ELEMENTIS

Performance specialties

EMEIA

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 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.

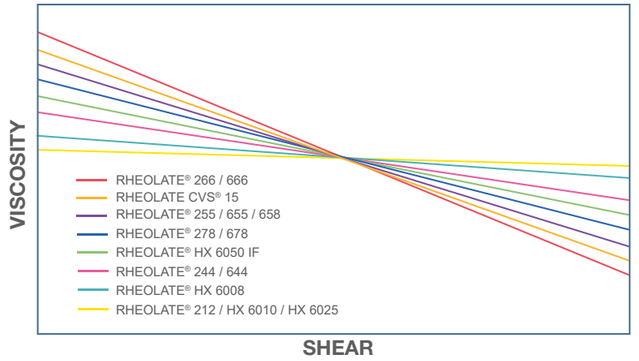
The large variety of available RHEOLATE® associative thickeners allow maximum flexibility to adjust and fine-tune the flow behavior of a system to meet the required performance.

Architectural coatings

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. 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 6025 or RHEOLATE® HX 6010. As powder combination is available with RHEOLATE® PHX 7025 and RHEOLATE® FX 1100.
Architectural coatings can also be made using a single associative thickener like RHEOLATE® HX 6008, RHEOLATE® HX 6050 or RHEOLATE® 678. As powder version its recommended to use RHEOLATE® 208. 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 or RHEOLATE® HX 6025 or the powder version RHEOLATE® PHX 7025.
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



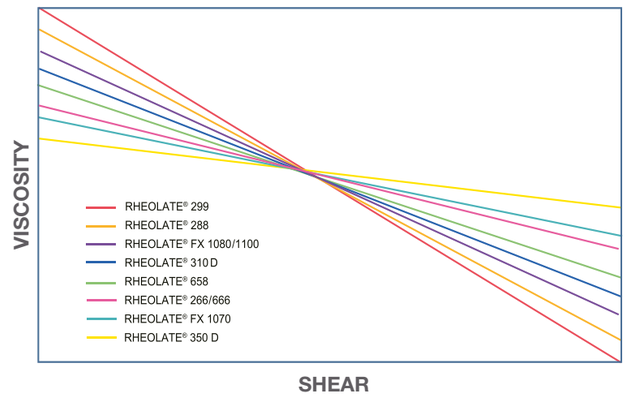
Industrial coatings

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® FX 1080/1010 for mid-shear thickener
- 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® nonionic synthetic associative thickeners

Product name	Composition	Description	Suitable for VOC compliant systems #	Volatile components	Typical use level, %	Active %	pH stability range	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 coatings	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings	Low	Medium	High
RHEOLATE® HX 6010	Polyurethane solution	Highly efficient, zero VOC, APEO free, Newtonian high-shear builder. Excellent efficiency with hydrophobic resins with exceptional application properties	Yes	Water	0.3 - 3.0	21	2 - 12		•	•	○	•	•	•	•	•		•	•	•	•		•		•			•			•			•
RHEOLATE® HX 6010 IF	Polyurethane solution	Highly efficient, zero VOC, APEO free, free of isothiazolinone type of preservatives, Newtonian high-shear builder. Excellent efficiency with hydrophobic resins with exceptional application properties. Isothiazolinone free (MIT biocide)	Yes	Water	0.3 - 3.0	21	2 - 12		•	•	○	•	•	•	•	•		•	•	•	•		•		•			•			•			•
RHEOLATE® HX 6025	Polyurethane solution	Zero VOC, APEO free, high-shear builder. Excellent stain resistance and applied hide	Yes	Water	0.3 - 3.0	21	2 - 12		•	•	○	•	•	•				•					•		•									•
RHEOLATE® PHX 7025	Polyurethane power	Zero VOC, high-shear builder. Excellent stain resistance and applied hide. Powdered rheology modifier for sustainable formulations	Yes	None	0.1 - 0.6	100	2 - 12		•	•	○	•	•	•				•				•	•	•	•		•	•						•
RHEOLATE® 212	Polyurethane solution	Excellent high-shear viscosity builder. Highly Newtonian profile with little influence on mid-shear viscosity. Used often in combination with pseudoplastic NiSAT grades like RHEOLATE® 666, RHEOLATE® CVS-15 thickeners for ideal balance of properties.	Yes and very low VOC	Water	0.4 - 3.0	20	2 - 12		•	•	○	•	○	○	•	•	•	•	•	•	•		•			•		•		○					•
RHEOLATE® 212 IF	Polyurethane solution	Excellent high-shear viscosity builder. Highly Newtonian profile with little influence on mid-shear viscosity. Used often in combination with pseudoplastic NiSAT grades like RHEOLATE® 666, RHEOLATE® CVS-15 for ideal balance of properties. Isothiazolinone free (MIT biocide)	Yes and very low VOC	Water	0.4 - 3.0	20	2 - 12		•	•	○	•	○	○	•	•	•	•	•	•	•		•			•		•		○					•
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	Yes and very low VOC	Water	0.5 - 5.0	50	2 - 12		•	•		•	•	•	•	•		•	•	•	•		•					•	○	•	•			•
RHEOLATE® HX 6008	Polyurethane solution	Highly efficient, zero VOC, APEO free, high-shear builder. Excellent efficiency with low/mid shear contribution. Excellent efficiency in acrylic, styrene-acrylic, PR and alkyd emulsion based systems	Yes	Water	0.1 - 1.5	25	2 - 12		•	•	○	•	○	○	•	•		•	•	•	•		•		•			•		•	•		○	•
RHEOLATE® HX 6008 IF	Polyurethane solution	Highly efficient, zero VOC, APEO free, high-shear builder. Excellent efficiency with hydrophobic resins and significant low shear contribution. Isothiazolinone free (MIT biocide)	Yes	Water	0.1 - 1.5	25	2 - 12		•	•	○	•	○	○	•	•		•	•	•	•		•		•			•		•	•		○	•

