ELEMENTIS

Performance specialties

Americas

Unique chemistry,
sustainable solutions

Contents

Overview

Elementis is a global specialty chemicals company that delivers enhanced performance through applied innovation.We partner with our customers to provide innovative and leading technologies in personal care, coatings, and energy around the globe.

We offer a variety of rheology modifiers and specialty additives for architectural and industrial paints and coatings, adhesives and sealants and inks.

In close partnership with our customers, we develop innovative solutions for both waterborne, solvent and solvent-free systems that enhance the look, feel, and stability of our customers' products. Our technology addresses performance needs through our rheological additives, wetting and dispersing agents, defoamers, waxes and slip aids, adhesion promoters and other performance enhancing additives.

Our trademarks, such as BENTONE®, RHEOLATE®, THIXATROL®, THIXCIN®, M-P-A®, DAPRO®, NUOSPERSE® , SLIP-AYD® and SUPREAD™ are recognized worldwide.

We continue to focus on harnessing our expertise in high-performing ingredients to enhance our customers' product performance and bring new technologies to the markets we serve.

Rheological additives

RHEOLATE® nonionic synthetic associative thickeners

Basic principles

Most Elementis associative thickeners are hydrophobically modified ethoxylated polyurethanes. These are the RHEOLATE® 200 series and RHEOLATE® 600 series as well as the RHEOLATE® FX, HX and CVS grades. The RHEOLATE® 600 products are alternative, low-VOC versions of their RHEOLATE® 200 equivalents. Elementis has also developed a class of hydrophobically modified polyether polyol associative thickeners, the RHEOLATE® 300 series. Both ranges of products represent advanced technology for waterborne systems and provide superior rheological performance.

Recommendations

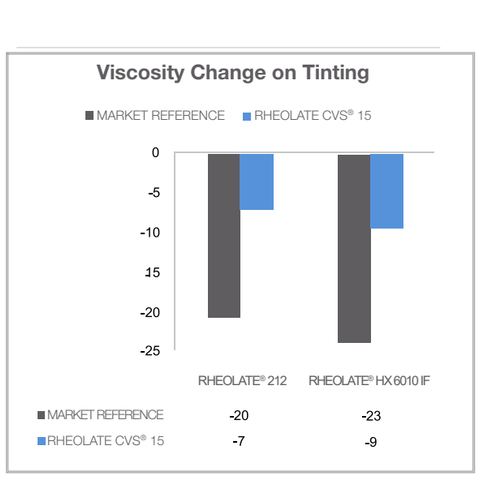
The new RHEOLATE® HX series comprises several high-efficient nonionic synthetic associative thickeners with excellent beneficial characteristics. RHEOLATE® HX 6008 has outstanding rheological properties for aqueous applications. It develops high-shear viscosity (ICI) very efficiently and additionally displays some mid-shear viscosity contribution. RHEOLATE® HX 6008 is effective in a broad range of latex chemistries particularly in acrylic and styrene acrylic emulsions.

RHEOLATE® HX 6050 is especially efficient in hydrophilic resins such as VAE-latices and in Vina-Veova latices. RHEOLATE® HX 6010 and RHEOLATE® HX 6025 have the most Newtonian rheological profile, has very low contribution to mid-shear (KU) viscosity and offers excellent flow and leveling and other application properties in hydrophobic acrylic and styrene acrylic binders.

RHEOLATE® HX 6050 IF is especially efficient in hydrophilic resins such as VAE and in Vina-Veova latices. RHEOLATE® HX 6010 and RHEOLATE® HX 6025 have the most Newtonian rheological profile, with very low contribution to mid-shear (KU) viscosity. They offer excellent flow and leveling and other application properties in hydrophobic acrylic and styrene acrylic binders.

RHEOLATE CVS® 15 is our newest mid-shear associative thickener. It provides paint formulations viscosity retention upon point-of-sale or in-plant color tinting in combination with excellent color properties such as improved color float resistance and greatly improved color rub up performance. The product has superior sag and leveling properties which provide excellent application properties when applied with brush, roller or when sprayed.

The large variety of available RHEOLATE® associative thickeners allow maximum flexibility to adjust and fine-tune the flow behavior of a system to meet the required performance.



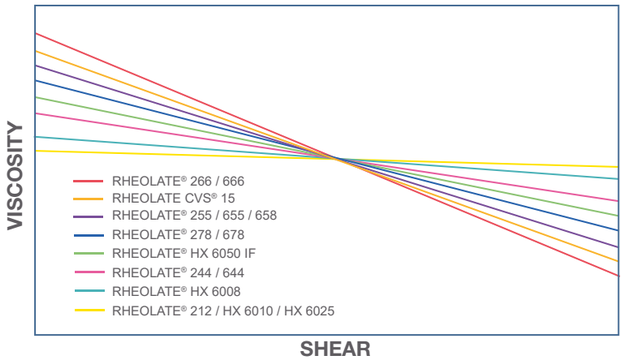
Architectural coatings

Depending on the application, an architectural paint can be formulated in various ways.

It can be formulated using a combination of a mid-shear (Stormer) viscosity associative thickener and a high shear (ICI) viscosity thickener. This combination allows maximum flexibility to adjust the application performance of a paint. Examples are the combination of RHEOLATE® 655 and RHEOLATE® 212 or RHEOLATE CVS® 15 and RHEOLATE® HX 6010 or RHEOLATE® HX 6025.

Architectural coatings can also be made using a single associative thickener like shear, RHEOLATE® HX 6050 IF or RHEOLATE® 678. If a more balanced flow behavior for decorative coating systems is required, such as a Newtonian type of flow for alkyd emulsion paints, it is advised to use RHEOLATE® 212 or RHEOLATE® HX 6010. Most associative thickeners recommended for decorative coatings allow the formulation of VOC-complaint coatings, or even very low VOC if required.

RHEOLATE® NiSAT for architectural coatings



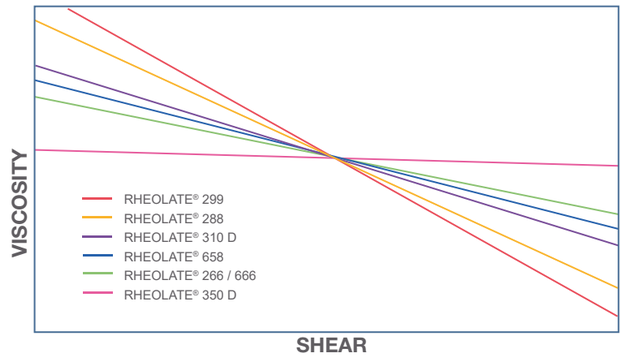
Industrial coatings

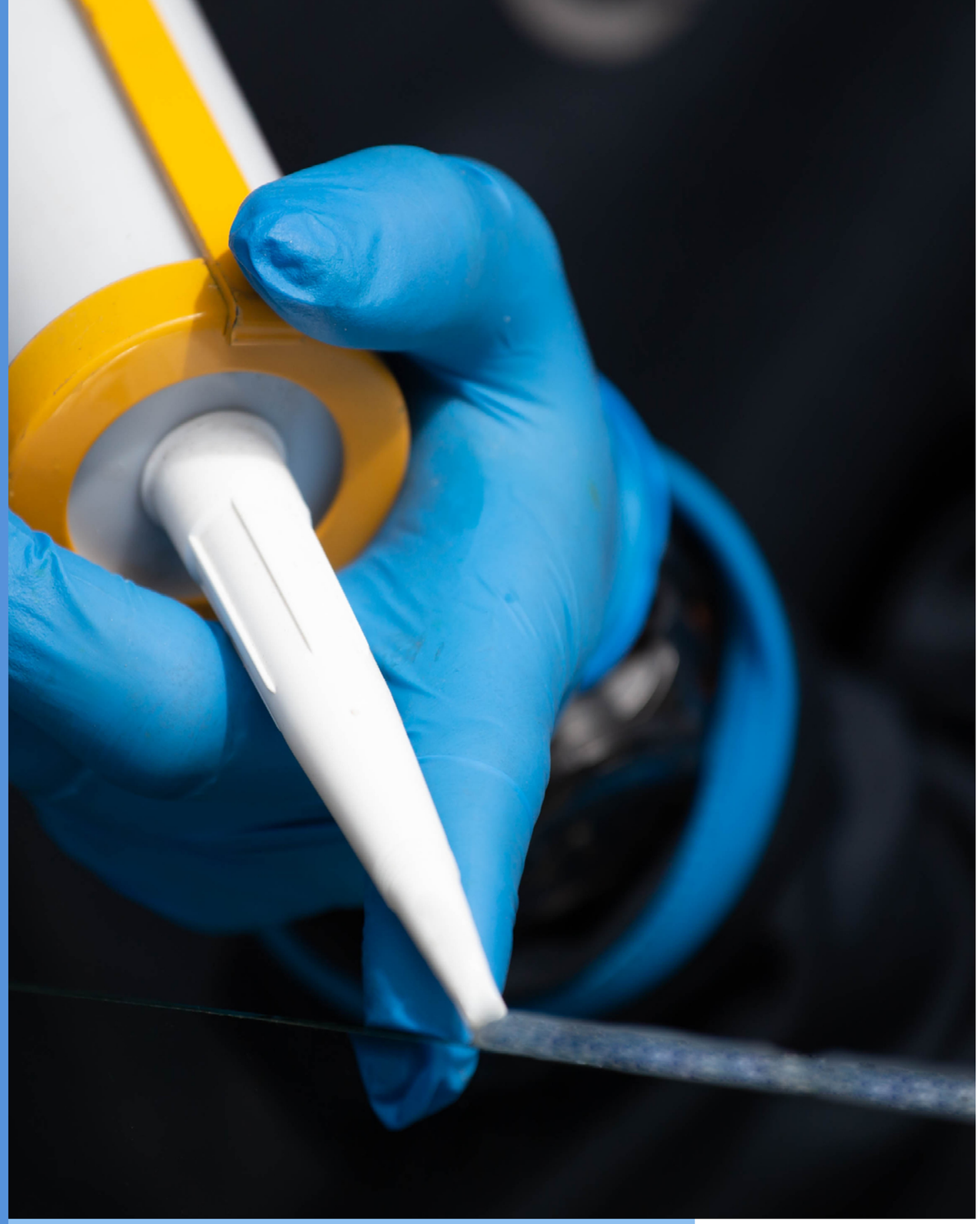
For industrial coatings, sag resistance, to allow for high film builds, and shear thinning behavior, to allow for spray application, are the most important properties.

