

# Solutions for the architectural coatings industry

Dispersions, formulation and performance additives



 **BASF**  
We create chemistry



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## Advanced solutions for architectural coatings

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Coatings design interior and exterior living spaces. At the same time, they create a sense of well-being and living comfort. To do so, they must meet many demands with regard to superior performance properties and product quality. Our product range from dispersions, resins to additives offers you the best solutions for various applications in the architectural coatings industry.



### High-performance façade coatings

Exterior paints need specific properties to be resistant enough over time and be able to cope with highly demanding weather conditions.

BASF's range of dispersions allows coatings formulators to develop high-class paints that will retain their initial quality level. Textured coatings are used to achieve a decorative structure on interior or exterior walls. Especially exterior textured finishes have a high resistance against the impact of water and staining materials and an excellent adhesion to the different substrates they are applied to. Straight acrylic binders have an inherent durability property that is reinforced by their excellent adhesion properties. Despite bad weather conditions and daily moisture exposure, paints formulated with our range of products maintain excellent film adhesion and flexibility and provide outstanding durability.

### Specialized products for interior finishes

Interior paints play an important role in increasing the quality of our lives. They help create more enjoyable and colorful living space while protecting the walls of our homes. At the same time, they need to offer excellent properties like wet scrub and stain resistance as well as good cleanability in order to withstand everyday use. With increasingly demand-

ing environmental standards, they have to be low in odor and VOCs, should not contain harmful substances and must comply with different ecolabels. BASF's range of products helps formulators develop high-quality and sustainable interior paints that keep their excellent aesthetic appeal look over time.

### Solutions for premium exterior and interior wood coatings

As your partner for wood, we support you by overcoming the challenges involved in formulating advanced exterior and interior wood coatings. We believe that innovative solutions are inspired by the exchange of ideas and information.

Whatever your needs are, you can rely on our proven expertise in polymer technology and colloids. We support you with formulation guidance, application assistance and expertise in testing. Protecting the natural beauty of wood is our passion. You can choose from our comprehensive and environmentally advanced portfolio of raw materials that suit the various requirements of exterior (decorative, joinery and trim paint applications) and also interior wood coatings for furniture and flooring applications.

## Creating chemistry for more sustainable architectural coatings

**Formulations in the architectural coatings industry have to meet high requirements:** They are expected to always provide greater performance while saving resources in the manufacturing process. At the same time, users and consumers are looking for safe, health-friendly coatings. No matter what kind of challenge you may face – we at BASF are committed to understanding these expectations.

**To drive forward sustainable development,** we have reviewed our entire portfolio under sustainability aspects by our standardized "Sustainable Solution Steering Method". By identifying key

drivers in the architectural coatings industry along the entire value chain, we are able to assess the sustainability contribution of each product in its specific application.

**Take a look at our broad portfolio** and let's discuss how to achieve more sustainable solutions in accordance with your specific needs. This way, you can combine environmental and social requirements with business success!

Further information at  
[www.basf.com/architectural-coatings](http://www.basf.com/architectural-coatings)



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## Dispersions by BASF – performance loves sustainability

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The Joncryl<sup>®</sup>, Luhydran<sup>®</sup> and Acronal<sup>®</sup> product families are water-based state-of-the-art solutions that work in a variety of decorative and wood coating solutions. They offer outstanding formulation latitude and enable our customers to successfully distinguish themselves in their markets.

Paints based on COL.9<sup>®</sup> keep façades looking fresher longer, while AQAGloss<sup>®</sup> technology by BASF offers alkyd-like features with outstanding durability for trim paints and exterior wood coatings – combining both innovative technology and environmental friendliness.

The AQACell<sup>®</sup> product is an opacifier that enables you to reduce the amount of TiO<sub>2</sub> in your formulation without sacrificing the coating's performance.

## Explanation of data

### Applications

The applications are divided into interior applications, exterior / façade coatings, silicate / silicone / stucco and wood coatings.

The following icons indicate the application for which the individual products are particularly recommended. This indication does not mean that the respective product may not be used for other applications.



interior applications



exterior / façade coatings



silicate / silicone / stucco



wood coatings



### Acronal® ECO

Sustainability is not a trend – it is a matter of course for the majority of premium decorative paints. Our range of solutions offers formulation latitude to create health-friendly paints that can exceed regulatory standards and that are in line with all relevant European ecolabels for paints. The possibilities are endless: fresh paints you cannot smell anymore, water-based interior trim paints without solvents, and façade paints that make biocides stay where they belong – within the coating, stopping them from trickling into the soil. Look for our range of binders tagged with ECO.

### Acronal® PLUS

Additional functionalities in our raw materials offer room for differentiation in the market. They enable formulators to achieve superior properties for numerous segments and applications, be it easy-to-clean surfaces for interior paints, extremely elastic façade paints to for bridging cracks in the substrate, or water-based deck stains for terraces that penetrate the wood more rapidly. Add a PLUS to your recipe by choosing from our range of dedicated products.

### Acronal® EDGE

Sets new market standards by using the latest technologies. Our EDGE products enable you to formulate premium paints with superior performance that increase renovation cycles for exterior façades and remain as bright and shiny as on the first day. Warranties for transparent and opaque coating systems for wooden doors and windows can be extended up to 10 years. Cutting-edge formulation know-how and expertise in tailoring raw materials take your best-in-class recipes to the next level.

### Acronal® HIDE

Maximizing opacity has been an important formulation goal for many years. Our HIDE products improve the hiding power of paints while saving  $\text{TiO}_2$ . This way our customers can improve resource efficiency and reduce costs. In effect, this means high-performing and more sustainable paints.



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## Styrene and pure acrylic technologies

Styrene and pure acrylics come with very high durability against the influence of weathering, which is important for exterior applications. Through careful selection of the type and quantity of the individual building blocks, it is possible to produce polymer dispersions with a wide range of properties. This allows us to cover various applications in the field of architectural coatings with pure acrylics, styrene acrylics as well as hybrid systems with alkyds and silicates and – if need be – additionally designed with multiphase morphology and the use of special functional monomers. Our product portfolio for architectural coatings is complemented by opaque polymers designed by hollow sphere technology.

### Multiphase morphology

Dedicated particle design of the polymer latex is increasingly important to fulfill the demands of state-of-the-art paints and coatings. Multiphase morphologies such as core shell, half-moon, acorn or raspberry like structures allow us to provide latexes with unique properties. For example, contradictory requirements such as early block resistance and good film formation at low contents of volatiles can be overcome by the right choice of the particle morphology. In this case: the right balance of soft and hard phases in the same particle.

### Functional dispersions

The diverse selection of functional monomers enables us to equip the emulsion polymers with unique properties. As architectural coatings are being applied on various substrates, different adhesion properties are requested. The combination of substrates like wood, mineral surfaces, metals, or pre-coated surfaces with coatings shows different physical interactions. Therefore, an appropriate selection of functional groups attached to the polymer backbone is necessary for optimization. In certain cases, such interaction is furthermore strengthened by chemical links formed between the polymer and active functions on the substrate's surface. Binders can be optimized for one specific substrate (such as wood) only, or several adhesion promoters may be co-polymerized in parallel to guarantee universal adhesion properties as requested for "house paints".

### RC technology

RC technology makes use of protective colloids for the stabilization of polymer dispersions, enabling finer particle sizes at lower surfactant levels and controlled viscosities compared to traditional sur-

factant-stabilized polymer dispersions. The protective colloid, which comes with a controlled molecular weight, is an integral part of the binder and may provide additional functionality (e.g. wet adhesion, block resistance, etc.).

### Hybrid technology

Alkyd-acrylic hybrids unite the best of both worlds: alkyd-like high gloss and application properties with acrylic durability are within reach. The patented hybridization process allows for both intimately-linked true hybrid film domains as well as the stratification of alkyd towards the film surface during film formation. This gives those final touches towards excellent performance that neither alkyds nor acrylics can deliver on their own.

Silica-acrylic hybrids are an example of organic-inorganic hybrids that allow the uniform distribution of high levels of colloidal silica nanoparticles in an acrylic polymer film. Hybrid particles are produced by a multi-step emulsion polymerization process in which an acrylic polymer particle is gradually linked to multiple silica particles. The marriage of organic and inorganic on the nanoscale gives rise to high dimensional stability of the final paint film, a superhydrophilic effect surface that results in excellent dirt pick-up resistance, durability and low-thermoplasticity.

### Opacifying polymers

























The binder portfolio is complemented by opacifying polymers (AQACell). Opacifying polymers are sub-micron-sized spheres with a hard shell and a water-swollen acrylic core. The spheres are produced by a proprietary process. Upon drying, the spheres produce air-filled hollows which scatter light and are used as a partial replacement for titania pigments in architectural coatings.