• Highly recommended ○ Recommended

Rheological additives

RHEOLATE® nonionic synthetic associative thickeners (page 2)

Product name	Composition	Description	Suitable for VOC compliant systems #	Volatile components	Typical use level, %	Active %	pH stability range	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 coatings	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings	Low	Medium	High
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	No	Water/butyl diglycol	0.4 - 3.0	25	2 - 12		●	●	○	●	●	●				●														○	○
RHEOLATE® 644	Polyurethane solution	RHEOLATE® 644 is a solvent-free version of RHEOLATE® 244.	Yes	Water	0.4 - 3.0	25	2 - 12		●	●	○	●	●	●				●														○	○
RHEOLATE® 644 IF	Polyurethane solution	RHEOLATE® 644 is a solvent- and biocide free version of RHEOLATE® 244.	Yes	Water	0.4 - 3.0	25	2 - 12		●	●	○	●	●	●				●														○	○
RHEOLATE® FX 1070	Polyurethane solution	Zero-VOC liquid rheology modifier for high shear viscosity in waterborne coatings.	Yes and very low VOC	Water	0.2 - 2.0	40	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●				●		●				●
RHEOLATE® 208	Polyurethane powder	Powdered rheology modifier for sustainable formulations, excellent mid-shear builder.	Yes and very low VOC	None	0.1 - 0.6	100	2 - 12		●	●		●	●	●				●													○	●	○
RHEOLATE® 210	Polyurethane solution	A VOC-free urethane associative thickener for use in low VOC and VOC- free formulations too many VOC`s, maybe “for VOC compliant formulations”	Yes and very low VOC	Water	0.4 - 2.0	25	2 - 12		●	●		●	●	●				●					●					●		●		○	●	●
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.	No	Water/butyl diglycol	0.4 - 2.0	25	2 - 12		●	●	○	●	●	●	●	●		●	●	●	●		●								○	●	○
RHEOLATE® 678	Polyurethane solution	RHEOLATE® 678 is a solvent-free version of RHEOLATE® 278.	Yes	Water	0.4 - 2.0	25	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●					●			○	●	○
RHEOLATE® 310 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 D for good overall balance of properties.	Yes and very low VOC	Water	0.3 - 3.0	32	2 - 12		●	●		●	●	●				●			○		●					○			●	○	●	
RHEOLATE® HX 6050	Polyurethane solution	Zero VOC, high-shear builder. dedicated for VAE and Vina-Veova emulsions	Yes	Water	0.4 - 2.0	25	2 - 12		●	●	●	●			●	●		●	●	●	●							●				○	●
RHEOLATE® HX 6050 IF	Polyurethane solution	Zero VOC, biocide free, high-shear builder. dedicated for VAE and Vina-Veova emulsions	Yes	Water	0.4 - 2.0	25	2 - 12		●	●	●	●			●	●		●	●	●	●							●				○	●
RHEOLATE CVS®-11	Polyurethane solution	Excellent mid-shear viscosity builder, provides good balance of sag and flow and leveling, reduced viscosity loss on tinting, good color properties and syneresis control.	Yes	Water	0.25 - 1.5	20	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●		○			○			●	●	○	
RHEOLATE® 255	Polyurethane solution	Good mid-shear viscosity builder, especially with small particle-size binders. Works well in flat through gloss paints.	No	Water/butyl diglycol	0.2 - 2.0	20	2 - 12		●	●		●	●	●	●	●		●	●	●	●							●		●	●	○	●	
RHEOLATE® 655	Polyurethane solution	RHEOLATE® 655 is a solvent-free version of RHEOLATE® 255.	Yes	Water	0.2 - 2.0	20	2 - 12		●	●		●	●	●	●	●		●										●		●	●	○	●	
RHEOLATE® 655 IF	Polyurethane solution	RHEOLATE® 655 is a solvent- and biocide free version of RHEOLATE® 255.	Yes	Water	0.2 - 2.0	20	2 - 12		●	●		●	●	●	●	●		●										●		●	●	○	●	●
RHEOLATE® CVS®-15	Polyurethane solution	Highly efficient, zero VOC, mid-shear builder with minimum KU drop upon tinting.	Yes	Water	0.25 - 1.5	50	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●		●	●		●		●		●	○	

