SOLVAY

asking more from chemistry®

Committed to
Your Coatings Success

Solvay helps you develop better formulations

A broad range of performance additives for emulsion polymerization and paint formulating

Solvay Novecare has become a world leader in the development and production of specialty chemicals and performance additives for paint and coatings application.

For more than 40 years, Solvay Novecare has served the coatings industry with the most comprehensive additives portfolio including surfactant, specialty monomers, wetting agents, dispersants and defoamers.

Our Vision for a Sustainable Future

We are convinced the future is dependent upon the responsible way in which we conduct our current activities – a way that reflects our commitments to each of our stakeholders. Solvay does business by creating sustainable value for all stakeholders through innovation and partnership.

Our solutions answer challenging criteria and labeling requirements in designing sustainable and environmentally friendly products. From eco-label compliance (such as GreenSeal) to claims and formulation requirements related to low- to zero-VOC, APE-free, biodegradability and renewable raw materials, Solvay has the solution.

Solvay works alongside customers to design products and solutions with reduced impact on health and the environment.

Committed to Customer Support

Solvay offers the widest range of products and industry-leading technical support and service to the coatings industry.

Solvay provides customers with custom-made solutions and develops formulations adapted to their needs and requirements for the paint and coatings industry.

The Solvay commitment is simple: develop new coatings solutions and products together with customers to support their success.

Global Industrial Footprint and Performance

Through world-class manufacturing operations in Europe, North America, Asia Pacific and Latin America, Solvay shares best practices within zones and benefits from technology transfer. Strengthened by a worldwide R&D and tech-support network, Solvay develops strong partnerships with companies around the world and creates innovative materials focused on next-generation technologies for the paint and coatings market.

Solvay Novecare has a dedicated global Coatings R&D team aligned to deliver innovation, performance and custom-made solutions to the markets we serve.

Note: These products are produced at worldwide locations through the Novecare division of the Rhodia subsidiaries of the Solvay group.

Worldwide and next door

24 Novecare sites

3 Coatings R&D centers

7 Coatings technical centers

Solvay can help you develop the right formulation for your market. So wherever you are, we're right there with the right solution.

SOLVAY way

The way we do business

Solvay puts into practice a sustainable development policy called **Solvay Way** because we are convinced our future is dependent upon the responsible way in which we conduct our current activities — a way that reflects our commitment to each of our stakeholders. **Solvay Way** encompasses three interlinked, equally important spheres: the Environment Sphere, the People Sphere and the Economic Sphere.

Based on a framework of responsibilities, **Solvay Way** allows Solvay sites and businesses to conduct self-assessments of their practices and establish action plans that promote continuous progress. At Solvay, the way we do business creates sustainable value for all our stakeholders through innovation and partnership.

> Responsible Care is the chemical industry's voluntary continuous improvement initiative to promote safe handling of products. (1987)

> The UN's Global Compact aims to ensure that heads of companies promote and uphold 10 universal principles concerning human rights, working conditions, respect for the environment and anti-corruption. (2003)

> The International Federation of Chemical, Energy, Mine and General Workers' Unions. (2005)

> Solvay Novecare has achieved world-wide ISO-9001 Quality Management System Multi-Site Certification. (2008)

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www.solvay.com

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SOLVAY

asking more from chemistry®

Additives for Paints and Coatings

Novecare

Solvay Novecare Coating Additives

SOLVAY Novecare, Global Expert in Additives for Coatings Applications

Solvay, a world leader in the development and production of specialty chemicals, supplies performance additives for a variety of paint and coating applications.

Solvay additives deliver outstanding benefits to coating formulations, such as enhanced surface wetting, improved coating adhesion to substrate, superior dispersion stability and gloss, enhanced color development and stability, and better foam control. Solvay additives are also effective in minimizing production mixing time and improving manufacturing efficiency.

Technical support dedicated

With our global technical support network, Solvay provides customers with custom-made solutions and develops formulations adapted to their needs and requirements for the paint and coatings industry. Solvay uses its expertise in safety, toxicology, environmental and regulatory affairs to provide guidance on industrial formulation compounds, thus creating additional value for paint and coatings customers.

Global industrial footprint

Through its world-class manufacturing operations in Europe, North America, Asia Pacific and Latin America, Solvay shares best practices within zones and benefits from technology transfer. Strengthened by a worldwide R & D and tech-support network, Solvay develops strong partnerships with customers around the world and creates innovative materials focused on next-generation technologies for the paint and coatings market.

Note: These products are produced at worldwide locations through the Novecare division of the Rhodia subsidiaries of the Solvay group.

Solvay Novecare offers multiple products

- **RHODOLINE®** series defoamers
- **RHODOLINE®** dispersing agents
- **RHODOLINE®, IGEPAL®, PENTEX®** and **GEROPON®** wetting agents
- **RHODOLINE®** series freeze/thaw and open time additives
- **FENTAMINE®** and **FENTACARE®** specialty amines
- **Rhodiasolv®** coalescent

Adapted for paint and coating applications:

- Waterborne paints
- Aqueous ink systems
- Water-based adhesives

Solvay is one of the leading suppliers of Specialty Additives for the Coating Industry

Solvay Novecare is a global supplier of emulsifiers, specialty monomers for enabling emulsion polymerization, and defoamers, dispersants, wetting agents and specialty functional additives for paint and coating formulations. Solvay features one of the broadest lines of products available in the industry serving architectural coatings, industrial coatings, and ink and adhesives markets.

After serving the industry for nearly 40 years, Solvay remains a technology leader today and continues to evolve to meet market needs with new additives for waterborne coatings.

With its global presence, Solvay offers customers customized, **sustainable** and functional **innovations**, cost-effective performance, **global technical support** and **commitment to R&D**, with an ongoing investment in people and resources. With an unmatched product range and industry leading technical support, Solvay is the preferred partner for **sustainable and differentiated solutions** for paint and coatings formulating.