The following products are recommended for industrial coatings:

- RHEOLATE® 299 for high build, spray applied coatings
- RHEOLATE® 288 for spray applied coatings, particular clear coats
- RHEOLATE® 310 D for general industrial coatings
- RHEOLATE® 266/666 for general industrial spray applied coatings
- RHEOLATE® 350 D for wood coatings in general

RHEOLATE® NiSAT for industrial coatings





Rheological additives

RHEOLATE® acrylic thickeners

Basic principles

RHEOLATE® alkali swellable rheological additives for aqueous systems are free-flowing liquids (25 - 30 % active in water). Each product enhances viscosity development, flow and application properties and can easily be post-added in the manufacturing process.
RHEOLATE® hydrophobically modified alkali swellable additives are highly efficient thickeners with predictable rheological profiles. They can be used as full or partial replacements for HEC and HMHEC. They enhance spatter resistance, flow and leveling, and since they are enzyme resistant, they give improved bio-stability, all at a lower cost in use.

Recommendations

RHEOLATE® 1 is an efficient low-shear ASE thickener. It is an effective alternative to cellulosics, with improved resistance to sag and settling. It is used extensively in low PVC systems.

RHEOLATE® 125 is a strongly shear-thinning ASE thickener offering improved pigment suspension and stable viscosity across a very wide pH window. An excellent choice for spray applied industrial coatings.

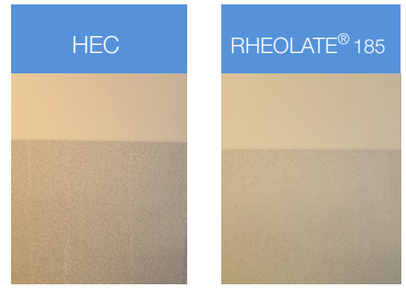
RHEOLATE® 150 and RHEOLATE® 175 are cost effective HASE thickeners for semi-gloss and flat latex paints, waterborne inks and waterborne adhesives. RHEOLATE® 150 is designed for excellent low-shear viscosity build in medium to high PVC formulations. RHEOLATE® 175 provides superb mid- to high-shear viscosity build.

RHEOLATE® 135 is the most newtonian HASE thickener in our portfolio. It has excellent performance in high PVC and contractor grade paints.

RHEOLATE® 425 is an associative HASE thickener for mid-shear viscosity build, improved leveling and spatter resistance while retaining good sag control. It works well in high PVC systems.

RHEOLATE® 465 and RHEOLATE® 475 are highly associative HASE thickeners for high-shear viscosity increase with some KU contribution. They provide an excellent balance between spatter resistance and flow and leveling. RHEOLATE® 465 and RHEOLATE® 475 have outstanding storage stability and is recommended for high quality decorative coatings.

RHEOLATE® 185 is a highly-efficient acrylic thickener developed to fully replace cellulosic thickeners in architectural paint formulations. It is more economical to use. It shows improved hide because of its superior roller pattern and leveling (see figure below). Like all HASE type thickeners, it has improved spatter resistance, especially when compared to HEC type thickeners. It can be used in paints that are developed to be brushed, rolled or sprayed, or without, additional dilution.



Rheological additives

RHEOLATE® thickeners

Product name	Composition	Description	Solventborne	Waterborne	Application																						Shear Rate		
					Architectural coatings					Industrial coatings							Construction						Others						
					Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesives	Adhesives and sealants	Inks	Leather coatings	Low	Medium	High
Acrylic thickeners																													
RHEOLATE® 1	Acrylic emulsion	Excellent low shear ASE-type viscosity builder. Cost-effective replacement for medium molecular weight HEC with improved sag and settling for low PVC systems, including wood, architectural, and industrial coatings.		●	○	●	●	●	●	●	●		●		●	●	●	●		●			●		●	●	○	
RHEOLATE® 101	Acrylic emulsion	Powdered low-shear ASE-type viscosity builder. Excellent spray application properties for industrial systems.		●	○	●	●	●	●	●	●		●		●	●			●			●				●	○	
RHEOLATE® 125	Acrylic emulsion	Very good low-shear ASE-type viscosity builder. Excellent spray application properties for industrial systems.		●	○	●	●	●	●	●	●		●		●	●	●	●					●	●	●	●	○	
RHEOLATE® 135	Acrylic emulsion	Excellent performance in high PVC and contractor grade paints. Good contribution to mid and high shear viscosity.		●	○	●	●	●	●							○	●	●			●						○	●
RHEOLATE® 150	Acrylic emulsion	Excellent low shear viscosity builder. Most pseudoplastic of all HASE products shown. Cost-effective alternate to high molecular weight HEC. Recommended for interior paints.		●	○	●	●	●	○	○	○		●		○	○	●	○		●			●	●	●	●	○	
RHEOLATE® 175	Acrylic emulsion	Excellent mid to high shear viscosity builder. Provides excellent film build, leveling and spatter resistance.		●	○	●	●	●	○	○	○		○		○	○	●	○		●			●	●	●	○	●	
RHEOLATE® 185	Acrylic emulsion	Excellent low-sheer acrylic thickener that was developed to replace HEC in interior and exterior formulations, giving improved applied hide and reduced spatter.		●	○	●	●	○	○								●	○		●			●	●	●	●	
RHEOLATE® 420	Acrylic emulsion	Excellent mid-shear viscosity HASE-type builder. Good balance of KU/ICI viscosities. Recommended for mid to high-PVC systems. RHEOLATE® 425 is the APEO-free version of RHEOLATE® 420.		●	○	○	●	●	●	○	○		○		○	○							●	●	○	●	
RHEOLATE® 425	Acrylic emulsion	Excellent mid-shear viscosity HASE-type builder. Good balance of KU/ICI viscosities. Recommended for mid to high-PVC systems.		●	○	○	●	●	●	○	○		○		○	○							●	●	○	●	
RHEOLATE® 465	Acrylic emulsion	HASE thickener with unique flow and leveling properties. Works well across all decorative latex systems.		●	○	○	●	●	●	○	○		○		○	○		●			○					○	●	
RHEOLATE® 475	Acrylic emulsion	Excellent mid-shear viscosity HASE-type builder. Provides the balance of properties not typically found in acrylic chemistries such as excellent flow and leveling.		●	○	○	●	●	●	○	○		○		○	○		●			○					○	●	○

● Highly recommended ○ Recommended

Rheological additives

RHEOLATE® thickeners

Product name	Composition	Description	Solventborne	Waterborne	Application																							Shear Rate		
					Architectural coatings					Industrial coatings							Construction						Others								
					Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesives	Adhesives and sealants	Inks	Leather coatings	Low	Medium	High
Nonionic associative thickeners (NiSAT)																														
RHEOLATE CVS® 10	Polyurethane solution	Excellent low-mid shear viscosity builder, provides good balance of sag, flow and leveling, reduced viscosity loss on tinting, excellent color properties and syneresis control.		●	●		●	●	●				●					●		●			●	●		●	○	
RHEOLATE CVS® 11	Polyurethane solution	Excellent mid-shear thickener that also contributes some high-shear viscosity and provides good balance of sag resistance and flow.		●	●		○	●	●				●			○		●						●			●	○
RHEOLATE CVS® 15	Polyurethane solution	Highly efficient, zero VOC , mid-shear builder with minimum KU drop upon tinting.		●	●		●	●	●	●	●		●	●	●	●		●		●	●		●	●		●	○	
RHEOLATE® 208	Polyurethane solution	Powdered rheology modifier, excellent mid-shear builder.		●	●		●	●	●				●													○	●	○
RHEOLATE® 212	Polyurethane solution	Excellent high-shear viscosity builder. Highly Newtonian profile with little influence on mid-shear viscosity. Used often in combination with RHEOLATE® 666, RHEOLATE® 655, or RHEOLATE CVS® thickeners for ideal balance of properties.		●	●	○	●	○	○	●	●	●	●	●	●	●		●			●		●	○				●
RHEOLATE® 222	Polyurethane solution	Highly efficient high-shear viscosity builder for aqueous applications, provides excellent flow and levelling.		●	●	○	●	○	○	●	●	●	●	●	●	●		●			●		●	○				●
RHEOLATE® 244	Polyurethane solution	Good high-shear viscosity build. Higher KU build in small particle-size binders than RHEOLATE® 212. Best balance of KU/ICI viscosities, ideal for use as sole thickener in small particle-size binders.		●	●	○	●	●	●				●														○	○
RHEOLATE® 255	Polyurethane solution	Good mid-shear viscosity builder, especially with small particle-size binders. Works well in flat through gloss paints.		●	●		●	●	●	●	●		●	●	●	●							●	●	●	○	●	
RHEOLATE® 266	Polyurethane solution	Excellent low-shear viscosity builder. Highly pseudoplastic rheology, excellent for spray and thick film application.		●	●		●	●	●	●	●		●	●	●	●							●	●		●	○	
RHEOLATE® 278 TF	Polyurethane solution	Excellent mid-high shear viscosity builder. Can be used as the sole thickener in quality acrylic flats and eggshell finishes.		●	●	○	●	●	●	●	●		●	●	●	●		●								○	●	○
RHEOLATE® 288	Polyurethane solution	Suitable for high-gloss, clear and pigmented coatings and haze-free architectural and industrial finishes.		●	●		●	●	●	●	●		●	●	●	●		●			●					●		

