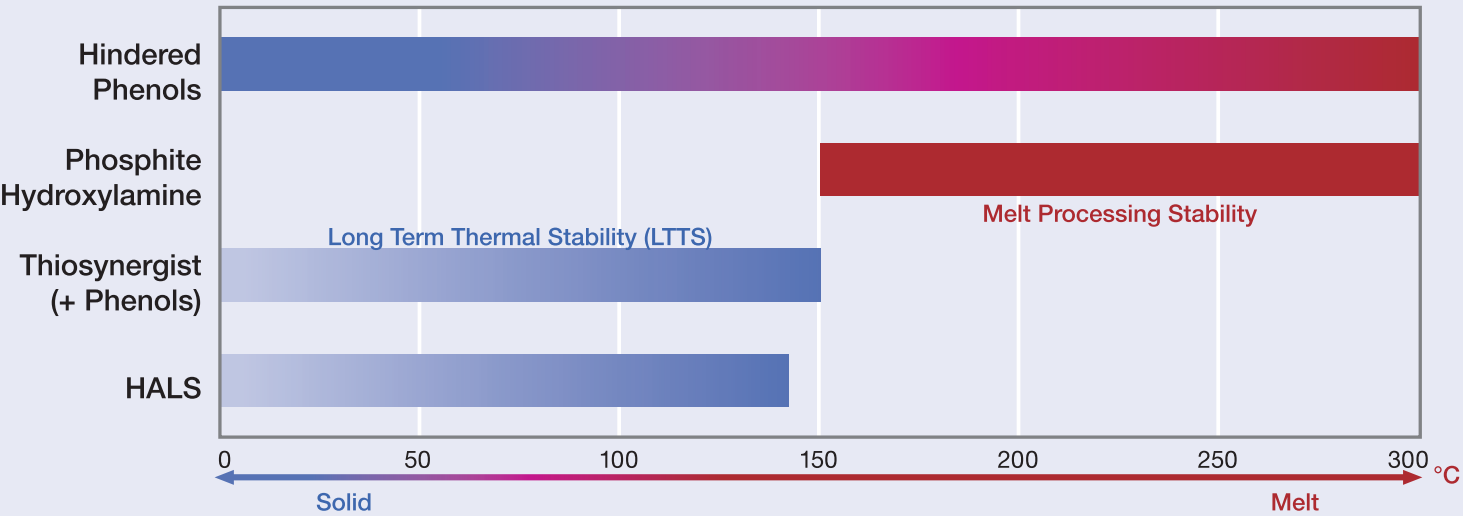


# Processing and thermal stabilization of plastics – Type of stabilization and domain of activity

Stabilizers are used at various stages in a polymer life-cycle. They are primarily used to prevent oxidation and degradation of the polymer chains. In PVC polymerisation they are used as chain stopper. Stabilizers play an imminent role in all melt processing

steps of polymer resins where temperatures well above 150°C are reached, though for limited periods of time. Ultimately, stabilizers will maintain the mechanical and aesthetic properties of plastic items and enhance their long term thermal stability.