Investing to Grow

Solvay continuously invests in expanding its specialty surfactants and additives portfolio, committed to answer today's issues and deliver the next-generation in performance and **sustainable solutions** demanded by the market.

Solvay Novecare is developing and expanding its line of industry-leading paint additives to enhance the performance of **zero-VOC and APE-free water-based formulations** while providing additional benefits such as improved freeze-thaw, open time film appearance, defoaming and wetting characteristics. Solvay consistently develops new **sustainable additives** that allow formulators to address the performance challenges of newer waterborne formulations, while answering the demand for more sustainable and cost-effective products.

Solvay's Sustainable Portfolio

Solvay Novecare works alongside its customers to design products and solutions with reduced impact on health and the environment. As part of corporate social responsibility, Solvay uses procedures that monitor its products throughout their entire life cycles. Solvay supports customers with a broad range of sustainable solutions and services including products optimized around criteria such as biodegradability, eco-toxicity, VOC content, and percentage of renewable materials.

Solvay **Zero VOC defoamers and APE free surfactants** are examples of its commitment to sustainability and the environment.

Solvay recognizes the difficulties in selecting the optimal surfactant system for wetting, dispersing or designing an emulsion polymer system. Formulators require surfactants that perform and are compatible with the entire formula and do not compromise the quality of the coating. Environmental concerns are also key drivers behind the reformulation of well-established systems, leaving formulators with additional challenges to overcome, such as the conversion to APE-free systems or ensuring compatibility with low to zero-VOC formulations.

Solvay offers a versatile toolbox for waterborne paint and coatings formulation.

RHODOLINE® defoamers provide:

- Efficient foam control during manufacture
- Application of coatings
- Inks and adhesive systems
- Emulsion polymerization applications

RHODOLINE® Defoamers

Solvay's extensive line of **RHODOLINE®** defoamers is designed to provide optimal foam control in coatings, inks and adhesive formulations. **RHODOLINE®** defoamers provide excellent deaeration and prevent foam formation during manufacture and application of paints, coatings, emulsion polymerization, inks and adhesives. **RHODOLINE®** defoamers minimize foam formation during high-shear applications such as paint roll, brush, spray and high-speed ink or coating applications.

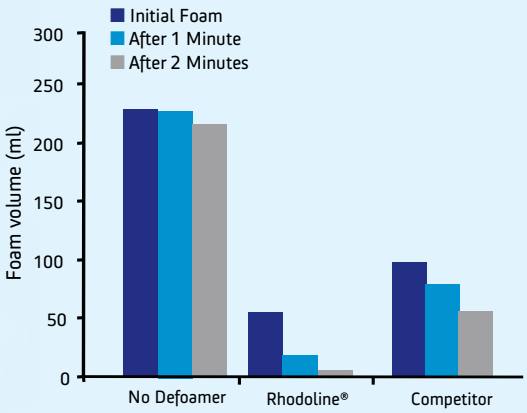
RHODOLINE® defoamer portfolio includes industry workhorse products for flat to high gloss paint systems as well as printing inks and adhesive systems. The newly developed eco-friendly, **APE–free and Zero-VOC defoamers**, provide quick foam knockdown and the lasting efficiency.

Wide range of use in polymers

- All acrylic
- Vinyl/Acrylic
- Styrene/Acrylic
- Vinyl Acetate Ethylene (VAE)

Key Features

- Quick bubble break and lasting efficiency in Flat to SG Paints
- Excellent efficiency in high-gloss architectural and industrial paints, adhesives and inks
- Does not cause fish-eyes or film defects
- Excellent foam control in latex manufacturing of vinyl, acrylics and VAE resins
- Broad compatibility



RHODOLINE® Defoamers

PRODUCT NAME	DESCRIPTION	Application Guideline								
		APE Free	VOC Free	Silicone Free	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks	Adhesives
Oil Based										
Rhodoline® 585	Silicone-free defoamer for high dispersability	◆	◆	◆	◆					◆
Rhodoline® 621*	Biodegradable, vegetable oil-based defoamer	◆	◆		◆					
Rhodoline® 622	Highly recommended for exterior w/b coatings	◆	◆		◆		◆			
Rhodoline® 635	In-process defoaming of vinyl latexes for coatings, PSA and paints	◆	◆	◆	◆					◆
Rhodoline® 640	Recommended for flat to semi-gloss coatings	◆	◆		◆					
Rhodoline® 643	Recommended for contractor and consumer latex paints	◆	◆		◆		◆	◆	◆	
Rhodoline® 646	In-process defoaming of latexes for coatings, PSA and coatings	◆	◆		◆					◆
Rhodoline® 654	Easy to disperse for compatibility		◆		◆		◆	◆	◆	
Rhodoline® DF-665	Recommended for flat to semi-gloss coatings	◆	◆		◆			◆		◆
Rhodoline® 670	In-process defoaming of latexes for coatings and PSA	◆	◆	◆					◆	◆
Rhodoline® 679	Recommended for adhesives and inks	◆	◆	◆					◆	◆
Rhodoline® 681F	Recommended for flat to semi-gloss coatings	◆	◆	◆	◆			◆	◆	◆
Rhodoline® 688	Workhorse defoamer for flat to semi-gloss waterborne coatings	◆	◆		◆			◆		
Rhodoline® 694	Versatile flat to semi-gloss waterborne coatings and adhesives	◆	◆		◆					◆
Rhodoline® 697	Recommended defoamer for flat to semi-gloss waterborne coatings	◆	◆		◆			◆		
Rhodoline® 796	Versatile flat to semi-gloss waterborne coatings and adhesives	◆	◆							◆

