CLARIANT

Polymer Additives for the Plastics Industry

OVERVIEW

what is precious to you?

As one of the world's leading specialty chemical companies, Clariant contributes to value creation with innovative and sustainable solutions for customers from many industries. With an active listening to our customers and monitoring of market dynamics, we design a portfolio of solutions to meet very specific needs, which result into a differentiating advantage. At the same time we drive our research and development activities to addressing the key trends of our time.

The Business Unit Additives has developed a wide range of products for plastics such as antioxidants, light stabilizers, antistatic agents and flame retardants. Besides, several specialties are available for special polymers.

Polymer Additives
PRODUCT INFORMATION

ANTIOXIDANTS
protect polymers from oxidative damage. They prevent discoloration, degradation by chain scission and/or cross linking of polymers during processing and ensure long term properties of the finished articles.

Phenolic antioxidants
Hostanox® O 3 and O 310 are phenolic stabilizers (also called primary antioxidants), acting as radical scavengers. During processing they maintain a consistent melt viscosity and prolong the lifetime of finished articles.

Hostanox O 3 shows a high resistance to extraction particularly when the plastic article is exposed to liquid media such as water or detergent, and therefore is a preferred stabilizer for demanding applications.

Hostanox O 310 combines the good stabilizing effect of a multi-nuclear, standard phenolic antioxidant with the extraordinary high extraction resistance of Hostanox O 3 in a synergistic way.

DIPHOSPHONITE HOSTANOX® P-EPQ®
is a highly effective processing stabilizer (also called secondary antioxidant) of the phosphonite type. It stabilizes the polymer melt against thermooxidative degradation ensuring excellent color stability as well as constant melt viscosity.

Thio co-stabilizers
Hostanox SE 4 and SE 10 are secondary antioxidants containing sulfur. They form synergistic mixtures with phenolic antioxidants maintaining the physical properties of the polymers during end product service life.

Metal deactivator
Hostanox OSP 1 belongs to metal deactivator group of additives. It is mainly used in polyolefins applications exposed to contact with copper or other metals such as wire & cable applications, polyolefin articles containing mineral fillers, etc. For high demanding conditions (high extraction resistance), Hostanox OSP 1 is well suitable. In addition Hostanox OSP 1 contributes highly to OIT.

POLYMER STABILIZER SELECTION GUIDE Standard plastics

	LDPE	HDPE	LLDPE	PP	PS	PS-HI	PVC	EVA
Phenolic antioxidants								
Hostanox O 3	■	■	■	■	■			■
Hostanox O 310	■	■	■	■	■	■	■	■
Processing stabilizers								
Hostanox P-EPQ	■	■	■	■	■	■		■
Metal deactivator								
Hostanox OSP 1	■	■	■	■				
Thio co-stabilizers								
Hostanox SE 4	■	■	■	■				
Hostanox SE 10	■	■	■	■				

POLYMER STABILIZER SELECTION GUIDE Engineering plastics

	ABS/SAN	PET	PBT	PMMA	PA	PC	POM	TPU
Phenolic antioxidants								
Hostanox O 3	■		■	■	■			
Hostanox O 310	■	■	■		■	■	■	
Processing stabilizers								
Hostanox P-EPQ	■	■	■		■	■	■	
Metal deactivator								
Hostanox OSP 1					■			
Thio co-stabilizers								
Hostanox SE 4	■							
Hostanox SE 10	■							

■ Recommended
■ Applicable
Detailed information on indirect food contact use is available upon request

Polymer Additives
PRODUCT INFORMATION

LIGHT STABILIZERS
protect polymers against the harmful UV light induced degradation. The use of Hostavin® or Nylostab® products prevent deterioration of mechanical and aesthetic properties of polymers articles and significantly extend their service life.

UV absorbers
Hostavin PR 25, ARO 8, VSU, 3310, 3326 and B-CAP® are strongly absorbing in the UV part of the solar spectrum. The special advantage of Hostavin PR 25, B-CAP and VSU is their absence of interaction with traces of metal ions. Such catalytically active impurities may present in the polymer matrice e. g. from polymerization catalyst residues, contact surfaces of the processing equipment, metal impurities in fillers, etc.

