FRESH SOLUTIONS FOR BLOW MOLDED CONTAINERS

YOUR BEST SOURCE
FOR BLOW MOLDING SOLUTIONS

As the world's leading polyethylene producer, The Dow Chemical Company (Dow) is uniquely positioned to be your supplier of choice for blow molding materials.

By collaborating with customers and other key members throughout the value chain, Dow helps drive innovation and promote sustainability with solutions that successfully address the needs of virtually every blow molding market, including:

- Water Juice Dairy (WJD)
- Household & Industrial Chemicals (HIC)
- Agricultural Chemicals (Ag Chem)
- Personal Care
- Pharmaceuticals (Pharma)
- Large Part Blow Molding (LPBM)
- Durable Goods

Our rich portfolio of sustainable solutions is backed by industry-leading technical expertise, deep understanding of the marketplace, a highly responsive supply chain, and an unmatched set of global resources. In addition to offering excellent performance and processing, Dow solutions are integral to developing containers that help reduce costs, improve retail visibility, and enhance shelf life.

The following pages provide an overview of Dow plastic resins designed for use in blow molded rigid packaging applications:

- **UNIVAL™ High Density Polyethylene (HDPE) Resins** are industry standard, "workhorse" materials for everything from food and beverages to household, industrial, and agricultural chemicals.
- **CONTINUUM™ Bimodal Polyethylene Resins** offer opportunities for increased competitive advantage with enhanced performance that creates the potential for lightweighting, incorporation of post-consumer recycle (PCR) content, and more.
- **DOW HEALTH+™ Polyethylene Resins** deliver the high levels of quality, compliance, and commitment needed to meet the stringent requirements of healthcare and pharmaceutical applications.
- **DOW™ HDPE Resins** are available in bimodal and monomodal grades that offer Dow customers in Latin America excellent top load strength, ESCR, and more for a wide range of applications.
- **DOW™ Linear Low Density Polyethylene (LLDPE) Resins** feature the unique combination of durability and pliability demanded by squeeze bottles, drum liners, and other flexible applications.
- **DOWLEX™ Polyethylene Resins** are typically used to provide added gloss while maintaining bottle performance.
- **DOW™ Low Density Polyethylene (LDPE) Resins** offer softness and flexibility for squeezable containers featuring translucency and/or high gloss.

If you don't see what you're looking for here, please contact your Dow representative, visit **www.dowrigidpackaging.com**, or call the nearest location on the back page.

TABLE 1: POLYETHYLENE (PE) RESINS FOR BLOW MOLDED RIGID PACKAGING APPLICATIONS[1]