## Styrene acrylics and opacifier


Product name	Data							Detailed information (advantages)
	Solids content (%) +/- 1	PH value	Viscosity (mPa·s) DIN EN ISO 3219 (23°C, 100 1/s)	Particle size (µm)	MFFT (°C)	Stress at break at 23°C (N/mm <sup>2</sup> )	Elongation at break at 23°C (%)	
All products are free of APEOs.								
<b>Styrene acrylics</b>								
<b>Acronal® ECO 6258</b>	50	7.5 - 8.5	20 - 200	0.15	3	3.2	1000	Low odor, for low VOC formulations, broad formulation latitude, good dirt pick-up resistance (photo-crosslinking), ammonia-free; can be also used for tannin-blocking primers
<b>Acronal® S 559</b>	50	6.0 - 7.5	70 - 400	0.15	3	3	800	Low odor, for low VOC formulations, broad formulation latitude, ammonia-free
<b>Acronal® S 562</b>	50	7.0 - 8.5	400 - 1,200	0.12	< 1	2	> 1,100	Excellent cost performance, good flexibility also at low temperatures (Tg -8°C), good dirt pick-up resistance by photo-crosslinking, low water sensitivity
<b>Acronal® 6562</b>	50	7.0 - 8.5	400 - 1,200	0.12	< 1	2	> 1,100	Acronal® S 562 without photo-crosslinking
<b>Acronal® S 589</b>	52	6.5 - 8.0	80 - 300	0.15	1	5	700	Low odor, for low VOC formulations, low surface tack, ammonia-free; can be used for tannin- and nicotine blocking primers; suitable for wet room paints
<b>Acronal® ECO 6716</b> Alternative of Acronal® 290 D	50	6.5 - 8.5	300 - 1,000	0.15	22	7	500	Broad formulation latitude, low odor, ammonia-free
<b>Acronal® PLUS 6727</b>	45	9.0 - 11.0	20 - 100	0.1	8	12	280	Excellent tannin and nicotine blocking; state-of-the-art primer for exterior wood coating solutions for Deco and Joinery
<b>Acronal® S 790</b> Alternative of Acronal® 290 D	50	7.5 - 9.0	700 - 1,500	0.1	20	10	400	Broad formulation latitude, exceptional cost performance
<b>Acronal® S 813</b>	50	7.6 - 8.2	100 - 250**	0.1	28	5	450	With siloxane functionality to improve adhesion to mineral substrates, very good water resistance, excellent wet scrub resistance
<b>Acronal® 6292</b>	50	6.5 - 7.5	20 - 100	0.17	5	-	-	Outstanding wet scrub resistance, low odor, for low VOC formulations, coalescent- and ammonia free formulations possible, exceptional cost performance
<b>Acronal® HIDE 6296</b>	50	7.0 - 8.5	100 - 600	< 0.2	20	-	-	Outstanding titanium dioxide utilization, exceptional cost-performance ratio, excellent saponification and alkaline resistance, very good water resistance, superior dirt pick-up resistance
<b>Opacifier</b>								
<b>AQACell® HIDE 6299 X</b>	30	8.1 - 9.5	10 - 50	0.4	> 80	-	-	Highly scattering organic pigment, additional pigment spacing effect that ultimately results in increased TiO <sub>2</sub> efficiency, broad formulation latitude, ammonia-free, low odor

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.  
\*\* viscosity (mPa·s) DIN EN ISO 3219 (23 °C, 250 1/s)




Detailed application area															Applications	Sustainability driver*
Exterior paints	Textured finishes	Concrete protection coatings	Exterior insulation and finishing systems EIFS	Floor coatings	Interior paints	Flexible paints	Wood paints	Wood stains	Gloss and satin latex paints	Primers	Tinters and deep-tone paints	Silicate emulsion paints	Corrosion protection	Joinery coatings		
■	■		■			□				■		■			 	■
■	■		■		■	□				□	■	■			  	■
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■		■			■		■		□	■					 	

■ very suitable □ suitable

 interior applications

 exterior/façade coatings

 silicate/silicone/stucco

 wood coatings

## Pure acrylics

Product name	Data							Detailed information (advantages)
	Solids content (%) +/- 1	PH value	Viscosity (mPa·s) DIN EN ISO 3219 (23°C, 100 1/s)	Particle size (µm)	MFFT (°C)	Stress at break at 23°C (N/mm <sup>2</sup> )	Elongation at break at 23°C (%)	
								All products are free of APEOs.
Pure acrylics								
<b>Acronal® ECO 6380</b>	47.5	7.0 - 8.5	50 - 400	0.1	2	10	300	For environmentally advanced health-friendly low-odor emulsion paints with good wet adhesion for indoor ceilings, walls, mouldings and panels; broad formulation latitude (low to high PVC), excellent hiding power, good pigment-binding power, for low VOC formulations, also for anti-allergic paints
<b>Acronal® PLUS 6282</b>	48	7.0 - 8.5	50 - 500	0.15	2	5	700	For environmentally advanced matt paints with outstanding resistance to both hydrophobic and hydrophilic stains; extremely low odor, for low VOC formulations, ammonia-free
<b>Acronal® PLUS 6288</b>	44	7.5 - 8.5	50 - 400	0.08	< 3	8	220	Fine-sized, multiphase binder with a tailor-made morphology, a special wet adhesion promotor and an optimized stabilization package; specific solution for clear and semitransparent stains for wooden decks, impregnations and low to high build stains
<b>Acronal® 6312</b>	45	6.5 - 7.5	20 - 100	0.1	> 50	-	-	Hard modifier for exterior joinery and industrial cladding; excellent blend partner to improve hardness, scratch resistance and hot blocking behavior of Acronal® EDGE 6283 and Acronal® LR 9014
<b>Acronal® EDGE 6295</b>	49	7.5 - 8.5	50 - 300	0.13	22	15	200	Results in outstanding color retention and excellent exterior durability; very good hydrophobicity, broad formulation latitude
<b>Acronal® A 508</b>	41	7.5 - 8.5	50 - 200**	0.07	< 3	-	-	Exceptional penetration and wetting properties for mineral substrates and wood
<b>Acronal® A 684</b>	50	7.5 - 9.0	100 - 400	0.1	17	12	250	Broad formulation latitude, excellent durability and wet adhesion properties, especially for house paints
<b>Acronal® A 754</b>	48	7.5 - 8.5	200 - 900	0.1	17	12	200	Universal exterior binder, outstanding blushing resistance, excellent hydrophobicity, for colored aggregates
<b>Acronal® PLUS 6257</b>	60	7.0 - 8.5	40 - 200**	0.25	< 1	0.6	1,500	Outstanding elasticity down to -20°C, good dirt pick-up resistance by mass- and photo-crosslinking, excellent water protection at good water vapor permeability, ammonia-free
<b>Acronal® DS 6262</b>	50	7.5 - 8.5	30 - 200	0.2	14	16	100	Superior abrasion resistance, excellent exterior durability, low water uptake and water whitening, very good resistance against chemicals, fuel and oil, self-crosslinking
<b>Acronal® DS 6266</b>	48	7.5 - 8.5	80 - 500	0.1	14	10	350	Superior weathering resistance, good blushing resistance, for exterior paints and colored aggregates
<b>Acronal® ECO 6270</b>	50	7.0 - 8.5	50 - 500	0.1	2	5	650	Low odor, excellent weathering resistance, high pigment-binding power, for low-VOC paints, ammonia-free

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.  
\*\* viscosity (mPa·s) DIN EN ISO 3219 (23 °C, 250 1/s)



Detailed application area															Applications	Sustainability driver*
Exterior paints	Textured finishes	Concrete protection coatings	Exterior insulation and finishing systems EIFS	Floor coatings	Interior paints	Flexible paints	Wood paints	Wood stains	Gloss and satin latex paints	Primers	Tinters and deep-tone paints	Silicate emulsion paints	Corrosion protection	Joinery coatings		
					■		□		□						Interior applications, Wood coatings	■
					■										Interior applications	■
							■	■		■					Wood coatings	
							■	■	□				■		Wood coatings	■
■	■	■	□		□		■	■		□					Exterior/façade coatings	■
										■					Interior applications, Exterior/façade coatings, Wood coatings	■
■	□		□				■	■	□	□					Exterior/façade coatings, Wood coatings	
■	■	■	□		□		■	■			□				Exterior/façade coatings, Wood coatings	
■	□	□	□			■									Exterior/façade coatings	
		■		■			□		■						Interior applications, Exterior/façade coatings, Wood coatings	
■	■	■	□		□		■	■			□				Exterior/façade coatings, Wood coatings	
■	■	□	□		■						□				Interior applications, Exterior/façade coatings	■