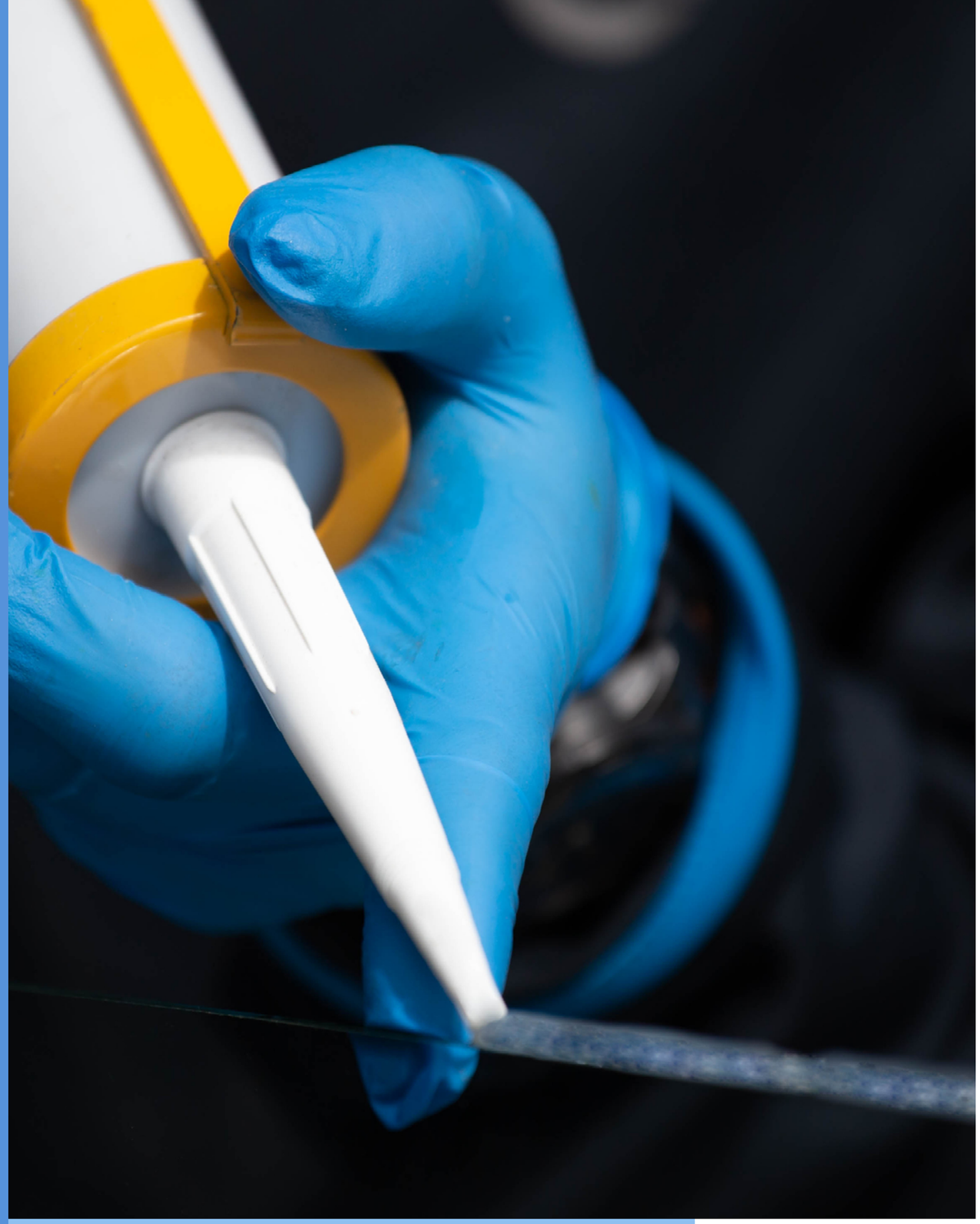
● Highly recommended ○ Recommended

Rheological additives

RHEOLATE® nonionic synthetic associative thickeners (page 3)