◆ Listed | - Not listed | NE Not evaluated | * Availability based on REACH status

International Inventory Status						FDA Compliance 21 CFR				
USA (TSCA)	CANADA (DSL)	EUROPE (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	JAPAN (MITI)	175.105	176.170	176.180	176.200	176.210
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◆	◆					NE	NE	NE	NE	NE
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RHODOLINE® Defoamers

PRODUCT NAME	DESCRIPTION	Application Guideline								
		APE Free	VOC Free	Silicone Free	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks	Adhesives
Glycol Ester / Oil Blends										
Rhodoline® 711	Oil-modifed, easy to incorporate defoamer for semigloss and gloss formulations	◆	◆	◆	◆					
Rhodoline® 770	Low oil, easy to incorporate defoamer for semigloss and gloss formulations	◆	◆	◆	◆					
Rhodoline® 962	Oil-modifed, multihydrophobe, easy to incorporate defoamer in w/b coatings	◆	◆				◆			
Rhodoline® 985	Oil-modifed, easy to incorporate defoamer for latex processing	◆	◆	◆						
Glycol Ester										
Rhodoline® DF 988	A molecular defoamer that provides efficient defoaming while maintaining gloss	◆	◆	◆		◆			◆	
Rhodoline® 990	A molecular defoamer that provides excellent defoaming efficiency with minimum impact on gloss.	◆	◆	◆		◆			◆	◆
Rhodoline® 999*	A molecular defoamer that provides excellent defoaming efficiency in waterbased inks with minimum impact on gloss	◆	◆	◆		◆			◆	◆
Silicone Emulsions										
Rhodoline® 843	Silicone based defoamer with high efficiency which is designed for quick foam knock out	◆	◆				◆		◆	
Rhodoline® 1010	High efficiency defoamer designed for quick foam knock down in letdown phase of paint manufacturing process	◆	◆				◆		◆	

◆ Listed | - Not listed | NE Not evaluated | L Listed with limitations | * Availability based on REACH status

International Inventory Status						FDA Compliance 21 CFR				
USA (TSCA)	CANADA (DSL)	EUROPE (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	JAPAN (MITI)	175.105	176.170	176.180	176.200	176.210
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Wetting and Dispersing Agents

SURFACTANTS

RHODOLINE® WA Series

- Very fast Wetting
- Extremely low foam
- Full compatibility with water based paints
- APE Free
- VOC Free, flexible for point choice
- Low viscosity easy to handle

Solvay offers a comprehensive line of wetting and dispersing agents specifically designed for waterborne coatings systems and drives its innovation to deliver new and better performing APE free and VOC free solutions. **RHODOLINE®** and **IGEPAL®** dispersing and wetting agents provide excellent broad compatibility, improvement of color stability and color acceptance, improved flow and leveling and storage stability in both architectural and industrial paints, inks and adhesive systems. These workhorse additives will reduce the surface tension and improve pigment wetting with minimum foaming. **RHODOLINE®** polymeric dispersants provide exceptional pigment dispersion, improved color acceptance and storage stability.

RHODOLINE® 3000 series provides exceptional pigment wetting and color improvement for organic pigments. **RHODOLINE® 4000** series is designed for inorganic pigments.

RHODOLINE® WA APE-free wetting agents provide excellent substrate wetting and low foaming for waterborne paints, coatings, adhesives and inks. **RHODOLINE® WA** line of products are low viscosity and low-pour point for ease of handling.

RHODOLINE® WA 120 at 1.0% addition	
Silicone	As is
RHODOLINE® WA 120	Benchmark

Wetting and Dispersing Agents

PRODUCT NAME	DESCRIPTION	Application Guideline								
		HLB Range	APE Free	VOC	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks	Adhesives
Rhodoline® 2109	APE-free non-ionic alcohol ethoxylate used as pigment wetter and color stabilizer.	14	Yes	None	◆	◆	◆	◆	◆	
Rhodoline® WA 100	APE-free and solvent free surfactant with a good balance of wetting and low foaming properties.	10-13	Yes	None	◆	◆	◆	◆	◆	◆
Rhodoline® WA 120	APE-free and solvent free low foaming surfactant with excellent wetting properties. Great alternative to silicone wetting agents.	10 - 13	Yes	None	◆	◆	◆	◆	◆	◆
Rhodoline® WA 150	Extremely low foaming APE-free and solvent free surfactant with good wetting properties. Good alternative to low foaming wetting agents.	10-13	Yes	None	◆	◆	◆	◆	◆	◆
Rhodoline® WA 200	APE-free and solvent free surfactant that provides excellent wetting in low to high PVC paint formulations. Excellent alternate for APE, high HLB wetting agents	17 - 19	Yes	None	◆	◆	◆	◆		
Rhodoline® 3100	Low to medium HLB organic pigment wetting including carbon black and lampblack, replaces APE wetting agents with HLB range 11-13.	11 - 13	Yes	None	◆	◆	◆	◆	◆	◆
Rhodoline® 3200	Low HLB organic pigment including toluidine red and yellow; replaces APE wetting agents within HLB range of 8 - 11.	8 - 11	Yes	None	◆	◆	◆	◆	◆	
Rhodoline® 3300	Medium HLB organic pigment wetting including phthalo green and quindo red; replaces APE wetting agents with HLB range 13 - 14.	13 - 14	Yes	None	◆	◆	◆	◆	◆	
Rhodoline® 3400	Medium to high HLB organic pigment such as azo yellow and phthalo blue; replaces APE wetting agents with HLB range 14-16.	14 - 16	Yes	None	◆	◆	◆	◆	◆	
Rhodoline® 3500	High HLB organic pigment wetting; replaces APE wetting agents with HLB > 16.	>16	Yes	None	◆	◆	◆	◆	◆	