● Highly recommended ○ Recommended

Rheological additives

RHEOLATE® thickeners

Product name	Composition	Description	Solventborne	Waterborne	Application																								Shear Rate		
					Architectural coatings					Industrial coatings							Construction						Others								
					Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesives	Adhesives and sealants	Inks	Leather coatings	Low	Medium	High
Nonionic associative thickeners (NiSAT)																															
RHEOLATE® 299	Polyurethane solution	Highly efficient thickener that provides excellent sag resistance on spraying.		●	●		●	●	●	●	●		●	●	●	●							●	●	●	●		
RHEOLATE® 300 D	Polyether polyol solution	Excellent mid-shear viscosity builder. Good color, sag resistance, and suspension properties. Less sensitive to higher HLB surfactants. Best used in combination with RHEOLATE® 350 for good overall balance of properties.		●	●		●	●	●				●			○		●					○		●	○	●	
RHEOLATE® 310 D	Polyether polyol solution	RHEOLATE® 310 is a solvent-free version of RHEOLATE® 300.		●	●		●	●	●				●			○		●					○		●	○	●	
RHEOLATE® 350 D	Polyether polyol solution	Excellent high-shear viscosity build, great synergy with RHEOLATE CVS® rheology modifiers, excellent color properties and good syneresis resistance. More contribution on the mid-shear viscosity than RHEOLATE® 212.		●	●		●	●	●	●	●		●	●	●	●		●					●	●	●			●
RHEOLATE® 644	Polyurethane solution	Low VOC, solvent free, APE-free, provides efficient thickening in high and mid-shear viscosity ranges		●	●	○	●	●	●				●														○	○
RHEOLATE® 655	Polyurethane solution	Low VOC, solvent-free, APE-free, provides thickening efficiency primarily in the medium-shear rate range viscosity.		●	●		●	●	●	●	●		●	●	●	●							●		●		●	
RHEOLATE® 658	Polyurethane solution	Excellent mid-shear viscosity builder, especially with small particle-size binders. Works well in low and zero VOC flat through gloss paints.		●	●		●	●	●	●	●		●	●		●							●	●		○	●	
RHEOLATE® 666	Polyurethane solution	Low VOC, solvent free, APE-free, provides viscosity at low and medium-shear rates and provides effective flow and leveling control.		●	●		●	●	●	●	●		●	●	●	●							●	●		●	○	
RHEOLATE® 678	Polyurethane solution	RHEOLATE® 678 is a solvent-free version of RHEOLATE® 278.		●	●		●	●	●	●	●		●	●	●	●		●					●			○	●	○
RHEOLATE® FX 1070	Polyurethane solution	Zero-VOC liquid rheology modifier for high shear viscosity in aqueous coatings.		●	●		●	●	●	●	●		●	●	●	●		●					●	●				●
RHEOLATE® FX 1080	Polyurethane solution	Very low VOC, high efficiency, high active content polyurethane mid-shear thickener for the use in aqueous coatings.		●	●		●	●	●				●					●								○	●	○
RHEOLATE® HX 6008	Polyurethane solution	Efficient, Zero VOC, APEO free, high-shear builder. Excellent efficiency with both hydrophobic and hydrophilic resins with some low-shear contribution.		●	●	○	●	○	○	●	●		●	●	●	●		●		●			●	●	●		○	●
RHEOLATE® HX 6010	Polyurethane solution	Highly efficient, zero VOC, APEO free, Newtonian high-shear builder. Excellent efficiency with hydrophobic resins with exceptional application properties.		●	●	○	●	●	●	●	●		●	●	●	●		●		●			●		●			●
RHEOLATE® HX 6025	Polyurethane solution	Zero VOC, APEO free, high-shear builder. Excellent stain resistance and applied hide		●	●	○	●	●	●				●					●		●								●
RHEOLATE® HX 6050 IF	Polyurethane solution	Highly efficient, zero VOC, APEO free, high-shear builder. Excellent efficiency with hydrophilic resins and significant low-shear contribution.		●	●	●	●			●	●		●	●	●	●							●				○	●
Powdered NiSATs																															
RHEOLATE® 208	Polyurethane powder	Powdered rheology modifier, excellent mid-shear builder.		●	●		●	●	●				●														○	●	○
RHEOLATE® FX 1100	Polyurethane powder	Powdered, high efficiency, high-shear polyurethane thickener developed for use in sustainable waterborne systems		●	●		●	●	●				●					●		○	○	○	●		○		○	●
RHEOLATE® PHX 7025	Polyurethane powder	Zero VOC, high-shear builder. Excellent stain resistance and applied hide. Powdered rheology modifier for sustainable formulations		●	●	○	●	●	●				●				●	●	●	●		●						●

● Highly recommended ○ Recommended

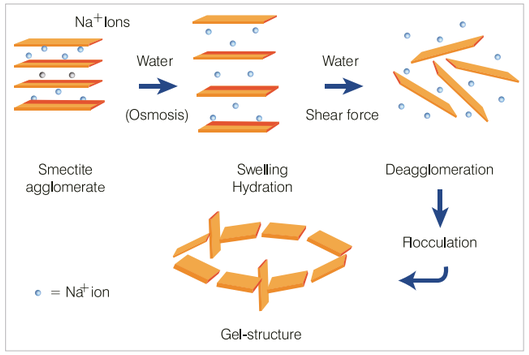
Rheological additives

BENTONE® clays for waterborne applications

Basic principles

Elementis clay products for waterborne systems are mainly based on hectorite, a naturally occurring smectite clay. Hectorite is a hydrophilic swelling clay composed of silicate sheets, which delaminate in water to provide an open three-dimensional structure. Because of this behavior, hectorite clays have the ability to thicken aqueous systems and are widely used as rheological additives.

BENTONE® clay thickening mechanism



BENTONE® rheological additives improve suspension properties and are easy to handle. They are also suitable for applications requiring fast water release and exceptional sag resistance. In construction applications, they give easier workability for tile adhesives, grouts, skim coats and mastics. Examples of very different types of modified clays are listed below.

Recommendations

BENTONE® DE is a refined natural hectorite clay modified for easy dispersion. It allows for high pregel solids (up to 14 %) with pourable viscosity. BENTONE® DE provides excellent in-can stability and sag control for a wide range of coating formulations.

BENTONE® DY CE is an optimized blend of smectite clay with a natural polymer. This product was specifically designed to prevent syneresis in standard architectural paints while maintaining open time. It is also suitable for industrial coatings including waterborne epoxies.

BENTONE® EW-NA is a highly-purified (beneficiated), easily dispersable powdered hectorite clay. This product is suitable for both architectural and industrial paint applications. It can be used to improve flow properties and reduce synersis and settling.

BENTONE® GS is a beneficiated, easily dispersable powdered hectorite clay. This product is suitable for different construction applications. It can be used to improve flow properties, pumpability and easier troweling.

Product name	Composition	Description	Solventborne	Waterborne	Application																								Shear Rate		
					Architectural coatings					Industrial coatings								Construction						Others							
					Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Concrete coating	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Inks	Leather coatings	Water treatment	Low	Medium	High
BENAQUA® 4000	Modified smectite clay	Hectorite clay-polymer for textured, spray applied and high build coatings		●	●		●			●								●				●					●		
BENAQUA® 5000	Modified smectite clay	Hectorite clay composite for the adhesives and grouts		●														●	●			●					●		
BENTONE® AD	Modified smectite clay	Provides a shear-thinning viscosity, exceptional anti-settling and sag control		●							●	●		●		●											●		
BENTONE® CT	Smectite clay	Thixotropic additive for aqueous construction and coatings systems		●		○								○				●	●	●		●				●	●		
BENTONE® DE	Modified smectite clay	Hyperdispersible hectorite clay for waterborne decorative coatings		●							●	●	●	●	●	●	●					○		○		●	●		
BENTONE® DH	Modified smectite clay	Modified clay thixotrope alternative to cellulosic thickeners		●	●		●	●										●									●	○	
BENTONE® DY CE	Modified smectite clay	Modified clay to improve sag resistance and flow in waterborne systems		●	●		●	●			●	●	●	●	●	●	●	●									●	○	
BENTONE® EW NA	Modified smectite clay	Hectorite clay for suspension control for waterborne systems		●	●	○	●	●	●	●	●	●	●	●	●	●	●	●		●			●	●	●	●	●		
BENTONE® GS	Modified smectite clay	Hectorite clay for waterborne adhesives/sealants and construction systems		●	●													●		●	●	●	●				●		
BENTONE® HC	Modified smectite clay	Refined hectorite for waterborne adhesives, sealants and high PVC emulsion paints		●		●													●	●	●			●			●	●		
BENTONE® HD	Modified smectite clay	Hyperdispersible hectorite clay for industrial coatings		●										●		●											●	●		
BENTONE® LT	Modified smectite clay	Modified hectorite clay for waterborne paints		●					●	●	●	●	●	●	●	●	●							●	●	●		●	○	
BENTONE® MA	Smectite clay	Hectorite clay for waterborne systems, 100% active		●	●		●														●						●		
BENTONE® OC	Smectite clay	Hectorite clay for waterborne construction systems, 50% active		●	●					●									●	●							●	●		
BENTONE® WBS	Smectite clay	Recommended for plasters, mortars and renderings based on lime, cement and gypsum		●	●	●	●		○										●	●	●		●					●		

● Highly recommended ○ Recommended

Rheological additives

BENTONE® organoclays for solventborne applications

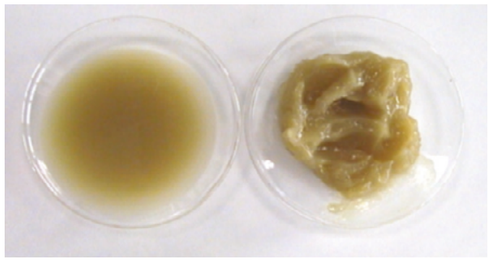
Basic principles

BENTONE® and BENTONE SD® organoclay rheological additives are reaction products of highly purified smectite clay and a quaternary ammonium salt. For applications that include coatings, adhesives and sealants, the clays are beneficiated before being converted into organoclays. When properly selected and activated, they will increase low shear viscosity, reduce sagging and help reduce settling in non-aqueous systems.