Hindered Amine Light Stabilizers (HALS)
Hostavin 3051 and 3050 are low molecular weight HALS. They are preferably used for thick walled articles but also in films. The main advantage of Hostavin 3051 in comparison to other low molecular weight HALS is its low volatility. Due to its good solubility and compatibility, Hostavin 3050 can be used in applications where other low molecular weight HALS have to be excluded because of their pronounced migration tendency. The low melting point of Hostavin 3050 makes it also highly suitable for liquid material or for applications where the light stabilizer has to be pre-dissolved in monomeric reaction components.

Hostavin PR 31 is a monomeric, methylated HALS. It is a sopisticated combination of radical scavenging and UV absorption. Hostavin PR 31 can undergo a photochemical reaction where it gets grafted to the polymer. Thereby it is highly persistant and non-extractable.

Hostavin N 30 is an oligomeric HALS. It has an excellent resistance to extraction and very low volatility. Hostavin N 30 is distinguished from other high molecular weight HALS mainly by its low basicity and high resistance to chemicals. Last but not least Hostavin N 30 provides an outstanding color stability. In contrast to triazine containing HALS it has no tendency towards yellowing.

Hostavin N 321 is a solid solution of HMW and LMW HALS. The patented technology of solid solutions ensures significant improvements of the molecular dispersion of the stabilizer in the resin. Hostavin N 321 protects efficiently and permanently the polymer bulk as well as the surface against light induced degradation.

Hostavin NOW XP 1 is a high molecular weight HALS of the aminoether class. This group of high end stabilizers shows extraordinary performance in contact with aggressive media, e. g. greenhouse covers. Before and after its activation it has nearly full compatibility in polyolefins without signs of plate out.

Hostavin N 845 PP is a LMW HALS Solution developed to provide outstanding protection to PP compounds.

1 = XP (experimental product) indicates a status where certain characteristics, e. g. appearance, physical form, remain a subject to possible changes.

POLYMER STABILIZER-SELECTION GUIDE Standard plastics

	LDPE	HDPE	LLDPE	PP	PS	PS-HI	PVC	EVA
UV absorbers								
Hostavin 3310	■	■	■	■	■	■	■	■
Hostavin 3326	■	■	■	■	■	■	■	■
Hostavin ARO 8	■	■	■	■	■	■	■	■
Hostavin B-CAP	■	■	■	■	■	■	■	■
Hostavin PR 25							■	
Hostavin VSU				■			■	
Light stabilizers (HALS)								
Hostavin 3051		■		■	■	■		■
Hostavin 3050		■		■	■			
Hostavin N 30	■	■	■	■				■
Hostavin N 321	■	■	■	■			■	
Hostavin N 845 PP		■		■	■	■		
Hostavin PR 31		■		■	■	■		
Multifunctional stabilizer								
Nylostab S-EED								■
Hostavin NOW XP	■	■	■	■	■	■	■	■
Hostavin NOW 4 XP			■					■
Hostavin NOW 5 XP			■					■

■ Recommended
■ Applicable
Detailed information on indirect food contact use is available upon request

POLYMER STABILIZER-SELECTION GUIDE Engineering plastics

	ABS/SAN	PET	PBT	PMMA	PA	PC	POM	TPU
UV absorbers								
Hostavin 3310	■	■	■				■	■
Hostavin 3326	■	■	■				■	■
Hostavin ARO 8	■	■	■				■	■
Hostavin B-CAP	■	■	■	■		■	■	■
Hostavin PR 25	■	■	■	■	■	■	■	■
Hostavin VSU		■	■	■	■	■		■
Light stabilizers (HALS)								
Hostavin 3051	■				■		■	
Hostavin 3050				■				■
Hostavin N 30					■		■	■
Hostavin N 321			■		■		■	
Hostavin N 845 PP	■		■					
Hostavin NOW XP						■		
Hostavin PR 31	■							
Multifunctional stabilizer								
Nylostab S-EED		■			■			
Hostavin NOW XP	■				■			
Hostavin NOW 4 XP					■			
Hostavin NOW 5 XP								

Polymer Additives
PRODUCT INFORMATION

MULTIFUNCTIONAL STABILIZER

Nylostab® S-EED® is an unique multifunctional additive specially tailored for polyamides. Nylostab S-EED improves processability of fiber spinning, molding and fiber manufacturing. It also enhance thermal and light stability as well as dyeability.