◆ Listed | - Not listed

International Inventory Status							
USA (TSCA)	CANADA (DSL)	EUROPE (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	CHINA (SEPA)	JAPAN (MITI)	PHILIPPINES (PICCS)
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FDA Compliance 21 CFR				
175.105	176.170	176.180	176.200	176.210
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Wetting and Dispersing Agents

		Application Guideline								
PRODUCT NAME	**DESCRIPTION**	HLB Range	APE Free	VOC	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks	Adhesives
Rhodoline® 4160	Anionic; used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents. Improved corrosion resistance.	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 4170	Anionic; used in low/zero VOC colorants; best for inorganic and organic pigments that require mid HLB range wetting agents. Improved corrosion resistance.	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 4200	Anionic; used in universal colorants; best for pigments requiring mid to high HLB range wetting agents.	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 4400	Anionic; used in universal colorants; best for pigments requiring low to high HLB range wetting agents. Excellent wetting properties and color acceptance/development .	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 4500	Anionic; good substrate wetting; best for corrosion resistance.	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 5520	Nonionic; excellent wetting and color acceptance	N/A	Yes	Low	◆	◆	◆	◆	◆	
Rhodoline® 5700	Nonionic; excellent wetting and color acceptance	N/A	No	Low	◆	◆	◆	◆	◆	
Igepal® CO series	Nonylphenol ethoxylates used as pigment wetters and color stabilizers.	4 - 19	No	None	◆	◆	◆	◆	◆	
Igepal® CA series	Octylphenol ethoxylates used as pigment wetters and color stabilizers.	4 - 19	No	None	◆	◆	◆	◆	◆	
Geropon® and Pentex® 99	Anionic surfactants for improved adhesion over chaulky and weathered surfaces.	N/A	Yes	Low	◆	◆	◆	◆	◆	◆

◆ Listed | - Not listed | NE Not evaluated

International Inventory Status							
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FDA Compliance 21 CFR				
175.105	176.170	176.180	176.200	176.210
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NE	NE	NE	NE	NE
-	-	-	-	-
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◆	◆	◆	◆	◆
◆	◆	◆	◆	◆
◆	◆	◆	◆	◆

Dispersants for Waterborne Systems

Dispersing Process of Pigment

Three steps

Wetting

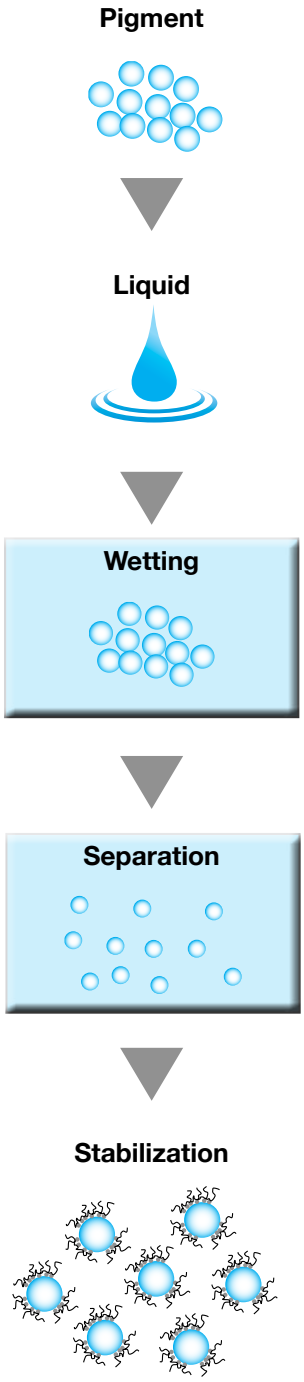
- Liquid replaces adsorbed gas on the surface of the pigment
- Immersion, adhesion, spreading, and capillary penetration

Separation

- Breaking up of the aggregates and agglomerates
- High amount energy needed

Stabilization

- Remaining particle size and its distribution during storage



Key Performance Features

- Excellent pigment wetting
- Improved flow
- Improved color acceptance
- Improved stability
- Low foaming
- Broad compatibility

Dispersants for Waterborne Systems

		Application Guideline											
PRODUCT NAME	**DESCRIPTION**	APE Free	VOC Free	Hydrophobic	Salt	pH	Percent active (%)	Recommende dosage Levels (wt %)	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks
Rhodoline® 111	Very hydrophobic dispersant for hard-to-wet pigments. Excellent color development	◆	◆	◆	Na	10.0	25	0.1-0.3	◆	◆	◆	◆	◆
Rhodoline® 142	Partially neutralized carboxylate polymer that is especially suited for use where hard water is encountered	◆	◆		Na	4.5	54	0.25-1.0					◆
Rhodoline® 207	Neutralized polyacrylated polymer with excellent chlorine and thermal stability	◆	◆		Na	7.0	45	1.0-5.0	◆			◆	◆
Rhodoline® 225	Hydrophobic dispersant for use with reactive pigments and high PVC paints	◆	◆	◆	Na	9.0	30	0.2-0.5	◆		◆	◆	◆
Rhodoline® 226/35	Low-foaming, hydrophobic copolymer for reactive and non-reactive pigments	◆	◆	◆	Na	7.3	35	0.1-0.5	◆		◆	◆	◆
Rhodoline® 230	Hydrophobic dispersant, particu-larly effective with high calcium carbonate pigment loadings	◆	◆		Na	7.9	44	0.1-0.5	◆		◆	◆	◆
Rhodoline® 231	Water-soluble anionic dispersant used in pigment slurries and paper coatings. Suited for stabilizing inorganic pigments like TiO2, CaCO3 and MgOH slurries. Viscosity stabilizer which prevents reflocculation.	◆	◆		Na	7.3	44	0.1-0.5	◆			◆	◆
Rhodoline® 270	Low-foaming, hydrophilic polyacrylate for general pigment dispersions	◆	◆		Na	7.3	43	0.1-0.4	◆			◆	◆
Rhodoline® 286N	Low foaming, ammonia-neutralized copolymer, best for gloss development	◆	◆	◆	NH4	7.0	50	0.1-0.4	◆	◆	◆	◆	◆
Rhodoline® RA-77	Low foaming, sodium-neutralized copolymer.	◆	◆		Na	7.0	43	0.1-0.25	◆			◆	◆

