



# Plastisol



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## **we add character to plastics**

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Baerlocher has extensive technology and market know-how drawn from more than 190 years of company history.

Additives play a crucial role in determining processing properties as well as product quality and character. Baerlocher offers a broad range of additives for polymers suitable for various industries.

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By developing and supplying innovative additives, Baerlocher enables the plastics industry worldwide to manufacture high-quality and sustainable products.

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Global presence and more than 1200 employees worldwide make sure that we are always close to the customer. Future-oriented, we are continuously investing in research and development. Our innovative power results from the creativity of our in-house scientists and technical experts. Baerlocher has R&D facilities in Germany (Munich-Unterschleissheim), France (Marseille), Italy (Lodi), the United States (Dover, Cincinnati) and India (Dewas).

Environmentally sound production processes as well as the safety and protection of people and environment are key corporate goals. As a globally active group of companies we are aware of our responsibility, regardless of time or place. We are committed to the principles of "Responsible Care": Our quality management is certified to ISO 9001 and our environmental management system to ISO 14001, encouraging our employees to work together in a responsible way. This policy will not least benefit our customers.

### Baerlocher products

<b>BAEROPAN</b>	<b>BAEROCID</b>
<b>BAEROSTAB</b>	<b>BAEROCIN</b>
<b>BAEROPOL</b>	<b>CEASIT</b>
<b>BAEROLUB</b>	<b>ZINCUM</b>
<b>BAEROPHOB</b>	

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## **Baerlocher PVC Additives**

- **high-performance**
- **tailor-made**
- **quality-controlled**
- **future-orientated**
- **cost-efficient**

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# Additives for the Processing of PVC Plastisol

Plastisols are dispersions of paste PVC resins in plasticizer. Being liquid, plastisols allow pressureless moulding at room temperature. Plastisols fuse or gel when heated and turn into a homogenous melt at about 150 – 210 °C. Liquid BaZn, CaZn stabilizers, pastes and modern solid CaZn stabilizers are widely used for plastisol processing. Contrary to other PVC processing methods, the required amount of stabilizer is relatively small. Lubricants are normally not used for processing, e.g. release agents can be applied directly to the mould instead of being incorporated into the plastisol. If necessary, both heat and light stability of mixed metal stabilizers can be enhanced by adding epoxidised soya bean oil (ESBO) like Baerostab LSA or epoxidised fatty acid ester like Baerostab LSU. Low tox, low odour and low volatile stabilizer systems have become more and more common in plastisol applications, e.g. in flooring, wall coverings, toys, car interiors, etc. ...

Baerlocher stabilizers for plastisols are developed under respect of REACH regarding the safety and protection of people and environment.

When choosing a stabilizer, the requirements of the final product need to be specified in detail in order to adjust both the performance and the price-effectiveness of the stabilizer.

The requirements a stabilizer must comply with:

- application
- processing and specific necessities
- the performance required of the final product
- the legal requirements during manufacturing and use of the final product.



Plastisol products (unsupported or supported) include the following:

- artificial leather (compact, expanded, compact-expanded)
- automotive artificial leather (compact, expanded, compact-expanded)
- car underbody sealants and seam sealers (compact)
- carpet backing and heavy weight coatings (compact, expanded)
- conveyor belts (compact, single-layers, multi-layers)
- dipped goods and dip coatings (compact, e.g. tool handholds, bar ends)
- dolls, balls, toy animals, anatomic models for education, etc. (compact)
- floorings (compact, expanded, compact-expanded)
- wall coverings (compact, expanded, compact-expanded)
- coated textiles, tarpaulins, tents, coil coatings (compact)
- roofing membranes (compact)
- sealants for closures (compact, expanded)
- gloves, boots (compact)

The most important properties which are influenced by the stabilizer include:

Stabilizer	Processing	Finished product
Efficiency	Static heat stability	Haptic / Surface / Gloss / Colour / Odour
Compatibility with ESBO	Dynamic heat stability	Transparency / Whiteness
Compatibility with plasticizer	Fusion	Conformity to regulations / standards
Compatibility with bonding agents	Adhesion	Toxicity / non tox approval
Colour	Mould release	Residual heat stability
Emission / VOC	Plate-out during embossing	Light fastness / UV resistance
Flashpoint	Condensation	Weather resistance
Odour	Paste deaeration	Heat ageing resistance
Handling behaviour	Paste viscosity	Amine resistance
Storage stability	Paste ageing	Fogging / Emissions / VOC
Ingredients		Migration behaviour
		Printability
		Weldability
		Adhesive compatibility
		Blocking behaviour

**Important notice**

Non-tox products: A group of stabilizers composed of those components approved by the different regulations as substances in PVC intended to come into contact with foodstuffs. For detailed pieces of information please contact one of Baerlocher's representatives.