ANTISTATIC AGENTS

The main reason for using antistatic agents is to improve aesthetic appearance as well as practical and safe handling of plastic articles. Their way of performance is based on a migration to the article surface and to build up a micro layer of humidity which enables electric charges to dissipate. Hence antistatic agents are used to solve the problems of static electricity avoiding troubles such as electric shock, dust attraction and sticking of films.

Hostastat® FA 14, FA 24, FA 38 and FA 68are ethoxylated alkylamines mainly used in polyolefins.

Due to its very low inherent odor and bright white color along with long lasting antistatic performance Hostastat FA 68 is especially recommended in BOPP applications. With easy incorporation and a high processing stability in polyolefins Hostastat FA 68 is an excellent antistatic agent for high filled masterbatches. Furthermore, Hostastat FA 68 is used to achieve hydrophilic surfaces in PP.

Hostastat FE 1, FE 2 and FE 20 are fatty acid esters. Hostastat FE 2 is often combined with Hostastat FA 14 or FA 24 in order to achieve immediate plus long term effect. Hostastat FE 20 is mainly used in PVC as it does not haze transparent articles.

Hostastat HS 1 is the ideal antistatic agent for polystyrene and styrenic copolymers. It is also very effective in opaque/ translucent PVC applications. Hostastat HS 1 has an excellent water solubility. It often is externally applied as an aqueous solution, e. g. spraying.

POLYMER STABILIZER-SELECTION GUIDE Standard plastics

	LDPE	HDPE	LLDPE	PP	PS	PS-HI	PVC	EVA
Antistatic agents								
Hostastat FA 14 / FA 24	■	■	■	■	■	■		■
Hostastat FA 38	■	■		■				
Hostastat FA 68	■	■	■	■				
Hostastat FE 1	■	■		■				
Hostastat FE 2	■	■		■				
Hostastat FE 20					■	■	■	
Hostastat HS 1	■	■	■		■	■	■	■
Hostanox QB Blends								
Hostanox QB 1202	■	■	■	■	■	■		■

■ Recommended
■ Applicable
Detailed information on indirect food contact use is available upon request

POLYMER STABILIZER-SELECTION GUIDE Engineering plastics

	ABS/SAN	PET	PBT	PMMA	PA	PC	POM	TPU
Antistatic agents								
Hostastat FA 14 / FA 24	■							
Hostastat FA 38	■							
Hostastat FA 68	■							
Hostastat FE 1								
Hostastat FE 2								
Hostastat FE 20								
Hostastat HS 1	■	■	■		■		■	■
Hostanox QB Blends								
Hostanox QB 1202	■	■	■				■	■

Polymer Additives
ANTIOXIDANTS

ANTIOXIDANTS	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
Phenolics Antioxidants						
Hostanox O 3	Phenolic	794	167 – 171	355	Powder, pills	25 kg Cardboard Box
Hostanox O 310	Phenolic	N/A	85 – 92	N/A	Micro pills	25 kg Cardboard Box
Processing stabilizer						
Hostanox P-EPQ	Phosphonite	1035	85 – 95 Softening point	319	Powder, FF, pills	20 kg Alu Bag
Metal deactivator						
Hostanox OSP 1	Thio based phenylphosphite	1067 ain component	106 – 124	309	Micro pills	25 kg Cardboard Box
Thio Co-stabilizers						
Hostanox SE 4	Thio-ester	683	63 – 67	330	Flakes	25 kg PE-Bag
Hostanox SE 10	Thio-ester	571	57 – 60	289	Powder, granules	25 kg Cardboard Box

