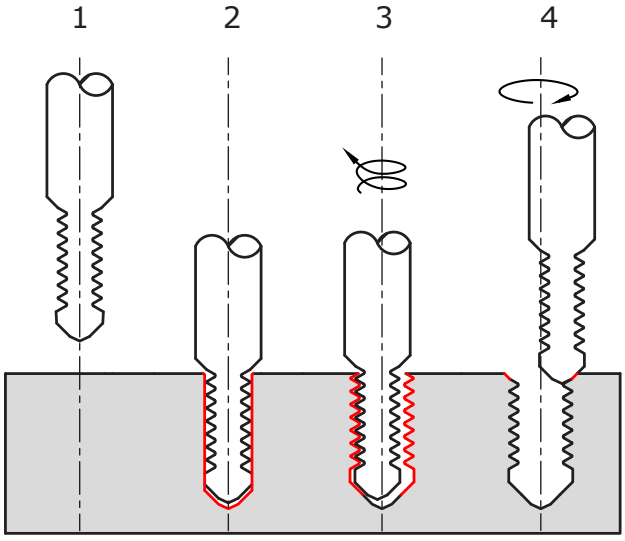




- Designed for combined drilling, threading, thread relief cutting, and chamfering
- One cutter for 4 different operations saves time on tool changes and leaves more room in the tool carousel
- Length of cut includes transition angle, allowing for optional 45° chamfer pass
- Optimized for cutting non-ferrous materials such as aluminum, unfilled plastics, copper, brass, and bronze alloys
- Recommended for cutting, threading and chamfering through holes
- 3 flutes to center • Cuts internal 60° UN threads • 90° included back chamfer
- Solid carbide • CNC ground in the USA

THREAD SIZE	DRILL DIAMETER	LENGTH OF CUT	THREAD DIAMETER	SECONDARY POINT ANGLE DIAMETER	LENGTH OF TIP	LENGTH OF THREAD RELIEF	CHAMFER LENGTH	SHANK DIA.	OAL	UNCOATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2 +.030″ −.000″	D_3 +.0005″ −.0005″	D_4	L_3	L_4	L_5	D_2	L_1	3 FL	USD$	3 FL	USD$
4-40	.0876	.2513	.085	.0356	.0580	.0250	.0247	1/8	2	820616	140.10	820616-C8	147.80
6-32	.1076	.3323	.100	.0475	.0707	.0312	.0284	3/16	2	820622	144.60	820622-C8	153.20
8-32	.1336	.3652	.115	.0735	.0767	.0312	.0284	3/16	2	820628	154.90	820628-C8	163.50
10-24	.1494	.4966	.120	.0760	.0939	.0416	.0345	1/4	2	820634	162.40	820634-C8	172.20
10-32	.1596	.4681	.120	.0995	.0828	.0312	.0284	1/4	2	820636	162.40	820636-C8	172.90
1/4-20	.2013	.7154	.180	.1172	.1168	.0500	.0394	3/8	2-1/2	820644	193.50	820644-C8	209.30
1/4-28	.2152	.7078	.180	.1494	.1016	.0357	.0310	3/8	2-1/2	820646	193.50	820646-C8	209.30
5/16-18	.2584	.8750	.240	.1671	.1372	.0555	.0427	3/8	2-1/2	820654	211.50	820654-C8	227.30
5/16-24	.2719	.8248	.240	.1985	.1224	.0416	.0345	3/8	2-1/2	820656	237.90	820656-C8	253.70
3/8-16	.3141	1.019	.285	.2140	.1592	.0625	.0468	1/2	3	820664	282.60	820664-C8	301.00
7/16-20	.3888	1.154	.335	.3047	.1605	.0500	.0394	1/2	3-1/2	820676	305.70	820676-C8	325.30
1/2-13	.4251	1.279	.350	.3064	.2036	.0769	.0553	5/8	3-1/2	820684	315.30	820684-C8	342.00

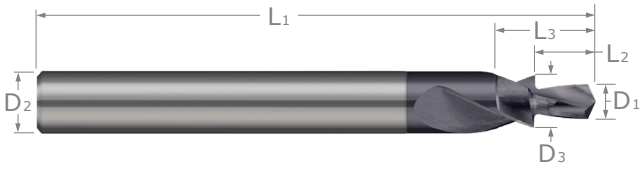
Combination Drill/Thread Mills Order of Operations



1. Approach the workpiece by centering the tool along the axis of the anticipated hole.
2. Drill a hole to the desired depth. For simultaneous chamfering, use the full length of cut to engage on the transition of the tool.
3. To begin thread, lift drill up by ½x - 1x pitch, then helically interpolate up 1 pitch. Return tool to center axis of the hole for retraction.
4. Re-engage the tool on top of the hole to create, increase, or finish the chamfer if desired.

COMBINATION DRILL/COUNTERBORE

for Socket Head Cap Screws

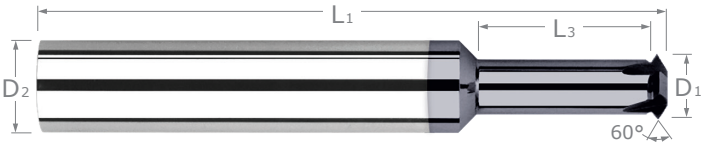


- Designed for combined drilling and counterboring
- Close fit for Socket Head Cap Screws
- Solid carbide • CNC ground in the USA

SIZE	DRILL DIAMETER	DRILL LENGTH	COUNTERBORE DIAMETER	MARGIN LENGTH	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.010''}_{-.000''}$	D_3 $^{+.000''}_{-.001''}$	L_3 $^{+.010''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
0	.067	.101 (3x)	1/8	.168	1/8	2	700100	39.90	700100-C3	45.80
0	.067	.335 (5x)	1/8	.402	1/8	2	700000	40.40	700000-C3	46.30
1	.081	.122 (3x)	5/32	.203	3/16	2	700101	40.90	700101-C3	47.10
1	.081	.405 (5x)	5/32	.486	3/16	2-1/2	700001	41.40	700001-C3	48.10
2	.094	.141 (3x)	3/16	.234	3/16	2	700102	40.90	700102-C3	47.10
2	.094	.469 (5x)	3/16	.562	3/16	2-1/2	700002	41.40	700002-C3	48.10
3	.109	.164 (3x)	7/32	.273	1/4	2-1/2	700103	41.90	700103-C3	49.40
3	.109	.547 (5x)	7/32	.656	1/4	2-1/2	700003	42.50	700003-C3	50.60
	D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.030''}_{-.000''}$	D_3 $^{+.000''}_{-.002''}$	L_3 $^{+.030''}_{-.000''}$	D_2	L_1	2 FL	USD$	2 FL	USD$
4	.125	.188 (3x)	7/32	.313	1/4	2-1/2	700104	41.90	700104-C3	49.40
4	.125	.625 (5x)	7/32	.750	1/4	2-1/2	700004	42.50	700004-C3	50.60
5	.140	.211 (3x)	1/4	.352	1/4	2-1/2	700105	41.90	700105-C3	49.40
5	.140	.703 (5x)	1/4	.844	1/4	3	700005	42.50	700005-C3	50.60
6	.156	.234 (3x)	9/32	.391	5/16	2-1/2	700106	45.00	700106-C3	54.10
6	.156	.781 (5x)	9/32	.937	5/16	3	700006	47.10	700006-C3	56.80
8	.172	.258 (3x)	5/16	.430	5/16	2-1/2	700108	45.00	700108-C3	54.10
8	.172	.859 (5x)	5/16	1.031	5/16	3	700008	47.10	700008-C3	56.80
10	.203	.305 (3x)	3/8	.508	3/8	3	700110	52.30	700110-C3	63.70
10	.203	1.016 (5x)	3/8	1.219	3/8	4	700010	55.40	700010-C3	67.70
1/4	.265	.398 (3x)	7/16	.664	1/2	4	700116	68.90	700116-C3	85.50
1/4	.265	1.328 (5x)	7/16	1.594	1/2	4	700016	68.90	700016-C3	85.50
5/16	.343	.516 (3x)	17/32	.859	5/8	4	700120	72.00	700120-C3	91.30
5/16	.343	1.719 (5x)	17/32	2.062	5/8	5	700020	76.20	700020-C3	98.60
3/8	.406	.609 (3x)	5/8	1.016	5/8	5	700124	84.50	700124-C3	105.30
3/8	.406	2.031 (5x)	5/8	2.437	5/8	6	700024	87.60	700024-C3	110.00
7/16	.468	.703 (3x)	23/32	1.172	3/4	5	700128	92.80	700128-C3	117.50
7/16	.468	2.344 (5x)	23/32	2.812	3/4	7	700028	99.00	700028-C3	128.10
1/2	.531	.797 (3x)	13/16	1.328	1	6	700132	101.10	700132-C3	128.50
1/2	.531	2.656 (5x)	13/16	3.187	1	8	700032	113.60	700032-C3	145.80

THREAD MILLING CUTTERS

Single Form – UN Threads



Stocked in Multiple Reach Lengths!



- Single thread form – can mill multiple pitches
- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide
- CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
00	.032	.016	**1/16**	2	1/8	1-1/2	71001	91.30	71001-C3	97.30		
00	.032	.016	**3/32**	2	1/8	1-1/2	41401	96.80	41401-C3	102.80		
00	.032	.016	**1/8**	2	1/8	1-1/2	54201	97.70	54201-C3	103.60		
0	.044	.024	**3/32**	2	1/8	1-1/2	71002	88.20	71002-C3	94.10	71002-C4	103.20
0	.044	.024	**1/8**	2	1/8	1-1/2	41402	93.70	41402-C3	99.60	41402-C4	108.70
0	.044	.024	**3/16**	2	1/8	1-1/2	54202	100.80	54202-C3	106.70	54202-C4	115.70
0	.044	.024	**1/4**	2	1/8	1-1/2	993902	105.50	993902-C3	111.40		
0	.044	.024	**5/16**	2	1/8	1-1/2	901202	109.80	901202-C3	115.70		
1	.054	.032	**3/32**	2	1/8	1-1/2	932904	88.90	932904-C3	94.80		
1	.054	.032	**1/8**	2	1/8	1-1/2	71004	88.20	71004-C3	94.10	71004-C4	103.20
1	.054	.032	**3/16**	2	1/8	1-1/2	41404	93.70	41404-C3	99.60	41404-C4	108.70
1	.054	.032	**1/4**	2	1/8	1-1/2	54204	100.80	54204-C3	106.70	54204-C4	115.70
1	.054	.032	**5/16**	2	1/8	1-1/2	993904	105.50	993904-C3	111.40		
1	.054	.032	**3/8**	2	1/8	1-1/2	901204	109.80	901204-C3	115.70		
2	.064	.038	**1/8**	2	1/8	1-1/2	772906	88.90	772906-C3	94.80		
2	.064	.038	**5/32**	2	1/8	1-1/2	71006	88.20	71006-C3	94.10	71006-C4	103.20
2	.064	.038	**3/16**	2	1/8	1-1/2	822706	90.90	822706-C3	96.80		
2	.064	.038	**7/32**	2	1/8	1-1/2	41406	93.70	41406-C3	99.60	41406-C4	108.70
2	.064	.038	**1/4**	2	1/8	1-1/2	821406	97.20	821406-C3	103.10		
2	.064	.038	**5/16**	2	1/8	1-1/2	54206	100.80	54206-C3	106.70	54206-C4	115.70
2	.064	.038	**7/16**	2	1/8	1-1/2	993906	105.50	993906-C3	111.40		
2	.064	.038	**9/16**	2	1/8	1-1/2	901206	109.80	901206-C3	115.70		
3	.072	.040	**5/32**	2	1/8	1-1/2	71008	88.20	71008-C3	94.10	71008-C4	103.20
3	.072	.040	**1/4**	2	1/8	1-1/2	41408	93.70	41408-C3	99.60	41408-C4	108.70
3	.072	.040	**5/16**	2	1/8	1-1/2	821408	97.30	821408-C3	103.20		
3	.072	.040	**3/8**	2	1/8	1-1/2	54208	100.80	54208-C3	106.70	54208-C4	115.70
3	.072	.040	**1/2**	2	1/8	1-1/2	993908	105.50	993908-C3	111.40		
4	.080	.040	**1/8**	2	3/16	2	71010	88.40	71010-C3	95.00	71010-C4	105.10
4	.080	.040	**3/16**	2	3/16	2	820310	91.10	820310-C3	97.80		
4	.080	.040	**1/4**	2	3/16	2	41410	93.90	41410-C3	100.50	41410-C4	115.00
4	.080	.040	**5/16**	2	3/16	2	821410	97.50	821410-C3	104.20		
4	.080	.040	**3/8**	2	3/16	2	54210	101.20	54210-C3	107.80	54210-C4	122.10
4	.080	.040	**7/16**	2	3/16	2	771810	103.70	771810-C3	110.40		
4	.080	.040	**1/2**	2	3/16	2	993910	106.20	993910-C3	112.90		
4	.080	.040	**5/8**	2	3/16	2	901210	111.60	901210-C3	118.10		
5	.093	.050	**1/8**	4	3/16	2	932915	88.90	932915-C3	95.10		
5	.093	.050	**3/16**	4	3/16	2	71015	88.20	71015-C3	94.70		
5	.093	.050	**1/4**	4	3/16	2	822715	90.90	822715-C3	97.60		
5	.093	.050	**3/8**	4	3/16	2	41415	93.70	41415-C3	100.30	41415-C4	114.80
5	.093	.050	**1/2**	4	3/16	2	54215	100.80	54215-C3	107.30		
5	.093	.050	**5/8**	4	3/16	2	993915	106.20	993915-C3	112.90		

