Polymer Additives







Table of Contents

POLYMER ADDITIVES PRODUCT GROUPS

MCB	5
Flame retardants	б
Plasticizers	8
Thermal & processing stabilizers	10
Dispersing Agents	12
Emulsifiers	14
Anionic emulsifiers	16
Nonanionic emulsifiers	18
Antistatic agents	28
Anti-fog agents	34
Slip agents	36
Pigment dispersants	36
Lubricants	38
Corrosion inhibitors	38
Notes for guidance concerning	40
PCC Group presentation	42





Monochlorobenzene

MCB is used as a solvent for different kinds of advanced polymers, e.g., dichloro diphenyl sulphone (intermediate for engineering polymers with applications in the aviation, automobile and baby bottles industries), high-performance polymers, like PPSU -Polyphenylsulfone, PES - polyethersulfone, PSU.







PCC Rokita SA is one of two manufacturers of chlorobenzenes in Europe. The products from our manufacturing plants are of the highest global quality and meet the requirements of all possible applications.

V	QUALITY	CHARACTERISTIC	PACKAGING	MAIN APPLICATIONS
	very high	Product of chlorobenzene plant	Steel drums 220 kg, road tank cars, iso- tanks, rail tank cars	Solvent for different kinds of advanced polymers

Flame Retardants – Roflam series

Roflam series - phosphorus-based flame retardants (FR), due to a unique flame retarding profile are assessed as one of the most efficient FR groups. Phosphorus-based FR, both chlorinated and non-halogenated are considered as an ideal choice giving a perfect balance of process ability, flame retardancy and physical properties. Roflam products are recommended as fire safety solutions for building and construction applications, the furniture and textile industry as well as for various applications in the transport sector. This range of products is especially recommended for polyurethanes as well as epoxy, unsaturated polyester and vinyl resins.

Flammability aspects of polymeric materials always play an important role in many applications. Roflam products as phosphorus containing compounds cause charring on the polymer surface, prevent the oxygen feeding to the flame and retard flame propagation. Therefore, they enhance fire resistance properties. This type of flame retardants is used in many types of polyurethane foams. The Roflam series reduces flammability of conventional and high resilience flexible PU foams used in upholstered furniture as well as

Key features:

- Provides an excellent flame retardant profile
- Boosts the beneficial influence on mechanical properties
- Demonstrates suitable miscibility with liquids
- Leads viscosity reduction
- Exhibits good compatibility
- Possesses low VOCs emission
- Known as 'easy to use'

many bedding components (e.g., mattresses, pillows). It enables to pass fire tests in the furniture industry whilst retaining good mechanical properties of flexible foams. They also provide fire resistant performance in combustion modified flexible PU foams as well as fire resistant semi-rigid and rigid PU foams used in the transport sector. Moreover, its low VOC means that it fulfils automotive requirements.

Fire safety is also an important issue in the building industry. For this reason, rigid and semi-rigid PU foams, mainly used in thermal and acoustic insulations, structural panels and decorative elements need to be fire resistant. Thanks to using Roflam products good fire classification of construction materials (e.g., according to DIN 4102-1) can be achieved. The other application of Roflam series is intumescent coatings. Their excellent fire resistant properties provide impressive performance in passive fire protection systems related to protection of steel structural elements from hydrocarbon and jet fire exposure. These solutions are used in the petrochemical, power generation, oil and gas industry (e.g., offshore installations) as well as any industrial plant and architectural applications, e.g., buildings, airports, bridges etc.

Key applications:

- Buildings & Construction
- Transportation
- Marine coatings
- Offshore installations
- Adhesives
- Chemical anchors

Roflam series – typical properties

PRODUCT NAME	CHEMICAL NAME	APPEARANCE	DENSITY (at 25°C), g/mL	VISCOSITY, mPa•s	ACID VALUE, mgKOH/g	PHOSPHORUS CONTENT	CHLORINE CONTENT	KEY FEATURES
Roflam P	Tris(2-chloro-1-	homogenous,	1.28	66	max 0.10	9.5%	32.5%	highly effective, viscosity reduction
Roflam P LO	phosphate	clear liquid	1.28	66	max 0.10	9.5%	32.5%	highly effective, viscosity reduction, low VOC emission
Roflam B7	Phenol, isobutylenated,	homogenous,	1.17	78	max 0.10	8.5%	-	halogen free
Roflam B7L*	phosphate (3:1)	clear liquid	1.12	310	max 0.10	7.4%	-	halogen free, low VOC emission
Roflam F5			1.18	58	max 0.10	8.5%	-	halogen free
Roflam F6	Phenol, isopropylated,	homogenous,	1.17	69	max 0.10	8.3%	-	halogen free
Roflam F9	phosphate (3:1)	clear liquid	1.14	103	max 0.10	7.6%	-	halogen free
Roflam F12			1.12	120	max 0.10	7.1%	-	halogen free
N,N-bis-(2-hydroxyethy aminomethane phosphonic acid diethyl ester		yellow to brown liquid	1.16	200	max 8.0	12.2%	-	halogen free, high phosphorous content, reactive

* available upon request

Roflam series – applications

PRODUCT NAME	FLEXIBLE & SEMI-RIGID PU FOAMS	RIGID & ONE COMPONENT PU FOAMS	C.A.S.E	EPOXY / UNSATURATED POLYESTER / VINYL ESTER RESINS
Roflam P		•	•	•
Roflam P LO	•			
Roflam 6		•	•	•
Roflam B7	•	•	•	•
Roflam B7L	•			
Roflam F5		•	•	•
Roflam F6		•	•	
Roflam F9	•		•	
Roflam F12	•		•	



Plasticizers – Roflex series

The Roflex series are specialty polymer additives based on phosphate esters. This product range exhibits an outstanding flame retarding profile with an excellent plasticizing performance especially in the PVC industry. The Roflex series is preferable for flexible and transparent application where substitute inorganic powder flame retardants. Due to great compatibility with non-flame retarding plasticizers they can be used simultaneously leading to a better economics. Moreover, the Roflex series provides low migration from plastics in comparison with traditional phthalate plasticizers.

During plastics processing Roflex non-phthalate plasticizers effectively penetrate into polymeri

Key features:

- Present excellent plasticizing performance
- Demonstrate outstanding flame retarding profile
- Sustain low migration level
- Exhibit good compatibility with non FR plasticizers

matrix cause chains movement resulting in material flexibility. Simultaneously they provide excellent flame retardancy. Therefore Roflex series are irreplaceable wherever flame retarding profile and excellent plasticizing performance are desirable.

Roflex plasticizers are dedicated mostly to the PVC flexible industry. They are widely used in extrusion processes (wires & cables insulation), calendering (foils, coverings) and casting (coated textiles, artificial leathers, film screens). Additionally they could be used in rubber industry, providing effectiveness in the plasticizing effect and flame retardancy in elastomers.

Key applications:

- Conveyor belts
- Film screens
- Tarpaulins
- Flexible ducting
- Coated textiles
- Transparent foils
- Floorings
- Artificial leathers
- Wires and cables



Roflex series – typical properties

PRODUCT NAME	CHEMICAL NAME	APPEARANCE	DENSITY (at 25°C), g/mL	VISCOSITY, mPa•s	FLASH POINT, °C	SOLVENTS
Roflex 50			1.17	53	235	
Roflex 65	phenol, isopropylated,		1.16	69	238	
Roflex 95	phosphate (3:1)	homogenous, clear liquid	1.13	97	243	Methanol, ethanol, acetone
Roflex NHP			1.08	120	245	
Roflex T70	phenol, isobutylenated, phosphate (3:1)		1.18	72	240	



Thermal & processing stabilizers - Rostabil series

The Rostabil series comprises secondary antioxidants based on organophosphites. Mainly, they are employed as effective thermal and processing stabilizers. Thanks to good inhibitation of polymer degradation they ensure colour control during processing and curing cycles. The degradation process is usually caused by heat, humidity or UV radiation. From a chemical point of view degradation (ageing process) is due to cracking of chemical bonds between carbon atoms in the polymeric matrix. This leads to deterioration of mechanical and visual

Key features:

- Sustain excellent protection against degradation
- Provide brighter, more consistent colours
- Improve clarity in unpigmented compounds
- Reduce discoloration of polymers containing pigments
- Ensure high performance at low loading levels for more cost effective formulations

properties resulting in yellowing or bleeding on the surface of plastic end products. Specially designed stabilizers protect polymers against degradation maintaining excellent physical properties during processing and the life cycle.

Products exhibit a synergistic effect with hindered phenol and amine stabilizers (primary antioxidants) during processing thermosets and rubbers. They are recommended to be used with metal soaps heat stabilizers to eliminate bleeding and yellowing effect in the PVC industry.