As supplied, BENTONE® and BENTONE SD® additives are powders in the form of agglomerated platelet stacks. A combination of wetting and mechanical energy deagglomerates the platelet stacks. Conventional BENTONE® additives require chemical polar activation, whereas in typical solventborne systems, the super dispersible BENTONE SD® additives do not. Polar activators can be 95/5 methanol/water mixture where methanol can still be used, 95/5 ethanol/water or propylene carbonate.

Thickening mechanism and incorporation

In a system containing the fully dispersed and separated organoclay platelets, a gel structure will develop by edge-to-edge hydrogen bonding between hydroxyl groups on the organoclay platelet edges. The most efficient gel structure develops when the hydroxyl groups are bridged by water molecules. If the water bridge is not present, the hydrogen bonding is significantly weaker, causing poor gel development.



BENTONE® 34 pregel without polar activator

BENTONE® 34 pregel with polar activator

Typical incorporation of organoclays follows these steps:

1. Add organoclay to a mixture of solvent and resin
2. Mix for 5 minutes
3. Add the polar activator (if needed)
4. Disperse at high shear for a minimum of 15 minutes
5. Continue with the rest of the formula

Solvent compatibility

Organoclays are compatible with most resin systems, including acrylics, epoxies, and polyurethane. The choice of BENTONE® additives depends on the solvent and the resin used in the system. BENTONE® rheological additives are available in conventional form and in super dispersible form for easier incorporation.

Low polarity systems	Mid polarity systems	High polarity systems	Activation	
Aliphatic Solvents, Mineral Spirits, Isopars, Naphtha, etc.	Aromatic and Hydrocarbon Solvents, Xylene, Toluene, etc.	Aldehydes, Acetates, Alcohols, Esters, Ethers, Glycols, Ketones.	Polar activator required	Easy to disperse
BENTONE® 34			•	
BENTONE® SD -1				•
BENTONE® 1000			•	
BENTONE® 38			•	
BENTONE® 52			•	
BENTONE® 54				•
BENTONE® SD -3				•
	BENATHIX®			•
	BENTONE® SD -2			•
	BENTONE® 27		•	

Rheological additives

BENTONE® organoclays

Product name	Composition	Description	Solventborne	Waterborne	Application														Polarity		
					Deco	Industrial coatings								Construc-tion		Others					
					Long-oil alkyds	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt	Roof coatings	Adhesives and sealants	Inks	Leather coatings	Low	Medium	High
BARAGEL® 3000	Organoclay	Organically modified bentone clay for low polarity systems	●			●				●				●	●	●	●		●		
BENATHIX®	Organoclay	Modified smectite clay for unsaturated polyester, plastisols and putties	●														●			●	
BENGEL® 434	Organoclay	Conventional organoclay for wide range of low polarity systems	●					○		●	●	●	●			●	●		●		
BENGEL® 818	Organoclay	Superdispersable organoclay for low polarity applications	●					○	●	●	●	●	●			●	●		●		
BENGEL® 958	Organoclay	Conventional organoclay for low to intermediate polarity organic systems	●		●	○	○	●	○	●	●	○	○		●	●	●		●	●	
BENTONE GEL® 2	Organoclay	Predispersed organoclay for industrial solvent based systems. Provides immediate thixotropic effect.	●					●	●	●											●
BENTONE SD® -1	Organoclay	Superdispersable organoclay for low polarity applications	●		●	●	●	●	●	●	●	●	●		●	●	●		●		
BENTONE SD® -2	Organoclay	Superdispersable organoclay for high polarity applications	●			●	●	●	●	●	●	●	●			●	●				●
BENTONE SD® -3	Organoclay	Organoclay for intermediate polarity applications	●			●	○	○	○	●	○	○	○			●	●			●	
BENTONE® 1000	Organoclay	High performance organoclay for low to intermediate polarity systems	●		●	●				●				●		●	●		●		
BENTONE® 27	Organoclay	Conventional hectorite-based organoclay for high polarity systems, polyol, epoxy, etc.	●			●	●	●	●	●	●	●	●			●	●	●			●
BENTONE® 30	Organoclay	Conventional organoclay for wide range of low to mid polarity solvent systems	●							●									●		
BENTONE® 34	Organoclay	Conventional organoclay for wide range of low polarity solvent systems	●		●	○	○	○	○	●	●	●	●	●	●	●	●		●		
BENTONE® 38	Organoclay	Conventional organoclay for intermediate polarity organic solvent systems	●			●	●	●	●	●	●	○	●			●	●		●	●	
BENTONE® 52	Organoclay	Conventional organoclay for intermediate polarity solvent systems	●				○	○		●	●	●	○				○		●	●	
BENTONE® 54	Organoclay	Organoclay for low to mid-polarity solvent systems	●		●			●			●		●	●	○		●		●	●	
BENTONE® 57	Organoclay	Conventional organoclay for high-polarity solvent systems	●							●	●					●					●
BENTONE® 920	Organoclay	Organically modified bentonite clay. Acts as a rheology modifier.	●											●					●		
BENTONE® NP-10	Organoclay	Easy dispersing organoclay for low polarity solvent inks and coatings	●														●		●		

● Highly recommended ○ Recommended

Rheological additives

THIXATROL® organic thixatropes and M-P-A® wax dispersions

Basic principles organic thixotropes

THIXATROL® and THIXCIN® rheological additives are based on castor oil derivatives, modified castor oil derivatives, polyamide or polyester amides. They typically must be subjected to appropriate wetting, deagglomeration, dispersion forces and minimum temperature requirements, to reach an activated structure.

Basic principles M-P-A®

M-P-A® anti-settling agents inhibit pigment, filler and extender movement in the paint. In most formulations, any settling problem will be eliminated. These products function by chain entanglement. M-P-A® grades can be used alone or in combination with a thixotropic additive for enhanced performance. Product selection is typically dependent on the solvent and reactivity of the system to be modified.

Recommendations

THIXATROL® MAX provides outstanding sag resistance in high solids solventborne epoxy primers and polyurethane topcoats. Overcoatability of coatings containing THIXATROL® MAX is excellent.

The THIXATROL® 8000 series are the latest developments in our portfolio. The key features of these new rheology modifiers are low activation temperatures, high structure build and thixotropy at low loading levels. They contribute to shorter production cycles, energy savings and excellent storage stability.

THIXATROL® AS 8053 and THIXATROL® PM 8056 perform particularly well in high-performance sealants. THIXATROL® PM 8056 and THIXATROL® PM 8054 have been developed for high-performance protective coatings. Depending on the formulation, THIXATROL® AS 8053 also shows advantages in industrial protective coatings.

We developed THIXATROL® PM 8058 for systems with high alcohol content.

THIXATROL® P200 series of products are pre-activated diamides in various solvents for post-additions.

Rheological additives

M-P-A® wax dispersions

Product name	Composition	Description	Solventborne	Waterborne	Application												Polarity		
					Industrial coatings								Construction		Others				
					Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt	Roof coatings	Adhesives and sealants	Inks	Low	Medium	High
Anti settling agents																			
M-P-A® 1075	Organic compound	Paste, anti-settling agent for polar systems	●						●	○									●
M-P-A® 1078-X	Organic compound	Very soft paste, anti-settling agent for industrial coatings	●						●								○	●	
M-P-A® 14	Organic compound	Powdered anti-settling agent useful in polar and nonpolar solvents	●			●	●		●		●	○					●	●	●
M-P-A® 2000-X	Organic compound	Liquid, pourable anti-settling and sag control agent	●			●	●		●		●	○					○	●	
M-P-A® 4020 BA	Organic compound	Post addable anti-settling HAPS-free agent, moisture free	●			●	●		●		●	○							●
M-P-A® 4020 X	Organic compound	Liquid, anti-settling agent for industrial finishes, moisture free	●			●	●		●		●	○					○	●	
M-P-A® 60 MS	Organic compound	Paste, anti-settling agent for aliphatic solventborne systems	●		○	○	○	○	●	●	○	○	●				●		
M-P-A® 60-A	Organic compound	Soft paste anti-settling agent dispersed in aromatic solvent blend	●		○	○	○	○	●	●	○	○						●	
M-P-A® 60-X	Organic compound	Soft paste anti-settling agent dispersed in xylene	●		○	○	○	○	●	●	○	○					○	●	
M-P-A® MS	Organic compound	Paste, anti-settling agent for aliphatic solventborne systems	●										●				●		