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THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

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THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
6	.098	.050	**5/32**	4	3/16	2	932920	88.40	932920-C3	95.00		
6	.098	.050	**1/4**	4	3/16	2	71020	88.40	71020-C3	95.00	71020-C4	109.40
6	.098	.050	**5/16**	4	3/16	2	822720	90.90	822720-C3	97.60		
6	.098	.050	**3/8**	4	3/16	2	41420	93.90	41420-C3	100.50	41420-C4	115.00
6	.098	.050	**7/16**	4	3/16	2	821420	97.50	821420-C3	104.20		
6	.098	.050	**1/2**	4	3/16	2	54220	101.20	54220-C3	107.80	54220-C4	122.10
6	.098	.050	**5/8**	4	3/16	2	993920	106.20	993920-C3	112.90		
6	.098	.050	**3/4**	4	3/16	2	901220	111.60	901220-C3	118.10		
8	.120	.070	**7/32**	4	1/4	2-1/2	932930	89.70	932930-C3	98.60		
8	.120	.070	**5/16**	4	1/4	2-1/2	71030	90.70	71030-C3	99.70	71030-C4	112.10
8	.120	.070	**3/8**	4	1/4	2-1/2	820330	93.70	820330-C3	102.60		
8	.120	.070	**1/2**	4	1/4	2-1/2	41430	96.80	41430-C3	105.70	41430-C4	118.20
8	.120	.070	**9/16**	4	1/4	2-1/2	821430	100.00	821430-C3	107.30		
8	.120	.070	**5/8**	4	1/4	2-1/2	54230	103.50	54230-C3	112.50	54230-C4	127.30
8	.120	.070	**3/4**	4	1/4	2-1/2	993930	111.60	993930-C3	120.50		
8	.120	.070	**7/8**	4	1/4	2-1/2	901230	118.20	901230-C3	127.10		
10	.135	.070	**7/32**	4	1/4	2-1/2	932940	89.70	932940-C3	98.60		
10	.135	.070	**5/16**	4	1/4	2-1/2	71040	90.70	71040-C3	99.70	71040-C4	114.60
10	.135	.070	**3/8**	4	1/4	2-1/2	820340	93.70	820340-C3	102.60		
10	.135	.070	**1/2**	4	1/4	2-1/2	41440	96.80	41440-C3	105.70	41440-C4	120.70
10	.135	.070	**5/8**	4	1/4	2-1/2	54240	103.50	54240-C3	112.50	54240-C4	127.30
10	.135	.070	**3/4**	4	1/4	2-1/2	771840	107.50	771840-C3	116.40		
10	.135	.070	**7/8**	4	1/4	2-1/2	993940	111.60	993940-C3	120.50		
10	.135	.070	**1-1/8**	4	1/4	2-1/2	901240	118.20	901240-C3	127.10		
12	.160	.095	**1/4**	4	1/4	2-1/2	932945	91.60	932945-C3	100.40		
12	.160	.095	**3/8**	4	1/4	2-1/2	71045	90.70	71045-C3	99.70		
12	.160	.095	**1/2**	4	1/4	2-1/2	822745	93.70	822745-C3	102.60		
12	.160	.095	**5/8**	4	1/4	2-1/2	41445	96.80	41445-C3	105.70		
12	.160	.095	**7/8**	4	1/4	2-1/2	54245	103.50	54245-C3	112.50		
12	.160	.095	**1-1/8**	4	1/4	2-1/2	993945	109.40	993945-C3	118.30		
1/4	.180	.115	**5/16**	4	1/4	2-1/2	932950	89.70	932950-C3	98.60		
1/4	.180	.115	**3/8**	4	1/4	2-1/2	772950	90.30	772950-C3	99.10		
1/4	.180	.115	**1/2**	4	1/4	2-1/2	71050	90.70	71050-C3	99.70	71050-C4	114.60
1/4	.180	.115	**5/8**	4	1/4	2-1/2	822750	93.70	822750-C3	102.60		
1/4	.180	.115	**3/4**	4	1/4	2-1/2	41450	96.80	41450-C3	105.70	41450-C4	120.70
1/4	.180	.115	**7/8**	4	1/4	2-1/2	821450	100.00	821450-C3	108.90		
1/4	.180	.115	**1**	4	1/4	2-1/2	54250	103.50	54250-C3	112.50	54250-C4	127.30
1/4	.180	.115	**1-1/8**	4	1/4	2-1/2	771850	107.30	771850-C3	116.20		
1/4	.180	.115	**1-1/4**	4	1/4	2-1/2	993950	111.60	993950-C3	120.50		
1/4	.180	.115	**1-1/2**	4	1/4	3	901250	118.20	901250-C3	127.10		
5/16	.240	.160	**3/8**	4	1/4	2-1/2	932955	91.60	932955-C3	100.40		
5/16	.240	.160	**1/2**	4	1/4	2-1/2	71055	90.70	71055-C3	99.70	71055-C4	114.60
5/16	.240	.160	**5/8**	4	1/4	2-1/2	822755	93.70	822755-C3	102.60		
5/16	.240	.160	**3/4**	4	1/4	2-1/2	41455	96.80	41455-C3	105.70	41455-C4	118.20
5/16	.240	.160	**7/8**	4	1/4	2-1/2	821455	101.80	821455-C3	110.80		
5/16	.240	.160	**1**	4	1/4	2-1/2	54255	106.90	54255-C3	115.70	54255-C4	130.60
5/16	.240	.160	**1-1/4**	4	1/4	2-1/2	993955	111.60	993955-C3	120.50		
5/16	.240	.160	**1-1/2**	4	1/4	3	901255	118.20	901255-C3	127.10		

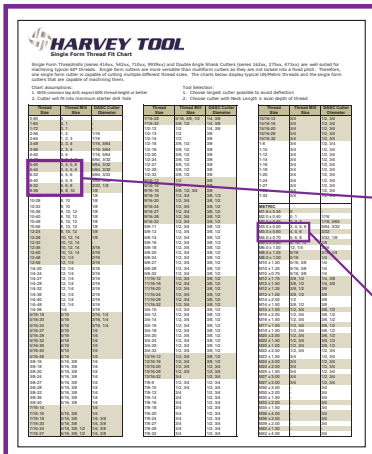
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THREAD MILLING CUTTERS

Single Form – UN Threads (cont.)

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THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED		AMORPHOUS DIAMOND	
	D_1 +.000″ −.002″		L_3 +.020″ −.000″		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
3/8	.300	.218	**3/4**	4	3/8	2-1/2	71060	118.20	71060-C3	129.60	71060-C4	146.80
3/8	.300	.218	**7/8**	4	3/8	2-1/2	822760	121.00	822760-C3	132.40		
3/8	.300	.218	**1**	4	3/8	2-1/2	41460	124.00	41460-C3	135.50	41460-C4	152.70
3/8	.300	.218	**1-1/8**	4	3/8	2-1/2	821460	130.00	821460-C3	141.40		
3/8	.300	.218	**1-1/4**	4	3/8	2-1/2	54260	130.80	54260-C3	142.20	54260-C4	159.40
3/8	.300	.218	**1-3/8**	4	3/8	3	771860	133.10	771860-C3	144.50		
3/8	.300	.218	**1-1/2**	4	3/8	3	993960	135.70	993960-C3	147.10		
3/8	.300	.218	**1-3/4**	4	3/8	3	901260	140.60	901260-C3	152.10		
7/16	.340	.230	**3/4**	4	3/8	2-1/2	71065	133.20	71065-C3	144.60		
7/16	.340	.230	**1**	4	3/8	2-1/2	41465	138.80	41465-C3	150.20		
7/16	.340	.230	**1-1/4**	4	3/8	3	54265	148.40	54265-C3	159.90		
1/2	.388	.250	**3/4**	4	1/2	3	71070	133.20	71070-C3	150.70		
1/2	.388	.250	**1**	4	1/2	3	822770	136.30	822770-C3	153.90		
1/2	.388	.250	**1-1/4**	4	1/2	3	41470	139.30	41470-C3	156.90	41470-C4	175.90
1/2	.388	.250	**1-1/2**	4	1/2	3	821470	144.00	821470-C3	161.50		
1/2	.388	.250	**1-3/4**	4	1/2	4	54270	148.60	54270-C3	166.00		
1/2	.388	.250	**2-1/4**	4	1/2	4	993970	155.00	993970-C3	172.40		
1/2	.388	.250	**2-3/4**	4	1/2	6	901270	161.00	901270-C3	178.50		
9/16	.400	.270	**7/8**	6	1/2	3	71073	139.10	71073-C3	156.70		
9/16	.400	.270	**1-1/4**	6	1/2	3	41473	139.10	41473-C3	156.70		
5/8	.450	.300	**1**	6	1/2	3	71075	139.10	71075-C3	156.70		
5/8	.450	.300	**1-3/8**	6	1/2	3	41475	145.60	41475-C3	163.20		
5/8	.450	.300	**1-3/4**	6	1/2	4	54275	155.90	54275-C3	173.50		
3/4	.495	.325	**1**	6	1/2	3	71080	139.10	71080-C3	156.70		
3/4	.495	.325	**1-1/4**	6	1/2	3	822780	145.10	822780-C3	162.70		
3/4	.495	.325	**1-3/8**	6	1/2	3	41480	145.60	41480-C3	163.20		
3/4	.495	.325	**1-3/4**	6	1/2	4	54280	153.40	54280-C3	170.90		
3/4	.495	.325	**2-1/4**	6	1/2	4	993980	160.10	993980-C3	177.50		
3/4	.495	.325	**2-3/4**	6	1/2	6	901280	166.60	901280-C3	184.10		
7/8	.590	.400	**1-1/4**	6	5/8	3-1/2	71085	189.20	71085-C3	206.80		
7/8	.590	.400	**1-1/2**	6	5/8	3-1/2	41485	199.70	41485-C3	217.30		
1	.620	.420	**1-5/16**	6	5/8	3-1/2	71090	189.20	71090-C3	206.80		
1	.620	.420	**1-3/4**	6	5/8	3-1/2	41490	199.70	41490-C3	217.30		
1	.625	.420	**2-1/4**	6	5/8	4	54290	214.20	54290-C3	233.60		


HARVEY TOOL
Single Form Thread Fit Chart

SINGLE FORM THREAD FIT CHARTS

5-40	3, 4, 5, 6
5-44	3, 4, 5, 6
6-32	4, 5, 6
6-40	4, 5, 6
8-32	5, 6, 8

M3.0 x 0.50	3, 4, 5, 6
M3.5 x 0.60	4, 5, 6
M4.0 x 0.70	5, 6, 8

Our single form thread milling cutters can produce a range of thread sizes, from common UN threads to metric threads.

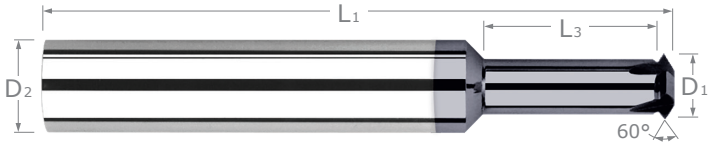
For example, our 5 thread size single form cutters (pictured left) can produce a range of thread sizes from 5-40 to 8-32 as well as M3.0 x 0.50 to M4.0 x 0.70.