Key applications:

- Ducting pipes
- Window frames
- Technical foils
- Wires and cables
- Roof membranes
- Household appliances
- Rubber belts
- Mattresses foams
- Car tires

Rostabil series – typical properties

CHEMICAL NAME	APPEARANCE	DENSITY (at 25°C), g/mL	HAZEN COLOUR	REFRACTIVE INDEX, n ²⁰ D	ACID VALUE, mgKOH/g
ris (nonylphenyl) phosphite	slightly coloured, homogenous liquid	0.97	max 150	1.53	max 0.3
sodecyl diphenyl phosphite		1.04	max 100	1.52	max 0.1
liisodecyl phenyl phosphite		0.95	max 100	1.48	max 0.1
tris (isodecyl) phosphite	clear liquid	0.88	max 50	1.45	max 0.1
tris (isotridecyl) phosphite		0.88	max 100	1.46	max 0.2
triphenyl phosphite		1.18	max 50	1.59	max 0.5
	CHEMICAL NAME ris (nonylphenyl) phosphite sodecyl diphenyl phosphite liisodecyl phenyl phosphite tris (isodecyl) phosphite tris (isotridecyl) phosphite triphenyl phosphite	CHEMICAL NAME APPEARANCE ris (nonylphenyl) phosphite slightly coloured, homogenous liquid sodecyl diphenyl phosphite	CHEMICAL NAMEAPPEARANCEDENSITY (at 25°C), g/mLris (nonylphenyl) phosphiteslightly coloured, homogenous liquid0.97sodecyl diphenyl phosphite1.041.04liisodecyl phenyl phosphite0.950.95tris (isotridecyl) phosphite0.880.88tris (isotridecyl) phosphite0.881.18	CHEMICAL NAMEAPPEARANCEDENSITY (at 25°C), g/mLHAZEN COLOURris (nonylphenyl) phosphiteslightly coloured, homogenous liquid0.97max 150sodecyl diphenyl phosphite1.04max 100tiisodecyl phenyl phosphite0.95max 100tris (isodecyl) phosphiteclear liquid0.88max 50tris (isotridecyl) phosphite0.88max 100tris (isotridecyl) phosphite1.18max 50	CHEMICAL NAMEAPPEARANCEDENSITY (at 25°C), g/mLHAZEN COLOURREFRACTIVE INDEX, n*Dris (nonylphenyl) phosphiteslighty coloured, homogenous liquid0.97max 1501.53sodecyl diphenyl phosphite1.04max 1001.52liisodecyl phenyl phosphite0.95max 1001.48tris (isodecyl) phosphiteclear liquid0.88max 501.45tris (isotridecyl) phosphite0.88max 1001.46triphenyl phosphite1.18max 501.59

* available upon request

Rostabil series – applications

PRODUCT NAME	PU FOAMS	EPOXY / UNSATURATED POLYESTER / VINYL ESTER RESINS	RUBBERS	RIGID & FLEXIBLE PVC
Rostabil TNF	•	•	•	•
Rostabil DPDP	•	•	•	•
Rostabil DDPP	•	•	•	•
Rostabil TDP				•
Rostabil TTDP				•
Rostabil TPP		•	•	



Dispersing agents – Rodys series

Two thirds of rubber produced annually is synthetic, produced from various petroleumbased monomers. The most common synthetic rubbers are styrene-butadiene rubbers (SBR) derived mainly from emulsion copolymerisation of styrene and 1,3-butadiene. As a result of the process the latex particles, made of mainly individual polymer chains, are formed and are stopped from coagulating with each other because they are surrounded by particles of a dispersant. The best choice for a dispersing agent is a polynaphthalenesulfonate sodium salt, built of inorganic hydrophilic groups (sulphate groups) and a hydrophobic

Key features:

- Inhibit particles agglomeration
- Provide excellent water based dispersion
- Possess low level both free formaldehyde and free naphthalene

organic chain. The charge on this molecule repels particles of latex electrostatically and allows to carry the process safe and efficiently.

PCC Rokita is a producer of polynaphthalenesulfonate salts widely used in synthetic rubber production sold under the brand name Rodys series. We offer them both as liquids and as powders. Thanks to the careful and well-established process of their synthesis our products are characterized by a very low level of free naphthalene and free formaldehyde and of metal ions (calcium and iron).

Key applications:

- Tire production
- Footwear production
- Hoses
- Flooring
- Cable insulations
- Consumer goods
- Industrial rubbers (e.g., conveyor belts)





Rodys series – typical properties

PRODUCT NAME	APPEARANCE	DENSITY AT 25°C, g/mL	рН	DRY MATTER, % (w/w)	SULPHATES, % (w/w)	WATER CONTENT, % (w/w)
Rodys R	dark brown liquid	1.20 - 1.21	6.5 - 8.5	min 37	max 4	-
Rodys K	brown liquid, small amounts of precipitate is acceptable	1.15 - 1.17	7.0 - 9.0	min 30	max 5	-
Rodys RP	powder with a colour of light brown	-	6.5 - 8.5	min 92	max 15	max 8
Rodys KP	powder with a colour of light brown	-	7.0 - 9.0	min 92	max 15	max 8

* available upon request



Emulsion polymerization is a process that is used to manufacture polymer dispersions, also called latexes, for a wide variety of formulations including water-based paints, coatings for wood, nonwoven, adhesives, sealants, rubbers. All of these applications are often called CASE (coatings, adhesives, sealants, elastomers).

The big adventage of water-based products oversolvent-borne is to reducing environmental impact due to much lower level of VOC (volatile compounds) in formulations. Another significant advantage is that it is easy to use and often there is no need for labeling as a hazardous product.

There are numerous process variations in emulsion polymerization. The batch process is just the start of the polymerization, with all portions of reagents present in the reactor. Continous process – parts of reagents are added to the reactor and the remainder are fed under controlled rates. Emulsion polymerization via preemulsion – a monomer mixture, water and surfactants are mixed together to form an emulsion which is fed during the emulsion polymerization course. Seeded emulsion polymerization - a small amount of fine particle-sized latex is added to the reactor followed by feeding monomers, surfactants and initiantors; the polymerization process starts in swelled latex particles. Seed latex can also be prepare in situ as a first step of emulsion polymerization.



The role of surfactants in emulsion polymerization

Anionic and nonionic surfactants are common used in emulsion polymerization as emulsifiers and latex stabilizers. The concentration of surfactants are in the range from a few tenth to 5%. Anionic surfactant can be used as a sole emulsifier or often in combination with nonionics. Nonionic surfactants are rarely used alone mainly due to the tendency to rising particles size of polymer dispersion. Even if nonionic surfactant consist primary emulsifier the small amount of anionic is common used to ensure lower particle size. The combination of nonionic and anionic emulsifier is very important to provide good performance of the polymer dispersion. Anionic surfactants is used to control particle size and ensure good polymerization rate and electroststic stability, nonionics impart mechanical, electrolitycal stability and freeze-thaw resistance.

Surfactants plays a many roles in emulsion polymerization process and are essential for latex manufacturing. Surfactants reduce the interfacial tension between insoluble

The different in latex stabilization nature by anionic and nonionic surfactants.

Anionic surfactants are adsorbed on polymer particles and surround them by electric charges. The electric layer form a energy barrier for other particles preventing their agglomeration. Anionic surfactants have the ability to stabilized small particles of dispersion by electrostatic repulsion thus they often used during nucleation process. The most weakness of anionic surfactants are very sensitivity to presence of

and freezing.



monomers and water and form small monomer droplets in aqueous matrix. Surfactants have the tendency to form a micelles which are play essential function during nucleation step of emulsion polymerization.

They help to solubilize monomers and provide the right sites where the polymerization occurs. With the progress of emulsion polymerization dimensions of micelle are rising rapidly and when achieved the limit values it breaks and form polymer particles. Each polymer particles are covered by surfactants witch prevent to approaching molecules to close distance. The usage of anionic and nonionic surfactant blends are very common in emulsion polymerization and help to stabilize the formulation for specific application and ensure polymer dispersion stability during transport and storage.

salts. Nonionic surfactants ensure the latex stabilization by adsorbing on polymer particles and covering them by long polyethylene glycol ethers chains, which constitute steric hindrance for other polymer particles. The steric forces act for smaller distance and provide weaker stability for a latex during emulsion polymerization. Steric stabilization are far less sensitive to ions

Anionic emulsifiers

We manufacture both sulfate and sulfonate products at our modern sulfonation plant located in Poland. Our plant gives us a broad level of flexibility in meeting customer's specific needs in respect of using new oleochemical feedstock and product purity requirements (unsulfated matter, inorganic salts content).

Sulfates and sulfonates

Rosulfan L and D

Sodium salt of lauryl C12-C14 alcohol sulfate(SLS) Sodium salt of decyl C10 alcohol sulfate

Sodium lauryl and decyl alcohol sulfates are derived from natural oleochemical feedstock. The SLS is commonly used emulsifier in emulsion polymerization for most monomer systems - acrylic, styrene-acrylic, vinyl acetate, EVA. Products with different alcohol distribution are also available.