■ very suitable □ suitable

Interior applications














exterior/façade coatings

wood coatings

## Pure acrylics and hybrid technologies

Product name	Data							Detailed information (advantages)
	Solids content (%) +/- 1	PH value	Viscosity (mPa·s) DIN EN ISO 3219 (23°C, 100 1/s)	Particle size (µm)	MFFT (°C)	Stress at break at 23°C (N/mm <sup>2</sup> )	Elongation at break at 23°C (%)	
All products are free of APEOs.								
<b>Pure acrylics</b>								
<b>Acronal® ECO 6370</b>	50	7.0 - 8.5	50 - 500	0.1	2	5	650	MIT-free version of Acronal® ECO 6270 for low VOC premium paints
<b>Acronal® DS 6277</b>	48	7.5 - 9.0	10 - 450	0.09	< 3	6	350	Excellent outdoor durability on wood, superior film elasticity together with outstanding water barrier properties (EN 927-5), blocking resistance and wet adhesion, excellent thickener interaction
<b>Acronal® LR 8960</b>	50	7.5 - 9.0	100 - 300	0.1	< 1	6	300	Proven over many years , excellent outdoor durability on wood, good blocking resistance, wet adhesion
<b>Acronal® LR 9014</b>	45	7.5 - 8.5	100 - 400	0.08	< 3	8.5	110	Broad formulation latitude, very good blocking resistance, very good durability, wet adhesion, excellent blushing and alkaline resistance, excellent stain resistance
<b>Luhdran® A 848 S</b>	44.5	6.5 - 7.5	150 - 250	0.07	39	-	-	Outstanding surface hardness, excellent resistance to water and blushing, superior resistance to household chemicals, self-crosslinking
<b>Hybrid technologies</b>								
<b>AQAGloss®</b> (Acrylic/Alkyd Hybrid)	42	7.0 - 8.5	40 - 300	0.1	< 1	3	250	Waterborne, environmentally friendly binder with alkyd-like features, superior gloss, excellent exterior durability and dirt pick-up resistance, also suitable for direct-to-metal applications, no siccation needed; can be used for tannin-blocking primers
<b>COL.9® 1200</b>	45	9.0 - 10.0	10 - 100	0.09	2	9	285	Exceptional dirt pick-up resistance, outstanding chalking resistance and color retention; wider formulation latitude and improved cracking behavior compared to former COL.9® DS 1100 X
<b>COL.9® 2000</b>	45	9.0 - 10.0	100 - 2800	0.09	2	11	190	Compared to COL.9® DS 1200, COL.9® DS 2000 results in coatings with harder surfaces and stronger adhesion to mineral surfaces



Detailed application area														Applications	Sustainability driver*	
Exterior paints	Textured finishes	Concrete protection coatings	Exterior insulation and finishing systems EIFS	Floor coatings	Interior paints	Flexible paints	Wood paints	Wood stains	Gloss and satin latex paints	Primers	Tinters and deep-tone paints	Silicate emulsion paints	Corrosion protection	Joinery coatings		
□	□	□	□		■						□				 	■
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■	□			□	□		□	□							 	
■				■			□									

■ very suitable □ suitable



Interior applications



Exterior/face coatings



Wood coatings

## RC technology

Product name	Data							Detailed information (advantages)
	Solids content (%) +/- 1	PH value	Viscosity (mPa·s) DIN EN ISO 3219 (23°C, 100 1/s)	Particle size (µm)	MFFT (°C)	Stress at break at 23°C (N/mm <sup>2</sup> )	Elongation at break at 23°C (%)	
								All products are free of APEOs.
<b>RC technology</b>								
<b>Acronal® EDGE 6283</b>	42	7.5 - 8.5	30 - 200	0.06	< 3	10	100	Superior durability on wood combined with an outstanding blocking resistance at low coalescent demand; excellent solution for transparent and opaque systems; high elasticity at low temperatures, very good adhesion; good water barrier properties without compromising breathability
<b>Acronal® 6327</b>	42	7.5 - 8.5	30 - 200	0.07	35 - 40	-	-	Self-crosslinking, hard and blocking resistant; binder for semi-protected joinery (e.g. wood-alumina windows and exterior doors) and hard modifier for exterior wood coatings
<b>Joncryl® 2560</b>	48	7.6 - 8.2	450 - 750	0.08	< 5	5	200	Broad formulation latitude, excellent elasticity and outdoor durability, high gloss level, blocking resistance; reduces coalescent demand and mud-cracking tendency
<b>Joncryl® 8280</b>	46	8.0 - 8.7	90 - 270	0.07	20	9	110	Broad formulation latitude for wood and trim, superior acrylic gloss level, good durability in exterior wood application
<b>Joncryl® 8284</b>	40	8.5 - 9.5	50 - 300	0.07	< 1	7	200	Excellent tannin blocking at still good interaction with associative thickeners, blocking resistance
<b>Joncryl® 8383</b>	40	7.5 - 8.5	20 - 200	0.07	16	15	80	Broad formulation latitude, excellent balance of surface hardness, blocking resistance and durability on hard wood, superior wet adhesion, very good water and blushing resistance
<b>Joncryl® 8387</b>	44	7.5 - 8.5	200 - 800	0.08	< 3	13	90	Broad formulation latitude, excellent blocking resistance and wet adhesion, outstanding water and blushing resistance, very good durability on wood





Detailed application area														Applications	Sustainability driver*	
Exterior paints	Textured finishes	Concrete protection coatings	Exterior insulation and finishing systems EIFS	Floor coatings	Interior paints	Flexible paints	Wood paints	Wood stains	Gloss and satin latex paints	Primers	Tinters and deep-tone paints	Silicate emulsion paints	Corrosion protection	Joinery coatings		
		□					■	■	■	□				■		■
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				□			■	■	■	■				■		

■ very suitable □ suitable

interior applications

exterior/façade coatings

wood coatings

## Acrylic emulsions, colloidal dispersions, self-crosslinking acrylic emulsions and polyurethane dispersions and polyurethane acrylic hybrids

Product	Appearance	Data					Key properties
		Solids by weight [%]	PH value	Viscosity [mPa.s] DIN EN ISO 3219 (23°C, 100 1/s)	MFT [°C]	Acid number on solids	
							All products are free of APEOs.
<b>Acrylic emulsions</b>							
<b>Joncryl® 8224</b>	Translucent emulsion	45	7.7	70	10	53	Very fast drying, excellent block resistance and stackability
<b>Colloidal dispersions</b>							
<b>Joncryl® 95 E</b>	Transparent emulsion	30	8.0	100	20	70	Excellent penetration, minimal grain raising, excellent clarity, fast drying, excellent sandability
<b>Self-crosslinking acrylic emulsions</b>							
<b>Joncryl® 8322</b>	Semi-translucent emulsion	41	8.6	500	30	18	Economical, good clarity and warmth of wood, quick hardness development, good chemical resistance, hardness and sandability
<b>Joncryl® 8330</b>	Semi-translucent emulsion	38	8.1	50	33	25	High clarity and chemical resistance, excellent block, good hardness development
<b>Joncryl® 1980-E</b>	Semi-translucent emulsion	39	8.6	150	56	18	Excellent chemical resistance, good scratch and mar resistance, low VOC, natural look
<b>Luhydran® A 849 S2</b>	White emulsion	44	7.0	200	39	20	High chemical resistance, excellent grain enhancement and scratch resistance
<b>Polyurethane dispersions and polyurethane acrylic hybrids</b>							
<b>Joncryl® U 4190</b>	Translucent emulsion	36.5	8.5	80	23	-	Cost-effective solvent-free; excellent appearance, clarity, chemical as well as scratch resistance, good grain enhancement
<b>Joncryl® HYB 6336</b>	Translucent emulsion	38	8.0	50	40	26	Solvent-free, high-solid polyurethane acrylic hybrid for excellent Taber <sup>®2</sup> abramer resistance, fast hardness development, good chemical resistance
<b>Joncryl® HYB 6340</b>	Translucent emulsion	40	7.6	50	45	12	Solvent-free, high solid, excellent Taber <sup>®2</sup> abrasion resistance, fast hardness development, good chemical resistance



Coating layer			Application segment		Detailed application	Deco
Primer / Sealer	Topcoat	Stains	Furniture	Flooring		
■	■	□	■	□	Emulsion recommended for primers and topcoats	
		■	■	■	Emulsion for quick-drying interior stains, wood sealers, clear lacquers	
□	■		■	□	Emulsion developed for use in industrial wood coatings	
□	■		■	□	Emulsion for high-quality interior clear and pigmented water-based wood coatings; good compatibility with UV dispersions	
	■		■	■	Self-crosslinking acrylic emulsion for interior wood applications	
□	■		■	□	Second generation emulsion for interior wood coatings	
	■		■	■	Ecological dispersion for high quality water-based clear coats on wooden flooring	
	■		■	■	Ecological aliphatic polyurethane acrylic hybrid for high-quality water-based clear coats on wood	
	■		□	■	Hybrid for high-quality water-based clear coats on wood for parquet flooring applications and high-performance furniture topcoats	

■ very suitable □ suitable

interior applications wood coatings



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# Formulation additives by BASF – improved performance with the right additives

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At BASF, we offer a comprehensive portfolio of formulation additives for architectural coatings. Our industry-leading offer comprises a strong selection of dispersing agents, defoamers, rheology modifiers, wetting and surface modifiers and film-forming agents. These unique products help create performance-driven products that meet the latest and most stringent environmental regulations.