Product name	Composition	Description	Suitable for VOC compliant systems #	Volatile components	Typical use level, %	Active %	pH stability range	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 coatings	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings	Low	Medium	High
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.	Yes and very low VOC	Water	0.2 - 1.0	17.5	2 - 12		●	●		●	●	●				●					●								○	●	○
RHEOLATE® FX 1010	Polyurethane solution	Acts as a high efficiency, low-shear, associative thickener for use in waterborne coatings.	No	Water/glycol	0.2 - 2.0	50	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●			○		●		●	●	●		
RHEOLATE® FX 1080	Polyurethane solution	Very low VOC, high efficiency, high active content polyurethane mid-shear thickener for the use in waterborne coatings	Yes	Water	0.3 - 2.5	33	2 - 12		●	●		●	●	●				●					●								○	●	○
RHEOLATE® FX 1100	Polyurethane powder	Powdered, high efficiency, high-shear polyurethane thickener developed for use in sustainable waterborne systems.	Yes	None	0.2 - 1.0	100	2 - 12		●	●		●	●	●				●					●		○	○	○	●			○		○	●
RHEOLATE® 266	Polyurethane solution	Excellent low-shear viscosity builder. Highly pseudoplastic rheology, excellent for spray and thick film application	No	Water/butyl diglycol	0.2 - 6.0	20	2 - 12		●	●		●	●	●	●	●		●	●	●	●							●		●		●	○	
RHEOLATE® 666	Polyurethane solution	RHEOLATE® 666 is a solvent-free version of RHEOLATE® 266.	Yes	Water	0.4 - 2.0	20	2 - 12		●	●		●	●	●	●	●		●										●		●		●	○	
RHEOLATE® 666 IF	Polyurethane solution	RHEOLATE® 666 is a solvent- and biocide free version of RHEOLATE® 266.	Yes	Water	0.4 - 2.0	20	2 - 12		●	●		●	●	●	●	●		●										●		●		●	○	
RHEOLATE® 288	Polyurethane solution	Highly efficient thickener that provides excellent sag resistance on spraying.	No	Water/butyl diglycol	0.2 - 2.0	25	2 - 12		●	●		●	●	●	●	●		●	●	●	●		●		●						●			
RHEOLATE® 299	Polyurethane solution	Suitable for high-gloss, clear and pigmented coatings for haze-free architectural and industrial finishes	No	Water/butyl diglycol	0.2 - 2.0	25	2 - 12		●	●		●	●	●	●	●		●	●	●	●							●		●	●	●		

● Highly recommended ○ Recommended



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.

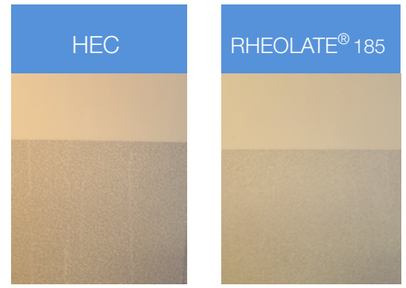
RHEOLATE® 150 and RHEOLATE® 175 are cost effective HASE thickeners for semi-gloss and flat latex paints, waterborne inks and waterborne adhesives. RHEOLATE® 150 is designed for excellent low-shear viscosity build in medium to high PVC formulations. RHEOLATE® 175 provides superb mid- to high-shear viscosity 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® acrylic 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 coatings	Wood coatings	Asphalt emulsion	Concrete coatings	Grouts	Plaster/stucco	Roof coatings	Tile adhesive	Adhesives and sealants	Emulsion synthesis	Inks	Leather coatings	Low	Medium	High
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® 125	Acrylic emulsion	Very good low-shear ASE-type viscosity builder. Excellent spray application properties for industrial systems		●	○	●	●	●	●	●	●		●		●	●	●	●					●		●	●	●	○	
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® 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® 135	Acrylic emulsion	High shear HASE thickener with unique flow and leveling properties with pronounced new-tonian viscosity character. Recommended for low PVC system – NOT REACH REGISTERED		●	○	○	●	●	●	○	○		○		○	○		●			○							○	●	

● Highly recommended ○ Recommended

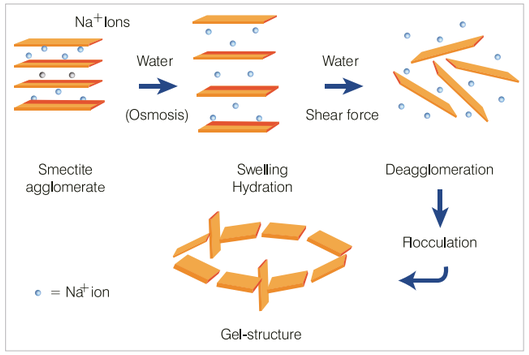
Rheological additives

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 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.