Polymer Additives

MULTIFUNTIONAL STABILIZER, LIGHT STABILIZERS AND SPECIALTY LIGHT STABILIZERS SOLUTIONS

MULTIFUNCTIONAL STABILIZER

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
Nylostab S-EED	Hindered Amine	443	270 – 274	349	Powder	15 kg PE-Bag
Hostavin QB 1202	Antioxidant solution	N/A	N/A	N/A	FF	20 kg Alu Bag

LIGHT STABILIZERS

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
UV absorbers						
Hostavin 3326	Benzotriazole	316	138 – 141	247	Powder	20 kg Cardboard Box
Hostavin ARO 8	Benzophenone	326	min. 48	269	Powder	25 kg Cardboard Box
Hostavin B-CAP	Malonate	418.5	137 – 139	286	Powder	25 kg Fiber Drum
Hostavin PR 25	Benzylidene malonate	250	55 – 58	208	Granules, powder	25 kg Fiber Drum
Hostavin VSU	Oxalanilide	312	126 – 128	265	Powder	50 kg Fiber Drum

SPECIALTY LIGHT STABILIZERS SOLUTIONS

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
Hostavin NOW XP	Aminoether HALS	N/A	N/A	N/A	Pills	20 kg Cardboard Box
Hostavin NOW 4 XP	Aminoether HALS based solutions	N/A	N/A	N/A	Pills	20 kg Cardboard Box
Hostavin NOW 5 XP	Aminoether HALS based solutions	N/A	N/A	N/A	Pills	25 kg Cardboard Box

Polymer Additives
LIGHT STABILIZERS AND ANTISTATIC AGENTS

HINDERED AMINE LIGHT STABILIZERS (HALS)

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
Hostavin 3051	LMW HALS	364	230	272	Powder	25 kg Cardboard Box
Hostavin 3050	LMW HALS	604 (lauryl-) 632 (myristyl-)	≈16 solidification point	305	Liquid	50 kg Steel Drum
Hostavin N 30	Oligomeric HALS	>1500	≥148	352	Powder, pills, micro pills	25 kg PE-Bag
Hostavin N 321	HALS Solution	N/A	58 – 70	325	Pills	25 kg PE-Bag
Hostavin N 845 PP	LMW HALS Solution	N/A	> 120		Pills, micro pills	20 kg Cardboard Box, 45 kg Cardboard Box
Hostavin PR 31	Photo-graftable HALS	529	120 – 125	294	Powder	25 kg Fiber Drum

ANTISTATIC AGENTS

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	MELTING RANGE [°C]	TGA [°C, 10 % mass loss]	SUPPLY FORM	PACKAGING FORM
Hostastat FA 14	Etholyxated alkylamine	273 – 357	< 5 solidification point	221	Liquid	180 kg Steel Drum
Hostastat FA 24	Etholyxated alkylamine	273 – 357	<10 solidification point	240	Liquid	180 kg Steel Drum
Hostastat FA 38	Solution of Ethoxylated Amine and Acid Scavenger	301 – 357❖	97 drop point	270	Micro pills	25 kg Cardboard Box
Hostastat FA 68	Ethoxylated Amine	301 – 357	45	>260	Solid	175 kg Steel Drum
Hostastat FE 1	GMS (90 %)	359	>65	259	Pills	25 kg PE-Bag
Hostastat FE 2	GMS (55 %)	359	60 drop point	259	Powder	25 kg PE-Bag
Hostastat FE 20	Fatty acid ester		<19 solidification point	233	Viscous liquid	180 kg Steel Drum
Hostastat HS 1	Alkyl-sulfonate	300 – 342	≈220	412	FF, pills, pills Zn	25 kg PE-Bag