## Our brands

	Water-based formulations	Non-aqueous formulations
<b>Dispersing agents</b>	Dispex® / Dispex® Ultra	Efka®
<b>Defoamers</b>	Foamaster® / FoamStar®	Efka®
<b>Rheology modifiers</b>	Rheovis®	Efka®
<b>Wetting and surface modifiers</b>	Hydropalat®	Efka®
<b>Film-forming agents</b>	Loxanol®	Efka®

Our brand names offer dedicated solutions for either water-based or non-aqueous-based applications. All non-aqueous system solutions are marketed under the strong Efka® brand. On the water-based side, multiple well-established brands (Dispex®, Hydropalat®, Foamaster®, Rheovis® and Loxanol®) represent our broad range of products. For certain product groups, we further differentiate products and their specifics via second dedicated brand names (Dispex Ultra® and FoamStar®).

**Looking for innovative solutions where little helps make all the difference for your high-quality coatings? At BASF, we create chemistry.**

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## Explanation of data

### Acid number

The acid number is determined by potentiometric titration with potassium hydroxide according to ISO 660. The value is given in mg KOH/g substance necessary for neutralization of the substance.

### Amine number

The amine number is determined by potentiometric titration with acid according to DIN 53176. It can be done in aqueous media with water-soluble amines or in acetic acid as solvent for water-insoluble amines. The amount of acid used is stoichiometrically converted to the equivalent amount of potassium hydroxide. The value is given in mg KOH/g substance.

### Iodine number

The iodine number is an indication of the content of carbon/carbon double bonds in a substance and is defined as the amount of iodine per 100 grams of substance which can be chemically added to the double bond. The measurement is carried out according to ISO 3961.

### Solid content

Solid content is determined according to ISO 3251 using an oven where the substance is heated in an aluminum pan for a defined time at a defined temperature, normally for 2 hours at 105°C with or without air circulation. The solid content is normally only determined where volatiles can be expected by the formulation. In other cases, it is set to 100%.

### Recommended for low-VOC systems

Recommended for low-VOC paints and coatings if VOC content < 1%.

### VOC content

The definition of volatile organic content (VOC) of a substance or paint is given in the European Directive 2004/42/EC ("Deco Paint Directive"). According to this directive, all substances with a boiling point below 250°C, measured at 1013 mbar, are considered VOC. Measurements are carried out by gas chromatography according to ISO 11890-2.

For products with a VOC level above 15%, the value is based on calculations according to the recipe.

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## Product line descriptions

### Dispersing agents

Dispersing agents are used to wet and stabilize pigments and other particles within paints and coatings. For formulators, they represent an essential component as they provide color strength, gloss, viscosity stability and prevent the sedimentation of particles. BASF offers a broad technology portfolio including polymeric, oligomeric and surfactant-based dispersing agents. BASF dispersing agents feature benefits including outstanding viscosity reduction, increased color intensity and hiding power, enhanced gloss, low VOC, APEO-free and improved freeze-thaw stability. Award-winning Controlled Free Radical Polymerization (CFRP) technology allows for higher efficiency and broader compatibility, which creates optimal rheology and improved coloristic properties.

### Defoamers

Defoamers suppress and destroy foam and its negative effects prior to and during application of a coating. By removing or inhibiting air bubbles, they serve as important process aids throughout the paint production as well as the application process. BASF offers a broad selection of defoamer technologies including products based on mineral or native oils as well as specialty-emulsion defoamers, organo-silicone-based and star-polymer defoamers. We focus on establishing a perfect balance between excellent foam suppression, high compatibility, long-term efficiency, easy handling and environmental compliance in the form of low-VOC, low-S-VOC and low-odor solutions.

### Rheology modifiers

Rheology modifiers enable formulators to adjust the flow behavior of paints. This way, painters benefit from improved viscosity and application characteristics. For example, rheology modifiers from BASF reduce dripping and spattering of paint during roller or brush application. Sag resistance of a paint is improved by a rapid, but controlled viscosity increase after application. During transport and storage of the paint, the rheology modifiers prevent the sedimentation of the pigments within a formulation. BASF offers a broad portfolio of synthetic rheology modifiers, including non-ionic associative (HEUR/HMPE), anionic associative (HASE) and non-associative thickener (ASE) technologies. We focus on water-based systems with highly efficient products that provide additional functionalities such as wetting properties and health or environmental aspects (low-VOC and low-odor, free of APEO and heavy metals).

### Wetting agents and surface modifiers

Wetting agents and surface modifiers provide a formulation with adequate wetting properties, which enhance different component compatibility and/or improve the appearance of a coating surface. BASF portfolio offers benefits such as high efficiency for dosage reduction and universal suitability.

### Film-forming agents

Film-forming agents are used to support the film-forming process of a paint or coating. Within this product group, BASF offers high-performance coalescing agents and a complete range of open-time prolongers based on renewable raw materials.

## Dispersing agents

Dispersing agents are used to wet and stabilize pigments and other particles within paints and coatings. For formulators, they represent an essential component as they provide color strength, gloss, viscosity stability and prevent the sedimentation of particles.

Product name	Description	Data						
		Solids (%)	Amine number (mg KOH/g)	Acid value (mg KOH/g)	VOC content (%)	Recommended for low-VOC systems*	High PVC paints	Matt / interior
<b>Anionic dispersing agents based on polycarboxylic acid</b>								
Dispex® AA 4040	Ammonium polyacrylate (co-)polymer	40	-	-	< 0.1	●	□	□
Dispex® AA 4140	Ammonium polyacrylate (co-)polymer	40	-	-	< 0.1	●	■	■
Dispex® CX 4231	Ammonium polyacrylate (co-)polymer	30	-	-	≤ 1	●		□
Dispex® CX 4320	Sodium salt of carboxylic acid copolymer	25	-	-	< 0.1	●	■	■
Dispex® CX 4345	Sodium salt of carboxylic acid copolymer	45	-	-	< 0.1	●	■	
Dispex® CX 4248	Ammonium carboxylic (co-)polymer	28	-	-	< 0.5	●	■	
<b>Dispersing agents for opacity enhancement</b>								
Dispex® HIDE AA 4545	Anionic dispersing agent	45	-	-	< 0.6	●	■	■
Dispex® HIDE CX 4540	Anionic copolymer	41	-	-	< 0.2	●	■	■
Dispex® HIDE CX 4542	Anionic copolymer	25	-	-	< 0.1	●	■	■
<b>High molecular weight dispersing agents</b>								
Dispex® Ultra PX 4522	Nonionic polymer	100	-	-	< 0.1	●		
Dispex® Ultra PX 4525	Blend of amine- and acid-functional polymers	92	16	33	< 1	●		
Dispex® Ultra PX 4575	Acrylic block polymer made by controlled free radical polymerisation (CFRP)	40	32	-	< 0.1	●		
Efka® PU 4009	Polyurethane in solvent	60	9	13	40			
Efka® PU 4063	Modified polyurethane polymer	45	10	-	55			
Efka® PX 4330	Acrylic block copolymer made by controlled free radical polymerisation (CFRP)	70	28	-	30			

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.