● Highly recommended ○ Recommended

Rheological additives

THIXATROL® organic thixatropes

Product name	Composition	Description	Solventborne	Waterborne	Application												Polarity		
					Industrial coatings								Construction		Others				
					Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt	Roof coatings	Adhesives and sealants	Inks	Low	Medium	High
Organic thixotropes																			
POST-4®	Castor oil derivative	Anti-settling/sagging agent for solventborne systems, can be used in post-addition	●						●	●		●					●		
THIXATROL® AS 8053	Proprietary organic	Organic thixotrope for use with adhesives and sealants at very low activation temperatures. Can be used with a broad range of solvents.	●						●	●				●	●		●	●	○
THIXATROL® GST	Castor oil derivative	An easier dispersing version of THIXATROL® ST	●						●	●					●	○	●	●	
THIXATROL® MAX	Proprietary organic	Powdered diamide thixotrope for solventborne & high solids systems	●						●	●					●		●	●	●
THIXATROL® P200A	Polyamide	Polyamide paste thixotrope in aromatic solvents for solventborne systems	●						●	●		●						●	
THIXATROL® P200N	Polyamide	Polyamide paste thixotrope for solventborne systems	●						●	●		●					●		
THIXATROL® P200X	Polyamide	Polyamide paste thixotrope in xylene for solventborne systems	●						●	●		●						●	
THIXATROL® P2100W	Proprietary organic	Organic thixotrope that provides excellent anti-sagging, anti-settling effect and improves the orientation of metallic pigments in industrial coatings.		●		●			●										
THIXATROL® P220X-MF	Polyamide	Polyamide paste thixotrope in xylene for solventborne systems	●						●	○	●	●						●	
THIXATROL® PLUS	Proprietary organic	Provides viscosity, thixotropy and sag control in both conventional and high-build systems.	●						●	●					●	●	●	●	●
THIXATROL® PM 8054	Proprietary organic	Organic thixotrope created for low polarity systems	●						●	●				●	●	●	●	●	
THIXATROL® PM 8056	Proprietary organic	High-performance organic thixotrope with easy activation. This thixotrope works with most solventborne systems.	●						●	●				●	●		●	●	●
THIXATROL® PM 8058	Proprietary organic	Organic thixotrope with low activation temperature and compatible with oxygenated solventborne systems.	●						●	●				●	●			●	●
THIXATROL® SR	Polyester amide	Non-seeding, highly efficient, liquid organic thixotrope for aromatic and oxygenated solventborne systems	●						●			●						●	●
THIXATROL® ST	Castor oil derivative	Organic thixotrope for low polarity aliphatic and aromatic systems	●						●	●					●	○	●	●	
THIXATROL® TSR	Polyamide	Provides viscosity, thixotropy and sag control in aliphatic systems	●						●			●		●			●		
THIXATROL® UV 1104	Polyester amide	Liquid, 100% NV, rheological additive for UV coatings	●								●				●		●	●	●
THIXCIN® E	Castor oil derivative	Powdered thixotrope, chemically the same as THIXCIN® R, but less dusty	●		●				●			○					●		
THIXCIN® GR	Inorganically modified derivative of castor oil	50% active, easily dispersed, powdered thixotrope with a reduced tendency for lumping	●						●	●		○			●		●		
THIXCIN® R	Derivative of castor oil	Organic thixotrope for low polarity aliphatic systems	●		●				●			○			●		●		

● Highly recommended ○ Recommended

Wetting and dispersing agents

Dispersing agents for coloarnts and pigment concentrates

Basic principles

Pigment dispersions and color concentrates should have full color value, broad compatibility and excellent stability, all obtained with maximum production throughput. NUOSPERSE® dispersants help meet these goals.

NUOSPERSE® multifunctional dispersing agents do much more than simple surfactants. Whether used as additives or as the grinding vehicles for highly- concentrated dispersions, they wet and deflocculate pigments without causing foaming or adversely affecting the film properties of the final coating.

In the manufacture of concentrated pigment dispersions, the right NUOSPERSE® dispersing agent will provide:

- Rapid pigment wetting
- Good flow at high pigment loading
- Increased mill output
- Maximum tinting strength development
- Full color development
- Compatibility with a broad range of coatings
- Elimination of floating, flooding and rub-up
- Long-term viscosity stability
- Elimination of hard settling

Additives for waterborne dispersions

NUOSPERSE® W-30, W-33, W-39 are high-performance dispersants for universal application in waterborne resin free pigment dispersions. These single products provide highly efficient dispersion of all pigment types in a wide variety of coating systems.

NUOSPERSE® FX 7500W is a polymeric dispersant for waterborne paints and aqueous inks. It shows excellent viscosity reducing effect, while improving color strength of organic and inorganic pigments. It can be used to make stable dispersions of high-jet grades of carbon black.

Additives for waterborne architectural dispersions

Waterborne architectural and light industrial pigment dispersions can be developed on a combination of NUOSPERSE® FN 260 or NUOSPERSE® FN 265 as wetting agent together with NUOSPERSE® FX 600 or NUOSPERSE® FX 610 as a dispersing agent. The amounts and ratios between them are dependent on the pigments used. Organic pigments and carbon blacks need to be processed on a media mill, while most inorganic pigments can be ground using a high-speed disperser.

Starting point formulas with NUOSPERSE® W-33 and NUOSPERSE® W-39

	White PW 6 [%]	Carbon Black PBk 7 [%]	Hansa Yellow PY 74 [%]	Red Oxide PR 101 [%]	Phthalo Blue PB 15:2 [%]	Yellow Oxide PY 42 [%]	Naphthol Red PR 170 [%]
Water	18.7	49.5	46.9	24.7	52.7	25.7	51.5
Glycol	5.0	5.0	6.0	4.0	6.0	5.0	7.0
pH adjustment	0.3	0.5	0.1	0.3	0.3	0.3	0.5
NUOSPERSE® W-33	11.0	10.0	12.0				
NUOSPERSE® W-39				11.0	11.0	9.0	11.0
Pigment	65.0	35.0	35.0	60.0	30.0	60.0	30.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Starting point formulas with NUOSPERSE® FN 260 and NUOSPERSE® FX 600

	Hansa Yellow PY 74 [%]	Tinting Black PBk 7 [%]	Phthalo Blue PB 15:2 [%]	Quinacridone Magenta PR 122 [%]	Phthalo Green PG 7 [%]	White PW 6 [%]	Yellow Oxide PY 42 [%]	Red Oxide PR 101 [%]
Water	30.0	39.0	37.0	41.0	26.0	12.0	13.0	15.0
NUOSPERSE® FN 260	6.0	10.0	8.0	7.0	8.0	3.0	5.5	3.0
NUOSPERSE® FX 600	2.5	3.5	1.0	7.0	3.5	4.5	5.0	2.5
Glycol / humectant	5.0	2.0	5.0	2.5	5.0	3.5	1.5	4.0
pH adjustment	0.3	0.0	0.6	0.0	0.0	0.5	0.8	0.6
Biocide	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5
DAPRO® DF 17	0.3	1.0	0.3	0.8	0.3	0.5	0.3	0.2
Pigment	45.0	38.0	43.0	36.5	48.0	63.0	59.0	55.0
Water	9.5	5.5	4.1	3.9	8.2	11.7	14.0	18.4
RHEOLATE® 1	0.4	0.0	0.0	0.3	0.0	0.8	0.4	0.8
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Wetting and dispersing agents

Humectants

Humectants are glycol replacing additives that are incorporated into low and zero-VOC colorants used in a dispensing machine for better open time and to prevent nozzle blocking.

NUOSPERSE® 3200 is a hydrophobic humectant that is exceptional in preventing nozzle blocking of high concentrated inorganic pigment dispersions like TIO_2 white, yellow and red oxide. These colorants have the highest pigmentation, leaving little room for sufficient humectant. NUOSPERSE® 3200 is much more efficient than traditionally used humectants like PEG 400.

NUOSPERSE® 2000 is a hydrophilic humectant that works well with organic pigments. It serves as both a liquid carrier and open time provider. It has considerably less impact on paint properties such as gloss, early water resistance and surfactant leaching as traditionally used high-boiling point glycols like PEG 400.

Nozzle blocking comparison

	Traditional EG / DEG	PEG & N 3200	PEG & 2 % EG
Yellow Oxide	4	4	1
Red Oxide	4	4	2
Tinting Black	4	3 - 4	3 - 4
Phthalo Blue	4	3 - 4	3 - 4

NUOSPERSE® non-ionic wetting agents

NUOSPERSE® non-ionic wetting agents are used for improved storage stability of the paint under different temperature conditions, including freeze-thaw.

The main applications for these low-foaming APE-free products are:

- NUOSPERSE® FN 211 : decorative indoor paints and low-cost paints
- NUOSPERSE® FN 260 : wetting agent and compatibilizer for universal (Point of Sale) colorants
- NUOSPERSE® FN 265 : all decorative paints and to improve compatibility of base paints with colorants
- NUOSPERSE® FN 270 : labeling-free wetting agent for universal use in decorative base paints
- NUOSPERSE® FX 365 : industrial and waterborne alkyd coatings

SUPREAD™ 2059 is our revolutionary new, labeling-free wetting agent. It is very low VOC, and imparts no, to very little foam in production and application. It was developed as a substrate and pigment surface wetter. It can be used in waterborne industrial and decorative coatings, pigment dispersions, waterborne inks and TiO_2 slurries.

NUOSPERSE® anionic wetting agents

Anionic wetting agents improve the compatibility of color systems in both waterborne and solvent-thinned coatings. NUOSPERSE® 2006 can be used in all types of water and solvent-thinned systems. It can also optimize the substrate wetting properties of the coating resulting in improved flow and leveling.

Dispersing and wetting agents for waterborne applications

Proper pigment wetting and dispersion are essential for optimum coating performance and appearance. NUOSPERSE® dispersing and wetting agents can maximize production output and improve the stability of the system to prevent reflocculation on aging.

NUOSPERSE® polymeric dispersing agents

NUOSPERSE® FX 504, FX 505 and NUOSPERSE® FX 605 are low foaming polymeric pigment dispersing agents that work effectively for many hydrophilic pigments and extenders used in aqueous decorative coatings. The products differ only in their neutralizing cation and concentration.

NUOSPERSE® FX 600 is a polyelectrolyte-based dispersing agent for industrial and architectural systems. In addition to being an effective wetting and dispersing agent, NUOSPERSE® FX 600 also has no negative influence on the corrosion resistance of a coating. For VOC-compliant coating systems NUOSPERSE® FX 610 is available.

NUOSPERSE® FX 665 and NUOSPERSE® FX 631 are dispersants based on hydrophobic copolymers. They should be used in architectural paints and light-duty industrial coatings where resistance to moisture and humidity are of importance. They work particularly well in combination with NiSAT thickeners.

Dispersing and wetting agents for solventborne applications

Benefits

- Rapid pigment wetting
- Good flow of mill base at high-pigment loading
- Increased mill output
- Maximum color acceptance of all bases
- Full color development
- Elimination of floating, flooding and rub-up
- Long-term viscosity stability
- Optimum initial gloss and gloss retention
- Elimination of hard settling

Recommendations

NUOSPERSE® 657 NA is a versatile wetting, dispersing and stabilizing aid for non-aqueous systems. It is compatible with a broad range of air drying resin systems as well as plasticizers. NUOSPERSE® 757 is a more economical version of NUOSPERSE® 657 NA. It is aromatic free and non-hazmat.