BENTONE® OC and BENTONE® CT are unrefined hectorite grades. BENTONE® OC is typically used in cementitious and gypsum based systems like renderings, plasters and skim coats in addition to cellulose ethers, to improve the in workability and surface quality while also minimizing crack initiation and propagation. BENTONE® CT is usually applied in lower demanding paint and coating systems as well as in emulsion based construction systems.

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® DE	Modified smectite clay	Hyperdispersible hectorite clay for waterborne decorative coatings		●							●	●	●	●	●	●	●					○		○		●	●		
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® 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.

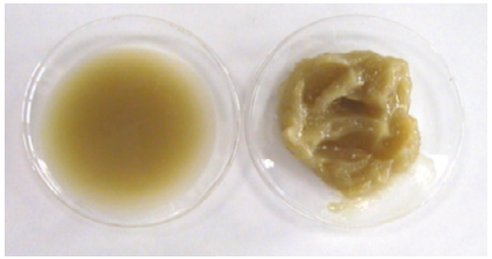
Thickening mechanism and incorporation

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.

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 that require specific shear conditions for incorporation. A combination of wetting and mechanical energy deagglomerates the platelet stacks and then delaminates the individual platelets in the stack. 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 for systems where no water can be tolerated, propylene carbonate can be used.

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



BENTONE® 34 pregel without polar activator

BENTONE® 34 pregel with polar activator

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								Construction		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
BENATHIX®	Organoclay	Easy dispersed modified smectite clay for unsaturated polyester, plastisols and putties	●														●			●	
BENTONE® 27	Organoclay	Conventional hectorite-based organoclay for high polarity systems, polyol, epoxy, etc.	●			●	●	●	●	●	●	●	●			●	●	●			●
BENTONE® 34	Organoclay	Conventional organoclay for wide range of low polarity solvent systems	●		●	○	○	○	○	●	●	●	●	●	●	●	●		●		
BENTONE® 38	Organoclay	This highly efficient conventional hectorite based organoclay is designed for low to intermediate polarity organic systems.	●		●	●	●	●	●	●	●	○	●			●	●		●	●	
BENTONE® 52	Organoclay	Conventional organoclay for intermediate polarity solvent systems	●				○	○		●	●	●	○				○		●	●	
BENTONE® 54	Organoclay	Conventional organoclay for low to intermediate polarity organic systems	●		●	○	○	●	○	●	●	○	○		●	●	●		●	●	
BENTONE® 1000	Organoclay	High performance organoclay for low to intermediate polarity systems	●		●	●				●				●		●	●		●		
BENTONE SD® -1	Organoclay	Superdispersable organoclay for non-polar to medium polarity applications	●		●	●	●	●	●	●	●	●	●		●	●	●		●		
BENTONE SD® -2	Organoclay	Superdispersable organoclay for moderate to high polarity applications	●			●	●	●	●	●	●	●	●			●	●				●
BENTONE SD® -3	Organoclay	Improved dispersibility hectroite based organoclay for non-poloar to medium polarity applications	●			●	○	○	○	●	○	○	○			●	●			●	
BENTONE® P380 MS	Organoclay paste	Organoclay paste in odorless mineral spirits, easy to use in production and more homogeneous end products	●			●	●	●	●	●	●	○	●			●	●		●	●	
BENTONE® P270 CO	Organoclay paste	Organoclay paste in castor oil, easy to use in production and more homogeneous end products	●			●	●	●	●	●	●	●	●			●	●	●			●

● 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.

Recommendations

THIXATROL® P2100W is a rheology control agent composed of a polyamide. It forms a network structure by interacting with the components in a paint system. It prevents pigment settling and improves metallic orientation resulting in an enhanced flip-flop effect. THIXATROL® P2100W works well with waterborne melamine baking paints and acrylic emulsion based paints.

THIXATROL® 5020W is a waterborne rheology control agent that can be used without a co-solvent for the stabilization and orientation of metal flakes and pearlescent pigments. It improves sag-resistance and acts as an anti-settling agent. It can be used in 2K polyurethanes as well as other industrial, leather, wood and furniture coatings.