						Recommended for	Features and benefits	Sustainability driver*
Silk / semi-gloss	Gloss	Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems		
■	□	□	■		●		Standard dispersing agent for inorganic fillers and pigments; low polydispersity leading to most efficient dispersing properties and liquefying effect	
■	■	■	■		●		Standard dispersing agent for inorganic fillers and pigments; low polydispersity leading to most efficient dispersing properties and liquefying effect	
■	■	■	■		●		For inorganic pigments and extenders, improves adhesion and gloss, lowers snail-trail tendency of exterior paints; leads to highest contact angles (e.g. for water-repellent effect paints)	●
■	■	■	■		●		Excellent dispersing performance, improves gloss, improves wet-scrub resistance, improves blocking resistance, excellent Z <sub>n</sub> O compatibility	●
					●		Leads to highest wet-scrub resistance, hydrophobic character	
					●		High performance, polymeric dispersing agent for improved wet scrub resistance and reduction of TiO <sub>2</sub>	●
■	■	■	■		●		All-purpose dispersing agent for TiO <sub>2</sub> , fillers and extenders; enhances opacity, excellent performance in all type of formulations, economical	●
■	■	■	■		●		Ultra-efficient dispersing agent for opacity enhancement, balanced hydrophobicity combined with steric stabilization	●
■	■	■	■		●		Hydrophobic dispersing agent for opacity enhancement, helps reduce water sensitivity, excellent interaction with hydrophobic thickeners	●
				■			Universal, non-ionic wetting and dispersing agent; improves gloss development, color intensity and color acceptance	
				■			Universal wetting and dispersing agent; improves gloss development, color intensity and color acceptance	
■	■	■	■	■	●		VOC-free dispersing agent for water-based systems with benchmark performance in inorganic pigments; excellent overall performance for organic pigments; broad compatibility towards different resin systems; designed for colorants but well suited for grinds into primers, gloss and semi-glosspaints	●
■	■			■	●		General industrial coatings where cost-effective performance is vital	
■	■			■	●		Polymeric dispersing agent for the deflocculation of inorganic and organic pigments in high-quality solvent-based pigment pastes	
■	■			■	●		Solvent-based industrial and decorative coatings; excellent (broad compatibility) for industrial colorants (pigment pastes) in combination with grinding resins such as Laropal® A 81	

## Dispersing agents

Product name	Description	Data						
		Solids (%)	Amine number (mg KOH/g)	Acid value (mg KOH/g)	VOC content (%)	Recommended for low-VOC systems*	High PVC paints	Matt / interior

Low-molecular-weight dispersing agents mainly designed for water-based systems, surfactant-like types

<b>Dispex® Ultra FA 4404</b>	Chelating agent	50	-	-	< 0.1	●	□	■
<b>Dispex® Ultra FA 4416</b>	Mixture of surfactants	75	-	-	< 2	●		
<b>Dispex® Ultra FA 4420</b>	Fatty-acid-modified emulsifier (FAME)	100	35	22	< 1	●		
<b>Dispex® Ultra FA 4425</b>	Fatty-acid-modified emulsifier (FAME)	100	47	46	< 1	●		
<b>Dispex® Ultra FA 4480</b>	Modified fatty alcohol ethoxylate	80	-	-	< 0.1	●		
<b>Dispex® Ultra FA 4483</b>	Phosphoric acid ester	30	-	25	< 0.1	●		■
<b>Dispex® Ultra FA 4484</b>	Phosphoric acid ester, sodium salt	26	-	-	<0.1	●	□	■
<b>Dispex® Ultra FA 4488</b>	Alkylpolyalkoxylate	100	-	-	<0.1	●	■	■

Low-molecular-weight dispersing agents mainly designed for solvent-based systems, conventional types

<b>Efka® FA 4600</b>	Surface active anionic compounds	35.5	-	-	27.5			
<b>Efka® FA 4601</b>	Blend of fatty alcohol sulfates	47	-	-	~ 16			
<b>Efka® WE 3110</b>	Surfactant blend	85	-	-	< 0.1	●		

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.



Recommended for							Features and benefits	Sustainability driver*
Silk / semi-gloss	Gloss	Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems		
■	■	■	■	□	●		Anionic dispersing agent; excellent liquefying effect in inorganic pigment slurry formulations	
■	■	■			●		Wetting and dispersing agent for aqueous formulations; suitable for organic and inorganic pigments and pigment concentrates	
				■	●	●	Dispersing agent for inorganic fillers and pigments; also suitable as codispersing agent with high-molecular-weight dispersing agents; improves compatibility and color acceptance of universal colorants in base paints	
				■	●	●	Dispersing agent for universal decorative colorants for tinting systems; makes colorants with excellent compatibility and stability	
				■	●		Universal, non-ionic wetting and dispersing agent; powerful alternative to APEOs; improves gloss development, color intensity and color acceptance	
■	■	□	■	■	●		Universal, anionic wetting and dispersing agent; especially suitable for inorganic pigment concentrates	●
■	■	□	■	■	●		Universal, anionic wetting and dispersing agent; especially suitable for inorganic pigment concentrates	
■	■	□	■	■	●		Universal, nonionic wetting and dispersing agent; especially suitable for organic pigment concentrates	
						●	Anti-settling agent for non-aqueous systems; provides good anti-settling properties in polar systems	
						●	Anti-settling agent for non-aqueous systems; good antissettling properties for medium-polar systems	
□	□	□	■	□		●	Outstanding stabilization of water in solvent-based systems (e.g., alkyds), improves formulation stability; compatibilizes colorants in water-based base paints	

## Defoamers

Broad selection of defoamer technologies including products based on mineral or native oils as well as specialty-emulsion defoamers, organo-silicone-based and star-polymer defoamers. Focus on establishing a perfect balance between excellent

foam suppression, high compatibility, long-term efficiency, easy handling and environmental compliance in the form of low-VOC, low-S-VOC and low-odor solutions.

Product name	Description	Data						
		Solids (%)	Incorporation	VOC content (%)	Recommended for low-VOC systems*	High PVC paints	Matt / interior	Silk / semi-gloss
<b>Defoamers designed to be used in water-based systems</b>								
Foamaster® MO 2134	Mineral-oil-based defoamers	100	Grinding stage / let-down	< 0.1	●	■	■	■
Foamaster® MO 2150	Mineral-oil-based defoamers	100	Grinding stage / let-down	< 0.1	●	■	■	□
Foamaster® MO NDW	Mineral-oil-based defoamers	100	At any stage of the production process	< 0.1	●	■	■	□
Foamaster® MO NXZ	Mineral-oil-based defoamers	100	At any stage of the production process	< 0.1	●	■	■	□
Foamaster® NO 2306	Native-oil-based defoamers	100	At any stage of the production process	< 0.5	●		■	■
Foamaster® NO 2335	Native-oil-based defoamers	100	Grinding stage / let-down	< 0.1	●	■	■	□
Foamaster® WO 2323	White-oil-based defoamers	100	Grinding stage / let-down	< 0.1	●		■	■
FoamStar® ED 2521	Emulsion defoamers	~ 20	Grinding stage / let-down	< 0.1	●	■	■	□
FoamStar® ED 2522	Emulsion defoamers	~ 20	At any stage of the production process	< 0.1	●		□	■
FoamStar® ED 2523	Emulsion defoamers	27	Grinding stage / let-down	< 0.1	●	■	■	■
FoamStar® SI 2210	Modified polydimethylsiloxane-based defoamers	100	At any stage of the production process	< 0.5	●		□	□
FoamStar® SI 2216	Modified polydimethylsiloxane-based defoamers	100	Grinding stage	< 0.5	●			□
FoamStar® SI 2240	Modified polydimethylsiloxane-based defoamers	100	Grinding stage	< 0.1	●			□
FoamStar® SI 2250	Modified polydimethylsiloxane-based defoamers	100	Grinding stage / final production	< 1	●			■
FoamStar® SI 2293	Modified polydimethylsiloxane-based defoamers	100	At any stage of the production process	< 0.5	●			
FoamStar® ST 2438	Star polymer-based defoamers	100	Grinding stage / let-down	< 0.5	●		□	□
<b>Defoamers designed to be used in non-aqueous systems</b>								
Efka® PB 2001	Solvent-based solution of defoaming substances, silicone-free	26	Before or after processing	74	NA			■
Efka® PB 2020	Solvent-based solution of defoaming substances, silicone-free	-	Before or after processing	~ 80	NA			■
Efka® SI 2040	Solvent-based solution of defoaming substances with modified silicone compounds	-	Final production	> 95	NA			■

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.