❖ of the active ingredient

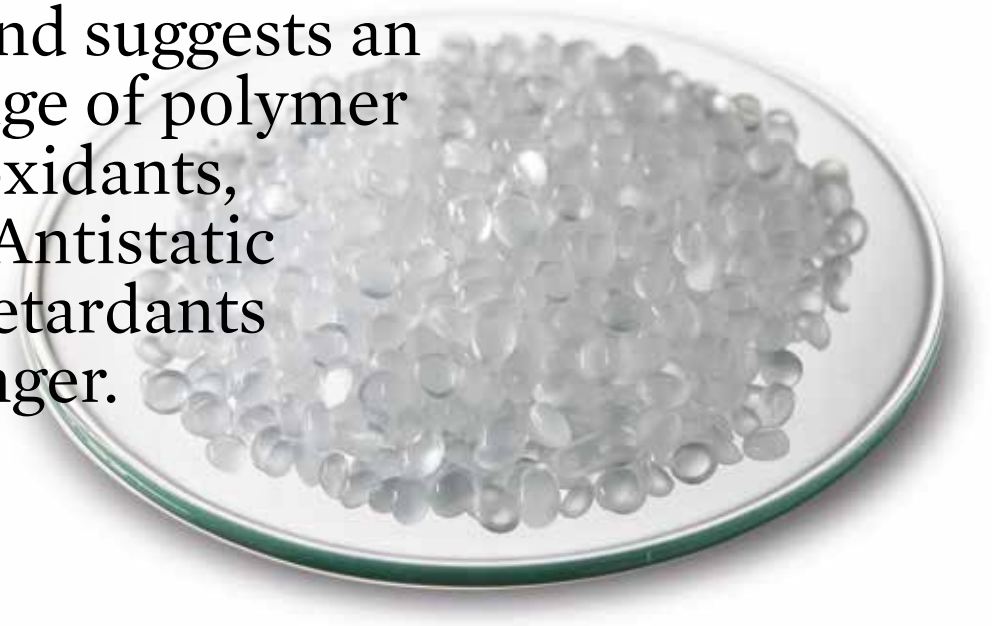
ACID SCAVENGER

	CHEMICAL CLASS	MOLECULAR WEIGHT [g/mol]	PARTICLE SIZE	HARDNESS (MOHS)	SUPPLY FORM	PACKAGING FORM
Hycite 713	Hydrotalcite	415	≥ 1 µm: min. 85 % ≥ 5 µm: 100 %	2	Powder	20 kg Cardboard Box

Development
AND CUSTOMER SUPPORT

The plastics industry continuously develops highly sophisticated materials. Additives contribute decisively to maintain the initial properties of plastics.

Clariant listens to its customers very carefully and suggests an appropriate range of polymer additives: Antioxidants, UV stabilizers, Antistatic agents, Flame retardants and Acid scavanger.



In order to efficiently respond to its customer's need, Clariant's Business Unit Additives operates its own Research & Development and its own Technical Service facilities.

Our R&D and Technical Service are devoted to constant improvements and optimization of our additives portfolio. The focus is set mainly on Antioxidants, Light Stabilizers, Antistatics additives.

The key objectives of our Product Development & Applications laboratories comprise the design and optimization of recipes, processing and lifetime history of additives, profound understanding of synergies between additives as well as basic questions of kinetics and thermodynamics.

In consequence our laboratories are equipped with the modern facilities for testing performance of additives and to provide innovative solutions.

Our analytic services support our activities to assist with state-of-the-art suitable and up-to-date methods. Hence, HPLC, GC, FTIR, UV, DSC, MDSC, TGA, XFS, tristimulus colorimeter, microtome cuttings, etc. are the accurate and reliable analytical techniques commonly used for the determination of our products.

Our know-how allows a high level of reactivity for challenges in application development. As a result our Technical Service is prepared to offer support and tailor made solutions that are adapted to the large number of demanding applications and increasing performance targets.