For help with choosing the right thread mill, please call our Technical Support Team at **800-645-5609**.

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD MILLING CUTTERS

Single Form – Metric



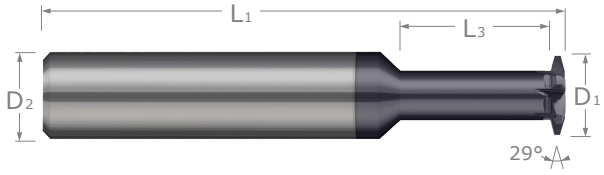
- Single thread form – can mill multiple pitches
- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Tip of included angle ground to a point
- Solid carbide • CNC ground in the USA

For thread fit chart, scan the QR code or visit harveytool.com/resources

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.00 mm −.05 mm		L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	USD$	TOOL #	USD$
M1.6	1.16 mm	.696 mm	**2.10 mm**	2	3 mm	38 mm	890316	95.10	890316-C3	101.00
M1.6	1.16 mm	.696 mm	**3.50 mm**	2	3 mm	38 mm	882116	95.10	882116-C3	101.00
M1.6	1.16 mm	.696 mm	**5.60 mm**	2	3 mm	38 mm	826516	97.80	826516-C3	103.70
M2	1.50 mm	.900 mm	**2.70 mm**	2	3 mm	38 mm	890319	95.10	890319-C3	101.00
M2	1.50 mm	.900 mm	**4.50 mm**	2	3 mm	38 mm	882119	95.10	882119-C3	101.00
M2	1.50 mm	.900 mm	**6.30 mm**	2	3 mm	38 mm	737619	96.40	737619-C3	102.30
M2	1.50 mm	.900 mm	**7.00 mm**	2	3 mm	38 mm	826519	97.80	826519-C3	103.70
M2	1.50 mm	.900 mm	**9.00 mm**	2	3 mm	38 mm	761419	99.30	761419-C3	105.30
M2.5	1.90 mm	1.140 mm	**3.50 mm**	2	3 mm	38 mm	890322	96.00	890322-C3	101.90
M2.5	1.90 mm	1.140 mm	**5.80 mm**	2	3 mm	38 mm	882122	95.10	882122-C3	101.00
M2.5	1.90 mm	1.140 mm	**9.00 mm**	2	3 mm	38 mm	826522	97.80	826522-C3	103.70
M3	2.30 mm	1.380 mm	**4.00 mm**	4	3 mm	38 mm	890324	95.10	890324-C3	101.00
M3	2.30 mm	1.380 mm	**6.80 mm**	4	3 mm	38 mm	882124	95.10	882124-C3	101.00
M3	2.30 mm	1.380 mm	**9.50 mm**	4	3 mm	38 mm	737624	96.40	737624-C3	102.30
M3	2.30 mm	1.380 mm	**11.00 mm**	4	3 mm	38 mm	826524	97.80	826524-C3	103.70
M3	2.30 mm	1.380 mm	**14.00 mm**	4	3 mm	38 mm	761424	99.30	761424-C3	105.30
M3.5	2.70 mm	1.620 mm	**8.00 mm**	4	3 mm	38 mm	882125	96.40	882125-C3	102.30
M4	3.00 mm	1.800 mm	**5.50 mm**	4	3 mm	38 mm	890326	96.40	890326-C3	102.30
M4	3.00 mm	1.800 mm	**9.00 mm**	4	3 mm	38 mm	882126	97.80	882126-C3	103.70
M4	3.00 mm	1.800 mm	**14.00 mm**	4	3 mm	38 mm	826526	100.80	826526-C3	106.70
M4	3.00 mm	1.800 mm	**18.00 mm**	4	3 mm	50 mm	761426	102.20	761426-C3	108.20
M5	4.00 mm	2.400 mm	**7.00 mm**	4	4 mm	50 mm	890328	97.80	890328-C3	104.50
M5	4.00 mm	2.400 mm	**12.00 mm**	4	4 mm	50 mm	882128	100.80	882128-C3	107.40
M5	4.00 mm	2.400 mm	**19.00 mm**	4	4 mm	50 mm	826528	104.00	826528-C3	110.60
M6	4.80 mm	2.880 mm	**8.50 mm**	4	6 mm	50 mm	890330	96.40	890330-C3	105.30
M6	4.80 mm	2.880 mm	**14.00 mm**	4	6 mm	50 mm	882130	97.80	882130-C3	106.80
M6	4.80 mm	2.880 mm	**23.00 mm**	4	6 mm	63 mm	826530	105.50	826530-C3	114.30
M8	6.00 mm	3.600 mm	**11.00 mm**	4	6 mm	50 mm	890332	97.80	890332-C3	106.80
M8	6.00 mm	3.600 mm	**18.00 mm**	4	6 mm	50 mm	882132	104.00	882132-C3	113.00
M10	8.00 mm	4.800 mm	**15.00 mm**	4	8 mm	63 mm	890334	126.80	890334-C3	137.30
M10	8.00 mm	4.800 mm	**24.00 mm**	4	8 mm	63 mm	882134	133.60	882134-C3	144.00
M12	10.00 mm	6.000 mm	**30.00 mm**	4	10 mm	75 mm	882136	138.90	882136-C3	152.20
M14	11.70 mm	7.020 mm	**36.00 mm**	4	12 mm	75 mm	882137	144.30	882137-C3	159.90
M16	13.70 mm	8.220 mm	**25.00 mm**	6	14 mm	75 mm	890339	149.60	890339-C3	167.60
M16	13.70 mm	8.220 mm	**42.00 mm**	6	14 mm	89 mm	882139	164.80	882139-C3	184.10

THREAD MILLING CUTTERS

Single Form – ACME

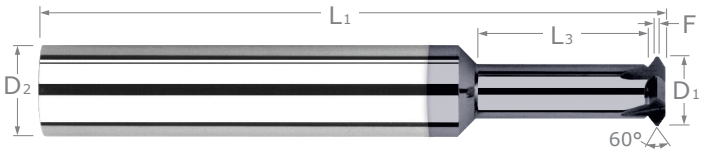


- Single thread form
- Cuts internal 29° ACME threads
- Mills right hand and left hand threads
- AlTiN coating for improved lubricity and heat resistance
- Solid carbide
- CNC ground in USA

THREAD SIZE	CUTTER DIA.	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.000"}_{-.002"}$		L_3 $^{+.020"}_{-.000"}$		D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/4-16	.170	.078	**1/4**	4	3/16	2-1/2	736950	50.30	736950-C3	57.00
3/8	.245	.132	**1/2**	4	1/4	2-1/2	736960	59.80	736960-C3	67.90
1/2-10	.360	.210	**5/8**	4	3/8	2-1/2	736970	78.10	736970-C3	89.50
5/8-8	.450	.275	**7/8**	6	1/2	3	736975	108.50	736975-C3	124.00
3/4-6	.495	.278	**7/8**	6	1/2	3	736980	116.90	736980-C3	132.40
7/8-6	.495	.278	**7/8**	6	1/2	3	736985	116.90	736985-C3	132.40
1-5	.620	.370	**1-1/8**	6	5/8	3-1/2	736990	139.00	736990-C3	158.30

THREAD MILLING CUTTERS

Single Form – UN Threads – For Hardened Steels





Tip of Included Angle Ground to a Flat for Increased Wear Resistance

- **Designed for threading hardened steels 46-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° UN threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 $^{+.000''}_{-.002''}$	F $^{+.0000''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
0	80	.044	.0013	.028	**3/32**	3	1/8	1-1/2	986602-C6	109.70
0	80	.044	.0013	.028	**1/8**	3	1/8	1-1/2	993102-C6	113.10
0	80	.044	.0013	.028	**3/16**	3	1/8	1-1/2	959502-C6	118.40
0	80	.044	.0013	.028	**1/4**	3	1/8	1-1/2	930302-C6	123.70
0	80	.044	.0013	.028	**5/16**	3	1/8	1-1/2	898902-C6	128.40
1	64-72	.054	.0014	.034	**1/8**	3	1/8	1-1/2	986604-C6	108.60
1	64-72	.054	.0014	.034	**3/16**	3	1/8	1-1/2	993104-C6	113.10
1	64-72	.054	.0014	.034	**1/4**	3	1/8	1-1/2	959504-C6	118.40
1	64-72	.054	.0014	.034	**5/16**	3	1/8	1-1/2	930304-C6	123.40
2	56-64	.064	.0016	.041	**5/32**	3	1/8	1-1/2	986606-C6	108.60
2	56-64	.064	.0016	.041	**7/32**	3	1/8	1-1/2	993106-C6	113.10
2	56-64	.064	.0016	.041	**1/4**	3	1/8	1-1/2	771706-C6	115.80
2	56-64	.064	.0016	.041	**5/16**	3	1/8	1-1/2	959506-C6	118.40
2	56-64	.064	.0016	.041	**7/16**	3	1/8	1-1/2	930306-C6	123.70
3	48-56	.072	.0018	.046	**5/32**	3	1/8	1-1/2	986608-C6	108.60
3	48-56	.072	.0018	.046	**1/4**	3	1/8	1-1/2	993108-C6	113.10
3	48-56	.072	.0018	.046	**3/8**	3	1/8	1-1/2	959508-C6	118.40
4	40-48	.080	.0021	.050	**5/32**	3	3/16	2	986610-C6	109.50
4	40-48	.080	.0021	.050	**1/4**	3	3/16	2	993110-C6	115.90
4	40-48	.080	.0021	.050	**5/16**	3	3/16	2	771710-C6	118.30
4	40-48	.080	.0021	.050	**3/8**	3	3/16	2	959510-C6	120.70
4	40-48	.080	.0021	.050	**1/2**	3	3/16	2	930310-C6	125.80
4	40-48	.080	.0021	.050	**5/8**	3	3/16	2	898910-C6	131.00
5	40-44	.093	.0023	.063	**3/16**	4	3/16	2	986615-C6	115.90
5	40-44	.093	.0023	.063	**1/2**	4	3/16	2	959515-C6	120.70
5	40-44	.093	.0023	.063	**5/8**	4	3/16	2	930315-C6	127.20
6	32-40	.098	.0025	.062	**3/16**	4	3/16	2	757320-C6	104.90
6	32-40	.098	.0025	.062	**1/4**	4	3/16	2	986620-C6	109.50
6	32-40	.098	.0025	.062	**5/16**	4	3/16	2	773220-C6	112.60
6	32-40	.098	.0025	.062	**3/8**	4	3/16	2	993120-C6	115.90
6	32-40	.098	.0025	.062	**7/16**	4	3/16	2	771720-C6	116.20
6	32-40	.098	.0025	.062	**1/2**	4	3/16	2	959520-C6	120.70
6	32-40	.098	.0025	.062	**5/8**	4	3/16	2	930320-C6	125.80

*Tools are designed to produce an 83% depth of thread maximum.

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THREAD MILLING CUTTERS

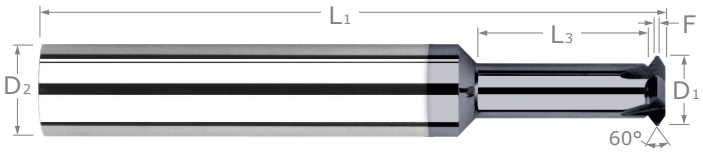
Single Form – UN Threads – For Hardened Steels (cont.)