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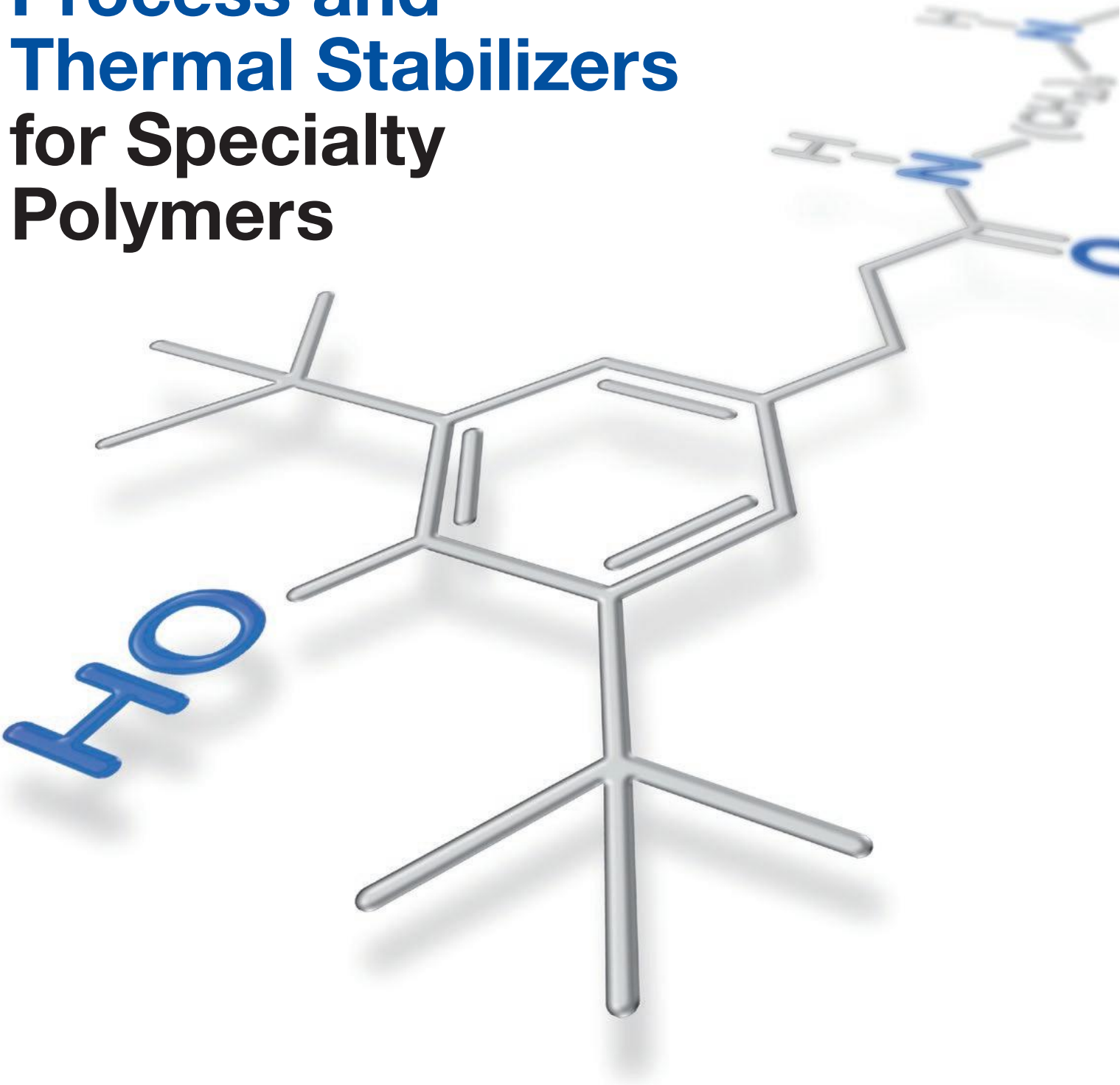
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# Process and Thermal Stabilizers for Specialty Polymers