NUOSPERSE® FA 196 is a 100% active dispersing agent for a wide range of pigments and especially recommended for carbon black. It is effective in reducing rub-up and preventing pigment flooding/floating. This solvent-free dispersant is excellent for high-performance coating formulations.

NUOSPERSE® 2008 is a solvent-free, low odor, wetting and dispersing agent for most pigments. The product is typically used in high solids alkyd coatings to improve opacity, gloss and color strength.

NUOSPERSE® 9850 is a polymeric dispersing agent that is highly effective for carbon black and most types of organic pigments. It is recommended for use in a wide range of high-performance solvent-borne industrial coatings.

Wetting and dispersing agents

Wetting and dispersing agents

Product name	Composition	Description	Actives [%]	Solventborne	Waterborne	Compatibilizer	Application																												
							Architectural coatings					Industrial coatings								Construction		Others			Pigments										
							Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss and gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Roof coatings	Adhesives and sealants	Inks	Leather coatings	White	Extenders/fillers	Carbon black	Oxides, sienna and umber	Organic yellow, orange, red	Organic red, violet, purple	Phthalo blue, green				
Dispersants for waterborne coatings																																			
NUOSPERSE® FX 504	Ammonia neutralized polyacrylic acid	Pigment dispersant for waterborne paints	30		●		○	●	●	○	○										○		●		●	○									
NUOSPERSE® FX 505	Ammonia neutralized polyacrylic acid	Increased solids dispersant for waterborne paints	50		●		○	●	●	○	●										○		●		●	○									
NUOSPERSE® FX 605	NaOH neutralized polyacrylic acid	Increased solids dispersant for waterborne paints	45		●			●	●	○											○		●		●	●									
NUOSPERSE® FX 618	Ammonia neutralized copolymer	Hydrophobic copolymer dispersant, intended for use in high performance interior and exterior water based coatings. Good compatibility with NiSat's			●		●	○	○	●	●				○			○	○		●		●		●	○		○							
NUOSPERSE® FX 631	NaOH neutralized copolymer	General purpose dispersant for coatings and inorganic pigment dispersions. Good compatibility with NiSAT's	25		●		●	○	○	●	●					○		○	○		●		●		●	●	○	●	○	○					
NUOSPERSE® FX 665	Ammonia neutralized copolymer	Hydrophobic dispersant with excellent water resistance for waterborne industrial and high performance deco paints	22		●		●	○	○	●	●					○		●	●		●		●	●	●	○		○							
Wetting and dispersing agents																																			
SUPREAD™ 2059	Nonionic surfactant	Extremely low foam, very low VOC wetting agent with excellent substrate and pigment surface wetting properties	100			○	●	○	○	●	●		●	●		●		●	●			●	●	●	●	●	○	●	○	○	○				
NUOSPERSE® FN 211	Nonionic surfactant	Nonionic wetting agent, APE and VOC free	100		●		●	●	●	●	●									●	●	●	○	●	●	●									
NUOSPERSE® FN 260	Nonionic surfactant	Nonionic low foaming wetting agent, APE and VOC free for waterborne and universal colorant systems	95		●	●	○	○	○	○	○		○	○		○		○	○	○	○			●			●	●	●	●	●				
NUOSPERSE® FN 265	Nonionic surfactant	Nonionic low foaming wetting agent, APE and VOC free for waterborne deco paints and colorant systems	90		●	●	●	●	●	●	●		○	○		○		○	○	●	●				●	●	●	●	●	●	●				
NUOSPERSE® FN 267	Nonionic surfactant	Hydrophilic, nonionic wetting agent. APE and VOC free	100		●	●	●	●	●	●	●									●	●				●	●									
NUOSPERSE® FN 270	Nonionic surfactant	Nonionic wetting agent, APE and VOC free	100		●		●	●	●	●	●									●	●			●	●	●	○	○	○	○	○				
NUOSPERSE® FX 365	Nonionic surfactant	Pigment wetting and dispersing agent for industrial systems	90		●	●	○			○	●		●	●		●		●	●	○	○	●	●		●	●	●	●	●	●	●				
NUOSPERSE® FA 115	Anionic surfactant	Solves surfactant drifting in architectural base paints. Improved color development.			●	●	●	●	●	●	●					●	●	●	●				●		●	○	○	○							
NUOSPERSE® FA 182	Anionic surfactant	Wetting agent can be combined with colorants to improve color development	65	○	●	●	●	●	●	●	●					●	●	●	●				●		○	○	○	○	●	●	●				
NUOSPERSE® 2006	Anionic surfactant	Wetting agent and color acceptance improver	76	○	●	●	●	●	●	●	●												●		○	○	○	○	○	○	○				

● Highly recommended ○ Recommended

Wetting and dispersing agents

Wetting and dispersing agents (page 2)

Product name	Composition	Description	Actives [%]	Solventborne	Waterborne	Compatibilizer	Application																														
							Architectural coatings					Industrial coatings								Construction		Others			Pigments												
							Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss and gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coating	Wood coatings	Asphalt emulsion	Roof coatings	Adhesives and sealants	Inks	Leather coatings	White	Extenders/fillers	Carbon black	Oxides, sienna and umber	Organic yellow, orange, red	Organic red, violet, purple	Phthalo blue, green						
Dispersing agents for waterborne and universal pigment dispersions																																					
NUOSPERSE® W-22	Mixture of wetting and dispersing agents	Dispersing agent for waterborne systems, organic yellows, reds, carbon blacks and whites	29		●	○	○			○	●		●	●		●	●	●	●				●	●	●	●	●	●	○							
NUOSPERSE® W-28	Mixture of wetting and dispersing agents	Dispersing agent for waterborne systems, blues, greens, iron oxides and violets	44		●	○	○			○	●		●	●		●	●	●	●				●	●				●		●	●					
NUOSPERSE® W-33	Mixture of wetting and dispersing agents	Low VOC and APE free version of NUOSPERSE® W-22	32		●	○	○			○	●		●	●		●	●	●	●				●	●	●	●	●	●	○							
NUOSPERSE® W-39	Mixture of wetting and dispersing agents	Low VOC and APE free version of NUOSPERSE® W-28	42		●	○	○			○	●		●	●		●	●	●	●				●	●				●		●	●					
NUOSPERSE® FA 620	Anionic dispersant	Wetting and dispersing agent for pigment concentrates	50		●	●					●					●		●	●			●	●	●	○	○	○	○	●	●	●				
NUOSPERSE® FX 7500W	Polymeric dispersant	Highly efficient dispersant for waterborne industrial applications	40		●						●	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●					
NUOSPERSE® FX 600	Polymeric dispersant	Pigment dispersant for industrial and deco coatings and colorants	25%		●						●		●	●		●		●	●		○	●		●	●	●		●	●	●	●				
NUOSPERSE® FX 610	Polymeric dispersant	VOC free version of NUOSPERSE® 600	25%		●						●		●	●		●		●	●		○				●	●		●	●	●	●				
NUOSPERSE® XL 210	Anionic dispersant	Dispersant and compatibilizer for pigment dispersions, waterborne and solventborne coatings	88%	○	●	●					●															○		○	○	○	○				
NUOSPERSE® XL 220	Anionic dispersant	Dispersant and compatibilizer for pigment dispersions, waterborne and solventborne coatings	100	●	●	●					●														○		○	○	●	●	●				
NUOSPERSE® 2008	Anionic dispersant	Pigment dispersant for carbon blacks and organic pigments	100	●	●	●					●			○		○	○	○	○						○		○	○	○	○	○				
NUOSPERSE® FA 196	Anionic dispersant	Pigment dispersant for carbon blacks and organic pigments	91	●	●	●				○	●	●	●	●	●	●	●	●	●			●	●	●	●		●	●	○	○	○				
Open time Extenders																																					
NUOSPERSE® 2000	Hydrophilic humectant	Liquid carrier and humectant for low-VOC universal colorants	71		●		●	●	●	●	●														○	○	●	○	●	●	●				
NUOSPERSE® 3200	Hydrophobic humectant	Unique hydrophobic humectant to prevent tip-dry. Works especially well with inorganic pigments.	65		●		●	●	●	●	●														●	●	●	○		○	○				
Solventborne																																					
DAPRO® FX 2060	Wetting and dispersing agent	Dispersing agent and polar activator for solvent systems	50	●										○	○	●			●				●		●	●		○								
NUOSPERSE® 657 NA	Dispersing resin	Pigment dispersant for industrial and deco coatings and primers	73	●											○	●			●				●		●	●	●	●	●	●	●				
NUOSPERSE® 9100	Dispersing resin	Powdered pigment dispersing resin for UV and solvent systems	100	●										○	○	●			●				●		●	●	●	●	●	●	●				
NUOSPERSE® 9850	Polymeric dispersant	Dispersing agent for carbon blacks and organic pigments	46	●								●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●				
NUOSPERSE® XL1/80	Anionic surfactant	Dispersing vehicle for in-plant and machine tinting colorant systems	75	●	○	●					○					●			●						○	○	○	○	●	●	●				

● Highly recommended ○ Recommended

Defoamers

Defoamers for waterborne applications

Selecting the optimum defoamer

Foam control is a complex problem. No single product is adequate for all applications. DAPRO® defoamers are based on a variety of active materials to provide air release and bubble-breaking for most applications. Elementis DAPRO® defoamers are effective in both the grind and the letdown stages of a wide range of systems in the manufacturing of coatings. This enables customers to reduce the number of foam control agents stocked. It is suggested to evaluate several DAPRO® foam suppressors to determine the most effective one for any given formulation.

Basic principles

In general, defoamers work by providing incompatibility eliminating the foam.

It is important to select a combination of grind and letdown defoamers that works synergistically. This combination is often required when the pigment dispersion retains a lot of air. When the optimum grind and letdown defoamers are formulated together, lless total defoamer will be required.