Alkyl ether sulfates

Sulforokanol L series

Alkyl ether sulfate; with the range 1-12 EO

We supply alkyl ether sulfates based on different alcohols feedstock: natural C12-C14, C12-C16 and synthetic C12-C15, with varying degrees of ethoxylation. The products are available as a solution and concentrated pastes. Products with a higher ethoxylation degree ensure both electrostatic and steric stabilization to latex particles significantly improved colloidal stability. Alkyl ethers sulfates have a better hard water tolerance then fatty alcohol sulfates. They can be used as a sole emulsifier or with other anionic and nonionic surfactant systems for all acrylic, styrene-acrylic, vinyl-acrylic, EVA lattices.

ABSNa and ABS

Alkyl benzene sulfonate (sodium salt)

benzene sulphonate surfactants Alkyl are derived from linear C10-C13 alkylate feedstock with high 2-phenyl content. Linear alkylbenzene sulphonate shows excellent acid/alkali stability and quite good hard water stability. The acid form of the product can be used as intermediate for various kind of salts. Product is compatible with many polymers like styrene-butadiene rubber, styrene-acrylic, polyvinyl and vinylydene chloride, EVA.



Sulfosuccinates

Sulfosuccinate L3/40 Etoxylated fatty alcohols sulfosuccinates

Monoester of ethoxylated (4EO) lauryl alcohol and sulfosuccinic acid, sodium salt is an efficient anionic surfactants for most monomer systems - acrylic, styrene-acrylic, vinyl acetate, EVA. Gives very good electrostatic stabilization and small particle size dispersion. Can be used in combination with nonionic surfactants in order to improve mechanical stability and freezethaw and reduce particle size.

Products based on different degree of ethoxylation and fatty alcohols feedstock are also available.

Anionic emulsifiers - product list

	PRODUCT CHARACT	TERISTIC						PF	ODU	ICTS	GRO	UP		
PRODUCT NAME	Description	CAS	Appearance	HLB	Active	Vinyl acetate & copolymers	Styrene Acrylics	Acrylics	Styrene butadiene rubber	Polyvinyl chloride	Nitrile rubber	Chloroprene rubber	APE - free	Post-polymerization stability
ABSNA 30	Sodium Dodecylbenzenesulfonate	68411-30-3	Liquid	-	28-32	•	•	o	•	•	•	•	•	
ROSULFAN A	Ammonium Lauryl Sulfate	931-558-1	Liquid	-	26-28	o	•	•	•	•			•	
ROSULFAN L	Sodium Lauryl Sulfate	85586-07-8	Liquid	-	27.5-30	o	•	•	•	•			•	
SULFOROKANOL L225/1	Sodium Laureth Sulfate + 2 EO	68891-38-3	Liquid	-	26-28	o	•	•	•	•			•	
SULFOROKANOL L270/1	Sodium Laureth Sulfate + 2 EO	68891-38-3	Paste/Liquid gel	-	26-28	o	•	•	•	•			•	
SULFOROKANOL L327/1	Sodium Laureth Sulfate + 3 EO	13150-00-0	Liquid	-	27-29	o	•	•	•	•			•	
SULFOROKANOL L370/1	Sodium Laureth Sulfate + 3 EO	13150-00-0	Paste/Liquid gel	-	27-29	o	•	•	•	•			•	
SULFOROKANOL L1230/1A	Sodium Laureth Sulfate + 12 EO	9004-82-4	Liquid	-	29-31	•	•	•	•	o			•	o
SULFOSUCCINATE L3/40	Disodium Laureth Sulfosuccinate	68815-56-5	Liquid	-	min. 38	•	•	•	o				•	
SULFOSUCCINATE DOSS 70GP	Di (2ethylhexyl)sulfosuccinic acid, sodium salt	577-11-7	Liquid	-	min. 70	o	o	0	o	•	o	o		

highly recommended
 recommended



Sulfosuccinate DOSS Dioctyl sulfosuccinate (sodium salt)

Diester of 2-ethyl hexyl alcohol is excellent wetting and leveling agent for binders and coating formulations. Has very low dynamic surface tension and migrate rapidly to interfactes. Sulfosuccinate DOSS as co-emulsifier in emulsion polymerization process provides also excellent emulsification capabilities for hydrophobic mnonomers like styrene, 2-ethylhextl acrylate, butyl actylate.

Nonionic emulsifiers

PCC Exol manufactures a broad range of nonionic products for emulsion polymerization. The product portfolio includes both commodity and speciality emulsifiers and latex additives. Our product range covers ethoxylates and alcoxylates of nonylphenol, fatty alcohols, acids and vegetable oils, fatty amines and amides and block copolymers of ethylene oxide and propylene oxide.

Fatty alcohol ethoxylates and alcoxylates

Rokanol L series Lauryl alcohol ethoxylates and alcoxylates

Rokanol L is the common used enviromential friendly alternative for nonylphenol ethoxylates. Products are available in various degree of ethoxylation and propoxylation ranging from 2 to 50. Rokanol L10/80 is the standard alternative for ethoxylated nonylphenol (10EO), gives good emulsification capability and latex performance of styrene-acrylic and full acrylic binders. Higher ethoxylates of lauryl alcohol e.g., Rokanol L30A (30EO) can be used as latex post-stabilisers to improve stabilization of various kind of polymers lattices or as emulsifier for p-VAc.

Typically we recommend to use our Rokanols in combination with various anionic surfactants.

Rokanol ID and IT series

Isodecyl and Iso-tridecyl alcohol ethoxylates

Ethoxylates of synthetic fully branched isotridecanol and isodecanol are more soluble in water and possess lower foaming capacity We manufacture our product based on alcohols derived from both - petrochemical and natural sources with extensive range of carbon chains distribution ranging from C9-C18. Owing to the appropriate method of conducting the reaction with ethylene oxide, it is possible to obtain a range of products with various ethoxylation degrees. Products based on other olechemical feedstock are possible to make upon request.

Rokanol T, K and O series

C16-C18 unsaturated and saturated alcohol ethoxylates

Linear fatty alcohols ethoxylates with C16-C18 carbon chains distribution are excellent emulsifiers for emulsion polymerization. Rokanol T18, K18, K21 and O20 are effective emulsifiers for polymerization of vinyl acetate and copolymer. The differences between Rokanols T, K and O is in the iodine value of oleochemical feedstock. Rokanol T is completely saturated but the other K and O are based on partly unsaturated fatty alcohols. The unsaturation degree influences slightly on HLB value and emulsification efficiency and viscosity of obtained polymer dispersions. Rokanol K21 and K18 can be also used as post-additives to improve freeze-thaw stability.

Other degree of ethoxylation is possible to make based on this oleochemical feedstock.

and a higher cloud-point then linear type of ethoxylates. Rokanol ITO and IT12 are suitable as an alternative for NPEs for most commonly used monomer systems including styrene and acrylates.

Fatty alkohol ethoxylates and alcoxylates - product list

	PRODUCT CHARACTERISTIC									רסטכ	'S GR	OUP	,		
PRODUCT NAME	Description	CAS	Appearance	HLB	Active	Vinyl acetate & copolymers	Styrene Acrylics	Acrylics	Styrene butadiene rubber	Polyvinyl chloride	Nitrile rubber	Chloroprene rubber	APE - free	Low foam	Post-polymerization stability
ROKANOL DB11W	Alcohols, C12-15 + 11 EO	68131-39-5	Oily liquid/ Paste	13.6	min. 90.0		•	o	o	o			•		
ROKANOL ID8	Alcohols, C10-Iso + 8 EO	68439-45-2	Liquid	13.8	min. 99.5		•	o	o	o			•		
ROKANOL IT8	Alcohols, C13, branched + 8 EO	69011-36-5	Liquid/Paste	12.8	min. 99.5		•	o	o	o			•		
ROKANOL IT9	Alcohols, C13, branched + 9 EO	69011-36-5	Oily liquid/ Paste	13.2	min. 99.0		•	0	o	o			•		
ROKANOL IT10	Alcohols, C13, branched + 10 EO	69011-36-5	Liquid	13.8	min. 99.5		•	ο	o	o			•		
ROKANOL IT12	Alcohols, C13, branched + 12 EO	69011-36-5	Liquid/Paste	14.5	min. 99.0		•	o	o	o			•		
ROKANOL K14	Alcohols, C16-18 unsaturated + 14 EO	9005-04-3	Paste/Wax	14.0	min. 99.0		•	ο	o	o			•		
ROKANOL K18	Alcohols, C16-18 unsaturated + 18 EO	9005-04-3	Paste/Wax	15.8	min. 99.0	•	•	•	o	o			•		•
ROKANOL K21	Alcohols, C16-18 unsaturated + 21 EO	9005-04-3	Paste/Wax	16.5	min. 99.5	•	•	•	o	o			•		•
ROKANOL L10/80	Alcohols, C12-14 + 10 EO	68551-12-2	Viscous liquid	13.8	min. 80.0		•	o	o	o			•		0
ROKANOL L22	Alcohols, C12-14 + 22 EO	68551-12-2	Wax	17.0	min. 99.7	o	•	•	o	o			•		0
ROKANOL L30A	Alcohols, C12-14 + 30 EO	68551-12-2	Wax	18.0	min. 99.7	•	•	•	o	o			•		•
ROKANOL L30A/65	Alcohols, C12-14 + 30 EO	68551-12-2	Viscous iquid	18.0	64-66	•	•	•	o	o			•		•
ROKANOL L80/50W	Alcohols, C12-14 + 10EO/PO	68551-12-2	Viscous liquid	17.6	47-51	•	•	•		o			•	o	o
ROKANOL O18	Alcohols, C16-18 unsaturated + 18 EO	9004-98-2	Paste	15.6	min. 99.0	•	•	•	o	o			•		•
ROKANOL O20	Alcohols, C16-18 unsaturated + 20 EO	9004-98-2	Paste	16.3	min. 99.0	•	•	•	o	o			•		•
ROKANOL T12	Alcohols, C16-18 + 12 EO	68439-49-6	Wax	13.5	min. 99.5		•	•	o	o			•		
ROKANOL T18	Alcohols, C16-18 + 18 EO	68439-49-6	Wax	15.8	min. 99.0	•	•	•	0	0			•		•