THIXATROL® MAX and THIXATROL® PLUS are effective in all solvents, provide excellent sag control, are seed resistant and allow more flexibility in processing.

THIXATROL® AS 8053 and PM 8056 are new additions to the Elementis portfolio. The key features of these rheology modifiers are high structure build and thixotropy at low loading levels as well as low temperature activation and a wide activation temperature window. They contribute to shorter production cycles, energy savings and excellent structural stability upon storage.

A new version THIXATROL® PM 8058 was developed to be compatible with formulas that contain high levels of very polar solvents. Performance, stability and efficiency are the main attributes of this product.

THIXATROL® PM 8024 is new in the portfolio and is the perfect partner for high baking processes in segments like coatings and adhesives.

THIXATROL® AS and PM grades have been used as replacements for fumed silica effectively with their low activation temperatures they streamline the production process.

THIXATROL® P220X-MF is a pre-activated diamide in xylene for post-corrections. It is easy both to activate and to disperse and can be applied in a variety of solventborne systems. It provides thixotropy and sag resistance along with increased anti-settling properties.

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.

Rheological additives

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

Product name	Composition	Description	Solvent	Solid %	Application														Polarity		
									Industrial coatings								Con-struction	Others					
					Solventborne	Waterborne	Solventfree	Can coatings	Car-OEM coatings	Car refinish coatings	Coil coatings	General industrial coatings	Marine protective coatings	Plastic coatings	Wood coatings	Roof coatings	Adhesives and sealants	Inks	Leather coatings	Low	Medium	High
Anti settling agents																					
M-P-A® 60-X	Organic compound	Soft paste anti-settling agent dispersed in xylene	Xylene	24	●			○	○	○	○	●	●	○	○					○	●	
M-P-A® 2000-X	Organic compound	Easily incoporated, highly efficient, liquid, pourable anti-settling and sag control agent	Xylene	20	●				●	●		●		●	○					○	●	
Organic thixotropes for solventborne systems																					
THIXATROL® AS 8024	Proprietary organic	Organic thixotrope for use with adhesives and solvent systems that need reological control at temperatures higher than 120 °C	None	100	●		●				●						●					●
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.	None	100	●							●	●			●	●			●	●	○
THIXATROL® MAX	Proprietary organic	Cost effective seed-resistant, powdered diamide thixotrope for solventborne and high solids systems	None	100	●							●	●				●			●	●	●
THIXATROL® P220X-MF	Polyamide	Polyamide paste thixotrope in xylene for solventborne systems	Xylene/low molecular weight alcohol	20	●							●	○	●	●						●	
THIXATROL® PLUS	Proprietary organic	Provides viscosity, thixotropy and sag control in both conventional and high build systems.	None	100	●							●	●				●	●		●	●	●
THIXATROL® PM 8054	Proprietary organic	Organic thixotrope that is easy to activate and process for use in high polarity systems.	None	100	●							●	●				○			●	●	●
THIXATROL® PM 8056	Proprietary organic	High-performance organic thixotrope with easy activation. This thixotrope works with most solventborne systems.	None	100	●							●	●			●	●			●	●	●
THIXATROL® PM 8058	Proprietary organic	High-performance organic thixotrope with easy activation. This thixotrope works with most solventborne systems. Recommended for high polar solvent mixes	None	100	●	●	●					●	●				○				●	●
THIXATROL® ST	Organic modified castor oil derivative	Organic thixotrope for low polarity aliphatic and aromatic systems	None	100	●							●	●				●	○		●	●	
THIXCIN® R	Derivative of castor oil	Organic thixotrope for low polarity aliphatic systems	None	100	●			●				●			○		●			●		
THIXSEAL® 1084	Derivative of castor oil	Organic thixotrope for sealants, caulks and thick-film coatings	None	100	●							●				●	●			●		
Rheological agents for waterborne 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.	Water/propylene glycol monomythyl ether	16 - 20		●			●			●										●
THIXATROL® 5020W	Modified EVA emulsion	Organic thixotrope that provides excellent anti-sagging, anti-settling effect and improves the orientation of metallic pigments in industrial coatings. Can be used without cosolvent.	Water	18 - 22		●		●	●			●		●	●				●			

● 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.

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.

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.

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.