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THREAD SIZE	PITCH RANGE*	CUTTER DIAMETER	TIP FLAT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 $^{+.000''}_{-.002''}$	F $^{+.0000''}_{-.0005''}$		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	TOOL #	USD$
8	32-36	.120	.0028	.084	**1/4**	4	1/4	2-1/2	757330-C6	110.30
8	32-36	.120	.0028	.084	**5/16**	4	1/4	2-1/2	986630-C6	114.90
8	32-36	.120	.0028	.084	**1/2**	4	1/4	2-1/2	993130-C6	121.70
8	32-36	.120	.0028	.084	**5/8**	4	1/4	2-1/2	959530-C6	128.00
8	32-36	.120	.0028	.084	**3/4**	4	1/4	2-1/2	930330-C6	134.30
8	32-36	.120	.0028	.084	**7/8**	4	1/4	2-1/2	898930-C6	140.90
10	24-36	.135	.0028	.086	**5/16**	5	1/4	2-1/2	986640-C6	114.90
10	24-36	.135	.0028	.086	**3/8**	5	1/4	2-1/2	773240-C6	118.30
10	24-36	.135	.0028	.086	**1/2**	5	1/4	2-1/2	993140-C6	121.70
10	24-36	.135	.0028	.086	**5/8**	5	1/4	2-1/2	959540-C6	128.00
10	24-36	.135	.0028	.086	**7/8**	5	1/4	2-1/2	930340-C6	134.30
10	24-36	.135	.0028	.086	**1-1/8**	5	1/4	2-1/2	898940-C6	140.90
12	24-32	.160	.0030	.111	**3/8**	5	1/4	2-1/2	986645-C6	114.90
12	24-32	.160	.0030	.111	**5/8**	5	1/4	2-1/2	993145-C6	128.00
1/4	20-32	.180	.0030	.122	**5/16**	5	1/4	2-1/2	845750-C6	114.90
1/4	20-32	.180	.0030	.122	**3/8**	5	1/4	2-1/2	757350-C6	118.30
1/4	20-32	.180	.0030	.122	**1/2**	5	1/4	2-1/2	986650-C6	121.70
1/4	20-32	.180	.0030	.122	**5/8**	5	1/4	2-1/2	773250-C6	124.90
1/4	20-32	.180	.0030	.122	**3/4**	5	1/4	2-1/2	993150-C6	128.00
1/4	20-32	.180	.0030	.122	**1**	5	1/4	2-1/2	959550-C6	134.30
1/4	20-32	.180	.0030	.122	**1-1/4**	5	1/4	2-1/2	930350-C6	140.60
5/16	18-28	.240	.0036	.174	**3/8**	5	1/4	2-1/2	845755-C6	116.00
5/16	18-28	.240	.0036	.174	**1/2**	5	1/4	2-1/2	986655-C6	121.70
5/16	18-28	.240	.0036	.174	**5/8**	5	1/4	2-1/2	773255-C6	126.00
5/16	18-28	.240	.0036	.174	**3/4**	5	1/4	2-1/2	993155-C6	128.00
5/16	18-28	.240	.0036	.174	**1**	5	1/4	2-1/2	959555-C6	134.30
5/16	18-28	.240	.0036	.174	**1-1/4**	5	1/4	2-1/2	930355-C6	140.60
3/8	16-28	.300	.0036	.227	**1/2**	5	3/8	2-1/2	845760-C6	148.40
3/8	16-28	.300	.0036	.227	**3/4**	5	3/8	2-1/2	986660-C6	154.80
3/8	16-28	.300	.0036	.227	**1**	5	3/8	2-1/2	993160-C6	161.30
3/8	16-28	.300	.0036	.227	**1-1/4**	5	3/8	2-1/2	959560-C6	167.80
3/8	16-28	.300	.0036	.227	**1-1/2**	5	3/8	3	930360-C6	174.10
3/8	16-28	.300	.0036	.227	**1-3/4**	5	3/8	3	898960-C6	178.40
1/2	12-18	.388	.0056	.294	**3/4**	5	1/2	3	986670-C6	171.00
1/2	12-18	.388	.0056	.294	**1**	5	1/2	3	773270-C6	176.70
1/2	12-18	.388	.0056	.294	**1-1/4**	5	1/2	3	993170-C6	182.40
1/2	12-18	.388	.0056	.294	**1-3/4**	5	1/2	4	959570-C6	189.10
1/2	12-18	.388	.0056	.294	**2-1/4**	5	1/2	4	930370-C6	195.40
3/4	10-16	.495	.0063	.385	**1**	6	1/2	3	986680-C6	181.30
3/4	10-16	.495	.0063	.385	**1-3/8**	6	1/2	3	993180-C6	196.60
3/4	10-16	.495	.0063	.385	**1-3/4**	6	1/2	4	959580-C6	212.00
3/4	10-16	.495	.0063	.385	**2-1/4**	6	1/2	4	930380-C6	227.20
1	8-14	.620	.0071	.480	**1-5/16**	6	5/8	3-1/2	986690-C6	214.70
1	8-14	.620	.0071	.480	**1-3/4**	6	5/8	3-1/2	993190-C6	230.00

THREAD MILLING CUTTERS

Single Form – Metric – For Hardened Steels





Tip of Included Angle Ground to a Flat for Increased Wear Resistance

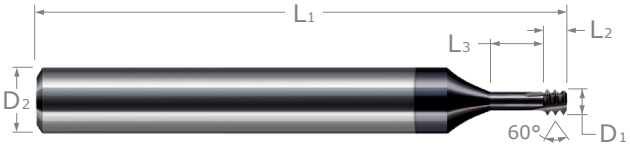
- **Designed for threading hardened steels 48-68Rc**
- Single thread form designed to mill common pitch sizes
- Cuts internal and external 60° Metric threads
- Tip of included angle ground to a flat for increased wear resistance
- Large rigid core diameter and eccentric relief for improved strength
- Mills left hand and right hand threads • h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for improved edge retention • CNC ground in the USA

THREAD SIZE	PITCH RANGE*	CUTTER DIA.	TIP FLAT	NECK DIA.	MAX DEPTH OF THREAD	FLUTES	SHANK DIA.	OVERALL LENGTH	AlTiN NANO COATED	
		D_1 +.00 mm −.05 mm	F +.000 mm −.127 mm		L_3 +.50 mm −.00 mm		D_2	L_1	TOOL #	USD$
M1.6	0.35	1.16 mm	.035	.742 mm	**2.10 mm**	3	3 mm	38 mm	771616-C6	108.80
M1.6	0.35	1.16 mm	.035	.742 mm	**3.50 mm**	3	3 mm	38 mm	772716-C6	107.80
M1.6	0.35	1.16 mm	.035	.742 mm	**4.90 mm**	3	3 mm	38 mm	724216-C6	110.30
M2	0.40	1.50 mm	.040	.960 mm	**2.70 mm**	3	3 mm	38 mm	771619-C6	108.80
M2	0.40	1.50 mm	.040	.960 mm	**4.50 mm**	3	3 mm	38 mm	772719-C6	107.80
M2	0.40	1.50 mm	.040	.960 mm	**6.30 mm**	3	3 mm	38 mm	724219-C6	110.30
M2.5	0.45	1.90 mm	.045	1.216 mm	**3.50 mm**	3	3 mm	38 mm	771622-C6	108.80
M2.5	0.45	1.90 mm	.045	1.216 mm	**5.80 mm**	3	3 mm	38 mm	772722-C6	107.80
M2.5	0.45	1.90 mm	.045	1.216 mm	**8.00 mm**	3	3 mm	38 mm	724222-C6	110.30
M3	0.50	2.30 mm	.050	1.541 mm	**4.00 mm**	4	3 mm	38 mm	771624-C6	108.80
M3	0.50	2.30 mm	.050	1.541 mm	**6.80 mm**	4	3 mm	38 mm	772724-C6	107.80
M3	0.50	2.30 mm	.050	1.541 mm	**9.50 mm**	4	3 mm	38 mm	724224-C6	110.30
M4	0.70	3.00 mm	.070	2.010 mm	**5.50 mm**	4	3 mm	38 mm	771626-C6	109.40
M4	0.70	3.00 mm	.070	2.010 mm	**9.00 mm**	4	3 mm	38 mm	772726-C6	110.70
M4	0.70	3.00 mm	.070	2.010 mm	**12.60 mm**	4	3 mm	38 mm	724226-C6	113.10
M5	0.80	4.00 mm	.080	2.800 mm	**7.00 mm**	5	4 mm	50 mm	771628-C6	111.80
M5	0.80	4.00 mm	.080	2.800 mm	**12.00 mm**	5	4 mm	50 mm	772728-C6	114.50
M5	0.80	4.00 mm	.080	2.800 mm	**17.00 mm**	5	4 mm	50 mm	724228-C6	117.00
M6	1.00	4.80 mm	.100	3.360 mm	**8.50 mm**	5	6 mm	50 mm	771630-C6	112.30
M6	1.00	4.80 mm	.100	3.360 mm	**14.00 mm**	5	6 mm	50 mm	772730-C6	113.80
M6	1.00	4.80 mm	.100	3.360 mm	**20.00 mm**	5	6 mm	63 mm	724230-C6	116.30

*Tools are designed to produce an 83% depth of thread maximum.

THREAD MILLING CUTTERS

Tri-Form – UN Threads



Left-Hand Cut, Left Hand Spiral Design

- **Designed for threading in hardened steels and difficult-to-machine materials**
- Left-hand cut, left-hand spiral design for climb milling from top to bottom of right-hand threads
- Three forms and helical design reduces tool pressure and deflection resulting in accurate threads
- Cuts internal 60° UN threads
- Able to cut larger threads of the same pitch
- h6 shank tolerance for high precision tool holders
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA



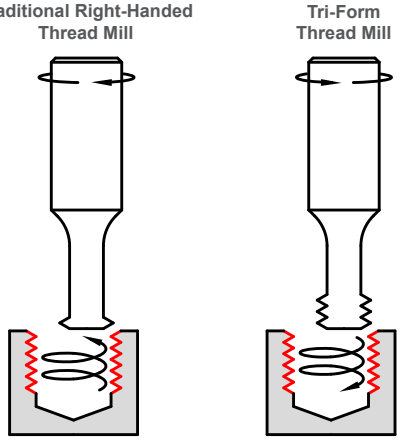
Left-Hand Cut, Left-Hand Spiral Design

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	NECK DIAMETER	MAX DEPTH OF THREAD	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		L_3 $^{+.020''}_{-.000''}$		D_2 (h6)	L_1	3 FL	USD$
2-56	.065	.053	.042	**3/32**	3	1/4	2-1/2	899910-C6	216.90
2-56	.065	.053	.042	**5/32**	3	1/4	2-1/2	896410-C6	226.00
4-40	.085	.075	.053	**3/32**	3	1/4	2-1/2	899916-C6	216.90
4-40	.085	.075	.053	**5/32**	3	1/4	2-1/2	896416-C6	226.00
6-32	.100	.093	.061	**5/32**	3	1/4	2-1/2	899922-C6	216.90
6-32	.100	.093	.061	**1/4**	3	1/4	2-1/2	896422-C6	226.00
8-32	.126	.093	.087	**7/32**	3	1/4	2-1/2	899928-C6	201.60
8-32	.126	.093	.087	**5/16**	3	1/4	2-1/2	896428-C6	210.60
10-24	.138	.125	.086	**7/32**	3	1/4	2-1/2	899934-C6	201.60
10-24	.138	.125	.086	**5/16**	3	1/4	2-1/2	896434-C6	210.60
10-32	.145	.093	.106	**7/32**	3	1/4	2-1/2	899936-C6	201.60
10-32	.145	.093	.106	**5/16**	3	1/4	2-1/2	896436-C6	210.60
1/4-20	.187	.150	.124	**5/16**	3	1/4	2-1/2	899944-C6	201.60
1/4-20	.187	.150	.124	**1/2**	3	1/4	2-1/2	896444-C6	210.60
1/4-28	.197	.107	.151	**5/16**	3	1/4	2-1/2	899946-C6	201.60
1/4-28	.197	.107	.151	**1/2**	3	1/4	2-1/2	896446-C6	210.60
5/16-18	.236	.166	.166	**3/8**	3	1/4	2-1/2	899954-C6	201.60
5/16-18	.236	.166	.166	**1/2**	3	1/4	2-1/2	896454-C6	210.60
3/8-16	.264	.187	.186	**1/2**	3	5/16	2-1/2	899964-C6	212.50
3/8-16	.264	.187	.186	**3/4**	3	5/16	2-1/2	896464-C6	221.50

Tri-Form Thread Mills

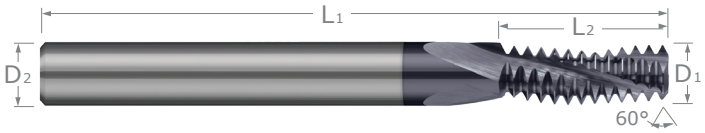
Our Tri-Form Thread Mills are unlike traditional right-handed thread mills, as they have a left-hand cut, left-hand spiral design.

- Improves thread accuracy and surface finish by climb milling from the top to the bottom of a hole.
- Tri-Form Thread Mills eliminate the need to arc-in when engaging the tool, which reduces radial pressure and deflection.