◆ Listed | - Not listed | NE Not evaluated | * Availability based on REACH status

FDA CLEARANCE					
175.105	175.300	175.320	176.170	176.180	176.210
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FDA Compliance 21 CFR					
USA (TSCA)	CANADA (DSL)	EUROPE * (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	JAPAN (MITI)
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Functional Additives

RHODOLINE® FT 100

RHODOLINE® FT 100 is a novel APE and VOC-free freeze-thaw stabilizer specially developed for low/zero VOC waterborne paints, pigments and ink systems. **RHODOLINE® FT 100** offers excellent freeze thaw stability for latex binders with low Tg and low/zero VOC paints.

Key Features

- Novel chemistry
- Enables low/zero VOC formulations
- Delivers freeze-thaw stability
- Enhances gloss
- Boosts stain resistance
- Improves scrub resistance
- APE-free and zero VOC
- Easy to use

Wide range of use in polymers

- All acrylic
- Vinyl/Acrylic
- Styrene/Acrylic
- VAE

RHODOLINE® OTE 500

RHODOLINE® OTE 500 is a novel APE free and VOC open time extender for low/Zero VOC waterborne paints, pigments and ink systems. **RHODOLINE® OTE 500** offers excellent open time extension for latex binders with low Tg and and low/zero VOC paints.

Key Features

- Novel chemistry
- Enables low/zero VOC formulations
- Extends open time in paints, textured coatings and other similar high film build applications
- Exhibits excellent dispersion stability
- Excellent retarder for WB screen printing inks
- Enhances gloss
- Easy to use

Wide range of use in polymers

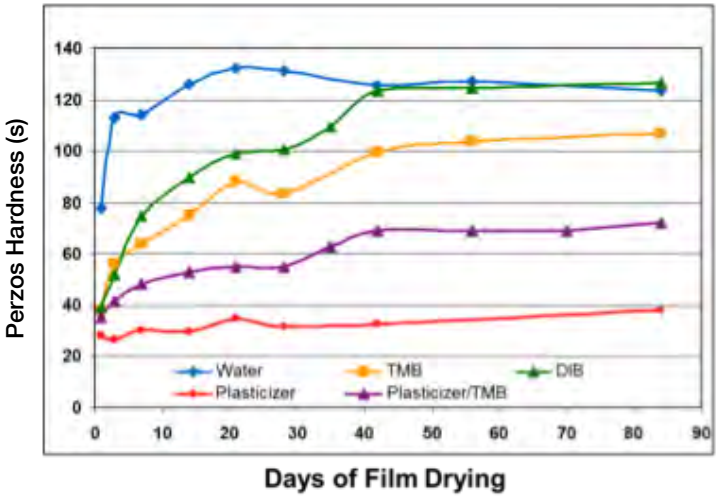
- All acrylic
- Vinyl/Acrylic
- Styrene/Acrylic
- VAE

		Application Guideline							
PRODUCT NAME	**DESCRIPTION**	APE Free	VOC Free	Flat to semi-gloss paints	High Gloss	Elastomerics / Roof coatings	Traffic Marking Paints	Inks	Adhesives
Rhodoline® FT-100	APE-free and Zero VOC additive that promotes freeze-thaw stability	◆	◆	◆	◆	◆	◆	◆	◆
Rhodoline® OTE-500	APE-free and Zero VOC additive that promotes extended open time	◆	◆	◆	◆	◆	◆	◆	◆
Rhodiasolv® DIB	True coalescing agent yielding superior film quality with major VOC reduction	◆		◆	◆	◆	◆	◆	◆

◆ Listed

DIB

RHODIASOLV® DIB, mixed aliphatic esters, is a new generation of low odor coalescent additive that meets tightening VOC regulations in the paint industry. **RHODIASOLV® DIB** helps formulating low VOC paints without the drawbacks of plastisizers. **RHODIASOLV® DIB** coalescent agent is extremely efficient for architectural, industrial coatings and inks. **RHODIASOLV® DIB** does not cause film softness and provides films with improved hardness and scrub resistance.



Key Features

- Enables low VOC formulations
- Low odor
- Enhanced efficiency
- Biodegradability
- Hydrolytically stable
- Nonflammable
- True coalescing agent

International Inventory Status					
USA (TSCA)	CANADA (DSL)	EUROPE (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	JAPAN (MITI)
◆	◆	◆	◆	◆	◆
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Specialty Amines

SOLVAY Novecare offers a broad portfolio of fatty and specialty amines for paints and coatings.

FENTAMINE® and **FENTACARE®** products are based on specialty amines for use in paints and ink systems. **FENTAMINE®** and **FENTACARE®** products offer multi-functional performance properties such as improvement of pigment wetting and dispersions, as polyurethane catalysts, epoxy curing agents and used as neutralizing agents.