Recommended for						Features and benefits	Sustainability driver*
Gloss	Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems		
□	□	■		●		Universal defoamer for aqueous emulsion-based coatings and plasters with outstanding long-term efficiency	
		■		●		Very efficient universal defoamer for aqueous emulsion-based coatings and plasters; specifically designed for flat aqueous coatings; exceptional product stability	
		■		●		Universal defoamer for aqueous emulsion-based coatings and plasters; specifically designed for flat aqueous paints and coatings; high compatibility – does not cause fish eyes	
		■		●		Universal defoamer for aqueous emulsion-based coatings and plasters; specifically designed for flat aqueous coatings and adhesives; good compatibility – does not cause fish eyes	
□	■	■		●		Universal defoamer free from mineral oil and silicone oil; effectively removes micro-foam	●
	□	■		●		Universal, highly efficient defoamer based on renewable raw materials for emulsion paints; excellent defoamer for matt to satin-finish aqueous coatings; extremely low SVOC content	●
□	□	■		●		Effective defoamer specifically designed for emulsion paints	
		■		●		Excellent defoamer emulsion for all flat to semi-gloss aqueous coatings; easy to incorporate; good foam suppression during grinding as well as during application; retains antifoam efficiency even during extended storage; extremely low SVOC content	●
■	■	■		●		High-performance, ultra-low-SVOC silicone emulsion defoamer for premium water-based paints; excellent storage stability; extremely low SVOC content	●
□	□	■		●		Ultra-low SVOC, emulsion defoamer for medium- to high-PVC architectural coatings	●
■	■	■		●		Defoamer with 100% active content for non-pigmented and low-pigmented aqueous coatings; provides a strong spontaneous defoaming effect; outstanding long-term defoaming persistency	
■		□	■	●		Highly effective defoamer for aqueous pigment concentrates and systems with high surfactant content	
■		□	■	●		Highly effective defoamer for aqueous pigment concentrates and systems with high surfactant content	
■			■	●		Water-based coatings and pigment concentrates where high-shear processing or application exists; most effective in the range	
■	■			●		VOC-free, highly compatible silicone-based defoamer solution for high-gloss paints and varnishes based on acrylics and polyurethane dispersions; minimized risk of cratering	●
■	■	■		●		Silicone-based defoamer for high-quality water-based paints, delivering excellent long-term persistency and foam knock-down	●
□	■				●	Silicone-free air-release agent for non-aqueous coatings such as epoxy, polyurethane or UPE systems	
■	□				●	Acid-cured and NC-curtain coating systems, unsaturated polyester and gelcoats; broad use silicone-free defoamer	
■	□				●	Solvent-based industrial and decorative finishes, including roller, brush and airless spray applications	

## Rheology modifiers

Broad portfolio of synthetic rheology modifiers, including non-ionic associative (HEUR/HMPE), anionic associative (HASE) and non-associative thickener (ASE) technologies. Focus on water-based systems with highly efficient products that provide additional functionality such as wetting properties and health or environmental aspects (low-VOC, low-odor, free of APEO and heavy metals).

Product name	Description	Data						
		Solids (%)	Viscosity (mPa.s)	VOC content (%)	Recommended for low-VOC systems*	Tin-free	High PVC paints	Matt / interior
<b>Rheology modifiers designed to be used in water-based systems</b>								
Rheovis® AS 1130	Non-associative thickener: anionic polyacrylate copolymer (ASE)	30	~ 5	< 0.5		●		□
Rheovis® HS 1162	Associative thickener: anionic polyacrylate copolymer, hydrophobically modified (HASE)	35	< 50	< 0.5		●		□
Rheovis® HS 1169	Associative thickener: anionic polyacrylate copolymer, hydrophobically modified (HASE)	30	< 50	< 0.1	●	●	□	■
Rheovis® HS 1212	Associative thickener: anionic polyacrylate copolymer, hydrophobically modified (HASE)	40	~ 5	< 0.5		●		■
Rheovis® PE 1330	Associative thickener: hydrophobic modified polyether (HMPE)	30	~ 4,500	< 0.1	●	●	■	■
Rheovis® PU 1190	Associative thickener: hydrophobic modified ethoxylated urethane (HEUR)	34	~ 30,000	< 1	●	●		■
Rheovis® PU 1191	Associative thickener: hydrophobic modified ethoxylated urethane (HEUR)	30	~ 2,800	< 1	●	●		■
Rheovis® PU 1291	Associative thickener: hydrophobic modified ethoxylated urethane (HEUR)	45	~ 3,000	< 0.1	●	●	■	■
Rheovis® PU 1331	Associative thickener: hydrophobic modified ethoxylated urethane (HEUR)	18	~ 4,500	< 0.1	●	●	■	■
<b>Rheology modifiers designed to be used in solvent-based systems</b>								
Efka® RM 1900	Modified hydrogenated castor oil	100	Powder	< 0.1	NA	●		

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.



Recommended for							Features and benefits	Sustainability driver*
Silk / semi-gloss	Gloss	Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems		
		□	□		●		Non-associative pure acrylic thickener; highly efficient low-shear thickener; high shear thinning, anti-sagging and anti-settling; used in pigment and filler slurries, but also highly successful in industrial and automotive formulations for spray applications	
□	□	■	□		●		Acrylic thickener with associative thickening; thixotropic flow behavior; low water uptake; no impact on wet adhesion even after long water contact	
■		■	■		●		Acrylic thickener with associative thickening; low-shear thickener; spray applications; less water uptake; elongation of open time	●
■		■	■		●		Acrylic thickener with associative thickening; mid-shear thickener; improves flow; excellent efficiency; all-round product which can be used in most paint systems	
■	■	■	■		●		Outstanding high-shear thickener; enables excellent flow	
■	■	■	■		●		Outstanding low-shear thickener; strong pseudoplasticity	●
■	■	■	■		●		Next-generation, strong, low-shear thickener with excellent performance and easy handling; strong pseudoplasticity	●
■	■	■	■		●		Next-generation, VOC-free, mid-shear rheology modifier with excellent balance KU and ICI thickening; easy handling	●
■	■	■	■		●		Next-generation, high-shear thickener; ultra efficient; best-in-class ICI performance	●
						●	Provides excellent sag resistance for non-aqueous formulations; higher temperature stability	

## Wetting agents and surface modifiers

Wetting agents and surface modifiers provide a formulation with adequate wetting properties, enhance different component compatibility and/or improve the appearance of a coating surface.

Product name	Description	Data						
		Solids (%)	VOC content (%)	Recommended for low-VOC systems*	High PVC paints	Matt / interior	Silk / semi-gloss	Gloss

### Substrate wetting agents

<b>Hydropalat® SL 3682</b>	Aqueous dispersion of an ultra-high molecular weight silicone	65	< 1	●				■
<b>Hydropalat® WE 3221</b>	Silicone surfactants	45	55				■	■
<b>Hydropalat® WE 3625</b>	Alkylpolyglucoside	70	< 0.5	●	■	■	■	■

### Flow and leveling agents

<b>Efka® FL 3740</b>	Polyacrylate	> 95	< 0.5					
<b>Efka® FL 3741</b>	Polyacrylate	> 95	< 0.5					

## Film-forming agents

Film-forming agents are used to support the film-forming process of a paint or coating. Within this product group, BASF offers a high-performance coalescing agent and a

complete range of open-time prolongers based on renewable raw materials.

New product name	Description	Data					
		Solids (%)	Viscosity (mPa.s)	VOC content (%)	Recommended for low-VOC systems*	High PVC paints	Matt / interior

### Coalescents

<b>Loxanol® CA 5308</b>	Dicarboxylic acid-diisobutyl ester	100	~ 6	< 0.1	●		□
<b>Loxanol® CA 5336</b>	Linear ester, based on renewable raw materials	100	~ 5	< 0.1	●		■

### Open-time prolongers

<b>Loxanol® OT 5840</b>	Aqueous dispersion of oleochemical compounds	20	600	< 0.1	●		
<b>Loxanol® OT 5843</b>	Aqueous dispersion of oleochemical compounds	30	~ 5,000	< 0.1	●		
<b>Loxanol® OT 5853</b>	Aqueous dispersion of oleochemical compounds	30	~ 1,000	< 0.1	●		
<b>Loxanol® OT 5900</b>	Oleochemical compounds	45	Powder	< 0.1	●		

\* The respective product has been evaluated with BASF's Sustainable Solution Steering Method and contributes substantially to sustainability drivers in the value chain.