Dependent on the final use goods could be produced in compact and expanded form or in many combinations. Expanded goods are either produced by mechanical foam (dispersion of small air bubbles like whipped cream) or by chemical process (decomposition of added blowing agent).

Azodicarbonamide (ADC) is the blowing agent with highest importance. For food contact applications (e.g. crown caps) ADC is no longer admitted and replaced by sodium-hydrogen-carbonate in combination with a non-tox stabilizer.

So called kickers reduce the high decomposition temperature of ADC to approx. 150°C to 200°C. Kickers also have a stabilising effect.

Most widely-used kickers are potassium-zinc (K/Zn) and barium-zinc (Ba/Zn). Kickers based on low odour and low volatile solvents with a flash point higher 100°C are favoured.

For plastisol processing following techniques are used :

- Spread coating
- Screen printing
- Casting
- Dipping
- Spraying

During spread coating the plastisol is applied to textiles, fabrics, mats, metal belts, papers or release papers by a knife, a roller or a brush, followed by gelling or pre-gelling when further coatings will be applied. Gelling and pre-gelling could be made by drum or by oven.

Casting technology include 3 different possibilities:

A. casting of solid parts

B. slush moulding of half-open parts (e.g. crash pads for automotive applications) and

C. rotational moulding for the manufacture of closed hollow bodies (e.g. balls, dolls, toys, anatomic models)

There are two different ways of dip coating: hot dipping (the moulds or metal parts are heated before dipping) and cold dipping (the moulds or metal parts are cold or slightly pre-heated when dipped into the plastisol). With hot dipping coating thickness is determined by temperature of the dipped part and the dipping time in the plastisol, which has usually a low viscosity and very good ageing behaviour. With cold dipping viscosity and rheological behaviour are the most important factors.

During spraying process the PVC mass is applied by a nozzles to metal surfaces under high pressure. The sprayed product will be gelled by moving to an oven.



# Applications

## Stabilizers for carpet backing

With this application based on paste-making PVC copolymers (approx. 5 % acetate) special types of azodicarbonamide are used which contain some activators for reduction of the decomposition temperature.

For increasing activation kickers are suitable due to their high zinc content.

For compact backing or heavy-weight coatings the same CaZn stabilizers are recommended as used for basecoat of CV flooring (cf. p. 10).

Baerostab	Form	Type	Characteristics
L 144-100	L	Zn	Standard octoate free zinc kicker, solvent with high flash point
KK 48	L	KZn	High performance, fast kicker, outstanding early colour
KK 430	L	KZn	Standard, fast kicker, good heat stability
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free
CT 683 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free,

L = liquid

## Stabilizers for closures

Sealing compounds for closures must display special organoleptic properties (no influence on taste and colour of foodstuff). The following products have been found to yield satisfactory results:

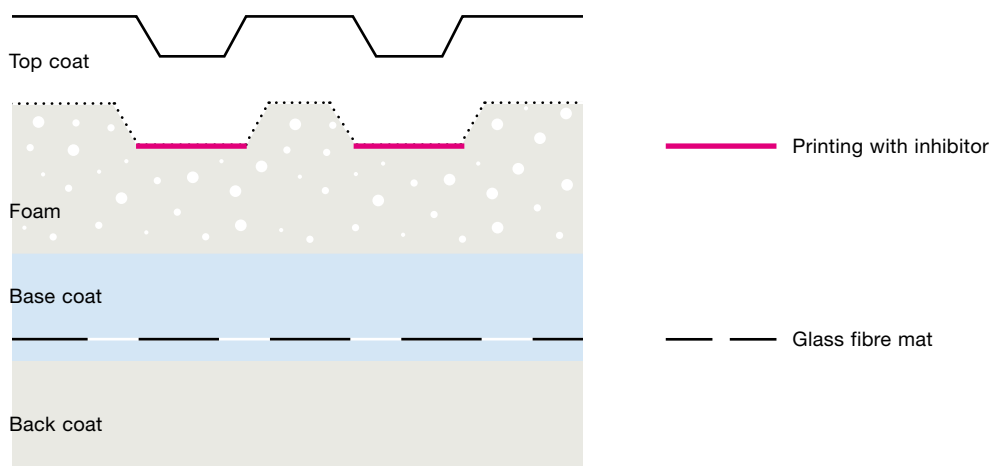
Baerostab	Form	Type	Characteristics
Zincum 5 Zincum T	P	Zn	Standard, non-tox, solid kicker with stabilising effect, phosphite free, 2-EHA free,
Zincaprilat SW	P	Zn	Standard plus, non-tox, solid kicker with stabilising effect, phosphite free, 2-EHA free, higher Zn content as Zincum series
NT 1 S NT 170 P	P	CaZn	Standard, non-tox, solid stabilizer with kicking effect, phosphite free, 2-EHA free
NT 164 PS	PS	CaZn	Standard, non-tox, stabilizer in paste form, phosphite free, 2-EHA free, cost efficient
NT 170 PS	PS	CaZn	Standard, non-tox, stabilizer in paste form, phosphite free, 2-EHA free, good heat stability
NT 324-1 P	P	Zn	Standard, non-tox, solid stabilizer, 2-EHA free, in combination with food-approved foaming agent Baerocel NT 2005

PS = paste; P = powder

## Stabilizers for flooring

Floorings manufactured by plastisol processing are heterogeneous (combination of PVC with other materials, e.g. glassfibre mat), mainly Cushion Vinyls (CV).

### CV flooring



**As shown above, CV flooring normally consists of 6 layers (from top to bottom):**

1. the topcoat or wear layer (provides the wearing properties),
2. the printing, normally up to 6 colours, partly with inhibitor containing printing ink,
3. the foam coat which will be chemically inhibited,
4. the basecoat (or impregnation coat) for closing the open glass fibre mat and for achieving an absolutely smooth surface for the following coating,
5. the glass fibre mat and
6. the backing.

## Topcoat

The topcoat is the last spread coating in the manufacture of the upper side of the flooring.

After applying the topcoat the flooring is finally gelled and expanded in an oven. This step mainly determines the speed of the total line, assuming that the total process is continuous.

The stabilizer of the topcoat must meet quite a number of demanding requirements. Not only does the stabilizer impart the heat stability required for processing, it also influences colour, transparency, brilliancy, light stability, dark yellowing, stain resistance, PU lacquering and the decomposition of the blowing agent in the foam coat close to the border-line foam coat/top-coat.

Other important requirements are very low volatility, low odour and low phenol content. The following stabilizers are recommended:

Baerostab	Form	Type	Characteristics
CT 9183 X RF	L	CaZn	Standard, low phenol, 2-EHA free, nonylphenol free, ptBBA free, low odour
CT 9169 X RF	L	CaZn	Standard plus, low phenol, 2-EHA free, nonylphenol free, ptBBA free
CT 9183 XLP RF	L	CaZn	Standard, very low phenol, 2-EHA free, nonylphenol free, ptBBA free, low odour
CT 9169 XLP RF	L	CaZn	Standard plus, very low phenol, 2-EHA free, nonylphenol free, ptBBA free
UBZ 613-1 X RF	L	BaZn	Standard plus, low phenol, low odour, 2-EHA free, nonylphenol free, ptBBA free, designed for "gelling drum" processing,
CT 143-1 PS	PS	CaZn	Standard plus, low odour, phenol free, 2-EHA free, nonylphenol free, ptBBA free, designed for "gelling drum" processing, Paste based on DIDP, dosage between 3,0 and 5,0 phr
CT 343-1 P	S	CaZn	Standard plus, low odour, phenol free, 2-EHA free, nonylphenol free, ptBBA free, designed for "gelling drum" processing, Dosage between 1,0 and 1,5 phr
CT 1181 P	S	CaZn	Standard plus, low odour, phenol free, 2-EHA free, nonylphenol free, ptBBA free, Dosage between 1,0 and 2,0 phr

L = liquid; PS = paste; S = solid

## Printing

After pregelling the foam coat is printed. For an excellent printing quality the surface of the foam coat must be absolutely smooth. Some of the printing inks contain a so-called inhibitor (usually benzotriazole and its compounds) which delays or prevents expansion of the foam coat when applied to specific areas. During later expansion this method produces flooring with a relief structure according to the printed design and is known as chemical embossing.