highly recommended
 recommended



Fatty acids and vegetable oils ethoxylates

Rokacet R and S series Stearic acid and castor oil ethoxylates

Ethoxylates of stearic acid and castor oil are used as emulsifiers, stabilizers and dispersants for many water-based coating formulations. As post-additives to lattices they improve

freeze-thaw stability and electrolite tolerance. They have have very good emulsification capabilities for many types of solvents, fatty acids, waxes.

Rokacet R and S series - product list

	PRODUCT CHARACTERISTIC PRODUCT NAME Description CAS Appearance HLB Active										GRO	UP		
PRODUCT NAME	Description	CAS	Appearance	HLB	Active	Vinyl acetate & copolymers	Styrene Acrylics	Acrylics	Styrene butadiene rubber	Polyvinyl chloride	Nitrile rubber	Chloroprene rubber	APE - free	Post-polymerization stability
ROKACET S24	Stearate + 24EO	9004-99-3	Wax	15.8	min 99.0	•	•	0	o	o			•	o
ROKACET R40	Castoroil + 40EO	61791-12-6	Paste	13.0	min 99.0		•	•	0	o			•	o
ROKACET R70	Castoroil +70EO	61791-12-6	Paste	15.4	min 99.0	•	•	•	o	o			•	•



Alkyl phenol ethoxylates and alcoxylates

Rokafenol N series Nonylphenol ethoxylates

Nonylphenol ethoxylates ensure excellent steric stabilization to latex, improve resistance against freeze-thaw, temperature and possess hard water tolerance. Rokafenols N can be used in combination with various anionic surfactants including ABSNa, Rosulfan L, products.

Rokafenol N series - product list

	PRODUCT CHARACTERISTIC PRODUCT NAME Description CAS Appearance HLB Active FENOL N10 Nonylphenol+10EO 127087-87-0 Oily liquid 13.3 min 99.0								RODU	ICTS	GRO	UP		
PRODUCT NAME	Description	CAS	Appearance	HLB	Active	Vinyl acetate & copolymers	Styrene Acrylics	Acrylics	Styrene butadiene rubber	Polyvinyl chloride	Nitrile rubber	Chloroprene rubber	APE - free	Post-polymerization stability
ROKAFENOL N10	Nonylphenol+10EO	127087-87-0	Oily liquid	13.3	min 99.0		•	o	o	0		•		
ROKAFENOL N12	Nonylphenol+12EO	127087-87-0	Oily liquid	14.0	min 99.0		•	o	o	o		•		
ROKAFENOL N14	Nonylphenol+14EO	127087-87-0	Oily liquid	15.0	min 99.0	o	•	o	o	o	o	•		
ROKAFENOL N22	Nonylphenol+22EO	127087-87-0	Paste/Wax	16.2	min 99.0	•	•	•	o	o	•	•		
ROKAFENOL N22/30	Nonylphenol+22EO	127087-87-0	Liquid	16.2	25-26.5	•	•	•	o	o	•	•		
ROKAFENOL N40/70	Nonylphenol+30EO	127087-87-0	Wax	17.6	69-71	•	•	•	0	0	•	•		•
ROKAFENOL N40	Nonylphenol+40EO	127087-87-0	Liquid	17.8	min 99.0	•	•	•	0	0	•	•		•



Sulfosuccinate L3/40 and Sulforokanols L. Our nonylphenol ethoxylates are available in various degrees of ethoxylation, ranging from 4-40. The good control of process production ensures a low PEG level and narrow ethoxylates distribution in our NPE

PEG/PPG block copolymers

Rokamers

PEG/PPG block copolymers

Nonionic surfactants composed of 3-block segments of PEG/PPG/PEG have versatile properties and application performance depends on the molecular weight and ratio of ethylene oxide to propylene oxide in the

molecule. Products with low EO contents (Rokamer 2000) show defoaming behavior, whereas products with higher EO content (Rokamer 1010) act as emulsifiers and dispersants.

PEG/PPG block copolymers - product list

	PRODUCT CI	HARACTERISTIC				PRODUCTS GROUP									
PRODUCT NAME	Description	CAS	Appearance	HLB	Active	Vinyl acetate & copolymers	Styrene Acrylics	Acrylics	Styrene butadiene rubber	Polyvinyl chloride	Nitrile rubber	Chloroprene rubber	APE - free	Low foam	Post-polymerization stability
ROKAMER 2100	PEG/PPG Copolymer	9003-11-6	Clear liquid	3.4	min. 99	o	o	o	o	o			•	•	
ROKAMER 2330	PEG/PPG Copolymer	9003-11-6	Viscous liquid	4.9	min. 99	0	o	o	o	o			•	•	
ROKAMER 2950	PEG/PPG Copolymer	9003-11-6	Viscous liquid or semi-liquid paste	8.1	min. 99	o	o	o	0	o			•	•	
ROKAMER 1010	PEG/PPG Copolymer	9003-11-6	Wax	16.6	min. 99	o	•	•	0	o	o		•	•	
ROKAMER 1010/50	PEG/PPG Copolymer	9003-11-6	Viscous liquid	16.6	>50	o	•	•	o	o	0		•	•	
ROKAMER 2000	PEG/PPG Copolymer	9003-11-6	Clear or turbid liquid	2.4	min. 99	o	o	o	o	o			•	•	
ROKAMER 2600	PEG/PPG Copolymer	9003-11-6	Clear or turbid liquid	5.6	min. 99	o	0	o	0	0			•	•	

Evaluation PCC Exol products in applications

Styrene/acrylic latex

This a recipe for low MFFT styrene-acrylic dispersion that can be used as a binder for decorative paints. Sulfosuccinate L3/40 provides good pre-emulsion stability within whole emulsion polymerization process and ensures small particle size of the final dispersion. Sulforokanol L1230/1A provides both electrostatic and steric stabilization, gives

high	er	p
Noni	ion	ic
and	Κ	
toler	an	Ce
nony	/lpl	he
Parti	cle	S
by	an	10
Sulfo	oro	kā

Reactor Charge		
Initial charge Water Sulfosuccinate L3/40	262.68 optional	54.55 0-0.4
Initiator solution I	2.05	0.00
Water Ammonium persulfate	3.95 0.25	0.82
Pre-emulsion		
Water	164.17	34.09
Rokanol L10/80 (80%)	8.41	1.4
Sulfosuccinate L3/40	11.98	1.0
Styrene	190.44	39.55
Butyl acrylate	279.09	57.95
Acrylamide	7.22	1.5
Acrylic acid	4.79	1.0
Initiator solution II		
Water	35.52	7.38
Ammonium persulfate	2.28	0.47
Chaser		
Peroxan BHP-70	0.66	0.14
Water	8.17	1.7
Bruggolite FF6	0.47	0.1
Water	8.17	1.7
pH Adjustment		
NH ₄ OH Solution (25%)	6.07	1.26

Υ.

Latex properties								
		Sulfosuccinate L3/40 in initial charge						
Properties	Units	0.0%	0.1%	0.2%	0.4%			
рН	Peroxan BHP-70	7.5	6.2	5.6	7.8			
Solids	%	49.7	49.9	52.2	50.5%			
Viscosity	сР	1812	5900	6100	11200			
Wet coagulum 100 mesh	%	0.01	0.08	0.09	0.44			
MTTF	°C	<1	<1	<1	<1			
Average particle size	nm	172	115	106	95			



particle size and narrow distribution. APEO-free surfactants - Rokanol L series ensures excellent electrolyte ce and can be used as alternatives for enol ethoxylates (APEO) emulsifiers. size of the latex can be regulated ount of Sulfosuccinate L3/40 or anols in water as initial charge.

ocedure

- dd water to reaction flask and heat to 85°C.
- dd initiator solution in one shot and charge % wt. of pre-emulsion.
- old for 15 min at 85°C to prepare seed latex.
- art metering pre-emulsion and Initiator
- olution II over 4 hours.
- fter addition hold for 90 min at 85°C.
- ool down to 55°C and start feed solution of ruggolite FF6 and solution of Peroxan BHPfor 30 min.
- ool down to 30°C. adjust pH to 7-8 with mmonium hydroxide solution.