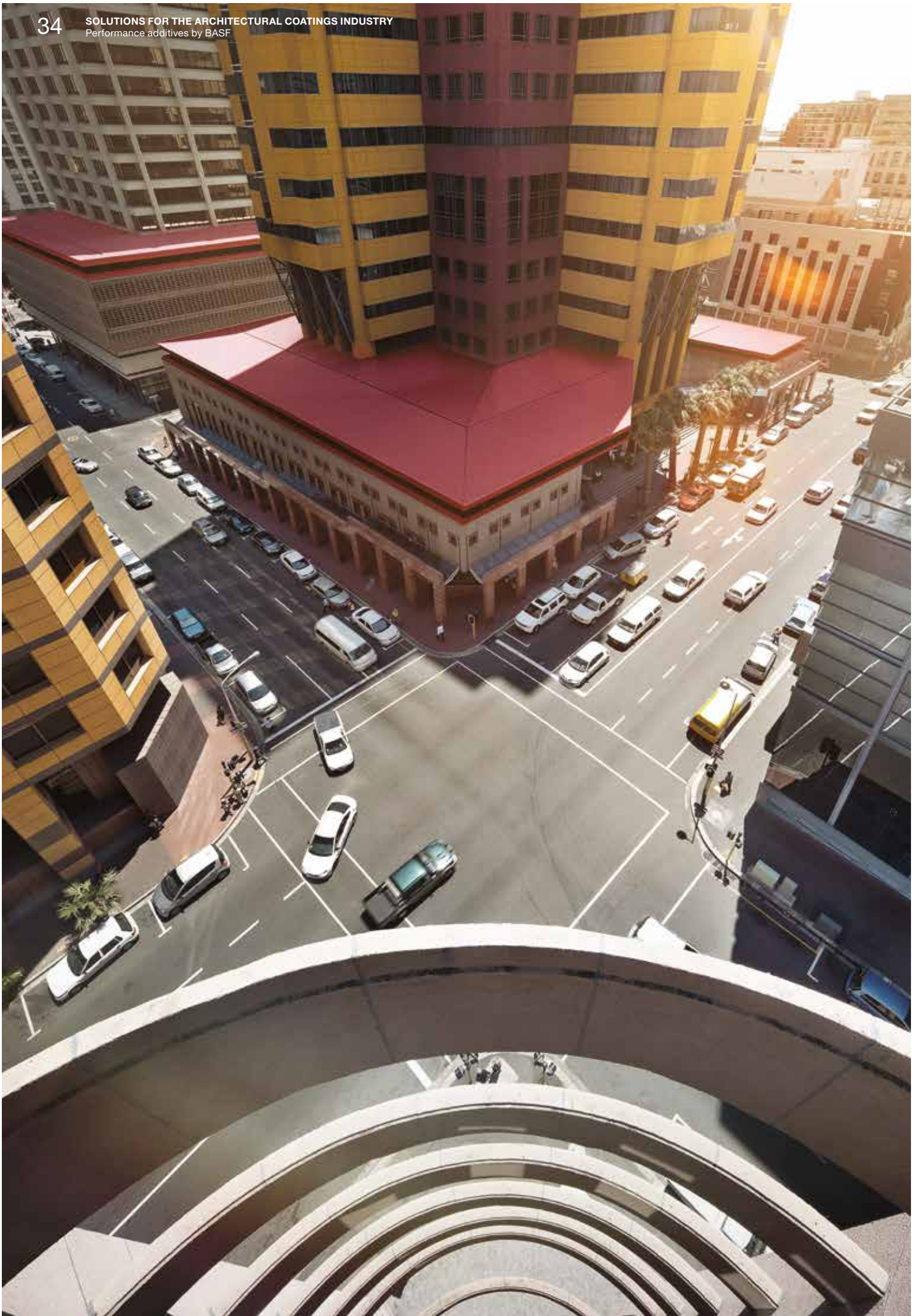




Recommended for							Features and benefits	Sustainability driver*
Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems				
■			●			Strong slip and anti-blocking additive for aqueous systems; good compatibility properties		
■			●			Silicone surfactant in dipropylene glycol monomethyl ether with strong reduction of surface tension in aqueous formulations; excellent substrate and anti-crater additive with good recoatability		
■	■	■	●			Silicone- and solvent-free surface wetting agent, improves incorporation of colorants	●	
				●		Silicone- and solvent-free flow and leveling agent with air-release properties for non-aqueous coatings		
				●		Silicone- and solvent-free flow and leveling agent with air-release properties; excellent compatibility		

Recommended for							Features and benefits	Sustainability driver*
Silk / semi-gloss	Gloss	Wood paints and stains	Exterior and elastic paints, plasters	Colorants	Water-based systems	Solvent-based systems		
		□	□		●		Outstanding coalescing efficiency; improves wet-scrub resistance; mild odor	
■	■	■	■		●		Highly efficient coalescent based on renewable resources. It contains no VOC in accordance with 1999/13/EU and 2004/42/EU and is odorless	●
			■		●		Open-time prolonger in liquid form; prevents/reduces cracking in resin-based plasters	●
			■		●		Highly efficient open-time prolonger in paste form for resin-based plasters	
			■		●		Highly efficient open-time prolonger; prevents/reduces cracking in resin-based plasters; improved storage stability	●
			■		●		Open-time prolonger in powder form	●

■ very suitable □ suitable



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## Performance additives by BASF – coatings that always look good

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Coatings used for aesthetic, protective and other purposes are exposed to a variety of detrimental phenomena such as solar radiation, humidity, temperature change, microbiological attack, air pollutants and many more. Protection against this wide range of degrading influences is absolutely essential for creating high-value, high-performance coatings.

The Tinuvin® light stabilizer range by BASF is represented by two types of light stabilizers, UV absorbers (UVA) and HALS (Hindered Amine Light Stabilizers).

UV absorbers from BASF's Tinuvin® range help prevent the degradation of the coating and underlying substrate by filtering out harmful UV radiation before subsequent photo-oxidation can begin to work destructively.

UV absorbers are not efficient enough on their own to fully protect the surface of a coating where coating thickness ends up at zero (consequence of the Lambert-Beer law).

Poorly protected coatings therefore tend to develop surface defects such as loss of gloss, cracking in clear coats, chalking and discoloration in pigmented coatings.

HALS act as radical scavengers in the autoxidation cycle and inhibit the photo-oxidative degradation of polymers right at the coating surface.

For this reason, HALS from the Tinuvin® range offer synergistic effects with Tinuvin® UV absorbers UVA, allowing excellent protection against surface defects and discoloration.

BASF is constantly working on further product developments and tailor-made solutions to ensure long service life for coatings and substrates. Customer-oriented scientific and technical work at BASF sets standards and provides solutions to industries such as decorative, joinery, paneling, decking, trim, façade, parquet, laminate and wooden furniture.

BASF offers the most comprehensive portfolio of stabilizers and other performance additives: UV absorbers (UVA) and Hindered Amine Light Stabilizers (HALS) for effective stabilization against the detrimental effects of light and weathering. These solutions contribute to long service life for coated products.

Whatever solutions we develop, we place paramount importance on achieving the consistent quality that our customers expect from us, along with long-term availability to ensure sustainable supply. BASF is constantly innovating to meet new trends or develop new solutions, and we have the expertise to work with you and ensure you get the tailor-made solution you need.

## Explanation of data

**Tinuvin®** light stabilizers are suitable for

- water-based coatings
- solvent-based coatings
- radiation-cured coatings

The **Tinuvin® range** is represented by two types of light stabilizers:

- **UVA:** UVA-based on 2-(2-hydroxyphenyl)-benzotriazole (BTZ) or 2-hydroxyphenyl-s-triazine (HPT) chemistry
- **HALS:** di-functional HALS based on tetramethyl piperidine derivatives

The Tinuvin® **DW** range is based on aqueous preparations of performance light stabilizers designed for waterborne coatings accomplished by the NEAT process (Novel Encapsulated Additive Technology).

Tinuvin® **blends** of the 5000 series are liquids based on synergistic combinations of UVA and HALS, combining easy handling along with excellent compatibility and solubility in most organic solvents, resins and binder systems.

**Lignostab®** are lignin-stabilizing additives for wood pretreatment resulting in color retention and improved durability (for light-colored woods only).

### Recommendations for usage

For interior conditions, a single use of UVA is usually sufficient to prevent both the fading of coatings and the yellowing of resins.

The use of UVA in pigmented coatings depends on the pigments used. The lightfastness or weather stability of some organic pigments can be improved by adding UVA, while the use of UVA can be disregarded for inorganic pigments.

The required concentration of UVA for effective protection depends on the dry film thickness (DFT) of the coating:

Dry film thickness	UVA concentration based on binder solids (% w/w)
10 - 20 µm	8 - 4
20 - 40 µm	4 - 2
40 - 80 µm	2 - 1

For exterior conditions, the combination of UVA and HALS offers synergistic effects, allowing excellent protection against surface defects and discoloration.

The use level of UVA and HALS strongly depends on the concentration of pigments (acting as UV screeners) and the final thickness of the coating.