**Note**  
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	Product form	Molecular weight (g/mol)	Melting point °C	PVC polymerization	ƒ-PVC	ƒ-PVC	POM	PA	PC	PBT	PET	PMMA	ABS	PS	UPES	PU flexible foam	PU micro-cellular foam	TPU/elastomers	TPE	Synthetic rubber	Key attributes
Processing & thermal stabilizers																					
Irgafos® 126	P	604	≤160					■		■	■		■	■				■			High performance, highly compatible phosphite; low color
Irgafos® 168	P, FF	647	183 – 186					■	■	■	■	■	■	■					■	■	Hydrolytically stable phosphite, maintains color properties
Irganox® 1010	P, FF	1178	110 – 125		■	■	■	■		■	■						■	■	■	■	High molecular weight, phenolic antioxidant (AO); extends long-term thermal stability (LTTS)
Irganox® 1035	P, FF	643	63 – 78																	■	Phenolic AO for cross-linked or carbon black containing systems (i.e. cable compounds)
Irganox® 1076	P, FD, M	531	50 – 55	□	■	■			■			■	■	■	■	■	■	■	●	■	Highly compatible, low-color phenolic AO
Irganox® 1098	P, ED	637	156 – 161				□	■										■	■		Low color phenolic AO, excellent compatibility with PA
Irganox® 1135	L	390	< –30													●	●	●			Liquid phenolic AO, specifically for PUR
Irganox® 1330	P	775	240 – 245																■		High molecular weight extraction resistant phenolic AO
Irganox® 1425	P, FF	695	> 260								■									■	Multifunctional stabilizer, catalyst, and property modifier
Irganox® 1520	L	425	12 – 15																■	■	Synergistic, multifunctional AO for elastomers and TPE
Irganox® 245	P, FF	586.8	76 – 79	□			■	■		■		□	■	□			■	■		■	Phenolic AO, excellent performance in engineering polymers
Irganox® 245 DW	AD	NA	NA	■																■	Aqueous suspension of Irganox® 245 as AO/chain-stopper for PVC polymerization
Irganox® 259	P	630	103 – 108				■				●									■	Standard phenolic AO
Irganox® 3114	P	784	218 – 223										■								Non-discoloring phenolic AO; high extraction resistance
Irganox® 5057	L	NA	NA													●				●	Liquid aromatic amine for processing and LTTS
Irganox® 565	P, DD	589	91 – 96																■	■	Multifunctional phenolic AO for synthetic rubbers and TPE
Irganox® B 1171	P, FF	NA	NA					■													Synergistic phenol/phosphite blend for PA
Irganox® B 215	P, FF	NA	NA																■	■	Synergistic phenol/phosphite blend, medium phosphite content for a balanced processing and LTT stability
Irganox® B 225	P, FF	NA	NA					■											■	■	Synergistic phenol/phosphite blend, low phosphite content
Irganox® B 561	P, FF	NA	NA								■	■									Synergistic phenol/phosphite blend, high phosphite content
Irganox® B 900	P, FF	NA	NA							■			■	■	■				●		Synergistic phenol/phosphite blend, high phosphite content
Irganox® MD 1024	P	553	221 – 232					○										■	●	●	High performance phenolic AO and metal deactivator (Cu passivator)
Irganox® PS 800	FL	515	39 – 41										■						■	■	Synergist extending the LTTS of phenolic AOs
Irganox® PS 802	FL	683	64 – 67					■					■						■	■	Synergist extending the LTTS of phenolic AOs
Irgastab® PUR 55	L	NA	NA													●					Liquid anti-scorch package for polyols, BHT free
Irgastab® PUR 67	L	NA	NA													●					Liquid anti-scorch package for polyols, BHT free, low amine
Irgastab® PUR 70	L	NA	NA													●	○	○			Liquid anti-scorch package, BHT free, amine free, low emission, especially for flexible foam
Irgastab® PVC 11 EM	AD	NA	NA	■																	Aqueous emulsion of Irgastab® PVC 11 as AO/chain-stopper for PVC polymerization
Irgastab® PVC 76	AD	NA	NA	■																	Aqueous emulsion of Irganox® 1076 as AO in PVC polymerization
Irgastab® IS 3066 L	AD	NA	NA	■																	Aqueous emulsion for PVC polymerization, antioxidant and chain stopper
Irgastab® IS 4188 L	AD	NA	NA										■								Aqueous emulsion of antioxidant for ABS Polymerization with excellent thermal stability
Irgastab® IS 6300 L	AD	NA	NA																	●	Aqueous emulsion of antioxidant for NBR and NR

NA: Not Applicable

## BASF product forms

- Food Contact Approval (FCA) Indicator**
- no FCA, can be used
  - no FCA, recommended
  - FCA in at least one country, can be used
  - FCA in at least one country, recommended