Influence of the concentration of anionic emulsifier in seed step emulsion polymerization on particle size and viscosity of styrene-acrylic acrylic dispersion

Particle size of Sulfosuccinate L3/40containing styrene-acrylic dispersion. The higher amount of anionic emulsifier in the reactor during the first step of seeded emulsion polymerization contributes to lowering particle

size of dispersion and rising viscosities. You can shape the properties of the final dispersion by changing the concentration of Sulfosuccinate L3/40 in the emulsion polymerization process.



APEO replacements in styrene-butyl acrylate dispersion

A series of nonionic surfactants was evaluated as nonylphenol alternatives in the above styrene-acrylate recipe.

			APE	O- FREE EMULSIFI	ERS		APEO EMI	APEO EMULSIFIERS			
Properties	Units	Rokanol L10/80	Rokanol IT12	Rokanol K21	Rokanol L30A/65	Sulforokanol 1230/1A*	NPE-10	NPE-20			
рН		7.5	8.7	8.7	7.8	8.7	8.4	7.8			
Solids	%	49.7	50.9	49.8	49	50.7	49.9	50.0			
Viscosity	cP	1812	3335	2040	1850	3250	1026	2850			
Wet coagulum 100 mesh	%	0.01	0.02	0.3	0.07	0.09	0.02	0.13			
MTTF	°C	<1	<1	<1	<1	<1	<1	<1			
Average particle size	nm	172	148	158	144	267	161	152			
Chemical stability											
10% CaCl ₂		•	•	•	•	•	•	•			
20% CaCl ₂	 Excellent Poor 	o	o	o	•	•	ο	•			
30% CaCl ₂		o	o	o	•	•	ο	•			
40% CaCl ₂		0	0	ο	o	ο	ο	ο			
Water resistance**		••	••	••	•••	• •	• •	• •			

* Instead of anionic surfactant - Sulfosuccinate L3/40

** Wet coatings at 200 microns thickness was dried for 96 hours at 20°C and immersed into distilled water to evaluate the condition of whiting according to the following standard:

• whitened in 30 minutes

• • not whitened in 30 minutes but slightly whited during 2 hour

• • • not whitened in 2 hours but slightly whited during 4 hours

• • • • not whitened in a 4-hour period



Vinyl actate/n-butyl acrylate latex

Anionic emulsifiers were compared in vinyl acetate/butyl acrylate dispersion. Sulforokanol L1230/1A provide better water resistance than standard low-molecular SLES.

Reactor Charge		% pphm
Initial charge		
Water	406.97	85.7
Sulforokanol L225/1	38.09	2.0
Rokanol L30A/65	14.66	2.0
Mowiol 18-88	9.52	2.0
Sodium carbonate	1.43	0.3
Initiator solution I		
Water	34.28	7.2
Ammonium persulfate	3.17	0.7
Pre-emulsion		
Vinyl acetate	380	80.0
Butyl acrylate	95	20.0
Chaser	0.67	0.1
Peroxan BHP-70	7.0/	1.7
Water	0.6	0.1
Bruggolite FF6 Water	7.94	1.7

Procedure

- Add water to reaction flask and heat to 65°C.
- Add 25% solution of initiator (APS) and charge 10% wt. of monomer.
- Hold for 15 min at 85°C to prepare seed latex.
- Start metering preemulsion and Initiator Solution II over 4 hours.
- After addition hold for 90 min. in 85°C.
- Cool down to 55°C and start feed solution of Bruggolite FF6 and solution of Peroxan BHP-70 for 30 min.

Latex properties

Properties		Sulforokanol L225	Sulforokanol L1230/1A
рН		3.5	3.7
Solids	%	50.4	49.6
Viscosity	cP	4853	760
Wet coagulum 100 mesh	%	0.5	0.1
Chemical stability			
10% CaCl ₂		•	•
20% CaCl ₂	• Excellent	•	•
30% CaCl ₂	• Poor	•	•
40% CaCl ₂		•	•
Water resistance ²		•	••

* Instead of anionic surfactant - Sulfosuccinate L3/40

** Wet coatings at 200 microns thickness was dried for 96 hours at 20°C and immersed into distilled water to evaluate the condition

of whiteningaccording to the following standard:

• whited in 30 minutes

- • not whited in 30 minutes but slightly whited during 2 hour
- • not whited in 2 hours but slightly whited during 4 hours

• • • • not whited during 4 hour passed

Post-addition of surfactants to improve dispersion performance

Several surfactants have been added at a level of 1% pphm to the common styrene-butylacrylate dispersion. Such addition allows to improve colloidal stability against freezing. Viscosity changes, after every freeze-thaw cycle, are shown in the diagram below:

Latex viscosity after freeze-thaw cycles



Without the additive, the latex was coaugulated after the first cycle. Addition of nonionic product prevents this negative effect, appropriate application properties of dispersion are allowed to remain. The best results (the lowest viscosities after every cycle) are ensured by using Rokanol L30A/65. For this reason to this reason this product is strongly recommended as a post-additive to improve freeze-thaw stability.



Antistats

Antistats may be applied to the polymer compound externally or internally. In both cases atmospheric water is attracted to the surface thus allowing a pathway for static dissipation. If internal, the antistat must migrate to the surface (bloom) prior to absorbing moisture and makes the surface more conductive. If external, the antistat must be applied in a separate operation.



Antistats - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Chemistry	%, Active Content	Polymer Type	Application	
Chemstat [®] 122	61791-31-9	Cationic	Liquid	POE (2) Cocoamine	Amine	100	PP, PE	Internal Antistat	Chemst PE and electros polypro functior
Chemstat [®] 122/60DC	Mixture		Powder	POE (2) Cocoamine on Silica	Amine	60	PP, PE	Internal Antistat	Chemst effective eliminat polypro functior
Chemstat [®] 182	61791-44-4	Cationic	Liquid/Paste	POE (2) Tallow Amine	Amine	100	PE	Internal Antistat	Chemst ing HDF els and
Chemstat® 182LC	61791-44-4	Cationic	Liquid/Paste	POE (2) Tallow Amine	Amine	100	PE	Internal Antistat	Chemst includin effective improve
Chemstat [®] 182/67DC	Mixture	Cationic	Powder	POE (2) Tallow Amine on Silica	Amine	67	PE	Internal Antistat	Chemst includin powder Chemst
Chemstat® 1880	Proprietary	Nonionic	Flake	Ester	Ester	100	PP, PE	Internal Antistat	Chemst protecti to hand materia This ma
Chemstat® 1880/PWDR	Proprietary	Nonionic	Powder	Ester	Ester	100	PP, PE	Internal Antistat Antifog	Chemst antistati PWDR i compor and at 3
Chemstat [®] 1890	Proprietary	Nonionic	Liquid	Ester	Ester	100	PP, PE	Internal Antistat	Chemst protecti easy ha product colour s

Features and Benefits

tat[®] 122 is a fast blooming internal, migratory antistat that performs effectively in PP polymers. Available in an easy to handle liquid form, the product eliminates static problems in extrusion, injection, and blow molding of polyethylene, popylene, and ABS resins. Chemstat[®] 122 is a vegetable derived antistat which ns at low use levels and has broad FDA approval.

tat[®] 122/60DC is a fast blooming internal, migratory antistat that performs vely in PE and PP polymers. Available in an easy to handle powder form, the product ates electrostatic problems in extrusion, injection, and blow molding of polyethylene, opylene, and ABS resins. Chemstat 122/60DC is a vegetable derived antistat which ins at low use levels and has broad FDA approval.

at[®] 182 was developed as an internal antistatic agent for use in polyethylene includ-PE, LLDPE and LDPE. This animal derived antistat performs effectively at low use levhas broad FDA approvals. Chemstat[®] 182 may also improve pigment dispersibility.

tat[®] 182LC was developed as an internal antistatic agent for use in polyethylene ng HDPE, LLDPE and LDPE. This low colour, animal derived antistat performs rely at low use levels and has broad FDA approvals. Chemstat[®] 182LC may also e pigment dispersibility.

tat[®] 182/67DC was developed as an internal antistatic agent for use in polyethylene ng HDPE, LLDPE and LDPE. This animal derived antistat is offered in an easy to use r form and performs effectively at low use levels and has broad FDA approvals. tat[®] 182/67DC may also improve pigment dispersibility.

tat[®] 1880 was developed for use in polyolefin systems requiring effective antistatic ion and may be used in indirect food contact situations. Chemstat[®] 1880 is an easy dle flaked solid containing no phenol derivatives or amine based components. The al provides long term antistatic protection and performs effectively and at 30% RH. aterial also functions as an efficient antifog in agricultural film.

tat[®] 1880/PWDR was developed for use in polyolefin systems requiring effective tic protection and may be used in indirect food contact situations. Chemstat[®] 1880/ is an easy to handle powder containing no phenol derivatives or amine based nents. The material provides long term antistatic protection and performs effectively 30% RH. This material also functions as an efficient antifog in agricultural film.

tat[®] 1890 was developed for use in polyolefin systems needing effective antistatic ion and may be used in indirect food contact situations. Chemstat[®] 1890 is an andling liquid containing no phenol derivatives or amine based components. This ts provides long term antistatic performance and functions effectively in liquid systems.