Amine Types

- Fatty Alky primary amines
- Fatty Alkyl Tri & Tetra amines
- Alkyl Ethanol/Propanol amines
- Specialty amines
- Ethoxylated amines
- Quaternary amines

PRODUCT NAME	DESCRIPTION	CAS #	Recommended Use					International Inventory Status					
			Epoxy curing agent	PU catalys	Neutralizer	Dispersant / grinding aid	Antistatic	USA (TSCA)	CANADA (DSL)	EUROPE ** (EINECS)	AUSTRALIA (AICS)	SOUTH KOREA (KECL)	JAPAN (MITI)
Primary Amines													
Fentamine® A-CO	Coco amine	61788-46-3				◆		◆	◆	◆	◆	◆	NE
Fentamine® A-12	Laurylamine	124-22-1				◆		◆	◆	◆	◆	◆	◆
Fentamine® A-O	Oleyamine	112-90-3				◆		◆	◆	◆	◆	◆	◆
Fentamine® A-HT	Hydrogenated tallow amine	61788-45-2				◆			◆	◆	◆	◆	◆
Fentamine® A-T	Tallow amines	61790-33-8				◆			◆	◆	◆	◆	◆
Secondary Amines													
Fentamine® DA-CO	N-Cocoalkyl 1,3-propanediamines	61791-63-7	◆	◆		◆		◆	◆	◆	◆	◆	◆
Fentamine® DA-T	N-Tallowalkyl 1,3-propanediamines	61791-55-7	◆	◆		◆		◆	◆	◆	◆	◆	◆
Tertiary Amines													
Fentamine® DMA 1295	Dodecyl dimethylamine	112-18-5				◆		◆	◆	◆	◆	◆	◆
Fentamine® DMA 1695	Hexadecyl dimethylamine	112-69-6				◆		◆	◆	◆	◆	◆	◆
Fentamine® DMA 1895	Octadecyl dimethylamine	124-28-7				◆		◆	◆	◆	◆	◆	◆
Fentamine® DMA 0897	Octyl dimethylamine	7378-99-6				◆		◆	◆	◆	◆	◆	◆
Specialty Amines													
Fentamine® DMAPA	3-Dimethylamino 1-Propylamine	109-55-7	◆	◆			◆	◆	◆	◆	◆	◆	◆
Fentamine® DEAPA	3-Diethylamino 1-Propylamine	104-78-9	◆					◆	◆	◆	◆	◆	◆
Fentamine® MDEA	n-methyl diethanol amine	105-59-9			◆			◆	◆	◆	◆	◆	◆
Specialty Amine Ethoxylates													
Fentacare® T02	Bis(2-Hydroxyethyl) tallowalkyl amine(2EO)	61791-44-4				◆	◆	◆	◆	◆	◆	◆	◆
Fentacare® CO5	Cocoamine 5EO	61791-14-8				◆	◆	◆	◆	◆	◆	◆	◆
Fentacare® CO2	Cocoamine 2EO	61791-14-8				◆	◆	◆	◆	◆	◆	◆	◆
Rhodameen® HT-50	Hydrogenated tallow amine ethoxylate	68783-22-2; 7732-18-5				◆	◆	◆	◆	◆	◆	–	–
Rhodameen® PN-430	Ethoxylated oleyl amine	58253-49-9				◆	◆	◆	◆	◆	◆	◆	◆
Rhodameen® VP532	Ethoxylated tallow amine	61791-26-2				◆	◆	◆	◆	◆	◆	◆	◆
Quaternary Amine													
Fentacare® DHT 21 75	Di(hydrogenated Tallow) Di-methyl Ammonium Chloride	61789-80-8				◆		◆	◆	–	◆	◆	◆
Fatty Alkyl Tri and Tetra Amine													
Fentamine® DPTA- T	N1-Tallowalkyl dipropylenetriamines	61791-57-9				◆		◆	NE	◆	◆	◆	NE

◆ Listed | - Not listed | NE Not evaluated | ** Availability based on REACH registration

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SOLVAY

asking more from chemistry®

Surfactants and Specialties
For Emulsion Polymerization

Novecare

Contents

Solvay Novecare Emulsion Polymerization

Solvay Novecare is the leading global supplier of emulsifiers and specialty monomers to the Emulsion Polymerization Industry.

For more than 40 years, we have been committed to provide solutions to this industry. Our portfolio has evolved into the most comprehensive range of products addressing formulation challenges and more importantly enabling customers creating tomorrow's performance requirements.

Solvay Novecare supports customers with a broad range of sustainable solutions and services including products optimized around criteria such as biodegradability, eco-toxicity, VOC content, and percentage of renewable materials.

Our APE-free surfactant portfolio covers all chemistries from nonionics (RHODASURF®), to anionics like sulfonates (RHODACAL®), sulfate ethers (RHODAPEX®), sulfosuccinates (GEROPON®), phosphate esters (RHODAFAC®) and formulated blends (ABEX®).

Solvay Novecare's dedicated specialty monomer portfolio (SIPOMER®) brings new functionality and boosts binder performance to higher levels. Whether seeking to improve substrate wetting, adhesion to different substrates, emulsion stability or simply demand higher film performance, such as high scrub, stain or water resistance, Solvay has the solution.

Working with Solvay

- Extensive portfolio of chemistries
- Surfactants & Specialty monomers dedicated to Emulsion Polymers manufacturing
- Over 40 years as major supplier to the Emulsion Polymer industry
- Global player with local teams to support your developments

Note: These products are produced at worldwide locations through the Novecare division of the Rhodia subsidiaries of the Solvay group.