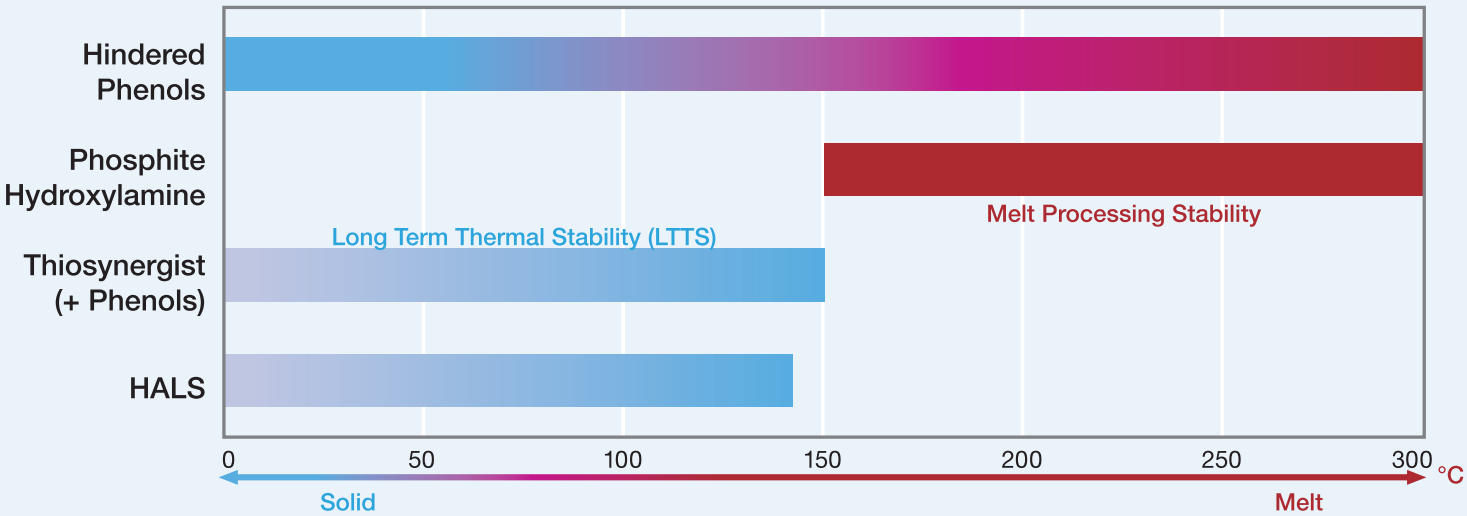


- Further Product Forms**
- AD Aqueous Dispersion (emulsion or suspension)
  - DF Dust Free, Free Flowing
  - FB Free Flowing Beads
  - G Granule
  - L Liquid
  - LD Low Dust

## Processing and thermal stabilization of plastics – Type of stabilization and domain of activity

Stabilizers are used at various stages in a polymer life-cycle. They are primarily used to prevent oxidation and degradation of polymer chains. Stabilizers play an imminent role in all melt processing steps of polymer resins where temperatures well

above 150°C are reached, though for limited periods of time. Ultimately, stabilizers will maintain the mechanical and aesthetic properties of plastic items and enhance their long term thermal stability.