Clear coatings require higher amounts of UVA (and lower dose levels of HALS) whereas opaque pigmented coatings require higher amounts of HALS (and lower UVA dose levels).

Typical use levels are listed below:

Pigmentation	Active UVA (%) <sup>1</sup>	Active HALS (%) <sup>2</sup>
clear	1 - 2	1
semi-transparent	1 - 2	1 - 2
opaque	0 - 1	1 - 2

<sup>1</sup> % active UVA on binder solid (DFT ~ 40 µm)

<sup>2</sup> % active HALS on binder solid (does not depend on DFT)

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## Product line descriptions

### Tinuvin® UV absorbers

UV absorbers (UVA) prevent the degradation of both coatings and substrates by filtering out harmful UV radiation.

The mode of action of UVAs consists of a conversion of the absorbed light energy (h·v) into heat.

According to the Lambert-Beer law, the absorbance  $A$ , i.e., the filter effect of a coating, is in a linear relationship with the UVA concentration ( $c$ ), the film thickness (= light path length  $d$ ) and the extinction coefficient  $\epsilon$ . Thus, the Lambert-Beer law makes it possible to calculate the necessary amount of UVA needed for proper light protection at a given film thickness  $d$ . Increased  $c$  or  $d$  results in increased filter effect and therefore increased protection against harmful UV radiation. On the other hand, this implies that the filter effect is strongly influenced by coating thickness.

Hence UVAs, on their own, are inefficient in protecting the very top surface of a coating (where  $d$  approaches 0). As a result, they cannot effectively prevent the formation of surface defects that occur due to photo degradation under exterior conditions.

Photo permanence (= physical/chemical loss of UVAs during service life) and heat stability (i.e. low volatility) are basic requirements for the performance of UVAs in the final application.

### Tinuvin® and Lignostab® hindered amine light stabilizers

Hindered amine light stabilizers (HALS) are mainly derivatives of 2,2,6,6-tetramethyl piperidine (TMP). They act as radical scavengers in the autoxidation cycle and inhibit the photo-oxidative degradation of polymers in coatings, adhesives and sealants.

The cyclical nature of the stabilization process along with the regeneration of the active species explains the high and long-term efficiency of HALS.

The way HALS works is largely independent of the film thickness applied, which in turn means they can also act at the coating surface where minor protection is provided by the UVA. In clear coats, they protect against surface defects such as loss of gloss or cracking; in pigmented coatings, they can prevent chalking and discoloration. Today, a large variety of different HALS representing mono-, di- or oligo-functional TMPs are available that fulfill the requirements of the coatings industries.

Besides solubility and compatibility, the first selection criteria for HALS is their basicity; this depends on possible interactions with certain formulation components such as biocides, surfactants, catalysts or certain acid-treated pigments, which can result in limited formulation stability or the deactivation of HALS or of other additives. Alkyd-substituted HALS are basic, whereas ami-noether – (N-OR) – functionalized HALS are considered non-basic.

## UV absorbers and hindered amine light stabilizers (HALS)

Product	Chemistry	Physical form	Molecular weight [g/mol]	Melting point [°C]	Key properties and applications
<b>Water-based UV absorbers</b>					
<b>Tinuvin® 400-DW (N)</b>	Hydroxyphenyltriazine	Liquid, 20% active	Mixture	-	Blue-shifted UVA for waterborne high-performance applications, excellent spectral coverage in combination with Tinuvin 479-DW
<b>Tinuvin® 477-DW (N)</b>	Hydroxyphenyltriazine	Liquid, 20% active	Mixture	-	Red-shifted UVA for high performance waterborne wood coatings
<b>Tinuvin® 479-DW</b>	Hydroxyphenyltriazine	Liquid, 20% active	Mixture	-	UVA with extremely high extinction coefficient, for highest durability requirements in waterborne clear coats, specifically suited for thin-film applications
<b>Tinuvin® 1130</b>	Benzotriazole	Liquid	Mixture	-	UVA for medium-performance solvent-based and water-based coatings (may require addition of cosolvent)
<b>Tinuvin® 9945-DW (N)</b>	Benzotriazole	Liquid, 45% active	Mixture	-	Multipurpose UVA for medium- to high-durability requirements for waterborne formulations
<b>Solvent-based UV absorber – benzophenone (BP)</b>					
<b>Chimassorb® 81</b>	Benzophenone	Solid	326	47–51	Mass stabilization of gel coats, UVA for moderate durability requirements
<b>Solvent-based UV absorber – benzotriazole (BTZ)</b>					
<b>Tinuvin® 99-2</b>	Benzotriazole	Liquid 95% in 1-methoxy-2-propyl acetate	452	-	UVA for medium-performance solventborne coatings
<b>Tinuvin® 326</b>	Benzotriazole	Solid	316	138–142	Chlorinated red-shifted UVA, allows < 1% transmittance up to 370 nm, FDA approval for indirect food contact in polyolefines, limited solubility in organic solvents
<b>Tinuvin® 1130</b>	Benzotriazole	Liquid	Mixture	-	UVA for medium-performance solventborne and waterborne coatings (may require addition of cosolvent)
<b>Solvent-based UV absorber – resorciny-triazine (HPT), high photo- and thermal permanence</b>					
<b>Tinuvin® 477</b>	Hydroxyphenyltriazine	Liquid 80% in 2-methoxy-1-propyl acetate	Mixture	-	Red-shifted UVA with high extinction coefficient, for high-durability wood coating requirements, allows < 1% transmittance up to 370 nm
<b>Solvent-based UV absorber – hydroxyphenyltriazine (HPT), best photo and thermal permanence, no interaction with amines, strong alkali or any metal catalyst</b>					
<b>Tinuvin® 400</b>	Hydroxyphenyltriazine	Liquid 85% in 1-methoxypropan-2-ol	647	-	Blue-shifted UVA for high-durability requirements in clear coat applications including UV curing systems, excellent spectral coverage in combination with Tinuvin® 479
<b>Tinuvin® 479</b>	Hydroxyphenyltriazine	Solid	678	39–43 *	UVA with extremely high extinction coefficient, for highest durability requirements in clear coats, powder coatings or UV-curing systems; specifically suited for thin-film applications

\* T<sub>g</sub> (°C)



Product	Chemistry	Physical form	Molecular weight [g/mol]	Melting point [°C]	Key properties and applications
<b>Non-basic HALS for water-based coatings</b>					
<b>Tinuvin® 123-DW (N)</b>	N-OR HALS	Liquid, 30% active	-	-	Non-basic HALS, no interaction with sensitive dispersions
<b>Basic HALS for water-based and solvent-based coatings</b>					
<b>Tinuvin® 292</b>	N-alkyl HALS	Liquid	509 / 370	-	Multipurpose, basic HALS for various applications; use in waterborne coatings may require addition of cosolvents, may interact with sensitive dispersions
<b>Non-basic HALS for solvent-based coatings</b>					
<b>Tinuvin® 249</b>	HALS	Liquid	482	-	Non-basic HALS, no exudation out of solventborne polar coatings, low viscosity and very low inherent color
<b>Tinuvin® 5100</b>	N-OR HALS	Liquid	737	-	Non-basic HALS for oxidative curing coatings
<b>HALS for wood color protection</b>					
<b>Lignostab® 1198</b>	Lignin stabilizer	Solid	172	66–70	Lignin stabilizer for wood impregnation
<b>Lignostab® 1198 L</b>	Lignin stabilizer	Liquid 20% in water	172	-	Lignin stabilizer solution for wood impregnation
<b>Light stabilizer blends</b>					
<b>Tinuvin® 5050</b>	BTZ / N-alkyl HALS	Liquid	Mixture	-	UVA / HALS blend for solvent-based coatings
<b>Tinuvin® 5060</b>	BTZ / N-OR HALS	Liquid	Mixture	-	UVA / non-basic HALS blend for solvent-based oxidative curing coatings
<b>Tinuvin® 5151</b>	BTZ / N-alkyl HALS	Liquid	Mixture	-	UVA / HALS blend for solventborne coatings; use in waterborne coatings may require addition of cosolvent
<b>Tinuvin® 5248</b>	HPT / N-alkyl HALS	Liquid	Mixture	-	UVA / HALS blend for high-performance solventborne applications
<b>Tinuvin® 5251</b>	HPT / N-alkyl HALS	Liquid	Mixture	-	UVA / HALS blend for high-performance solventborne applications
<b>Tinuvin® 5333-DW (N)</b>	UVA / HALS	Liquid, 40% active	Mixture	-	High-performance UVA / non-basic HALS blend for waterborne applications with broad spectral coverage

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