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 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 coatings	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 605	NaOH neutralized polyacrylic acid	Increased solids dispersant for waterborne paints	45		●			●	●	○											○		●		●	●											
Wetting agents for waterborne system																																					
SUPREAD™ 2059	Nonionic surfactant	Extremely low foam, very low VOC wetting agent with excellent substrate and pigment surface wetting properties	100			○	●	○	○	●	●		●	●		●		●	●			●	●	●	●	●	○	●	○	○	○						
NUOSPERSE® 2006	Anionic surfactant	Wetting agent and color acceptance improver	76	○	●	●	●	●	●	●	●												●		○	○	○	○	○	○	○						
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 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	Pugment wetting and dispersing agent for industrial systems	90		●	●	○			○	●		●	●		●		●	●	○	○	●	●		●	●	●	●	●	●	●						
Wetting and dispersing agent for solventborne system																																					
DAPRO® FX 2060	Wetting and dispersing agent	Dispersing agent and polar activator for solvent systems	50	●										○	○	●			●				●		●	●		○									
NUOSPERSE® 657 RD	Dispersing resin	Pigment dispersant for industrial and deco coatings and primers	70 - 75	●											○	●			●				●		●	●	○	●	●	○	○						
NUOSPERSE® 757	Dispersing resin	Pigment dispersant for industrial and deco coatings and primers	70 - 75	●											○	●			●				●		●	●	○	●	●	○	○						
NUOSPERSE® 9850	Polymeric dispersant	Dispersing agent for carbon blacks and organic pigments	46	●								●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●	●						
NUOSPERSE® FX 9086	Polymeric surfactant dissolved in methoxy propyl acetate	Designed for use in pigment pastes. It provides stable pigment dispersions for applications in a wide range of solventborne coatings and inks.	50	●								●	●	●	●	●	●	●	●			●	●	●	●	●	●	●	○	○	○						

● 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 coatings	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® 2008	Anionic dispersant	Pigment dispersant for carbon blacks and organic pigments	100	●	●	●					●			○		○	○	○	○						○		○	○	○	○	○						
NUOSPERSE® FA 115	Anionic dispersant	Additive to improve the incorporation of universal colorants into base paints	50		●	●					●														○	○	○	○	○	○	○						
NUOSPERSE® FA 162	Alcohol ethoxylated phosphate ester	Wetting and dispersing agent for waterborne pigments in plasticizer and universal tinting aids	100	○	●		●	●	●	●	●							●						○	○	○	●	○	○								
NUOSPERSE® FA 196	Surface active compound	Pigment dispersant for carbon blacks and organic pigments	91	●	●	●				○	●	●	●	●	●	●	●	●	●			●	●	●	●		●	●	○	○	○						
NUOSPERSE® FA 601	Anionic dispersant	A liquid wetting and dispersing agent for use in organic solventborne systems	50	●		○				○						●	●	●	●						●	●	●	●	●	●	●						
NUOSPERSE® FA 615	Anionic dispersant	Wetting and dispersing agent for pigments in plasticizer, inks and pigment concentrates	100	●										○		●	●	●	●				●		○	○	●	○	○								
NUOSPERSE® FA 620	Anionic dispersant	Wetting and dispersing agent for pigment concentrates	50		●	●					●					●		●	●			●	●	●	○	○	○	○	●	●	●						
NUOSPERSE® FX 600	Multi-functional polymer	Pigment dispersant for industrial and deco coatings and colorants	25		●						●		●	●		●		●	●		○	●	●	●	●		●	●	●	●	○						
NUOSPERSE® FX 610	Polymeric dispersant	VOC free version of NUOSPERSE® FX 600	25		●						●		●	●		●		●	●		○			●	●		●	●	●	●	○						
NUOSPERSE® FX 7500W	Polymeric dispersant	Highly efficient dispersant for waterborne industrial applications	40		●						●	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●						
NUOSPERSE® W-30	Polymeric dispersant	A wetting and dispersing agent for the manufacturing high concentrated, low viscosity, waterborne pigment dispersions	100			○	●	○	○	●	●		●	●		●		●	●			●	●	●	●	●	○	●	○	○	○						
NUOSPERSE® W-33	Polymeric dispersant	Highly efficient dispersant for waterborne industrial applications	40		●						●	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●	●	●						
NUOSPERSE® W-39	Polymeric dispersant	Pigment dispersant for industrial and deco coatings and colorants	25		●						●		●	●		●		●	●		○	●	●	●	●		●	●	●	●	○						
NUOSPERSE® W-44	Anionic dispersant	Additive to improve the incorporation of universal colorants into base paints.	50		●	●					●														○	○	○	○	○	○	○						
Pigment dispersion open time improver																																					
NUOSPERSE® 2000	Hydrophilic humectant	Liquid carrier and humectant for low-VOC universal colorants	71		●		●	●	●	●	●														○	○	●	○	●	●	●						

● Highly recommended ○ Recommended

Specialty additives

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 due to an incompatibility which destabilizes the foam.