Grind defoamers require shear to disperse into the system. The lower the dispersibility rating, the more shear is required and the more effective the defoamer. Typically, grind defoamers are very hydrophobic and not very well dispersible. Grind defoamers are the most powerful and only a small amount is used. The grind defoamers are normally not recommended for the letdown as they might cause surface defects.
Letdown defoamers require low shear to disperse into the system. The higher the dispersibility rating, the easier the defoamer will get into the system. Typically, letdown defoamers are less hydrophobic and dispersible.
Glycols and polyglycols do not reduce gloss and have good compatibility with resins but are often less persistent than oils.
Mineral oil defoamers are cost effective and have good persistence; however, in some systems there may be a reduction in gloss at higher usage levels.

Recommendations

DAPRO® DF 39 has wide compatibility with multiple resin systems. It imparts excellent foam control as both the grind and letdown defoamer in paints and coatings. It is particularly effective in semi-gloss and high-gloss paints in providing rapid bubble break at low concentrations.

DAPRO® DF 451 a highly-effective defoamer that has good compatibility across a wide variety of resins and coating types. The product provides both deaeration and defoaming and can be utilized in both the grind and letdown stages of paint production.
DAPRO® DF 645, DF 646, DF 649 and DF 696 are modified silicone-based grind defoamers for use in industrial and wood coatings as well as inks. They are easy to incorporate and have minimal impact on gloss and appearance properties.

Defoamers for solventborne applications

Basic principles

DAPRO® defoamers provide rapid bubble-breaking in solventborne systems when foam develops in the manufacturing process. This solventborne defoamer technology is also used to formulate foam-free coatings in industrial maintenance applications and in high-performance, field-applied coating systems. DAPRO® defoamers are also additive solutions for solventborne OEM finishes in automotive, appliance, and packaging applications.

Recommendation

DAPRO® DF 5300 is a modified polysiloxane and a bubble-releasing and anti-foaming agent for a variety of solventborne coatings. It provides excellent defoaming in dip and roller coating systems while minimizing surface defects.

DAPRO® DF 6800F is a foam-releasing and anti-foaming agent particularly suited for thick film epoxy floor coatings and other high-build systems. It can be used in solvent-free and solventborne coatings and exhibits excellent anti-foaming properties. It is recommended to incorporate DAPRO® DF 6800F before grinding or processing to achieve the optimum effect. Because of its high efficiency, the product is not recommended for low-viscosity systems.

Defoamers

Defoamers

Product name	Composition	Description	Solventborne	Waterborne	Application																								
					Architectural coatings					Industrial coatings								Construction						Others			
					Deco grind	Deco letdown	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt emulsion	Concrete	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings
DAPRO® DF 17	A blend of hydrophobic silica and mineral oil	Can be used in all waterborne paints and decorative coatings and is suitable for a broad range of latex systems		●		●	●							●					○	●	●		●				
DAPRO® DF 1760	Silicone free	A highly effective, silicone free, long lasting bubble breaker. It remains effective after extended storage of the system in which it is used.		●																							
DAPRO® DF 19	Silicone free	Excellent performance in semi-gloss to high gloss paint. Silicone free		●	●	●	●			○									○	●	●		●	●	●		
DAPRO® DF 21	Silicone modified	Effective dispersible defoamer in a variety of resins and coatings. It is particularly useful for high gloss paints.		●		●	●		●	○				●										●	●	●	●
DAPRO® DF 300	Silicone free	Silicone-free defoamer for industrial waterborne acrylic coatings		●						○				●										●		●	
DAPRO® DF 38	Silicone modified	Good defoamer for acrylic, vinyl-acrylic tint bases, flat to satin		●		●	●																				
DAPRO® DF 39	Silicone modified	Work horse defoamer for both grind and letdown in most paint systems		●	●	●	●	●	●	●				●		●	●		○	●	●		●	●	●		●
DAPRO® DF 40	Silicone modified	Excellent defoaming properties, providing rapid bubble break and excellent persistence		●						○														●			
DAPRO® DF 404	Silicone free	Can be used for many applications such as: roller coating, spraying, dipping and flow coating		●					●					●			●									○	
DAPRO® DF 420	Silicone free	Defoamer for inks and adhesives that contributes to smooth films. Excellent persistence		●				○	○	●				●		●	●							●		●	
DAPRO® DF 451	Silicone modified	Especially efficient in destabilizing both macro and micro foam in waterborne coatings and inks. Little impact on gloss		●	●	●	●	●	●					●		●								●		●	●
DAPRO® DF 47	Silicone modified	A general purpose let down defoamer for decorative coatings		●						○				●		●		●				●				●	
DAPRO® DF 503	Silicone modified	Silicone free dispersible defoamer that exhibits fast knock down. Can be used across a variety of coating and printing ink applications		●		●	●			○						●	●							●		●	
DAPRO® DF 51	Mineral oil free	Developed for flexo coatings and paper coatings. Mineral oil free		●						○														●		●	
DAPRO® DF 52	Silicone free	A mineral oil free, dispersible mixture of hydrophobic liquid and particulate actives with additives for printing ink applications		●			●	○	○	●						●	●							●		●	
DAPRO® DF 537	Silicone modified	Excellent general purpose defoamer with good compatibility		●	●	●	●										●										
DAPRO® DF 60	Silicone modified	A grind defoamer for semi-gloss waterborne systems		●				●	●					●	●												
DAPRO® DF 605	Silicone based	An excellent defoamer for waterborne elastomeric coatings, mastics and water reducible industrial coatings		●						○									○	●	●		●	●			
DAPRO® DF 615	Silicone based	A defoamer for waterborne coatings and water-reducible industrial coatings. It easily diluted with water.		●						○																	
DAPRO® DF 645	Silicone based	Easy to incorporate defoamer for high-gloss, deco and wood coatings, and inks		●		●	○	●	●							●	●									●	●
DAPRO® DF 646	Silicone based	Highly efficient, easily incorporated defoamer with minimal impact on gloss for waterborne industrial and wood coatings, and inks		●		●	○	●	●					●		●	●									●	●

● Highly recommended ○ Recommended

Defoamers

Defoamers (Page 2)

Product name	Composition	Description	Solventborne	Waterborne	Application																										
					Architectural coatings					Industrial coatings								Construction						Others			
					Deco grind	Deco letdown	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt emulsion	Concrete	Grouts	Plaster/stucco	Roof coatings	Tile adhesives	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings
DAPRO® DF 649	Silicone based	Superior defoamer, effective against microfoam for use in waterborne, high-gloss wood and deco coatings, and inks		●	●	●	○	●	●		●	●		●			●									●
DAPRO® DF 661	Silicone modified	Great in waterborne industrial coatings like amino baking paint systems. It has little to no impact on gloss characteristics.		●										●			●									
DAPRO® DF 665	Silicone based	Great silicone defoamer for coatings based on styrene acrylic resins		●			●	●	●	●	●	●	●	●	●	●	●							●		●	●
DAPRO® DF 670	Silicone based	Designed for the let down phase		●		●	●	●	●																		
DAPRO® DF 675	Silicone based	Blend of glycols and modified polysiloxanes suitable for semi-gloss paint		●	●		●	●	●	●	●	●	●	●	●	●	●							●		●	●
DAPRO® DF 696	Silicone based	Designed for the grind phase for industrial and architectural coatings.		●	●		●	●	●	●	●	●	●	●	●	●	●							●		●	●
DAPRO® DF 7005	Silicone free	Silicone free defoamer for deco paints		●	●	●	●																	●			
DAPRO® DF 7010	Silicone modified	Defoamer for deco paints		●		●	●																				
DAPRO® DF 7015	Silicone modified	Defoamer for deco coatings and letdown addition		●	●	●	●											●				●	●				
DAPRO® DF 80	Silicone free	Effective in adhesives, water reducible coatings, acrylic, vinyl acrylic, and polyvinyl acetate emulsion systems		●													●						●			
DAPRO® DF 880	Silicone free	Metallic salt of fatty acid for industrial coatings		●						●				○												●	
DAPRO® DF 900	Silicone free	Defoamer for inks, silicone free		●						●	●	●														●	
DAPRO® DF 911	Silicone free	Imparts excellent foam control properties in architectural, industrial paints and coatings, and inks		●							●	●														●	
DAPRO® DF 975	Silicone free	Defoamer for inks, silicone free		●						●	●	●														●	
DAPRO® DF 99	Silicone free	Effective in flexo, gravure and screen printing inks, adhesives and waterborne coatings. It exhibits fast knockdown at low use levels.		●						●														●			
DAPRO® PD 827	Silicone free	Effective in the defoaming of entrained air in drywall joint compounds and other dry mixes		●															●	●	●						
DAPRO® PD 829	Silicone free	A powder defoamer for preventing air entrapment		●															●	●	●						
Solventborne																											
DAPRO® DF 5300	Silicone modified	Defoamer for solventborne 2K PU, epoxy, alkyd enamels	●								●	●		●	●	●	●							●		●	
DAPRO® DF 603	Silicone modified	Highly effective in alkydmelamine, alkyd, 2-pack polyurethane and polyester systems. It has a good compatibility in clears	●											●	●												
DAPRO® DF 6800	Silicone based	Solvent free defoamer for high solids epoxy coatings and thick films	●										●	●	●												
DAPRO® NA 1622	Silicone based	Silicone modified, for solventborne inks and coatings	●							●	●	●	●	●	●	●	●							●		●	

● Highly recommended ○ Recommended

Slip and leveling additives

Basic principles

SLIP-AYD® surface conditioners can improve a number of properties of coatings and inks including resistance to metal marking, fingernail scuffing and blocking.

Surface conditioners are based on low molecular weight polyethylene and other synthetic and natural waxes. Low-level additions of the right surface conditioner can lower coefficient of friction and/or increase apparent film hardness.

SLIP-AYD® wax additives can protect your coating, ink or overprint varnish from:

- Marring
- Blocking
- Scuffing
- Staining
- Abrasion
- Rubbing
- Forming damage
- Metal marking
- Ransit damage
- Water penetration

SLIP-AYD® surface conditioners will not cause cratering or fish-eyes, or interfere with intercoat adhesion or overprinting. They are stable and will not seed-out or reagglomerate during storage or use.