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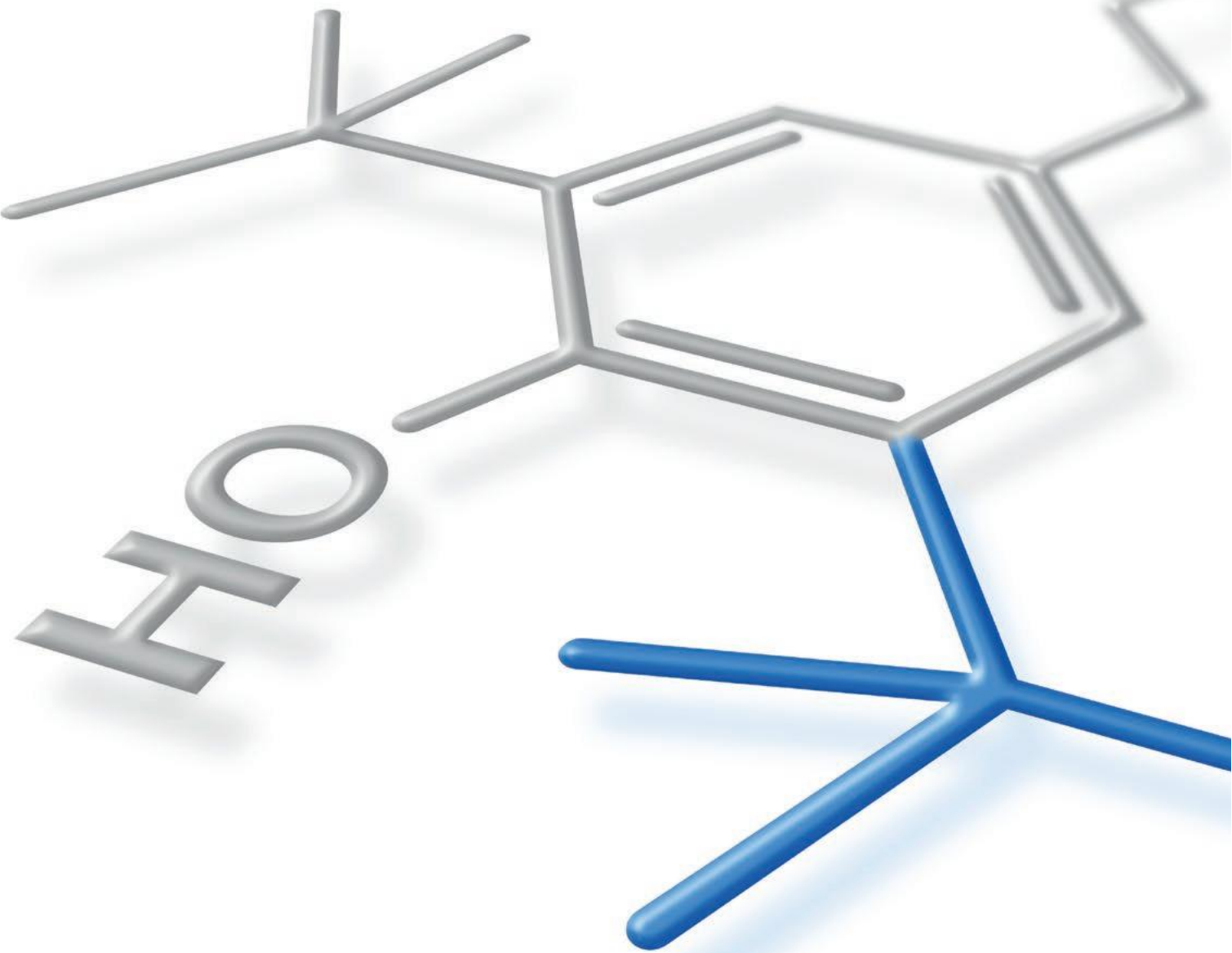
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# Process and Thermal Stabilizers for Polyolefins