## Basecoat

The surface quality of the pre-gelled basecoat is responsible for the smoothness and uniform thickness of the applied foam coat and therefore also affects the quality of the later printing. To achieve an absolutely smooth and closed (porous-free) surface the basecoat is gelled in contact with a heated metal surface (heated drum). During spreading onto the open glass fibre mat the plastisol penetrates more or less into the mat (impregnation of the mat). The degree of penetration is fixed by the type of glass fibre mat, the plastisol rheology, the kind of spreading and the line speed. Normally, relatively highly filled plastisols (or mechanical foams) are applied. For the heat stabilization inexpensive stabilizers are sufficient except in cases where additional requirements of the finished product demand special stabilizers like low emission, low phenol content and low odour products. The normal dosage is about 1 phr.

Baerostab	Form	Type	Characteristics
CT 683 X RF	L	MgZn	Standard, low odour, phosphite free, phenol free, nonylphenol free, ptBBA free, 2-EHA free
NT 583 P	P	CaZn	Standard plus, low odour, phosphite free, phenol free, nonylphenol free, ptBBA free, 2-EHA free, designed for "gelling drum" processing

L = liquid; P = solid/powder



## Stabilizers for artificial leather

The product range of artificial leathers is almost unlimited. The large number of possible products, beginning with compact unsupported and ending with compact-expanded-textile supported for various requirements or applications (bags, upholstery, clothing, suitcases, shoes, table cloth, etc.), is additionally complicated by variations in processing. All these different possibilities result in different requirements and therefore affecting the choice of stabilizer and kicker.

### Compact artificial leather and topcoats

Baerostab	Form	Type	Characteristics
UBZ 660-4 RF	L	BaZn	Standard, nonylphenol free, ptBBA free
UBZ 711-1 X RF	L	BaZn	Standard plus, low phenol, 2-EHA free,
CT 683 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free, low odour
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free

L = liquid



**Close to the reality -  
artificial leather**

### Kicker for artificial leather

Baerostab	Form	Type	Characteristics
KK 42	L	KZn	Standard, fast all-round kicker,
KK 42-4	L	KZn	Standard, fast all-round kicker, 2-EHA free

L = liquid

### Stabilizers for artificial leather / automotive use

The requirements on the raw materials for products for car interiors have been increased dramatically in the last years. The specifications range from more stringent fogging demands to heat ageing resistance in the temperature range of 130 °C and perfect vacuum forming of unsupported expanded artificial leather. A further requirement is the colour resistance in contact with PUR foam.

Co-stabilizers like Baerostab ASM 711 and ASM 715 normally used in combination with basic stabilizers.

Baerostab	Form	Type	Characteristics
UBZ 711-1 X RF	L	BaZn	Standard plus, low phenol, nonylphenol free, ptBBA free, 2-EHA free,
ZE 603	L	Epoxy	Standard plus, epoxy based, metal free, phenol free, nonylphenol free, ptBBA free, 2-EHA free,
NT 580 A	P	CaZn	Standard plus, phenol free, nonylphenol free, 2-EHA free, ptBBA free, Bisphenol A free, low fogging, low odour
CT 181 PS	PS	CaZn	Standard plus, phenol free, nonylphenol free, 2-EHA free, ptBBA free, Bisphenol A free, low fogging, low odour, Paste based on DIDP
ASM 711 ASM 715	P	Co-stabilizer	Co-stabilizers in combination with BaZn and CaZn for improvement of heat ageing resistance in the temperature range of 120 °C to 150 °C and amine resistance when plastisol comes in contact with PUR foam.
KK 430-4	L	KZn	Standard, fast kicker, good heat stability

L = liquid; PS = paste; P = powder

## Kickers and stabilizers for vinyl wall coverings

High speed processing for wall covering manufacturing requires kickers to start chemical foaming reaction. Next to kickers stabilizers are needed for compact vinyls or compact parts of expanded vinyls. The requirements on the kickers and stabilizers regarding kicking behaviour, whiteness and heat stability are extremely high. New issues like odour and emissions become more and more important.