RESIN NAME	PRODUCT DESCRIPTION; MARKET APPLICATION(S)	MELT INDEX[2] (I_2), g/10 min	MELT FLOW RATE[3] (I_{21}), g/10 min	DENSITY[4], g/cc	TENSILE STRENGTH @ YIELD[5], psi	2% SECANT FLEXURAL MODULUS[6], psi	TENSILE IMPACT STRENGTH[7], ft.-lb./in.^{2}	ESCR[8], 122°F (50°C), F50, 100% IGEPAL, hrs.	FDA COMPLIANCE – U.S. FDA 21 CFR 177.1520 (c)[9]
UNIVAL™ HDPE COPOLYMER PRODUCTS									
UNIVAL™ DMDA-6200 NT 7 HDPE Resin	Household & Industrial Chemicals (HIC), Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDB-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDD-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.25	23	0.954	3,800	150,000	100	50	3.2a
UNIVAL™ DMDG-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.40	41	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDA-6220 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDA-6320 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.46	39	0.953	3,900	150,000	80	40	3.2a
UNIVAL™ DMDA-6230 NT 7 HDPE Resin	HIC, Personal Care, Agricultural Chemicals (Ag Chem); High Environmental Stress Crack Resistance (ESCR)	0.25	25	0.949	3,400	130,000	100	180	3.2a
UNIVAL™ DMDD-6230 NT 7 HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.25	25	0.949	3,400	130,000	100	180	3.2a
UNIVAL™ DMDF-6230 NT HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.25	25	0.949	3,400	130,000	100	180	See Note[10]
XDMDB-6240 NT 7 Experimental HDPE Resin [11, 12]	HIC, Personal Care, Ag Chem; High ESCR	0.40	43	0.946	3,000	110,000	70	400	3.2a
UNIVAL™ DMDG-6240 NT 7 HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.40	43	0.946	3,400	118,000	70	400	3.2a
UNIVAL™ HDPE HOMOPOLYMER PRODUCTS									
UNIVAL™ DMDA-6400 NT 7 HDPE Resin	Water, Juice, Dairy	0.80	57	0.961	4,600	188,000	40	20	2.2
UNIVAL™ DMDH-6400 NT 7 HDPE Resin	Water, Juice, Dairy	0.80	57	0.961	4,600	188,000	40	20	2.2
CONTINUUM™ BIMODAL HDPE PRODUCTS									
XDMDA-6601 Experimental Bimodal HDPE Resin [11, 12]	Lightweighting; High ESCR; PCR Blends	0.30	27	0.954	3,200 -3,400	145,000 -155,000	170 - 230	>1,100	3.1a
CONTINUUM™ DMDD-6620 NT 7 Bimodal HDPE Resin	Lightweighting; High ESCR; PCR Blends	0.30	27	0.958	3,600	170,000	170	>1,100	3.1a
CONTINUUM™ DMDE-6620 NT 7 Bimodal HDPE Resin	Lightweighting; High ESCR, High Barrier	0.30	27	0.960	3,600	170,000	170	>1,100	3.1a
CONTINUUM™ HEALTH+™ BIMODAL HDPE PRODUCTS[13]									
CONTINUUM™ DMDD-6620 NT 7 HEALTH+™ Bimodal HDPE Resin[13]	Healthcare, Pharmaceutical; Lightweighting; High ESCR	0.30	27	0.958	3,600	170,000	170	>1,100	3.1a
CONTINUUM™ DMDE-6620 NT 7 HEALTH+™ Bimodal HDPE Resin[13]	Healthcare, Pharmaceutical; Lightweighting; High ESCR, High Barrier	0.30	27	0.960	4,060	170,000	—	>1,100	3.1a