The effectiveness of a wax can be altered by changing the process by which the particle size is reduced to a useable level, by blending two or more wax types, and in the case of wax dispersions, by changing the solvent or the vehicle in which the wax is dispersed. SLIP-AYD® surface conditioners are offered in several forms to provide the greatest range of effectiveness.

Wax selection

Many waxes can be effective in improving surface characteristics of coatings and inks and reducing or eliminating performance problems associated with coefficient of friction. Effectiveness is dependent on many factors, including but not limited to, wax chemistry, hardness and softening range.
Experience has shown that certain wax types provide consistent results in a wide range of applications.

The following chart provides a good indicator of the probable benefits of a variety of waxes. There is sufficient variability in the results that two or more wax types should always be evaluated to determine optimum effectiveness.

Wax Selection	Desciption
Carnauba wax	A hard, brittle, lustrous natural wax which provides very low coeffi-cient of friction, excellent product release and improved resistance to marring, scuffing and metal marking.
Hard polymeric wax	Hard, brittle, synthetic aliphatic wax that provide excellent slip and good block resistance.
Polyethylene	Tough, tasteless, low molecular weight polyethylene. Extremely versatile with good overall benefits.
High melt polyethylene	Extremely hard, low molecular weight synthetic wax. Excep-tional resistance to blocking and abrasion. May reduce gloss.
Wax blends	Blends of synthetic waxes and wax-like materials that synergisti-cally enhance the benefits of the individual waxes. They are highly effective in reducing coefficient of friction and increasing resistance to marring, scuffing and rubbing.
PTFE	Ultra low coefficient of friction and exceptional resistance to high tem-peratures. Easy to blend with other waxes for best value and property balance.

Slip and leveling additives

Slip and leveling additives

Product name	Composition	Description	Solvent	Average particle size [micron]	Hardness ASTM D-5	Softening range [°C]	Solventborne	Waterborne	Application									
									Industrial coatings							Others		
									Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Plastic coating	Wood coatings	Adhesives and sealants	Inks	Leather coatings
SLIP-AYD® FS 444	Organic polysiloxane	Slip and mar resistant agent for universal applications	Dipropylene glycol ether	–	–	–	●	●			●		●	●	●	●	●	●
SLIP-AYD® SL 18	Polyethylene wax dispersion	Polyethylene wax dispersion for industrial coatings	2-butoxyethanol	10 - 15	3.0 - 3.5	104 - 107	●	●	●	●	●		●	●	●			
SLIP-AYD® SL 31	Polyethylene wax dispersion	Polyethylene wax dispersion for industrial coatings	Xylene	4 - 8	3.0 - 3.5	104 - 107	●						●	●	●			
SLIP-AYD® SL 50	Polyethylene wax dispersion	Polyethylene wax dispersion for industrial coatings	Xylene/plasticizer	10 - 15	3.0 - 3.5	104 - 107	●	○				●	●	●	●			
SLIP-AYD® SL 78	Polyethylene wax dispersion	Polyethylene wax dispersion for wood furniture and floor coatings	Xylene/short oil alkyd	10 - 15	3.0 - 3.5	104 - 107	●						●		●			
SLIP-AYD® SL 177	High melt polyethylene wax dispersion	High melt polyethylene wax dispersion for industrial coatings, coil coatings and wood finishes	Xylene	10 - 15	<0.5	138 - 143	●	○		●	●	●	●	●	●			
SLIP-AYD® SL 295A	High melt polyethylene wax dispersion	High melt polyethylene wax dispersion for industrial coatings and inks	2-butoxyethanol/water	15 - 20	<0.5	138 - 143		●		●	●	●	●	●	●		●	
SLIP-AYD® SL 300	High melt polyethylene wax dispersion	High melt polyethylene wax dispersion for industrial coatings and inks	Water/propylene glycol	15 - 20	<0.5	138 - 143	○	●		●	●	●	●	●	●		●	
SLIP-AYD® SL 404	Hard polymeric wax dispersion	Hard polymeric wax dispersion for industrial coatings	2-butoxyethanol	2 - 5	2.0 - 2.5	93 - 99	●		●	●	●		●	●	●			
SLIP-AYD® SL 425	Hard polymeric wax dispersion	Hard polymeric wax dispersion for industrial coatings providing block and slip resistance	Xylene/plasticizer	2 - 3	2.0 - 2.5	93 - 99	●	○	●	●	●		●	●	●			
SLIP-AYD® SL 506	Carnauba wax dispersion	Carnauba wax dispersion low coefficient of friction, excellent product release	Dipropylene glycol methyl ether (DPM)	1 - 3	2.0 - 3.0	82 - 86	●	●	●				●	●	●		●	
SLIP-AYD® SL 508	Carnauba wax dispersion	Carnauba wax dispersion for industrial coatings	Isopropanol	2 - 4	2.0 - 3.0	82 - 86	●	●	●				●	●	●		●	
SLIP-AYD® SL 523	Hard polymeric wax dispersion	Hard polymeric wax dispersion for can coatings and metal drums	Isopropanol	1 - 3	2.0 - 2.5	93 - 99	●	●	●	●	●		●	●	●			
SLIP-AYD® SL 530	Polyethylene wax dispersion for general industrial coatings	Polyethylene wax dispersion for general industrial coatings	2-butoxyethanol	1 - 3	3.0 - 3.5	104 - 107	●						●	●	●			
SLIP-AYD® SL 551	High melt polyethylene wax dispersion	High melt polyethylene wax dispersion for industrial coatings	Aromatic 100/n-butanol	2 - 3	2.0 - 3.0	82 - 86	●		●	●	●		●	●	●			
SLIP-AYD® SL 600	Polyolefin wax powder	Polyolefin wax powder, 100% active material, for automotive and wood coatings	–	10	–	–	●			●	●		●		●		●	
SLIP-AYD® SL 1606	High melt polyethylene wax powder	High melt polyethylene wax powder for furniture and inks	–	6	<0.5	135-138	●	●					●	○	●		●	

● Highly recommended ○ Recommended

Specialty additives

DAPRO® interfacial tension modifiers

DAPRO® interfacial tension modifiers are silicone-free. They are designed to eliminate or reduce film defects such as crawling, fish-eyes and some forms of cratering. They promote spreading and uniform film formation on hard-to-wet or contaminated surfaces without affecting recoatability.

DAPRO® W-77 acts as an intermediate between areas of high and low surface tension, either within a coating or between the coating and the substrate. It will eliminate or diminish film defects such as crawling, fish eyes, and some forms of cratering .

DAPRO® U-99 is generally more effective in two-component epoxies and alkyds.

DAPRO® coalescing agents

DAPRO® coalescing agents and plasticizers are water-dispersible, environment-friendly products prepared from renewable resources. They assist in excellent film formation, scrub resistance, improved gloss & open-time and excellent color acceptance. They are nearly odorless clear liquids, specifically designed for low VOC waterborne coatings. Suitable for emulsion paints for interior or exterior applications in a wide variety of binders. They are typically added at the letdown stage of the formulation (use levels are 1 % to 3 % by weight of the formulation).

RHEOLATE® anti-settling agents

RHEOLATE® 2001 is a highly effective waterborne anti-settling agent. It is an ultra-fine suspension of an aliphatic copolymer in water whose particle size is small enough to allow post addition. The product is for highly-concentrated pigment slurries, colorants or industrial finishes. It is not recommended for standard latex paints.

Specialty additives

Specialty additives

Product name	Composition	Description	Solventbore	Waterborne	Application																										
					Architectural coatings					Industrial coatings								Construction						Others							
					Exterior coatings	High PVC coatings	Flat coatings	Semi-gloss/gloss coatings	Water reducible coatings	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Asphalt emulsion	Concrete	Grouts	Plaster/stucco	Roof coatings	Tile adhesives	Adhesives and sealants	Inks	Leather coatings						
Flattening agent																															
DAPRO® FA NCO-6	Silica and wax dispersion	Silica based flattening agent for oil modified urethanes	●											●		●	●														
Coalescents																															
DAPRO® FX 511	Plasticizer	Coalescing agent for waterborne emulsion paints		●	●	●	●	●														●									
DAPRO® FX 513	Plasticizer	Coalescing agent for VOC compliant systems		●	●	●	●	●														●									
DAPRO® FX 514	Plasticizer	Coalescing agent for VOC compliant systems		●	●	○	●	●														●		●							
Interfacial tension modifiers																															
DAPRO® U-99	Anionic surfactant mix	Interfacial tension modifier for epoxies and industrial application, FDA approved	●	●										●		●	●								●						
DAPRO® W-77	Anionic surfactant mix	Interfacial tension modifier for industrial coatings and inks		●										●		●	●							●	●	●					
DAPRO® W-95HS	Anionic surfactant mix	High solids Interfacial tension modifier for industrial coatings and inks		●										●		●	●								●						
Hydrophobically modified silica																															
DUMACIL® 100 FGK	Hydrophobic silica	Micro-fine silica treated with an organic silicone compound for defoamer formulation	●	●																											
DUMACIL® 300 FGK	Hydrophobic silica	Micro-fine silica treated with an organic silicone compound for defoamer formulation	●	●																											
DUMACIL® 402 FGK	Hydrophobic silica	Micro-fine silica treated with an organic silicone compound for defoamer formulation	●	●																											
Anti-corrosion additives																															
NALZIN® 2	Zinc hydroxy phosphite	Zinc Hydroxyphosphite anti-corrosive pigment for solvent & water systems	●	●								●		●	●																
NALZIN® FA 179	Complex zinc compound in a mixture of solvents	Liquid flash rust inhibitor for waterborne systems		●								●		●	●																
Waterborne anti-settling agents																															
RHEOLATE® 2000	Wax dispersion	Highly efficient, pourable liquid anti-settling additive		●					●					●		○	●														
RHEOLATE® 2001	Wax dispersion	Anti-settling agent for waterborne pigment pastes		●					●					●		○	●									○					

● Highly recommended ○ Recommended

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Unique chemistry, sustainable solutions