THREAD MILLING CUTTERS

Multi-Form – UN Threads



- Cuts internal and external 60° UN threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

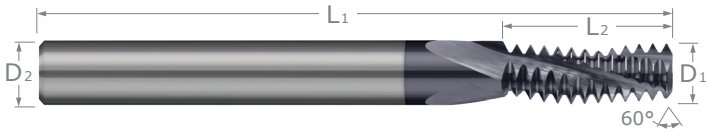
THREAD SIZE	CUTTER DIA.	LENGTH OF CUT	FLUTES	SHANK DIA.	OAL	UNCOATED		AlTiN COATED		TiB_2 COATED		CVD DIAMOND (9 µm)	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
2-56	.065	.125	3*	1/8	2	70010	101.10	70010-C3	107.00	70010-C8	109.80		
3-48	.075	.167	3*	1/8	2	70012	106.90	70012-C3	112.80				
4-40	.085	.175	3*	1/8	2	70016	106.90	70016-C3	112.80	70016-C8	115.40	732816	166.50
5-44	.095	.228	3	1/8	2	70020	106.90	70020-C3	112.80				
6-32	.100	.218	3	1/8	2	70022	110.50	70022-C3	116.50	70022-C8	119.10	732822	170.10
8-32	.115	.250	3	1/8	2	70028	118.50	70028-C3	124.50	70028-C8	127.20		
8-36	.115	.250	3	1/8	2	70031	118.50	70031-C3	124.50				
10-24	.120	.312	3	1/8	2	70034	124.80	70034-C3	130.70	70034-C8	132.40		
10-28	.120	.312	3	1/8	2	70035	127.30	70035-C3	133.20				
10-32	.120	.312	3	1/8	2	70036	124.80	70036-C3	130.70	70036-C8	133.30	732836	184.30
1/4-20	.180	.500	3	3/16	2-1/2	70044	149.20	70044-C3	155.80	70044-C8	157.80	732844	220.60
1/4-28	.180	.500	3	3/16	2-1/2	70046	149.20	70046-C3	155.80	70046-C8	157.80	732846	220.60
5/16-18	.235	.625	3	1/4	2-1/2	70054	161.60	70054-C3	170.30	70054-C8	170.90	732854	247.40
5/16-24	.235	.625	3	1/4	2-1/2	70056	182.60	70056-C3	191.30	70056-C8	191.90		
3/8-16	.285	.750	4	5/16	3	70064	217.30	70064-C3	227.50	70064-C8	230.50		
3/8-24	.285	.750	4	5/16	3	70066	217.30	70066-C3	227.50	70066-C8	230.50		
7/16-14	.305	.750	4	5/16	3	70074	217.30	70074-C3	227.50	70074-C8	230.50		
7/16-20	.335	.875	4	3/8	3-1/2	70076	234.50	70076-C3	246.70	70076-C8	251.50		
1/2-13	.350	.875	4	3/8	3-1/2	70084	242.40	70084-C3	253.70				
1/2-20	.370	1.000	6	3/8	3-1/2	70086	254.40	70086-C3	266.70				
1/2-32	.370	1.000	6	3/8	3-1/2	70089	254.40	70089-C3	266.70				
9/16-12	.370	.875	4	3/8	3-1/2	70092	242.40	70092-C3	253.70				
9/16-18	.370	.875	4	3/8	3-1/2	70094	242.40	70094-C3	253.70				
5/8-11	.470	1.250	4	1/2	3-1/2	70104	299.70	70104-C3	316.70				
3/4-10	.495	1.250	4	1/2	3-1/2	70124	299.70	70124-C3	316.70				
3/4-12	.495	1.250	4	1/2	3-1/2	70126	299.70	70126-C3	316.70				
3/4-16	.490	1.250	4	1/2	3-1/2	70128	305.70	70128-C3	322.80				
7/8-9	.620	1.375	4	5/8	4	70132	459.70	70132-C3	479.00				
7/8-14	.490	1.250	4	1/2	3-1/2	70134	305.70	70134-C3	322.80				
1-8	.620	1.375	4	5/8	4	70154	459.70	70154-C3	479.00				
1-12	.745	1.500	6	3/4	4	70158	575.40	70158-C3	593.80				

*Straight flutes

NEW SIZES!

THREAD MILLING CUTTERS

Multi-Form – UN Threads – For Hardened Steels

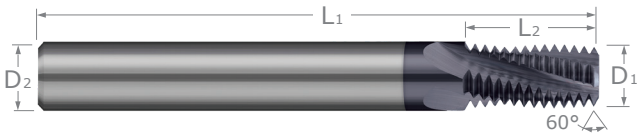


- Designed for threading hardened steels 46-68 Rc
- Cuts internal and external 60° UN threads
- Mill right hand and left hand threads
- Able to cut larger threads of the same pitch
- Variable helix design reduces chatter and harmonics and produces more accurate threads
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Select carbide grade for maximum tool life
- CNC ground in the USA

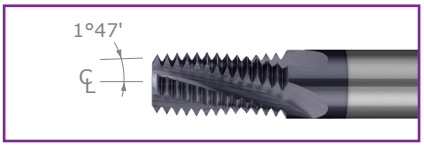
THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED		
	D_1 $^{+.000''}_{-.002''}$	L_2		D_2	L_1	TOOL #	USD$	
2-56	.065	.125	3	1/8	2	836710-C6	151.00	
4-40	.085	.180	3	1/8	2	836716-C6	144.30	
5-44	.095	.228	3	1/8	2	836720-C6	151.00	
6-32	.100	.218	3	1/8	2	836722-C6	148.80	
8-32	.115	.250	3	1/8	2	836728-C6	159.30	
10-24	.120	.312	3	3/16	2	836734-C6	167.20	
10-32	.120	.312	3	3/16	2	836736-C6	167.20	
1/4-20	.180	.500	3	3/16	2-1/2	836744-C6	199.20	
1/4-28	.180	.500	3	3/16	2-1/2	836746-C6	199.20	
5/16-18	.240	.625	3	1/4	2-1/2	836754-C6	217.80	
5/16-24	.240	.625	3	1/4	2-1/2	836756-C6	245.00	
3/8-16	.285	.750	4	5/16	3	836764-C6	291.10	
3/8-24	.285	.750	4	5/16	3	836766-C6	291.10	
7/16-20	.335	.875	4	3/8	3-1/2	836776-C6	314.70	
1/2-13	.350	.875	4	3/8	3-1/2	836784-C6	324.90	
1/2-20	.350	.875	4	3/8	3-1/2	836786-C6	324.90	NEW
9/16-18	.370	.875	4	3/8	3-1/2	836794-C6	324.90	NEW
3/4-16	.495	1.250	4	1/2	3-1/2	836798-C6	412.80	
5/8-11	.470	1.250	4	1/2	3-1/2	836799-C6	412.80	NEW

THREAD MILLING CUTTERS

Multi-Form – N.P.T. Threads



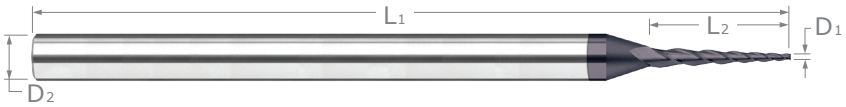
- Cuts internal and external 60° National Pipe Taper (N.P.T.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA



THREAD SIZE	MAJOR CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 +.0005″ −.0005″	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
1/16, 1/8-27	.245	.437	3	1/4	2-1/2	70204	168.70	70204-C3	177.50	70204-C8	178.20
1/4, 3/8-18	.305	.625	4	5/16	3	70214	231.30	70214-C3	241.50	70214-C8	251.10
1/4, 3/8-18	.363	.680	4	3/8	3-1/2	790414	246.00	790414-C3	258.30		
1/2, 3/4-14	.495	.875	4	1/2	3-1/2	70226	269.70	70226-C3	287.00		
1,2-11.5	.620	1.125	4	5/8	4	70232	381.40	70232-C3	400.70		

THREAD MILLING CUTTERS

N.P.T. Tapered End Mills – Square



1°47' Angle for NPT threads

- 1°47' angle for preparation of parts prior to internal or external NPT thread milling
- Length of cut and diameters designed for range of standard NPT dimensions
- 3 flutes
- Center cutting
- Solid carbide
- CNC ground in the USA

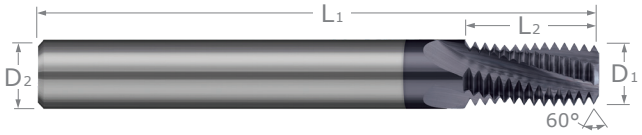


ANGLE PER SIDE	END DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN NANO COATED	
A_1 +0°30′ −0°30′	D_1 +.0005″ −.0005″	L_2 +.020″ −.000″	D_2 (h6)	L_1	3 FL	USD$	3 FL	USD$
1°47'	.200	**.625** (3x)	1/4	2	912282	70.30	912282-C6	83.20
	.300	**.900** (3x)	3/8	2-1/2	912286	87.70	912286-C6	102.20
	.400	**1.250** (3x)	1/2	3	912292	118.00	912292-C6	136.90

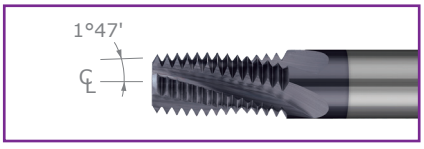
N.P.T. Thread Fit Chart		
Thread Mill Tool #	Thread Size	Tapered End Mill Tool #
70204	1/16, 1/8-27	912282
70214, 790914	1/4, 3/8-18	912282, 912286
70226	1/2, 3/4-14	912286
70232	1, 2-11.5	912292

THREAD MILLING CUTTERS

Multi-Form – N.P.T.F. Threads



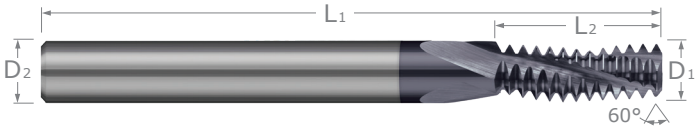
- Cuts internal and external 60° National Pipe Taper - Fuel (N.P.T.F.) threads
- Mills right hand and left hand threads
- Helical flutes
- Solid carbide
- CNC ground in the USA



THREAD SIZE	MAJOR CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$
1/16, 1/8-27	.245	.437	3	1/4	2-1/2	784304	197.10	784304-C3	205.90
1/4, 3/8-18	.305	.625	4	5/16	3	784314	235.30	784314-C3	243.40
1/2, 3/4-14	.495	.875	4	1/2	3-1/2	784326	305.40	784326-C3	322.70
1, 2-11.5	.620	1.125	4	5/8	4	784332	454.40	784332-C3	473.70

THREAD MILLING CUTTERS

Multi-Form – Metric

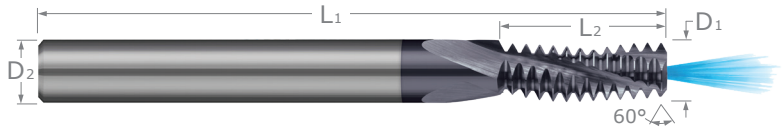


- Cuts internal and external 60° metric threads
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch • Helical flutes • Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$
M2-0.40	.059	.126	3	1/8	2	16901	138.90	16901-C3	144.80
M2.5-0.45	.059	.142	3	1/8	2	16902	138.90	16902-C3	144.80
M3-0.50	.085	.178	3	1/8	2	16903	136.30	16903-C3	142.20
M4-0.70	.115	.276	3	1/8	2	16907	136.30	16907-C3	142.20
M4.5-0.75	.120	.250	3	1/8	2	16909	136.30	16909-C3	142.20
M5-0.80	.120	.312	3	1/8	2	16911	136.30	16911-C3	142.20
M6-0.75	.170	.366	3	3/16	2-1/2	16919	168.40	16919-C3	175.00
M6-1.00	.170	.500	3	3/16	2-1/2	16917	165.20	16917-C3	171.90
M8-1.00	.235	.625	3	1/4	2-1/2	16924	180.90	16924-C3	189.80
M8-1.25	.235	.625	3	1/4	2-1/2	16923	177.60	16923-C3	186.40
M10-1.00	.300	.750	4	5/16	3	16930	244.00	16930-C3	254.30
M10-1.50	.300	.750	4	5/16	3	16929	239.60	16929-C3	249.70
M12-1.75	.360	.875	4	3/8	3-1/2	16935	266.50	16935-C3	278.70
M14-1.50	.370	.875	4	3/8	3-1/2	16941	266.50	16941-C3	278.70
M16-2.00	.470	1.250	4	1/2	3-1/2	16947	328.10	16947-C3	345.50
M18-1.50	.490	1.250	4	1/2	3-1/2	16953	328.10	16953-C3	345.50
M20-2.50	.495	1.250	4	1/2	3-1/2	16959	334.40	16959-C3	351.80