Antistats - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/Amine/ Ester/PEG/Quat	%, Active Content	Polymer Type	Application	
Chemstat [®] 1900	Proprietary	Nonionic	Liquid/Paste	Ester	Ester	100	PP, PE	Internal & External Antistat	Chemsta transitio ranging and resi
Chemstat® 1910	Proprietary	Nonionic	Paste/Solid	Ester	Ester	100	PP, PE	Internal & External Antistat	Chemsta molding be used chemist
Chemstat [®] 2218	Proprietary		Solid	Surfactant Mixture		100	PP, PE	Internal Antistat	Chemsta resins.
Chemstat [®] 3820	68071-95-4		Liquid	Quaternary Compound	Quat	100	PP, PE	External Antistat	Chemsta a variety multiple
Chemstat [®] 273-C	61791-31-9	Cationic	Liquid	POE (2) Cocoamine	Amine	100	PP, PE	Internal Antistat	Chemst molding at low u may also
Chemstat® 273-E	10213-78-2	Cationic	Solid	POE (2) Stearyl Amine	Amine	100	PP, PE	Internal Antistat	Chemst. and was stability
Chemstat® 273-EP	10213-78-2	Cationic	Pastille	POE (2) Stearyl Amine	Amine	100	PP, PE	Internal Antistat	Chemst and was form for low use
Chemstat [®] 830/60DC	Mixture		Powder	Antistat on Silica		60	PP, PE	Internal Antistat	Chemsta polypro The che a slow provide
Chemstat [®] G-118/42K	67701-33-1	Nonionic	Flake	Glycerol Monostearate	GMS	100	PP, PE	Internal Antistat, Lubricant, Mold Release	Chemst content in polyc modifie and pro



Features and Benefits

tat[®] 1900 was developed as an antistat and antifog for a variety of high glass on temperature polymers including PET. Chemstat[®] 1900 may be used at levels g from 0.5% to 3.0% depending on the desired functionality, processing conditions in properties. This amine free antistat has broad FDA approval.

tat[®] 1910 was developed as an antistatic material for PET that is suitable for blow g as well as sheet applications. This product has broad FDA approvals and may d from 0.1% to 3.0% depending on the application and processing conditions. The try operates effectively under high temperature conditions.

tat[®] 2218 provides long term, quick blooming antistatic properties for PE and PP

tat®3820 is a water soluble cationic antistat suitable for external application to by of substrates. The product operates at low concentration and is readily soluble in e diluents.

tat[®] 273-C eliminates electrostatic problems in extrusion, injection, and blow g of polyethylene and polypropylene resins. It imparts excellent antistat properties use levels and is a fast blooming, plant derived material. This easy to handle liquid to improve pigment dispersibility and has broad FDA approvals.

tat 273-E is an internal antistat which is effective in both film and molded products, s designed primarily for polypropylene resins. This chemistry exhibits good thermal y and performs efficiently at low use levels.

tat 273-EP is an internal antistat which is effective in both film and mold products, s designed primarily for the polypropylene resins. The product is offered in a pastille or ease of handling and exhibits good thermal stability and performs efficiently at e levels.

tat® 830/60DC functions as both an internal antistat and lubricant for polyethylene, populene and polystyrene resins.

emistry combines a quick blooming component for fast antistatic properties and blooming component to extend performance time. The easy to handle powder as efficient antistatic properties at low RH.

tat[®] G-118/42K is a glycerol monostearate with a 42% minimum alpha monoester t. It is derived from natural fats and oils. Its primary use is as an internal lubricant olefins, but it also imparts temporary antistat protection, mold release and viscosity er properties. The chemistry provides fast blooming, short term antistatic properties ovides efficacy at low RH

Antistats - product list

	Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/Amine/ Ester/PEG/Quat	%, Active Content	Polymer Type	Application	
	Chemstat® G-118/52K	67701-33-1	Nonionic	Flake	Glycerol Monostearate	GMS	100	PP, PE	Internal Antistat, Lubricant, Mold Release	Chemsta content. modifier provides
	Chemstat® HTSA #218/ VIT	Mixture	Nonionic	Solid	Fatty Acid Ester	Ester	100	PP	Internal Antistat, Slip Agent	Chemsta This mat
	Chemstat [®] LD-100	120-40-1	Nonionic	Solid	Lauric Diethanolamide	Amide	100	PP, PE	Internal Antistat	Chemsta resins pr relative be used blow m Specifica
_	Chemstat® LD- 100/30DC	120-40-1	Nonionic	Powder	Lauric Diethanolamide on Silica	Amide	30	PP, PE	Internal Antistat	Chemsta polyprop as an an amines extrusio material
	Chemstat® LD- 100/60DC	120-40-1	Nonionic	Powder	Lauric Diethanolamide on Silica	Amide	60	PP, PE	Internal Antistat	Chemsta polyprop ed as an ylated as in extrus material
	Chemstat® P-400	25322-68-3	Nonionic	Liquid	Polyethylene Glycol	PEG	100	PE	Internal Antistat, Lubricant	Chemsta where it stability
	Chemstat® PS-101	68037-49-0		Pastille	Aliphatic Sulfonate		100	PP, PE	Internal & External Antistat	Chemsta antistati good th pigment polystyr
	Chemstat [®] SE-20	Proprietary	Nonionic	Liquid	Fatty Acid Ester	Ester	100	PP, PE	External Antistat	Chemsta material 2 - 5% in



Features and Benefits

tat G-118/52K is a glycerol monostearate with 52% minimum alpha-monoester t. Chemstat[®]G-118/52K is used as an antistat agent, internal mold release agent, flow er and an internal lubricant in polyolefin resins. The material is fast blooming and es excellent short term antistatic properties.

tat® ®HTSA#218/VIT was developed as an anti-stat for polypropylene film applications. aterial has broad FDA approvals and offers good functionality at low concentrations.

stat[®] LD-100 was developed as an internal antistat for polyethylene and polypropylene providing long term results. Chemstat[®] LD-100 is recommended as an antistat when e humidity conditions of <40% are present and when ethoxylated amines cannot ed. Chemstat[®] LD-100 eliminates electrostatic problems in extrusion, injection, and molding of polyethylene and polypropylene resins. The material meets Military ication MIL-B-81705C and has FDA approval.

tat[®] LD-100/30DC was developed as an easy to handle antistat for polyethylene and populene resins providing long term results. Chemstat[®] LD-100/30DC is recommended tistat when relative humidity conditions of <40% are present and when ethoxylated cannot be used. Chemstat[®] LD-100/30DC eliminates electrostatic problems in on, nijection, and blow molding of polyethylene and polypropylene resins. The al meets Military Specification MIL-B-81705C and has FDA approval.

tat[®] LD-100/60DC was developed as an easy to handle antistat for polyethylene and poplene resins providing long term results. Chemstat[®] LD-100/60DC is recommendn antistat when relative humidity conditions of <40% are present and when ethoxamines cannot be used. Chemstat[®] LD-100/60DC eliminates electrostatic problems usion, injection, and blow molding of polyethylene and polypropylene resins. The al meets Military Specification MIL-B-81705C and has FDA approval.

tat® P-400 was developed as an lubricant/internal antistat for polyethylene resins it may be used at a 1.5 - 4.0% loading by weight. This product has excellent thermal y and broad FDA approval.

tat[®] PS-101 is an aliphatic sulfonate that may be used as a long acting internal tic agent which is effective in most thermoplastics film. This chemistry exhibits thermal stability and is offered in a pastille form. Chemstat[®] PS-101 improves at dispersibility and gloss, and is recommended for polystyrene and rubber modified rene.

at[®] SE-20 was developed as an external antistat for use with thermoplastics. The I has good thermal stability and broad FDA clearances. Recommended use level is n an aqueous solution for topical applications

Antifogs

Antifogs prevent the formation of water droplets on the surface of a film. This is achieved by incorporating an additive designed to have controlled incompatibility with the polymer matrix and chemical functionality that allows it to sheet the water droplets. The best antifog for a specific application will depend on polymer type, film thickness, use temperature and lifetime of film. FDA requirements should be identified prior to evaluation.