Baerostab	Form	Type	Characteristics
KK 42	L	KZn	Standard, fast all-round kicker,
KK 42-4	L	KZn	Standard, fast all-round kicker, 2-EHA free
KK 48	L	KZn	High performance, very fast kicker, excellent early colour
KK 432	L	KZn	High performance, very fast kicker, 2-EHA free
UBZ 660-4 RF	L	BaZn	Standard, nonylphenol free, ptBBA free
CT 683 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free, low odour
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free

L = liquid

## Stabilizers for outdoor applications, coated textiles, roofing and coil coating

Roofing, coated textiles (e.g. tarpaulins, tents, inflatable tents, advertisement banners, sun-protections) and coil coating require particularly high light and weathering resistance. Coated textiles require special discolouration resistance caused by amine-based bonding agents.

Baerostab	Form	Type	Characteristics
UBZ 660-4 RF	L	BaZn	Standard, nonylphenol free, ptBBA free, suitable for coil coating
UBZ 711-1 X RF	L	BaZn	Standard, low phenol, 2-EHA free, nonylphenol free, ptBBA free
UBZ 729 RF	L	BaZn	Standard plus, 2-EHA free, nonylphenol free, ptBBA free, highly self lubricated, high whiteness, high compatibility with bonding agent
CT 9169 X RF	L	CaZn	Standard, all-purpose, 2-EHA free, nonylphenol free, ptBBA free, suitable for coil coating
NT 319 P MC 8763-1 CP	P	CaZn	High performance, non-tox for all types of films and profiles, phenol free, 2-EHA free, nonylphenol free, ptBBA free, low emission, performance could be improved by combination with liquid phosphites like Baerostab CWM 201
MC 8763-3 CP	P	CaZn	High performance, especially developed for pool liner, non-tox for all types of films and profiles, phenol free, 2-EHA free, nonylphenol free, ptBBA free, low emission, performance could be improved by combination with liquid phosphites like Baerostab CWM 201
ASM 711 ASM 715	P	Co-stabilizer	Co-stabilizers could be used in combination with basic stabilizers to improve heat ageing and discolouration resistance.

L = liquid; P = solid/powder



Front lit



## Stabilizers for car underbody sealants and seam sealers

For these application plastisol will be applied by spraying process is used (high pressure spray nozzles). Stabilizers of low fatty acid content and low water absorption are preferred.

Baerostab	Form	Type	Characteristics
UBZ 674 X RF	L	BaZn	Standard, low phenol, nonylphenol free, ptBBA free, high heat stability,
NT 319 P MC 8763-1 CP	P	CaZn	High performance, free of compounds under discussion, long thermo-stability

## Stabilizers for dip coating

Handles for tools and bicycles, hangers and gloves without fabric are manufactured by the hot dipping process. Wire baskets, frames, table and chair legs or textile supported gloves are provided with a PVC coating by cold dipping.

Baerostab	Form	Type	Characteristics
UBZ 660-4 RF	L	BaZn	Standard, nonylphenol free, ptBBA free,
UBZ 711-1 X RF	L	BaZn	Standard plus, low phenol, nonylphenol free, ptBBA free, 2-EHA free
UBZ 771 RF	L	BaZn	Standard, nonylphenol free, ptBBA free, high heat stability
NT 1 S NT 170 P	P	CaZn	Standard, non-tox EC / FDA approved, phenol free, nonylphenol free, ptBBA free, 2-EHA free,
NT 170 PS	PS	CaZn	Standard, non-tox paste based on ESBO, EC / FDA approved, phenol free, nonylphenol free, ptBBA free, 2-EHA free
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free
CT 683 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free, low odour
NT 333 RF	L	CaZn	Standard, non-tox, phosphite-free, phenol-free, 2-EHA free, nonylphenol free, ptBBA free, suitable for toys to be in compliance with EN 71, compliance with food contact regulations

L = liquid; PS = paste; P = powder

## Stabilizers for rotational moulding

Balls, dolls, anatomic models, toy animals and other articles are produced by rotational moulding. Besides from technical requests, for goods used by children final product must comply with the requirements of the European Toys Standard EN 71.