Formulated Emulsifiers

Product	Description	Hydrophobe	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)
Formulated Anionics						
ABEX® 18-S	Proprietary	Aliphatic	Liquid	35	0.03	48
ABEX® 23-S	Proprietary	Aliphatic	Liquid	60	0.10	40
ABEX® 26-S	Proprietary	Aromatic	Liquid	33	0.02	55
ABEX® 33-S	Proprietary	Aromatic	Liquid	30	0.12	37
ABEX® JKB	Proprietary	Aliphatic	Liquid	30	0.13	40
ABEX® VA-50	Proprietary	Aromatic	Liquid	46	0.17	44
ABEX® 2005	Proprietary	Aliphatic	Liquid	30	—	—
ABEX® 2020	Proprietary	Aliphatic	Liquid	30	0.01	41
ABEX® 2115-A	Proprietary	Aliphatic	Liquid	33	—	—
ABEX® 8018	Proprietary	Aliphatic	Liquid	31	0.05	37
Formulated Anionics						
ABEX® EP-100	Ammonium salt of Sulfated Nonylphenol Ethoxylate; 4 Moles EO	Aromatic	Liquid	30	0.03	33
ABEX® EP-110	Ammonium salt of Sulfated Nonylphenol Ethoxylate; 9 Moles EO	Aromatic	Liquid	30	0.01	37
ABEX® EP-120	Ammonium salt of Sulfated Nonylphenol Ethoxylate; 30 Moles EO	Aromatic	Liquid	30	0.05	42

FDA Status								
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400	181.30
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

● Listed with no specific limits | E Extraction limitation | L Listed with limitations | R Referenced with no limitations | RL Referenced with limitations

International Inventory Status Codes

● Listed | – Not Listed

Formulated Emulsifiers

Product	Description	Hydrophobe	HLB	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)
Nonionics							
ABEX® 2515	Proprietary	Aliphatic	16.3	Liquid	50	0.03	38
ABEX® 2525/40	Proprietary	Aliphatic	17.4	Liquid	40	0.08	44
ABEX® 2535	Proprietary	Aliphatic	18.0	Liquid	50	0.09	45
ABEX® 2545	Proprietary	Aliphatic	18.3	Liquid	50	0.12	46

FDA Status								
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400	181.30
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

● Listed with no specific limits | E Extraction limitation | L Listed with limitations | R Referenced with no limitations | RL Referenced with limitations

International Inventory Status Codes

● Listed | – Not Listed

Sulfates

Product	Description	Ionic Charge	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)
ALKYL SULFATES						
RHODAPON® UB STD	Sodium Lauryl Sulfate	Anionic	Liquid	30	0.06	29
RHODAPON® L-22EP	Ammonium Lauryl Sulfate	Anionic	Liquid	28	0.06	33
RHODAPON® LX-28	Sodium Lauryl Sulfate	Anionic	Liquid	30	29	
ETHER SULFATES						
RHODAPEX EST-30*	Sodium Tricecyl Ether Sulfate; 3 Moles EO	Anionic	Liquid	30	0.08	33
RHODAPEX® LA-40S	Sodium Salt of Sulfated Linear Alcohol Ethoxylate; 4 Moles EO	Anionic	Liquid	31	0.02	32
RHODAPEX® LA-120S	Sodium Salt of sulfated linear alcohol ethoxylate, 12 Moles EO	Anionic	Liquid	30	0.02	34
RHODAPEX® LA-300S	Sodium Salt of sulfated linear alcohol ethoxylate, 30 Moles EO	Anionic	Liquid	30	0.03	44
RHODAPEX® TR-2030S	Sodium Sulfate of branched tricycle alcohol, 20 Moles EO	Anionic	Liquid	30	0.02	34
RHODAPEX® AB-20 **	Ammonium Salt of Sulfated Alcohol Ethoxylate; 9 Moles EO	Anionic	Liquid	29	0.03	33
RHODAPEX® OPS-253	Alkylphenol Ethoxylate; 23 Moles EO	Anionic	Liquid	36	0.09	36
RHODAPEX® CD-128	Ammonium Salt of Sulfated Linear Alcohol Ethoxylate; 3 Moles EO	Anionic	Liquid	58	0.14	29
RHODAPEX® CO-436	Ammonium Salt of Sulfated Alkylphenol Ethoxylate; 4 Moles EO	Anionic	Liquid	58	0.03	33
RHODAPEX® BSA***	Ammonium Salt of Sulfated Alcohol Ethoxylate; Mid range EO	Anionic	Liquid	30	0.03	33

* North America Only, **Europe- Asia, ***Latin America

FDA Status							
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400
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International Inventory Status							
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)	New Zeland	Philippines
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FDA Listing Status Codes

● Listed with no specific limits | E Extraction limitation | L Listed with limitations | R Referenced with no limitations | RL Referenced with limitations

International Inventory Status Codes

● Listed | – Not Listed

Phosphate Esters

Product	Description	Ionic Charge	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)
PHOSPHATE ESTERS						
RHODAFAC® RS-410	Aliphatic Phosphate Ester; 3 Moles EO	Anionic	Liquid	100	0.002	—
RHODAFAC® RS-610	Aliphatic Phosphate Ester; 6 Moles EO	Anionic	Liquid	100	0.002	—
RHODAFAC® RS-610A-25	Aliphatic Phosphate Ester; 6 Moles EO; Ammonium Salt Solution	Anionic	Liquid	25	0.01	30
RHODAFAC® RS-710	Aliphatic Phosphate Ester; 10 Moles EO	Anionic	Liquid	100	0.002	36
RHODAFAC® RS-710 E30	Aliphatic Phosphate Ester; 10 Moles EO	Anionic	Liquid	30		36
RHODAFAC® RS-960	Aliphatic Phosphate Ester; 50 Moles EO	Anionic	Liquid	80	—	—
RHODAFAC® RE-610	Aromatic Phosphate Ester; 9 Moles EO	Anionic	Liquid	100	0.01	37
RHODAFAC RK-500 A	Aliphatic Phosphate Ester; 3.5 Moles EO	Anionic	Liquid	74	—	—

FDA Status							
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

● Listed with no specific limits | E Extraction limitation | L Listed with limitations | R Referenced with no limitations | RL Referenced with limitations