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – UN Threads





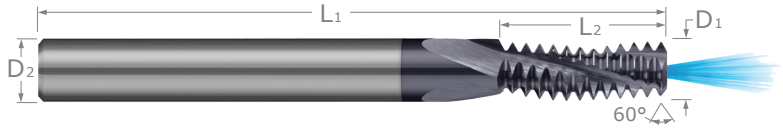
Coolant-Fed for Chip Removal

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° UN threads
- Able to cut larger threads of the same pitch
- Helical flutes • Solid carbide • CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$
2-56	.065	.125	3	1/8	1-1/2	17310	114.30	17310-C3	120.20
4-40	.085	.175	3	1/8	1-1/2	17316	114.30	17316-C3	120.20
6-32	.100	.218	3	1/8	1-1/2	17322	114.30	17322-C3	120.20
10-24	.145	.312	3	3/16	2-3/8	17334	136.30	17334-C3	142.90
10-32	.150	.312	3	3/16	2-3/8	17336	136.30	17336-C3	142.90
1/4-20	.180	.500	3	3/16	2-3/8	17344	163.80	17344-C3	170.40
1/4-28	.180	.500	3	3/16	2-3/8	17346	163.80	17346-C3	170.40
5/16-18	.235	.625	3	1/4	2-3/8	17354	176.30	17354-C3	185.20
5/16-24	.235	.625	3	1/4	2-3/8	17356	205.80	17356-C3	214.90
3/8-16	.285	.750	4	5/16	3	17364	237.70	17364-C3	248.10
3/8-24	.285	.750	4	5/16	3	17366	237.70	17366-C3	248.10
7/16-14	.305	.750	4	5/16	3	17374	237.70	17374-C3	248.10
7/16-20	.335	.875	4	3/8	3	17376	256.10	17376-C3	267.50
1/2-13	.350	.875	4	3/8	3	17384	264.20	17384-C3	275.60

THREAD MILLING CUTTERS

Multi-Form – Coolant-Through – Metric





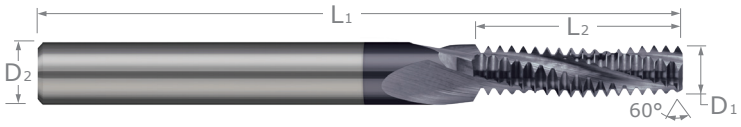
Coolant-Fed for Chip Removal

- Coolant through design for maximum chip ejection in blind holes
- Mills right hand and left hand 60° Metric threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 +.000″ −.002″	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$
M3-0.50	.085	.1780	3	1/8	2	819624	145.60	819624-C3	151.50
M4-0.70	.115	.2760	3	1/8	2	819626	145.60	819626-C3	151.50
M5-0.80	.120	.3125	3	1/8	2	819628	145.60	819628-C3	151.50
M6-1.00	.170	.5000	3	3/16	2-1/2	819630	177.00	819630-C3	183.60
M8-1.25	.235	.6250	3	1/4	2-1/2	819632	190.10	819632-C3	198.90

THREAD MILLING CUTTERS

Multi-Form – Long Flute – UN Threads



Designed for Deep Threaded Applications!

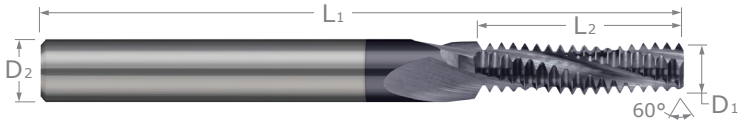
- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° UN threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED		TiB_2 COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$	TOOL #	USD$
2-56	.069	.215	3*	1/8	2	987110	132.20	987110-C3	138.20	987110-C8	141.20
3-48	.079	.250	3	1/8	2	987112	138.90	987112-C3	144.80		
4-40	.089	.275	3	1/8	2	987116	138.90	987116-C3	144.80	987116-C8	147.90
6-32	.110	.375	3	1/8	2	987122	138.90	987122-C3	144.80	987122-C8	147.90
8-32	.131	.407	3	3/16	2-1/2	987128	147.80	987128-C3	154.50	987128-C8	157.00
8-36	.131	.417	3	3/16	2-1/2	987131	155.50	987131-C3	162.10		
10-24	.145	.500	3	3/16	2-1/2	987134	182.40	987134-C3	189.00	987134-C8	191.60
10-32	.150	.500	3	3/16	2-1/2	987136	182.40	987136-C3	189.00	987136-C8	191.60
1/4-20	.195	.750	3	1/4	2-1/2	987144	185.50	987144-C3	194.40	987144-C8	195.00
1/4-28	.195	.750	3	1/4	2-1/2	987146	185.50	987146-C3	194.40	987146-C8	195.00
5/16-18	.245	.944	3	5/16	3	987154	240.80	987154-C3	251.10		
5/16-24	.245	.958	3	5/16	3	987156	247.10	987156-C3	257.60		
3/8-16	.300	1.125	4	3/8	3-1/2	987164	287.10	987164-C3	299.40		
3/8-24	.300	1.125	4	3/8	3-1/2	987166	295.40	987166-C3	307.70		
7/16-20	.350	1.300	4	3/8	3-1/2	987176	295.40	987176-C3	307.70		
1/2-13	.400	1.308	4	1/2	3-1/2	987184	299.70	987184-C3	317.40		
9/16-18	.450	1.500	4	1/2	3-1/2	987194	318.40	987194-C3	335.80		
5/8-11	.490	1.820	4	1/2	4	987100	350.10	987100-C3	367.80		
3/4-16	.580	1.875	4	5/8	4	987103	451.80	987103-C3	471.10		

*Straight flutes

THREAD MILLING CUTTERS

Multi-Form – Long Flute – Metric



Designed for Deep Threaded Applications!

- Designed for deep threaded applications
- Larger cutter diameter for maximum strength
- Due to increased cutter diameter, tools are designed to achieve 60% threads
- Cuts internal 60° metric threads only
- Mills right hand and left hand threads
- Able to cut larger threads of the same pitch
- Helical flutes
- Solid carbide
- CNC ground in the USA

THREAD SIZE	CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AlTiN COATED	
	D_1 $^{+.0005''}_{-.0005''}$	L_2		D_2	L_1	TOOL #	USD$	TOOL #	USD$
M3-0.50	.090	.276	3	1/8	2	842903	163.70	842903-C3	169.60
M4-0.70	.124	.441	3	3/16	2-1/2	842907	167.60	842907-C3	174.30
M5-0.80	.155	.504	3	3/16	2-1/2	842911	164.10	842911-C3	170.80
M6-1.00	.186	.748	3	1/4	2-1/2	842917	194.10	842917-C3	203.00
M8-1.25	.245	.984	3	5/16	2-1/2	842923	249.50	842923-C3	260.00
M10-1.50	.311	1.122	4	3/8	3-1/2	842929	313.20	842929-C3	325.40
M16-2.00	.490	1.890	4	1/2	3-1/2	842947	408.80	842947-C3	426.40

In The Loupe TV

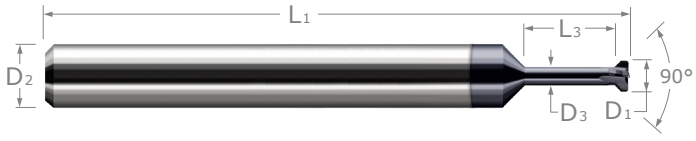
Check Out Our New CNC Show!

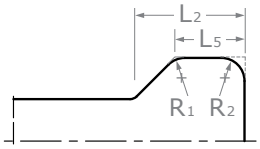
Join Harvey Performance Company National Applications Engineer Don Grandt as he dives into specific cutting tool topics, answering the questions machinists ask most, to help you accomplish more at the spindle.

youtube.com/intheloupetv

THREAD MILLING CUTTERS

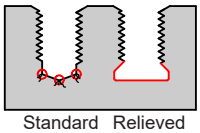
Thread Relief Cutter





- Tool designed to relieve stress concentrations at corners of undercut and bottom of last thread to prevent fracture and failure
- Relief is typically done before threading operation to avoid damaging the thread forms
- Chamfer eliminates burrs and partial threads at last thread
- Flattens bottom of hole to achieve maximum thread depth
- Center cutting
- Solid carbide
- CNC ground in the USA

THREADED HOLES

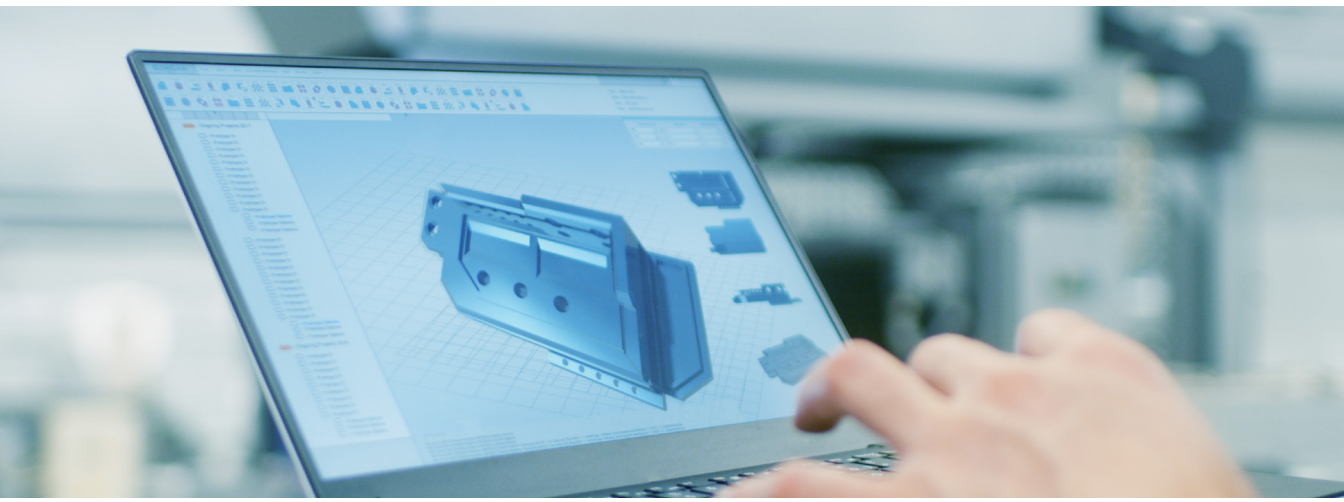


Standard Relieved

CUTTER DIA.	LOC	WIDTH (TSC)	RADIUS 1	RADIUS 2	NECK DIA.	NECK LENGTH	RADIAL DOC	SHANK DIA.	OAL	UNCOATED		AlTiN COATED	
D_1 $^{+.000''}_{-.001''}$	L_2 $^{+.002''}_{-.000''}$	L_5	R_1 $^{+.001''}_{-.001''}$	R_2 $^{+.001''}_{-.001''}$	D_3	L_3 $^{+.010''}_{-.000''}$		D_2	L_1	4 FL	USD$	4 FL	USD$
.066	.029	.015	.000	.005	.036	.172	.014	1/8	1-1/2	896602	69.90	896602-C3	75.80
.075	.030	.015	.000	.005	.042	.187	.015	1/8	1-1/2	877502	66.70	877502-C3	72.70
.084	.038	.020	.000	.005	.045	.218	.018	3/16	2	988804	64.80	988804-C3	71.50
.102	.049	.025	.000	.010	.051	.281	.024	3/16	2	985707	66.10	985707-C3	72.70
D_1 $^{+.000''}_{-.002''}$	L_2 $^{+.005''}_{-.000''}$	L_5	R_1 $^{+.001''}_{-.001''}$	R_2 $^{+.001''}_{-.001''}$	D_3	L_3 $^{+.030''}_{-.000''}$		D_2	L_1	4 FL	USD$	4 FL	USD$
.125	.054	.030	.000	.010	.074	.343	.024	1/4	2-1/2	979609	80.20	979609-C3	89.20
.142	.050	.020	.000	.010	.078	.359	.030	1/4	2-1/2	975405	82.10	975405-C3	91.10
.168	.050	.020	.000	.010	.103	.422	.030	1/4	2-1/2	955305	80.20	955305-C3	89.20
.193	.055	.020	.000	.010	.118	.547	.035	1/4	2-1/2	952505	82.40	952505-C3	91.50
.193	.075	.040	.015	.015	.118	.547	.035	1/4	2-1/2	952516	82.40	952516-C3	91.50
.245	.072	.030	.000	.010	.155	.797	.042	1/4	2-1/2	946009	85.60	946009-C3	94.50
.245	.102	.060	.020	.020	.155	.797	.042	1/4	2-1/2	946027	85.60	946027-C3	94.50
.355	.086	.030	.000	.010	.236	1.078	.056	3/8	2-1/2	942909	133.50	942909-C3	144.90
.355	.116	.060	.020	.020	.236	1.078	.056	3/8	2-1/2	942927	133.50	942927-C3	144.90
.355	.136	.080	.030	.030	.236	1.078	.056	3/8	2-1/2	942931	133.50	942931-C3	144.90

CAM Tool Libraries

Harvey Performance Company works closely with industry-leading CAM software companies to optimize Harvey Tool and Helical Solutions product libraries for their platforms.