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We create chemistry

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Plastic Additives

				PP molding		PP extrusion					PE molding		PE extrusion						Key attributes	
	Product form	Molecular weight (g/mol)	Melting point °C	General	Filled	Pipe/sheet/profiles	Yarn, BCF	Nonwoven	Tapes/monofilaments	Film	HD-, LLD-PE general	LLD-PE rotomolding	Pipe	PE, PE-x cable	Tapes/monofilaments	HDPE film	LD-/EVA , LLD-PE film	LD-, LLD-PE, EVA agro		
Processing & thermal stabilizers																				
Irgafos® 126	P	604	≤160	□	□	□	□	□	□	□	□		□			■	□		High performance, highly compatible phosphite; low color	
Irgafos® 168	P, FF	647	183 – 186	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	Hydrolytically stable phosphite, maintains color properties	
Irganox® 1010	P, FF	1178	110 – 125	■	■	■			■	■	■	■	■	■	■	■	□	□	High molecular weight, phenolic antioxidant (AO); extends long-term thermal stability (LTTS)	
Irganox® 1035	P, FF	643	63 – 78		□									■					Phenolic AO for cross-linked or carbon black containing systems (i.e. cable compounds)	
Irganox® 1076	P, FD, M	531	50 – 55	□	□	□					□	□	□	□	□	□	■	■	Highly compatible, low-color phenolic AO	
Irganox® 1330	P	775	240 – 245	□	□	■			■	□			□		□				High molecular weight extraction resistant phenolic AO	
Irganox® 1425 WL	P	NA	NA		□				□	□									Phenolic AO with high extraction resistance; polyethylene wax carrier	
Irganox® 3114	P	784	218 – 223	□	■	□	□	□				□	□	□					Non-discoloring phenolic AO; high extraction resistance	
Irganox® B 215	P, FF	NA	NA	■	■	■			■	■	■	■	□			■	■	□	□	Synergistic phenol/phosphite blend, medium phosphite content, for a balanced processing and LTTS
Irganox® B 225	P, FF	NA	NA	■	■	■			■	■	■	□	■			■	■	□	□	Synergistic phenol/phosphite blend with extended LTTS
Irganox® B 501 W	P, FF	NA	NA		□		□		□	□					□				Synergistic phenol/phosphite blend for PP fiber	
Irganox® B 561	P, FF	NA	NA	□	□	□			□	□	■	□	□		□	■	□	□	Synergistic phenol/phosphite blend for demanding process conditions	
Irganox® B 900	P, FF	NA	NA								□				□	□	■	■	Synergistic phenol/phosphite blend with high phosphite level	
Irganox® E 201	L	431	1 – 4	□	□					□	□	□				□	□	□	A high efficiency phenolic AO with consumer appeal and excellent MFI stability	
Irganox® MD 1024	P	553	221 – 232	□		□							■	■					High performance phenolic AO and metal deactivator (Cu inhibitor)	
Irganox® PS 800	FL	515	39 – 41								□	□	□	■					Synergist extending the LTTS of phenolic AOs	
Irganox® PS 802	FL	683	64 – 67	■	■	■					□	□	□	□					Synergist extending the LTTS of phenolic AOs	
Irganox® XT 500	P	NA	NA	□	□	□			□	■	□	□							Stabilization system for BOPP films	
Irgastab® FS 210	FF	NA	NA	□			□	■			□								Phenol-free and basic light stability; low color; gas fade resistant	
Irgastab® FS 301	FF	NA	NA	□	■	□	■	■	□		□	□		□	□	□	□	□	□	Phenol-free and basic light stability; low color; gas fade resistant
Irgastab® FS 410	FF	NA	NA	□		□	■	■			□									Phenol-free basic and basic light stability; low color; gas fade resistant
Irgastab® FS 533	FF	NA	NA	□			■	■												Phenol-free basic and basic light stability; gas fade resistant
Irgastab® FS 811	FF	NA	NA	■	■															Phenol-free basic and basic light stability
Irgastab® RM 68	FF	NA	NA									■								Stabilization system for rotomolded applications with improved processing window
Hycite® 713	P	NA	NA	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	Acid scavenger
Irgastab® Cable KV 10	L	425	14											□						High performance, multifunctional antioxidant and heat stabilizer for wire and cable applications
Irgastab® IS 2100	G	NA	NA														■			Stabilization for high clarity and high throughput LLDPE Film

Hycite®: Registered trademark of Clariant International Ltd.  
NA: Not Applicable

## BASF product forms

### Food Contact Approval (FCA) Indicator

- no FCA, can be used
- no FCA, recommended
- FCA in at least one country, can be used
- FCA in at least one country, recommended



FD/FD Free Flowing Dust Free



FF Free Flowing



P Powder



FL Flakes

### Further Product Forms

- AD Aqueous Dispersion
- AR Attrition Resistant
- DF Dust Free, Free Flowing
- FB Free Flowing Beads
- G Granule
- L Liquid
- LD Low Dust