Status
UNDER THE EUROPEAN REGULATIONS ON DANGEROUS SUBSTANCES (CLP/GHS)

PRODUCTS	HAZARD WARNING LABEL	RISK PHRASES	SAFETY PHRASES
Hostanox O 3	Does not require a hazard warning label		
Hostanox O 310	Does not require a hazard warning label		
Hostanox OSP 1	Xi »irritant«	43 May cause sensitization by skin contact	24, 37
Hostanox P-EPQ	Does not require a hazard warning label		
Hostanox QB 1202	Does not require a hazard warning label		
Hostanox SE 10	Does not require a hazard warning label		
Hostanox SE 4	Does not require a hazard warning label	52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment	61
Hostastat FA 14 / FA 24	C »Corrosive« N »Dangerous for the environment«	22 Harmful if swallowed. 34 Causes burns. 50 Very toxic to aquatic organisms.	26, 28.2, 36/37/39, 45 61
Hostastat FA 38	Xi »irritant« N »Dangerous for the environment«	38 Irritating to skin. 41 Risk of serious damage to eyes. 50 Very toxic to aquatic organisms.	26, 28.2, 36/37/39, 45, 61
Hostastat FA 68	Xi »irritant« N »Dangerous for the environment«	38 Irritating to skin. 41 Risk of serious damage to eyes. 50 Very toxic to aquatic organisms	26, 28.2, 37/39, 61
Hostastat FE 1	Does not require a hazard warning label		
Hostastat FE 2	Does not require a hazard warning label		
Hostastat FE 20	Does not require a hazard warning label		
Hostastat HS 1	Xn »harmful«	22 Harmful if swallowed. 38 Irritating to skin. 41 Risk of serious damage to eyes	26, 28.1, 37/39
Hostavin 3326	Does not require a hazard warning label	53 May cause long-term adverse effects in the aquatic environment.	61
Hostavin 3310	Xn »harmful«	48/22 Harmful: danger of serious damage to health by prolonged exposure if swallowed. 53 May cause long-term adverse effects in the aquatic environment.	22, 36, 61
Hostavin ARO 8	Xi »irritant«	43 May cause sensitization by skin contact. 53 May cause long-term adverse effects in the aquatic environment.	24, 37, 61
Hostavin B-CAP	Xi »irritant«	43 May cause sensitization by skin contact.	37, 24

PRODUCTS	HAZARD WARNING LABEL	RISK PHRASES	SAFETY PHRASES
UV Absorbers			
Hostavin PR 25	Xi »irritant«	36 Irritating to eyes.	26, 25, 24
Hostavin VSU	Does not require a hazard warning label		
Hostavin 3051	Xn »harmful« N »Dangerous for the environment«	20 Harmful by inhalation. 41 Risk of serious damage to eyes. 48/22 Harmful: danger of serious damage to health by prolonged exposure if swallowed. 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	22, 26, 28.2, 46, 61
Hostavin 3050	Xi »irritant« N »Dangerous for the environment«	38 Irritating to skin 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment	1/2, 25, 28.2, 61
Hostavin N 30	Does not require a hazard warning label		
Hostavin N 321	Xi »irritant«	38 Irritating to skin 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	1/2, 25, 28.2, 61
Hostavin N 845 PP	Xi »irritant« N »Dangerous for the environment«	41 Risk of serious damage to eyes. 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	26, 37/39, 60, 61
Hostavin PR 31	N »Dangerous for the environment«	50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	22, 60, 61
Nylostab S-EED	Xi »irritant«	22 Harmful if swallowed. 36 Irritating to eyes.	26, 25, 22
Hostavin NOW	Does not require a hazard warning label		
Hostavin NOW 4 XP	Xi »irritant«	43, 53	24, 37, 61
Hostavin NOW 5 XP	Xi »irritant«	43, 53	24, 37, 61
Acid scavenger			
Hycite 713	Does not require a hazard warning label		

CLARIANT INTERNATIONAL LTD
Rothausstrasse 61
4132 Muttenz
Switzerland

BUSINESS UNIT ADDITIVES
BUSINESS LINE POLYMER ADDITIVES
Phone + 41 (0) 61 469 79 12
Fax + 41 (0) 61 469 75 50

WWW.ADDITIVES.CLARIANT.COM
WWW.CLARIANT.COM

DA 3100 E | 05.2013