CAM Partners

Valuable Time Savings
Import tool libraries directly into CAM software and allow more time to be spent at the machine.

Confident Machining
Program confidently with accurate tool dimensions and CAM-specific tool data.

Growing Libraries & Partnerships
Count on up-to-date product libraries across a roster of leading CAM partners.



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AUTODESK® FUSION 360™ · AUTODESK® HSM · CAMWorks · ESPRIT CAM System · GibbsCAM® · Mastercam · SolidCAM iMachining – The Revolution in CAM!

www.harveyperformance.com/tool-libraries

TOOL HOLDERS

Browse a fully stocked and expanded offering of Tool Holders and Collets, including Extended Reach Tool Holders, Solid ER Integrated Tool Holders, Saw Arbors, ER Collets, ER Performance Collets, and accompanying nuts and wrenches. When your machine setup includes a Harvey Tool holder and collet, you can rest assured that you'll maximize tool performance and repeatability.

Tool Holders 568

Extended Reach Tool Holders & Collets 568



Solid ER Integrated Tool Holders 569



Solid ER Integrated Tool Holders – Coolant-Through 569



Saw Arbors mm & in New Style! 570



Collets 571

ER Collets 571

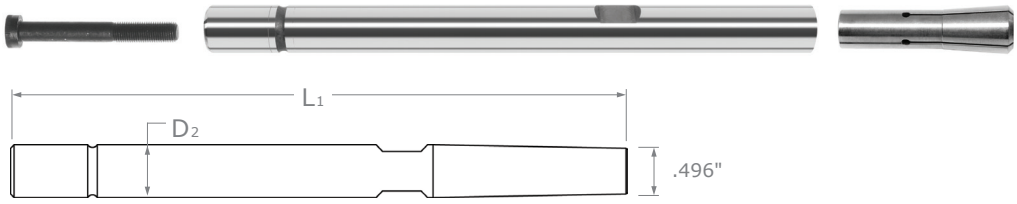


ER Performance Collets 572



TOOL HOLDERS

Extended Reach Tool Holders & Collets



- Center gripping collet with threaded draw screw
- More accurate than traditional single-set screw type holders
- High precision concentricity and rigidity
- Maximum T.I.R. of .0002” from shank to collet pocket
- Quick tool changes
- Coolant through capable
- Allen wrench included
- Collet not included — choose from many sizes
- Two offsetting flats to maintain T.I.R.
- Use with mills, lathes, and grinders



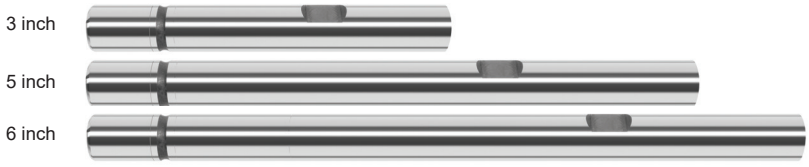
Center Gripping Collet Design.
Choose from Six Sizes!

Tool Holders

SHANK DIAMETER	OVERALL LENGTH	TOOL HOLDERS (Collet Not Included)	
D_2	L_1	TOOL #	USD$
1/2	3	36730	269.00
1/2	5	36750	288.70
1/2	6	36760	305.90

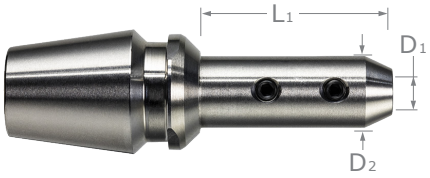
Collets

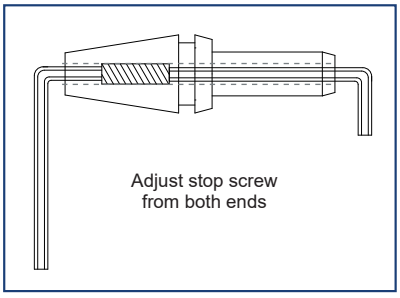
COLLET SIZE	TOOL #	USD$
1/8	36810	91.00
3/16	36820	91.00
1/4	36830	91.00
3 mm	36840	91.00
4 mm	36850	91.00
6 mm	36860	91.00



TOOL HOLDERS

Solid ER Integrated Tool Holders



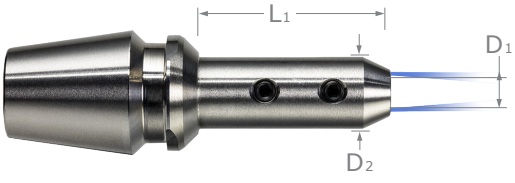


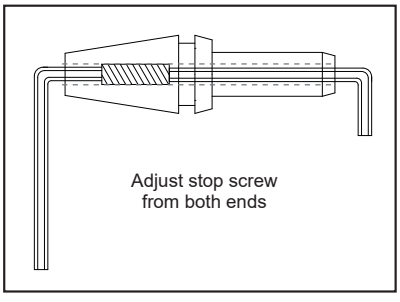
- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches • Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	USD$
.1250	9.5 mm	16 mm	ER16	83001	315.40
.1250	9.5 mm	25 mm	ER16	83003	315.40
.1875	9.5 mm	16 mm	ER16	83002	315.40
.1875	9.5 mm	25 mm	ER16	83004	315.40
.2500	12.5 mm	14 mm	ER20	83005	376.60
.2500	12.5 mm	25 mm	ER20	83006	369.50

TOOL HOLDERS

Solid ER Integrated Tool Holders – Coolant-Through





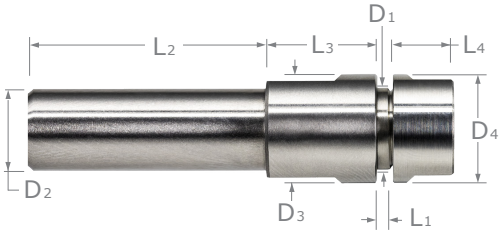
- Reached taper integrated holder that eliminates the need for multiple spindle accessories
- Designed for Turn Mill Centers and Machining Centers
- Works with any ER holder or spindle
- Multiple reaches
- Maximum T.I.R. of <.0002”
- Capable of quick change with included stop screw
- Compatible with coolant through holders
- Stop screw can be adjusted from both ends of holder

BORE DIAMETER	SHAFT DIAMETER	PROJECTION LENGTH	TAPER	TOOL HOLDERS	
D_1	D_2	L_1		TOOL #	USD$
.1250	9.5 mm	25 mm	ER16	83203	405.70

NEW!

SAW ARBORS

Straight Shank



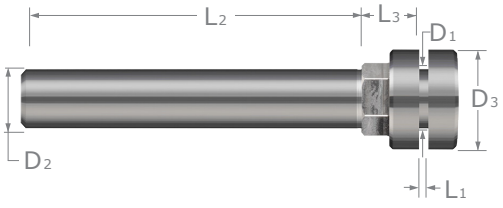
- Maximum T.I.R. of .0001”
- Straight shank allows for chucking at multiple depths
- Key not included

ARBOR DIAMETER	ARBOR LENGTH	SHANK DIAMETER	SHANK LENGTH	FLANGE DIAMETER	FLANGE LENGTH	NUT DIAMETER	NUT LENGTH	THREAD LENGTH (IN FRONT OF ARBOR)	SAW ARBORS	
D_1	L_1	D_2	L_2	D_3	L_3	D_4	L_4		TOOL #	USD$
.250	.045	.250	1.40	.394	.500	.394	.250	.300	84100	281.10
.375	.050	.375	1.40	.500	.500	.500	.276	.300	84101	281.10
.500	.050	.500	1.40	.625	.500	.625	.276	.300	84102	281.10
1.000	.125	.750	2.00	1.250	1.500	1.250	.437	.500	84103	359.30

For Slitting Saws, see pages 428 - 432

SAW ARBORS

Straight Shank Metric



- Maximum T.I.R. of .005”
- Straight shank allows for chucking at multiple depths
- Key not included

ARBOR DIAMETER	ARBOR LENGTH	SHANK DIAMETER	SHANK LENGTH	FLANGE DIAMETER	FLANGE LENGTH	SAW ARBORS		
D_1	L_1	D_2	L_2	D_3	L_3	TOOL #	USD$	
8 mm	1.60 mm	7 mm	38 mm	18 mm	4.30 mm	84104	281.10	NEW
13 mm	2.50 mm	13 mm	45 mm	22 mm	7.10 mm	84105	296.70	NEW
22 mm	3.00 mm	22 mm	38 mm	32 mm	6.40 mm	84107	374.50	NEW

For Slitting Saws, see page 430

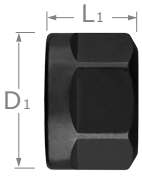
ER COLLETS



- Maximum T.I.R. of .0004”
- High polished finish helps resists oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER COLLETS	
	D_1		TOOL #	USD$
ER11	1/8	.086 - .125	82401	18.20
ER16	1/8	.086 - .125	82402	19.60
ER16	3/16	.148 - .187	82403	19.60
ER16	1/4	.211 - .250	82404	19.60
ER16	3/8	.336 - .375	82405	28.30
ER20	1/4	.211 - .250	82406	30.20
ER32	1/4	.211 - .250	82407	31.90
ER32	3/8	.336 - .375	82408	31.90
ER32	1/2	.461 - .500	82409	31.90

ER COLLETS
Nuts



- Special anti-friction coating increases clamping pressure of tool shank

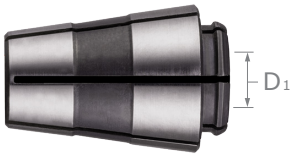
SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER NUTS	
	D_1	L_1			TOOL #	USD$
ER11	19 mm	12 mm	M14 x 0.75	17 ft. lbs	82461	33.80
ER16	27.5 mm	18 mm	M22 x 1.5	42 ft. lbs	82462	33.80
ER20	34 mm	19 mm	M25 x 1.5	59 ft. lbs	82463	48.10
ER32	50 mm	23 mm	M40 x 1.5	100 ft. lbs	82464	53.20

ER COLLETS
Wrenches



SIZE	LENGTH	WIDTH	THICKNESS	ER WRENCHES	
				TOOL #	USD$
ER11	4.80	1.50	0.20	82481	16.10
ER16	5.60	2.00	0.20	82482	16.10
ER20	6.30	2.40	0.20	82483	33.70
ER32	10.00	3.00	0.20	82484	40.10

ER PERFORMANCE COLLETS

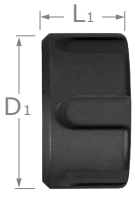


- Specialized, low profile design reduces radial distortion and improves repeatability during tool changeover
- Maximum T.I.R. of .0002”
- Works with any ER holder or spindle
- High polished finish helps resist oxidation
- Related nut and wrench sold separately

SIZE	BORE DIAMETER	CLAMP RANGE	ER PERFORMANCE COLLETS	
	D_1		TOOL #	USD$
ER11	1/8	.1050 - .1250	85501	42.40
ER16	1/8	.1050 - .1250	85502	42.40
ER16	3/16	.1470 - .1875	85503	42.40
ER16	1/4	.2100 - .2500	85504	42.40

ER PERFORMANCE COLLETS

Nuts



- Provides increased clamping pressure on tool shank which reduces vibration and increases tool life
- Allows collet to sit further into the collet pocket, creating a more concentric tool
- Special anti-friction coating increases clamping pressure of tool shank

SIZE	HEAD DIAMETER	NUT LENGTH	THREAD SIZE	MAX TORQUE	ER PERFORMANCE NUTS	
	D_1	L_1			TOOL #	USD$
ER11	18 mm	12 mm	M14 x 0.75	25 ft. lbs	85561	41.40
ER16	26 mm	14 mm	M22 x 1.5	42 ft. lbs	85562	41.40

ER PERFORMANCE COLLETS

Wrenches



SIZE	LENGTH	WIDTH	THICKNESS	ER PERFORMANCE WRENCHES	
				TOOL #	USD$
ER11	Please see page 571 for ER11 Wrench size				
ER16	6.50	2.20	0.20	85582	40.40



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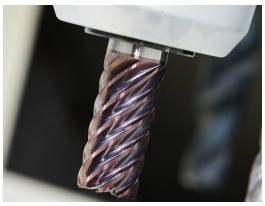
Our corporate blog, In the Loupe, is dedicated to machining how-tos, technical tips, and tool selection guides. Access helpful resources at any time and share them easily with fellow machinists at www.harveyperformance.com/in-the-loupe/.