Defoamers which are more dispersible improve compatibility and gloss, reduce film defects and improve color acceptance.

When there is little air entrained in the grind paste, a small amount of a defoamer appropriate for the letdown can often be used in both the grind paste and letdown.

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.

DAPRO® DF 696 is a new a new defoamer based on silicon chemistry and designed to defoam industrial systems.

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 is used extensively in industrial waterborne coatings to reduce surface tension

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

DAPRO® coalescing agents

DAPRO® FX 514 is a coalescing agent and plasticizer. It is a water-dispersible, environment-friendly product prepared from renewable resources. It assists in excellent film formation, scrub resistance, improved gloss and open-time, and excellent color acceptance.

It is a nearly odorless clear liquid, specifically designed for low VOC waterborne applications. Suitable for emulsion paints for interior or exterior applications in a wide variety of binders. It can also act as a plasticizer and impart flexibility to systems like floor adhesives or pressure sensitive adhesives.

Typically added at the letdown stage of the formulation, use levels are 1% to 3% by weight of the formulation. DAPRO® BIO 400 is a new coalescence agent based Levulinic ketal chemistry derived from non-food biomass such as corn stover, sugarcane or sorgum biomass residue. The product is 100 %, VOC free and can be used to replace petroleum based products in waterborne systems

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	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	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				
Defoamers																													
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 21	Silicone modified	Effective dispersible defoamer in a variety of resins and coatings and is particularly useful for high gloss paints.		●		●	●		●	○			●										●	●	●	●			
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 696	A blend of glycols, hydrophobic silica powder and organic modified polydimethylsiloxanes	Highly efficient grind defoamer composed of foam destroying particles, modified silicone and polypropylene glycol. Easy to incorporate due to its low viscosity.		●						●	●	●	●	●	●	●													
DAPRO® BIO 9910	Liquid vegetable oil based defoamer,	Economical in use, for universal waterborne applications. The product shows very good long-term efficiency.		●	●		●	●	●														●	●					
Coalescing agents																													
DAPRO® FX 511	Plasticizer	Coalescing agent for waterborne emulsion paints		●	●	●	●	●													●								
DAPRO® FX 514	Plasticizer	Coalescing agent for VOC compliant systems		●	●	○	●	●													●		●						
DAPRO® BIO 400	Plasticizer	Replacement for glycol coalescence solvents in architectural and industrial coatings. Reduces minimum film formation temperature of aqueous binder emulsions. For VOC compliant systems.		●	●		●	●	●		●	●	●	●	●	●							●		●				
Interfacial tension modifierss																													
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		●									●		●	●							●		●	●			
SUPREAD™ 2059	Nonionic surfactant	Extremely low foam, very low VOC wetting agent with excellent substrate and pigment surface wetting properties																											
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		●																									
Flash rust inhibitors																													
NALZIN® FA 179	Complex zinc compound in a mixture of solvents	Liquid flash rust inhibitor for waterborne systems	●	●								●	●	●															
NALZIN® FA 579	Nitrite-free corrosion inhibitor	Liquid flash rust inhibitor for acidic waterborne coatings	●	●								●	●	●															
Anti-settling agents																													
RHEOLATE® 2001	Wax dispersion	Anti-settling agent for waterborne pigment pastes		●					●				●		○	●										○			
DAPRO® BEZ 75	Sulphonated castor wax	Anti-settling agent for non-aqueous coatings and efficient polar activator for organoclays										●	●		●	●	●						●						
Anti-static additives																													
DAPRO® FK 321	Quaternary ammonium compound	ffective auxiliary for reducing the resistance of paints that are sprayed electrostatically									●	●	●		●	●							●						
Matting binder																													
HYPOMER MT-2550K	Acrylic resin	Hydroxyl acrylic resin with stable and efficient matting effect. Recommended for 2K PU coatings	●							●	●	●		●	●														

● Highly recommended ○ Recommended

For more details
please contact:

North America
Elementis
469 Old Trenton Road
East Windsor
NJ 08512, USA
T +1 609 443 2500

Europe
Elementis UK Ltd
c/o Elementis GmbH
Stolberger Strasse 370
50933 Cologne, Germany
T +49 221 2923 2066

Asia
Deuchem (Shanghai)
Chemical Co., Ltd.
99, Lianyang Road
Songjiang Industrial Zone
Shanghai, China 201613
T +86 21 577 40348

elementis.com

Unique chemistry, sustainable solutions