Antifogs - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/Amine/ Ester/PEG/Quat	%, Active Content	Polymer Type	Application	Features and Benefits
Chemstat [®] AF-322	Mixture	Nonionic	Liquid	Surfactant Mixture	Ester	100	PP, PE, EVA	Hot & Cold Antifog	Chemstat [®] AF-322 is an internal antistat which is effective in both film and molded products; and may be used for polypropylene resins. This material provides both hot and cold antifog performance.
Chemstat® AF-687	Proprietary	Nonionic	Liquid	Surfactant Blend	Ester	100	PP, PE, PS	Hot & Cold Antifog	Chemstat [®] AF-687 is recommended primarily as an external anti-fog agent for PS films and acts as a hot and cold antifog for PE resins. Use levels of 1.0-2.0% are recommended as starting points and carry broad FDA approvals.
Chemstat® AF-710	Mixture	Nonionic	Luquid	Surfactant Blend	Ester	100	PP, PE, EVA, PVC, PS	Hot & Cold Antifog	Chemstat [®] AF-710 is recommended for food wrap film applications as a hot and cold antifog. The product carries broad FDA approvals. Recommended use levels based on polymer type are as follows: Polyethylene: 0.5%-2.0%, EVA: 0.5%-2.0%, PVC 3.0%-4.0%, and polystyrene: 2.0%-3.0%
Chemstat® AF-1820	Mixture	Nonionic	Solid	Surfactant Blend	Ester	100	PP, PE, EVA	Hot & Cold Antifog	Chemstat [®] AF-1820 was developed as a fast migrating, amine free, phenol free antifog for LLDPE and PP with excellent short and long term performance. The recommended use level of Chemstat [®] AF-1820 is 1.0-2.0%. The chemistry also provides some antistatic properties in films.
Chemstat® AF-1873	Mixture	Nonionic	Paste	Surfactant Blend	Ester	100	PP, PE	Hot & Cold Antifog	Chemstat [®] AF-1873 was developed as a fast migrating, amine free, phenol free hot antifog for clarified polypropylene (CPP). Chemstat [®] AF-1873 does not interfere with the clarifying mechanism and also provides good antistatic performance. The recommended use level of Chemstat [®] AF-1873 is 1.5-2.5%.
Chemstat® AF-1879	Mixture	Nonionic	Solid	Surfactant Blend	Ester	100	PE, PS	Hot & Cold Antifog	Chemstat [®] AF-1879 was developed as a fast migrating, amine free, phenol free cold antifog for polystyrene with excellent short term for cold fog applications performance. This chemistry exhibits excellent thermal stability and broad FDA approvals. The recommended use level of Chemstat [®] AF-1879 is 2.0-4.0%.



Slip agents

Slip agents provide surface lubrication during and immediately after processing. Slip agents function by exuding to the surface of the plastic and provide a coating which lowers the coefficient of friction. In addition, they reduce the ability of a plastic sheet or film from adhering to itself by minimizing tack. Slip agents have anti-block properties and play a role during processing preventing the polymer from adhering to metal. The reduced friction facilitates processing on high speed packaging equipment as well as easing consumer use of plastic film products.

Pigment dispersants

Pigment dispersants are used in high content dispersions of colorants in carrier resins or liquid systems. The dispersion of a pigment is a process by which the pigment particles are "wetted" down by the resin in the liquid or molten stage. How well the pigment disperses depends on the temperature at which the two materials are mixed, the particle size of the pigment, and the molecular weight of the polymer. The mixing time and equipment are very important and dispersion is the key to successful coloring.

Slip agents - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/ Amine/ Ester/PEG/ Quat	%, Active Content	Polymer Type	Application	
Chemstat® HTSA #18-20M	301-02-0	Nonionic	Bead	Oleamide	Amide	100	PP, PE	Slip Agent	Ch an H1 pc
Chemstat® HTSA #22-20M	112-84-5	Nonionic	Powder	Erucamide	Amide	100	PP, PE	Slip Agent, Mold Release	Ch an Io Io th 22
Chemstat®HTSA #3/Bead	10094-45-8	Nonionic	Bead	Stearyl Erucamide	Amide	100	PP, PE	Slip Agent	Ch im fo #3 im
Chemstat® HTSA #1A	16260-09-6	Nonionic	Bead	Oleyl Palmitamide	Amide	100	PP, PE	Slip Agent, In- ternal Antistat	Ch de th an

Pigment dispersants - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/ Amine/ Ester/PEG/ Quat	%, Active Content	Polymer Type	Application	
Maxsperse [®] W-3000	Proprietary		Flake	Proprietary Surfactant		100	PP, PE	Pigment Dispersant	Max for in a
Maxsperse [®] W-85	577-11-7	Anionic	Powder	Sodium Dioctyl Sulfosuccinate Mixture		85	PP, PE	Pigment Dispersant	Max in n of ii
Maxsperse [®] 8900/100M	123-26-2	Nonionic	Flake	Fatty Amide	Amide	100	PP, PE, PS	Lubricant, Mold Release, Pigment Dispersant	Max poly poly of e
Maxsperse® 8913	106-15-0	Nonionic	Flake	Fatty Acide Amide	Amide	100	PP, PE, PS	Lubricant, Mold Release, Pigment Dispersant	Max oth blac pro Mol up e unic



Features and Benefits

hemstat[®] HTSA#18-20M is designed to modify the surface properties of LDPE nd PP film. This chemistry is fast blooming allowing for rapid results. Chemstat[®] TSA#18-20M may be used as slip and antiblock agent in polyolefins and other olymers. The chemistry is thermally stable to 195°C.

"hemstat[®] HTSA#22-20M is designed to modify the surface properties of LDPE ind PP film. It also provides excellent mold release properties for a wide range of oblymers. Chemstat[®] HTSA #22-20M is a slow blooming primary amide that provides onger term performance than alternate chemistries. This chemistry reduces both he block tendency and the co-efficient of friction and is thermally stable up to t20°C. It may also improve melt flow characteristics and increase scratch resistance.

hemstat HTSA #3/Bead is designed for use in most thermoplastics, to impart nproved characteristics including slip, antiblocking, and mold release. It is designed or plastic materials having process temperatures in excess of 300°C. Chemstat HTSA 3/Bead can be successfully incorporated into high clarity thermoplastic film without npairment of the optical properties with no evidence of slip additive "plate out".

hemstat[®] HTSA #1A is a specially synthesized, nitrogenous organic compound, esigned for use as a slip additive for thermoplastics – particularly BOPP film. Due to ne chemical composition of Chemstat[®] HTSA #1A, it also imparts anti-block, antistat nd mold release characteristics.

Features and Benefits

axsperse® W-3000 is a polyolefin wax developed for use as a pigment dispersant r use in manufacturing colour concentrate masterbatches. This material is offered an easy to use flake form and has broad FDA approval.

axsperse[®]W-85 is an easy-to-handle free-flowing powdered wetting agent for use most polyolefins. This material functions primarily as a dispersant for a wide range inorganic pigments.

axsperse[®] 8900/100M was developed as a dispersing agent for use in most plyolefins. It is most effective for white and black pigments. In high impact plystyrene, Maxsperse 8900/100M improves appearance and colour development extruded and molded parts. It is offered in a free flowing powder form.

axsperse[®] 8913 was developed primarily as a dispersant for organic pigments and her additives when compounding polyolefins. It works particularly well in carbon ack and polypropylene. In addition to dispersant properties, Maxsperse[®] 8913 also ovides slip, anti-block and lubricating properties to a variety of polymer resins. olded and extruded products exhibit improved gloss and a reduced tendency to pick electrostatic charges on the surface. These added properties are attributable to the ique molecular structure of this product.

Lubricants

Lubricants are used as processing aides particularly in rigid and flexible PVC. They can either be incorporated into the polymer compound or applied externally to the polymer surface. A lubricant works by providing a considerable decrease in resistance to movement of chains or segments of a polymer, without disproportionate change in observable properties. Ease of internal rotation is the key to polymer flow. Internal lubricants reduce friction between polymer molecules, leading to lower melt viscosity and low energy input needed for processing. Internal lubricants are usually chemically compatible with the polymer. External lubricants are generally incompatible with the polymer and act to reduce friction at the interface of the polymer and surface of the processing equipment.

Corrosion inhibitors

Corrosion inhibitors can be used as additives in packaging films and containers to minimize corrosion on metal parts including ferrous, steel, copper and galvanized materials. The corrosion inhibitor is incorporated into the polymer during processing and migrates to the surface before volatilizing in the airspace between the metal and the polymer.