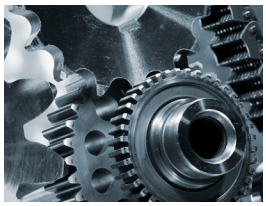
How to Avoid Common Part Finish Problems



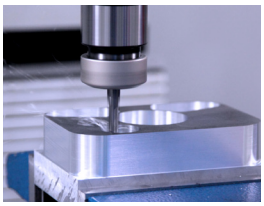
Optimize Roughing with Chipbreaker Tooling



Why Flute Count Matters



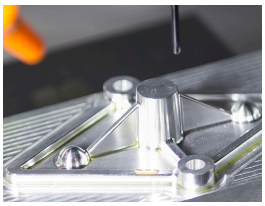
Titanium Machining Guide



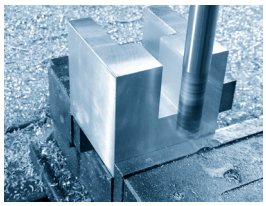
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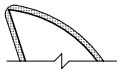
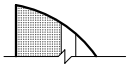
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COATINGS & SUBSTRATES CHART

Coating/ Substrate:	TiN Titanium Nitride -C1	AlTiN Aluminum Titanium Nitride -C3	AlTiN Nano Aluminum Titanium Nitride Nano -C6	Ti Nano Titanium Based -C10	Ti Hard Nano Titanium Based -C12
Application/ Benefits:	• General purpose coating for machining ferrous materials.	• High performance coating in ferrous materials. • Excellent high temperature resistance and hardness. • Maintains high surface hardness at elevated temperatures improving tool life and allowing faster feed rates. • Produces aluminum oxide layer at high temperature which reduces thermal conductivity, transferring heat into the chip. • Excellent in dry machining, machining titanium alloys, inconel, stainless alloys and cast iron. • Not recommended for use in aluminum and aluminum alloys.	• Premium coating in ferrous materials. • Latest generation AlTiN coating mixed with silicon to produce a unique nanocomposite coating. This structure improves hardness, heat resistance, and toughness over traditional AlTiN coatings. • Superior results, extended tool life and reduced cycle times over traditional AlTiN coatings in demanding applications where setup minimizes runout and vibration. • Not recommended for use in aluminum and aluminum alloys.	• Highest performing coating in ferrous materials. • Exceptionally hard nanocomposite coating, particularly suitable for hard machining, high temperature, and premium finish applications. • Enhanced wear resistance and longer tool life in rigid, vibration-free machine setups. • Optimized for a wide variety of ferrous and difficult-to-machine materials including inconel, stainless steel, and high hardness materials up to 65 Rc.	• High performing coating in hardened steels. • Improved coating adhesion produces a smooth and dense layer structure. • HiPiMS coating technology provide enhanced hardness, wear resistance, thermal stability, and low friction, resulting in longer tool life, improved machining efficiency, and superior performance on tough materials. • High hardness, temperature, and oxidation resistance. • homogenous wear behavior leads to process stability.
Materials:	**Ferrous Materials & Exotic Metals**				
	General Purpose Ferrous Materials	Alloy steels, stainless steels, tool steels, titanium, inconel, nickel and other aerospace materials	Hardened steels, hardened stainless, nickel based alloys, tool steels, titanium alloys, inconel and other aerospace materials	Inconel, superalloys, hardened steels, stainless steel, titanium, and other aerospace materials.	Hardened steel, stainless steel, titanium, cast iron
Color:	Gold	Dark Gray / Black	Blue / Black	Copper	Red Gold
Structure:	Mono-layer	Multi-layer	Nano Composite Multi-layer	Nano Composite	Nano Composite
Hardness (HV 0.05):	2447 (24 GPa)	3569 (35 GPa)	4181 (41 GPa)	4487 (44 GPa)	3477 (34.1 Gpa)
Coefficient of Friction:	.40	.70	.40	.35	.35
Coating Thickness (microns):	2 - 5	2 - 5	1 - 4	1-4	1.5 - 3
Max. Working Temp:	1000° F	1400° F	2100° F	2,192°F	2,012°F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

COATINGS & SUBSTRATES CHART

ZrN Zirconium Nitride -C7	**TiB_2** Titanium Diboride -C8	**Amorphous Diamond** Diamond-Like Coating -C4	**CVD Diamond** Crystalline CVD Diamond	**PCD Diamond** Polycrystalline Diamond
• High hardness, lubricity and abrasion resistance. • Improves performance over uncoated carbide in a wide variety of non-ferrous materials. • Less expensive alternative to diamond.	• Primary benefit over other non-ferrous coatings is extremely low affinity to aluminum. • Prevents build-up on cutting edge, chip packing and extends tool life. • Recommended in Aluminum Alloys and Magnesium Alloys. • Not ideally suited for abrasive varieties of these alloys.	• A PVD amorphous diamond coating which improves lubricity and wear resistance in non-ferrous materials. • Coating is thin relative to CVD diamond, preventing edge rounding. • Sharp edges improve results (performance and finish) over CVD in certain abrasive, non-ferrous materials (copper, brass, high silicon aluminum). • Low temperature threshold makes diamond unsuitable for ferrous applications. Thin coating maintains sharper edge. 	• True Crystalline CVD diamond is grown directly into a carbide end mill. • Dramatically improves hardness. • Hardness improves abrasion resistance and allows higher feed rates than uncoated carbide. • Ideal for machining Graphite, Composites, Green Carbide, and Green Ceramics. • Thinner CVD layer yields a sharper cutting edge compared to the standard CVD coating and leaves a smoother finish on non-ferrous materials • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thinner CVD diamond layer for a balance between wear resistance and edge sharpness.  Thicker diamond layer for increased wear resistance. Diamond layer approx 5 times thicker than Amorphous Diamond, improving wear resistance.	• PCD diamond is manufactured as a carbide backed flat wafer. The wafer is brazed to a carbide body to form an end mill. • PCD has excellent hardness and abrasion resistance, and is the thickest diamond layer we offer. • Sharply ground cutting edges and thick diamond layer combine the sharp edge benefits of Amorphous Diamond with the abrasion resistance of CVD Diamond. • Low temperature threshold makes diamond unsuitable for ferrous applications.  Thickest diamond layer ground to sharp edge.
Non-Ferrous & Non-Metallic Materials				
Abrasive non-ferrous alloys such as Brass, Bronze, Copper and Abrasive Aluminum Alloys	Aluminum Alloys, Magnesium Alloys	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc	Graphite, Composites, Green Carbide, Green Ceramics	Abrasive Plastics, Graphite, Carbon Fiber Materials, Composites, Aluminum, Copper, Brass, Bronze, Carbon, Gold, Silver, Magnesium, Zinc, Green Carbide, Green Ceramics
Light Gold / Champagne	Light Gray / Silver	Charcoal / Gray <1µm Rainbow	Gray	Gray / Black
Mono-layer	Mono-layer	Mono-layer	True Crystalline CVD Multi-Layer	Polycrystalline Diamond (Carbide Backed)
2243 (22 GPa)	2804 (27.5 GPa)	7954 - 8973 (78 - 88 GPa)	8973 - 9993 (88 - 98 GPa)	8973 - 9993 (88 - 98 GPa)
.40	.35	.10	.05 - .30	.05 - .20
2 - 5	1 - 3	.5 - 2.5	3 - 13 Thickness Identified on Product Tables	.010" - .030" Solid PCD Layer
1100° F	900° F	750° F	1100° F	1100° F

PLEASE NOTE: Information and test results were compiled from multiple sources and testing methods. Data presented is intended to be a general application guideline for comparing various coatings / substrates.

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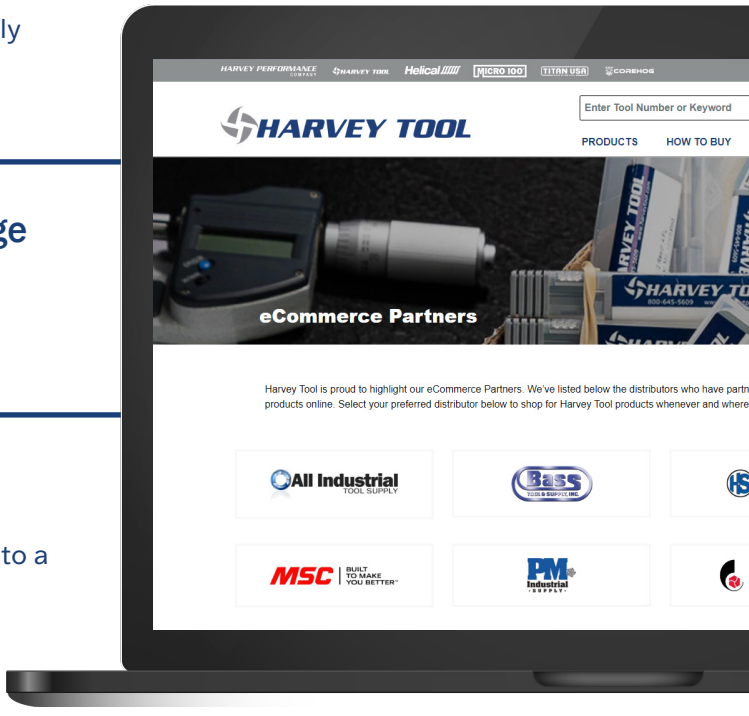
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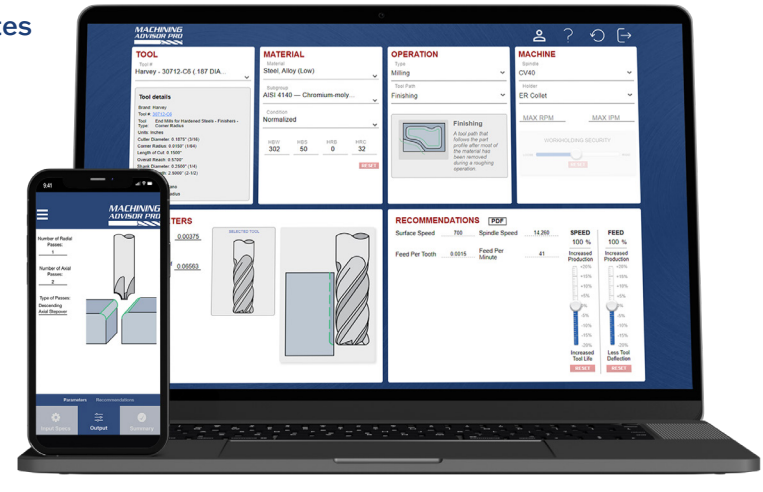
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Miniature End Mills



Square - Long Flute - Metric - pg. 27



Corner Radius - Stub, Standard - Metric - pg. 88

NEW

TOOLS FOR FALL 2025

Material Specific End Mills

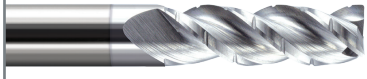
End Mills for Titanium Alloys

Ball - Variable Helix pg. 142



End Mills for Aluminum

Corner Radius - Chipbreaker Rougher pg. 220

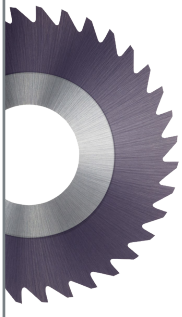


Diamond End Mills for Non Ferrous Material

Square - PCD Diamond - Full Nib pg. 265



Specialty Profiles



Slitting Saws - Metric pg. 430

Told Holders



Saw Arbors - Straight Shank - Metric - pg. 570



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Square pg. 140


Corner Radius pg. 141


NEW Ball pg. 142

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