RESIN NAME	PRODUCT DESCRIPTION; MARKET APPLICATION(S)	MELT INDEX[2] (I_2), g/10 min	MELT FLOW RATE[3] (I_{21}), g/10 min	DENSITY[4], g/cc	TENSILE STRENGTH @ YIELD[5], psi	2% SECANT FLEXURAL MODULUS[6], psi	TENSILE IMPACT STRENGTH[7], ft.-lb./in.^{2}	ESCR[8], 122°F (50°C), F50, 100% IGEPAL, hrs.	FDA COMPLIANCE – U.S. FDA 21 CFR 177.1520 (c)[9]
UNIVAL™ HDPE LARGE PART PRODUCTS									
UNIVAL™ DMDC-6143 NT 7 HDPE Resin	Large Part Blow Molding (LPBM) (5-30 gallons)	—	14	0.952	3,400	150,000	170	>1,100	3.2a
UNIVAL™ DMDC-6145 NT 7 HDPE Resin	LPBM (5-30 gallons)	—	14	0.952	3,700	145,000	170	>1,500	3.2a
UNIVAL™ DMDA-6147 NT 7 HDPE Resin	LPBM (5-30 gallons)	—	10	0.949	3,300	130,000	220	>1,500	3.2a
DOW™ HDPE PRODUCTS – LATIN AMERICA ONLY									
DOW™ HDPE 35057L Resin	Bimodal HDPE; Rigidity/ESCR Balance; Containers up to 5 L for HIC, Personal Care, Mineral Oil, Food, Medicine	0.29	27	0.956	3,630	125,000	—	>200	3.2a
DOW™ HDPE 35060L Resin	Bimodal HDPE; Excellent Top Load/ESCR; EBM & IBM Processes; Containers up to 5 L for HIC, Personal Care, Mineral Oil, Food, Medicine	0.29	27	0.961	4,060	131,000	—	>280	3.2a
DOW™ HDPE 40055L Resin	Bimodal HDPE; Excellent Top Load; Extremely High ESCR; Containers up to 30 L (e.g., Jerry Cans/Bottles for Aggressive Liquids, Containers Compliant with UN Standards, Drums for Food Products)	0.41 (I_5)	10	0.953	3,630	126,000	—	>1,000	3.2a
DOW™ HDPE LP 8000 Resin	Monomodal HDPE; Excellent Melt Strength/Processability; Drums & Other Containers up to 250 L	0.22 (I_5)	7	0.945	2,990	—	—	>1,000	3.2a
LLDPE PRODUCTS									
DOW™ DNDA-7340 NT 7 LLDPE Resin	Squeeze Bottles, Flexible Containers, Drum Liners	0.65	48	0.920	1,600	50,000	120	>1,500	3.1a
DOWLEX™ 2037 LLDPE Resin	Gloss Resin	2.5	—	0.935	—	—	—	—	3.2a
LDPE PRODUCTS									
DOW™ LDPE 132i Resin	Barefoot Resin	0.25	—	0.921	—	—	—	—	2.2
AGILITY™ 2001 LDPE Resin	Stiffness, Optics	0.40	—	0.925	—	—	—	—	2.2
DOW™ LDPE 692 HEALTH+™ Resin[13]	Healthcare, Pharmaceutical; Good Flexibility & Chemical Resistance	0.75	—	0.922	1,830 (MD) 1,660 (TD)	—	—	—	2.1

(1) Properties shown represent typical values; not to be construed as specifications. Users should confirm results by their own tests.
(2) ASTM D1238 (190°C/2.16 kg)
(3) ASTM D1238 (190°C/21.6 kg)
(4) ASTM D792
(5) ASTM D638, molded and tested in accordance with ASTM D4976
(6) ASTM D790B, molded and tested in accordance with ASTM D4976
(7) ASTM D1822, Type S, molded and tested in accordance with ASTM D4976
(8) ASTM D1693, molded and tested in accordance with ASTM D4976
(9) Consult the regulations for complete details.
(10) U.S. FDA 21 CFR 175.105; consult the regulations for complete details.
(11) Experimental product of The Dow Chemical Company
(12) If products are described as "experimental" or "developmental": 1) product specifications may not be fully determined; 2) analysis of hazards and caution in handling and use are required; 3) there is greater potential for Dow to change specifications and/or discontinue production; and 4) although Dow may from time to time provide samples of such products, Dow is not obligated to supply or otherwise commercialize such products for any use or application whatsoever.
(13) All medical application uses for DOW HEALTH+™ Polymers must be approved by Dow pursuant to its Medical Policy. Each HEALTH+™ Polymer has been certified in accordance with requirements for some healthcare applications. It is the responsibility of the medical device or pharmaceutical manufacturer to determine that the Dow product is safe, lawful, and technically suitable for the intended use.

Refer to individual technical data sheets (TDSs) for additional information regarding property performance, regulatory compliance, and handling considerations.

HDPE = High Density Polyethylene LLDPE = Linear Low Density Polyethylene LDPE = Low Density Polyethylene

For more information on these or any other resins available from Dow, please contact your sales representative, your technical service and development (TS&D) representative, or the nearest location listed on the last page. You can also visit us online at **www.dowrigidpackaging.com.**