Lubricants - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/ Amine/ Ester/PEG/ Quat	%, Active Content	Polymer Type	Application
Chemstat HTSA #54	115-83-3	Nonionic	Bead	Pentaerythritol Tetrastearate		100	PP, PE	Lubricant, Slip Agent
Chemstat HTSA #54P	85116-93-4	Nonionic	Powder	Pentaerythritol Tetrastearate		100	PP, PE	Lubricant, Slip Agent
Maxomer® Lube-E2SA-B	Mixture	Nonionic	Bead	Fatty Acid Amide	Amide	100	PS	Lubricant, Mold Release, Pigment Dispersant
Maxomer® Lube-EBO	110-31-6	Nonionic	Bead	Fatty Acid Amide	Amide	100	PS	Lubricant, Mold Release, Pigment Dispersant
Maxomer [®] Lube-FESA	Mixture		Powder	Ferric Stearate	Amide	100	PP, PE	Photo Degradation Agent
Chemstat® G-118/9501	68990-53-4	Nonionic	Powder	Glycerol Monostearate	GMS	100	PP, PE	Lubricant, Mold Release, Internal Anti- stat, Antifog
Chemstat [®] G-118/GTS	555-43-1	Nonionic	Powder	Glycerol Tristearate	GTS	100	PP, PE	Lubricant, In- ternal Antistat

Corrosion inhibitors - product list

Product Name	CAS Number	Ionic Nature	Physical Form	Description	Amide/ Amine/ Ester/PEG/ Quat	%, Active Content	Polymer Type	Application
Chemstat [®] Cl- 1020/60DC	Mixture	Cationic	Powder	Surfactant Blend	Mixture	60	PP, PE	Corrosion Inhibitor



Features and Benefits

Chemstat[®] HTSA #54 is an effective lubricant for polycarbonate, thermoplastic polyesters and other engineering thermoplastics which require high processing temperatures. This product is Nitrogen free and also provides antiblocking, slip and mold release properties.

Chemstat[®] HTSA #54P is an effective lubricant for polycarbonate, thermoplastic polyesters and other engineering thermoplastics which require high processing temperatures. This product is Nitrogen free and also provides antiblocking, slip and mold release properties.

Maxomer[®] Lube-E2SA-B is effective as a lubricant in PVC, polystyrene, ABS, and some engineering resins. It also functions as a mold release agent in PVC, polystyrene, and polyesters. The high molecular weight chemistry also serves as a pigment dispersant on polyolefin processing.

Maxomer[®] Lube EBO is used primarily as a slip agent in film manufacturing. It is particularly suitable in polymers like PVC, polyamide, polycarbonate and polypropylene. This chemistry is often used to raise the melt flow of polystyrene and imparts antiblocking properties to a variety of resins.

Maxomer® Lube-FESA performs as a photo degradation agent in polyolefins

Chemstat[®] G-118/9501 is a distilled, (96% minimum monoester content) glycerol monostearate derived from fully hydrogenated vegetable oil. Chemstat[®] G-118/9501 is recommended for internal use as an antistat and antifog in flexible PVC applications as well as general polyolefins. Chemstat[®] G-118/9501 is also used externally in polymer systems requiring surface coating of the additive directly onto the resin pellets. The product is effective as a processing aid in EPS applications. This product is typically used at levels of 0.2% to 0.5%.

Chemstat®G-118/GTS is a Glycerol Tristearate and is primarily used as a lubricant in polystyrene applications. This material is a free flowing white powder with a melt point above 60°C.

Features and Benefits

Chemstat[®] Cl-1020/60DC is an internal, migratory vapor phase corrosion inhibitor for use in extruded products and is designed primarily for use in polyolefin resins. This material is an easily handled free flowing powder possessing strong internal lubricating properties. The recommended loading of Chemstat[®] Cl-1020/60DC is 0.33 - 3.0%

Notes for guidance concerning the functional parameters and notation used in the catalogue

HLB (Hydrophilic-Lipophilic Balance)

The hydrophilic-hydrophobic balance is a parameter that determines the ratio of the content of the hydrophilic group and that of the hydrophobic group in a particle. The validity scope of the HLB number for non-ionic surface-active compounds is included within the range of 0 to 20 and is the measure of the share of the hydrophilic group in the particle.



molecular mass of hydrophilic part molecular mass of compound

On the other hand, for aqueos solution of ionic surface active agents acquire additional transformations increasing their degree of hydrophilicity, the value of the HLB number goes up to 40.

HLB for ester type compounds (polyoxyethylenated fatty acids):

$HLB=20 \cdot (1 - \frac{LZ}{LK})$

where:

LZ saponification number of oxyethylenation product, mgKOH/g

LK acid number of acids subjected to oxyethylenation, mgKOH/g

On the basis of the HLB scale, the range of the utility fitness of surface-active agents can be determined.

HLB NUMBER	EO CONTENTS IN PRODUCT, %	PRODUCT APPLICATION
1-3	5-15	Anti-foaming agent
4-6	20-30	Emulsifier W/O
7-11	35-55	Wetting agent
8-18	40-90	Emulsifier O/W
10-15	50-75	Detergent
10-18	50-90	Solubilizer

Cloud point

Cloud point is an indicator determining the behaviour of water or other organic solutions of nonoionic surfactants. Solutions of surfactants become cloudy during heating and revert to a clear solution at a certain temperature when cooled - this temperature is defined as 'cloud point'.

Depending on the temperature range at which the solution becomes cloudy, five determination methods are discriminated:

Method A – aqueous solution (10 - 90°C) Method B – solution of NaCl 50g/l (>90°C) Method C – solution of NaCl 100g/l (>90°C) Method D – solution 45g of butyl diglycol/water (<10°C) Method E – solution 25g of butyl diglycol/water (<10°C)





PCC Group We build value through sustainable innovation

Operating in 17 countries in 39 different locations, PCC SE currently employs 3300 people.

Each project or venture with a long-term success story shares one common thing - it's based on in-depth market research and on the knowledge acquired through years of experience. It is knowledge and experience that enables us to constantly aim higher and deliver greater value through dynamic and sustainable world-wide development of the PCC Group.

The companies, operating as a part of the PCC Group, act with responsibility and care. We only

embark on new business challenges when we are certain that we have the skills and knowledge to achieve success. We operate in three major markets: chemicals, energy and logistics. Several dozen business units, managed by PCC SE, work in synergy to generate the greatest possible competitive advantage in both local and international markets. Each day nearly three thousand professionals contribute their energy, and effort, to secure the sustainable

development of the PCC Group. The key element of our strategy is to ensure the development of each individual business unit through taking advantage of innovative technology and new market applications. We achieve our goals in a sustainable and responsible way - we care about the environment and the society within which we operate.

We are always ready to reach our strategic goals. Efficient and dynamic management helps our employees to fully develop their potential and therefore enhances the overall PCC Group value. Joint enterprises and individual initiatives of our companies are the results of the entrepreneurship culture promoted within

the PCC Group. Our philosophy is built on simple values - integrity, trust and reliability. We believe that following those principles is the only way to build a long-term competitive advantage.

The divisions, segments and business units of the PCC Group





The PCC Group currently employs nearly 3300 people. We operate in 17 countries, in 39 different locations around the world. Our portfolio includes eight basic segments. Individual operational responsibility is assigned to seven of them - Polyols, Surfactants, Chlorine, Specialty Chemicals, Consumer Products, Energy and Logistics. Each of these segments is supported by 19 business units, all under the management of the PCC Group.

visions	Segm	ients	Business units
Energy		Energy	Renewable Energies Conventional Energies
Logistics		Logistics	 Intermodal Transport Road Haulage Rail Transport
Holding	{\begin{bmatrix} & & & & & & & & & & & & & & & & & & &	Holding	 Portfolio Management Projects Services

PCC Group - Industrial Park in Brzeg Dolny, Poland

PCC Group in the world









In accordance with our environmental concerns, this publication from the PCC Group was printed on Cocoon Silk - an ecological double-sided-coated matt paper. This paper is made of 100% waste paper via environment-friendly technology. The FSC® Certificate confirms that the raw materials used during the paper production process come from well-managed forests or other certified and controlled sources.

TEXT PAGES	
Brand	Cocoon S
Grammage	150
Number of pages	32
COVER PAGES	
Brand	Cocoon S
Grammage	250
Number of pages	4
PUBLICATION	
Size (cm)	21 x 29.
Quantity	200

By using Cocoon Silk rather than non-recycled paper, the environmental impact was reduced by:



Carbon footprint data evaluated by Labelia Conseil in accordance with the Bilan Carbone® methodology. Calculations are based on a comparison between recycled paper used versus a virgin fibre paper - according to the latest European BREF data (virgin fibre paper) available.





ilk	
ilk	
7	



PCC Group

Sienkiewicza 4 56-120 Brzeg Dolny, Poland products@pcc.eu

Please visit our capital group business platform: **www.products.pcc.eu**

The information in the catalogue is believed to be accurate and to the best of our knowledge, but should be considered as introductory only. Detailed information about products is available in TDS and MSDS. Suggestions for product applications are based on our the best of our knowledge.

The responsibility for the use of products in conformity or otherwise with the suggested application and for determining product suitability for your own purposes rests with the user.

All copyright, trademark rights and other intellectual and industrial property rights and the resulting rights to use this publication and its contents have been transferred to PCC Rokita SA or PCC EXOL SA or its licensors. All rights reserved.

Users/readers are not entitled to reproduce this publication in whole or in part, nor are they entitled to reproduce it (excluding reproduction for personal use) or to transfer it to third parties.

Permission to reproduce it for personal use does not apply in respect to data used in other publications, in electronic information systems, or in other media publications. PCC Rokita SA and PCC EXOL SA shall not be responsible for data published by users.