Baerostab	Form	Type	Characteristics
UBZ 711-1 X RF	L	BaZn	Standard plus, low phenol, nonylphenol free, ptBBA free, 2-EHA free,
UBZ 674 X RF	L	BaZn	Standard, low phenol, nonylphenol free, ptBBA free, high heat stability,
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free
CT 682 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free, low odour
NT 333 RF	L	CaZn	Standard, non-tox, phosphite-free, phenol-free, 2-EHA free, nonylphenol free, ptBBA free, suitable for toys to be in compliance with EN 71, compliance with food contact regulations

L = liquid



## Stabilizers for conveyor and processing belts

There are an uncountable number of different conveyor and processing belts. Belts are used for technical and food contact applications. Special requirements as HACCP (hazard analysis and critical control point concept) for food + pharma belts must be taken into consideration. Conveyor and processing belts are normally multi-layer systems coated on a fabric, often basecoat is containing amine based bonding agents.

Baerostab	Form	Type	Characteristics
UBZ 660-4 RF	L	BaZn	Standard, nonylphenol free, ptBBA free
UBZ 729 RF	L	BaZn	Standard plus, 2-EHA free, nonylphenol free, ptBBA free, high whiteness, high compatibility with bonding agent
UBZ 674 X RF	L	BaZn	Standard, nonylphenol free, ptBBA free, high heat stability
NT 1 S NT 170 P	P	CaZn	Standard, non-tox EC / FDA approved, phenol free, nonylphenol free, ptBBA free, 2-EHA free
NT 170 PS	PS	CaZn	Standard, non-tox paste based on ESBO, EC / FDA approved, phenol free, nonylphenol free, ptBBA free, 2-EHA free
CT 680 X RF	L	MgZn	Standard, good colour properties, phosphite free, nonylphenol free, ptBBA free
CT 683 X RF	L	MgZn	Standard, phosphite free, 2-EHA free, nonylphenol free, ptBBA free, low odour
NT 333 RF	L	CaZn	Standard, non-tox, phosphite-free, phenol-free, 2-EHA free, nonylphenol free, ptBBA free, compliance with food contact regulations

L = liquid; PS = paste; P = powder

# Other Additives for the Processing of Plastisol

Product	Type	Form	Dosage [phr]	Characteristics
Baerolub 72 O	Viscosity depressant	L	3,0–10,0	High flash point hydrocarbon, low VOC, improves mould release behaviour,
Baerolub 76	Viscosity depressant	L	3,0–10,0	Low flash point hydrocarbon, improves mould release behaviour
Baerolub L-KK	External lubricant	L	0,1–0,5	Hydrocarbon wax, suitable for twist-off cap application, it reduces opening force, EC / FDA approved
Baerostat 318 S	Antistatic agent	L	0,5–10,0	Improves electrical conductivity, imparts antistatic properties
Baerostat 351	Antistatic agent	L	0,5–10,0	Improves electrical conductivity, imparts antistatic properties
Laevisiel SL	Silica	P	0,5–1,0	Avoids formation of plate-out during processing, d50 = 5 µm
Laevisiel SP	Silica	P	0,5–1,0	Avoids formation of plate-out during processing, d50 = 20 µm
Baerostab ASM 104	Co-stabilizer	P	0,1–0,5	Organic co-stabilizer for combination with mixed metal stabilizers in order to prevent a pink discolouration during heat ageing (especially in darkness)
Baerostab ASM 711 Baerostab ASM 715	Co-stabilizer	P	0,5–2,5	Improvement of the heat ageing resistance in the temperature range of 120–150 °C (prevents discolouration and embrittlement) and for achievement of amine resistance (PUR foam backing)
Baerostab B 200 P	UV Absorber	P	0,2–0,4	Improvement of the light stability/weatherability for outdoor applications
Baerostab LSA	ESBO	L	2,0–4,0	Epoxidised soya bean oil, improvement of heat and light stability by synergetic effect together with mixed metal stabilizers
Baerostab LSU	Epoxy octyl stearate	L	2,0–4,0	Co-stabilizer, improvement of heat and light stability by synergetic effect together with mixed metal stabilizers
Baerostab CWM 35	Organo-Phosphite, TNPP	L	0,3–1,0	Organic co-stabilizer, improvement of heat stability and colour, low odour
Baerostab CWM 201	Organo-Phosphite, TTDP	L	0,3–1,0	Organic co-stabilizer, improvement of heat stability and colour, low odour, for outdoor applications
Baerostab CWM 201 XLP	Organo-Phosphite, TTDP	L	0,3–1,0	Organic co-stabilizer, improvement of heat stability and colour, low odour, for outdoor applications, very low phenol

L = liquid; P = powder

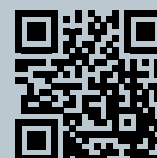




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