FAST FACTS

RE: BLOW MOLDED CONTAINERS

FOCUS ON PHARMA

CONTINUUM™ DMDE-6620 HEALTH+™ Bimodal Polyethylene Resin is a "game changing" HDPE product that meets the demands of the pharmaceutical packaging industry while enabling strong, safe, and secure packaging solutions for all members of the value chain. This versatile addition to the innovative DOW™ HEALTH+™ Polymers product line can enable bottle weight reductions of up to 20 percent while maintaining barrier properties and top load for enhanced sustainability profiles. Or, if needed, it can maintain current bottle weight and offer even higher levels of performance. CONTINUUM™ DMDE-6620 HEALTH+™ Bimodal HDPE offers all the value of the DOW™ HEALTH+™ service offering, including secure product supply, drug master file (DMF) listings, USP Class VI, U.S. FDA 21 CFR 177.1520(c) 3.1a, EU, No 10/2011, and other regulatory compliance. It's your "one-stop shop" for pharmaceutical, healthcare, and nutritional bottling needs.

Dow solutions for blow molding are:

- Used in **primary packaging** for a range of foods, beverages, and chemicals
- Includes **HDPE**, **LDPE**, and **LLDPE**
- Well suited for multiple blow molding processes, including extrusion blow molding (**EBM**), injection blow molding (**IBM**), injection stretch blow molding (**ISBM**), and compression blow forming (**CBF**)

Market overview:

- **Bimodal HDPE** offers the combination of high stiffness and high ESCR – adding exceptional value with potential for downgauging/reduced material use/enhanced sustainability profiles
- **WJD** containers require high levels of stiffness, balanced toughness, and excellent taste and odor (typically >0.961 density and 0.8 melt index [MI])
- **HIC** containers demand a range of top load, ESCR, and drop impact. A few typical applications include:
  - Windshield Cleaning Agent (0.953-0.958 density and 0.2-0.4 MI)
  - Bleach/Detergent (0.949-0.953 density and 0.2-0.4 MI)
  - Detergent/Ag (0.945-0.953 density and 0.02-0.4 MI)
- **Ag Chem** applications require UN and DOT compliance
- **LPBM** containers demand higher melt strength/drop impact (0.949-0.952 density and melt flow rate [MFR] of 10 to 16 – 5-20 gallons/Ag)
- **Pharma** applications demand a secure, ongoing product supply and typically face a wide range of regulatory requirements, including but not limited to stability testing; DMF listings; USP Class VI; U.S. FDA 21 CFR 177.1520(c) 3.1a; and EU, No 10/2011.
- **Personal Care** applications typically require excellent aesthetics and a good balance of top load, ESCR, and drop impact performance. The huge number of end-use products and brands means a truly diverse range of attributes can play important roles – including chemical resistance, flexibility, soft touch/grip, clarity, gloss, printability, and more.

THE SKY'S THE LIMIT!

DOW BLOW MOLDING SOLUTIONS PROVIDE OPPORTUNITIES FOR LIGHTWEIGHTING AND REDUCED MATERIAL USAGE WHILE MAINTAINING EXCELLENT TOP LOAD STRENGTH, ESCR, AND TOUGHNESS. AS A RESULT, YOU CAN DEVELOP EXCITING NEW DESIGNS THAT DELIVER IMPROVED SUSTAINABILITY PROFILES, CONTAINER QUALITY, AND PEACE OF MIND.

FOR MORE INFORMATION, CONTACT YOUR DOW REPRESENTATIVE, VISIT WWW.DOWRIGIDPACKAGING.COM, OR CALL THE NEAREST LOCATION ON THE FOLLOWING PAGE.

North America		**Europe/Middle East**	00 800 3694 6367	**dow.com**
U.S. & Canada	1 800 441 4369		00 31 115 672626	
	1 989 832 1426	Italy	800 783 825	
Mexico	+ 1 800 441 4369	**South Africa**	00 800 99 5078	
Latin America		**Asia Pacific**	+ 800 7776 7776	
Argentina	+ 54 11 4319 0100		+ 603 7965 5392	
Brazil	+ 55 11 5188 9000		+ 86 21 3851 4988	
Colombia	+ 57 1 219 6000	China	+ 400 889 0789	
Mexico	+ 52 55 5201 4700			

Form No. 305-03023-1116X SMG
SMG 13085