International Inventory Status Codes

● Listed | – Not Listed

Sulfonates

Product	Description	Ionic Charge	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)
SULFONATES						
RHODACAL® A-246/L	Sodium Alpha Olefin Sulfonate	Anionic	Liquid	40	0.07	29
RHODACAL® 330	Isopropyl Amine Dodecyl Benzene Sulfonate	Anionic	Liquid	90	0.1	32
RHODACAL® DS-10	Sodium Dodecyl Benzene Sulfonate	Anionic	Flake	98	0.1	32
RHODACAL® DS-4	Sodium Dodecyl Benzene Sulfonate	Anionic	Liquid	23	0.1	32
RHODACAL® DSB	Disodium Alkyl Diphenyloxide Sulfonate	Anionic	Liquid	45	0.08	32
RHODACAL® LDS-22	Sodium Dodecyl (linear) Benzene Sulfonate	Anionic	Liquid	23	0.1	32
SULFOSUCCINATES						
GEROPON® SS-OIP	Disodium Oleoylisopro-ponolamide Sulfosuccinate	Anionic	Liquid	40	—	—
GEROPON® ACR-4	Monoalkyl ether	Anionic	Liquid	31	0.01	29
PENTEX® 99	Aqueous Dioctyl Sodium sulfosuccinate	Anionic	Liquid	75	0.35	27

FDA Status							
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

● Listed with no specific limits | E Extraction limitation | L Listed with limitations | R Referenced with no limitations | RL Referenced with limitations

International Inventory Status Codes

● Listed | – Not Listed

Nonionics (APE Free)

Product	Description	Moles of Ethylene Oxide	Ionic Charge	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/ CM)	HLB
ALIPHATIC ALCOHOL ETHOXYLATES								
RHODASURF® BC-610	TDA Ethoxylate	6	Nonionic	Liquid	100	—	—	11.4
RHODASURF® BC-720	TDA Ethoxylate	9-10	Nonionic	Paste	100	—	—	13.8
RHODASURF® BC-729	TDA Ethoxylate	9-10	Nonionic	Liquid	90	—	—	13.8
RHODASURF® BC-840	TDA Ethoxylate	15	Nonionic	Paste	100	—	—	15.4
RHODASURF® TLA 3040	TDA Ethoxylate	30	Nonionic	Liquid	40	0.08	44	17.4
RHODASURF® TLA 4050	TDA Ethoxylate	40	Nonionic	Liquid	50	0.09	45	18
RHODASURF® TLA 5050	TDA Ethoxylate	50	Nonionic	Liquid	50	0.12	46	18.3
RHODASURF® TR 4070*	TDA Ethoxylate	40	Nonionic	Liquid	70	—	—	—
RHODASURF® TR 1540*	TDA Ethoxylate	15	Nonionic	Liquid	40	0.08	34	—
RHODASURF® TR 2080*	TDA Ethoxylate	20	Nonionic	Liquid	80	—	—	—
RHODASURF® L-4	LA Ethoxylate	4	Nonionic	Liquid	100	—	—	9.7
RHODASURF® LA-9/85	LA Ethoxylate	9	Nonionic	Liquid	85			13.1
RHODASURF® LA-12/80	LA Ethoxylate	12	Nonionic	Liquid	80			14.4
RHODASURF® B-1	LA Ethoxylate	16	Nonionic	Solid	100	0.007	41	15.6
RHODASURF® ON-870	OA Ethoxylate	20	Nonionic	Solid	100	0.015	37	15.4
RHODASURF® ON-877	OA Ethoxylate	20	Nonionic	Liquid	70			
RHODASURF® 6530	Proprietary	—	Nonionic	Liquid	65	0.08	41	17
TRISTYRLPHENOL ETHOXYLATE								
SOPROPHOR® BSU	TSP Ethoxylate	16	Nonionic	Liquid	100	—	—	12.5
SOPROPHOR® S/40-P	TSP Ethoxylate	40	Nonionic	Powder	100	—	—	15.0
BLOCK CO-POLYMERS								
ANTAROX® F-88 FLK	EO/PO	—	Nonionic	Flakes	100	—	48.5	28.0
ANTAROX® L-62	EO/PO		Nonionic	Liquid	100	—	Soluble	7.0
ANTAROX® L-64	EO/PO	—	Nonionic	Liquid	100	—	43.2	15.0

*Europe- Asia

FDA Status								
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400	181.30
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

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International Inventory Status Codes

● Listed | – Not Listed

Nonionics

Product	Description	Moles of Ethylene Oxide	Ionic Charge	Physical Form	Solids Content (%)	Critical Micelle Concentration (%)	Surface Tension at CMC (dynes/CM)	HLB
ALKYLPHENOL ETHOXYLATES								
IGEPAL® CA-210	Octylphenol Ethoxylate	1.5	Nonionic	Liquid	100	—	Insoluble	4.8
IGEPAL® CA-630	Octylphenol Ethoxylate	9	Nonionic	Liquid	100	0.005	31	13
IGEPAL® CA-877	Octylphenol Ethoxylate	23	Nonionic	Liquid	70	—	—	16.6
IGEPAL® CA-887	Octylphenol Ethoxylate	30	Nonionic	Liquid	70	0.03	38	17.4
IGEPAL® CA-897	Octylphenol Ethoxylate	40	Nonionic	Liquid	70	0.04	44	18
IGEPAL® CA-407	Octylphenol Ethoxylate	40	Nonionic	Liquid	70	0.04	44	18
IGEPAL® CO-530	Nonylphenol Ethoxylate	6	Nonionic	Liquid	100	0.03	32	10.8
IGEPAL® CO-630	Nonylphenol Ethoxylate	9	Nonionic	Liquid	100	0.005	32	13
IGEPAL® CO-720	Nonylphenol Ethoxylate	12	Nonionic	Liquid	100	0.007	36	14.2
IGEPAL® CO-730	Nonylphenol Ethoxylate	15	Nonionic	Liquid	100	0.008	39	15.0
IGEPAL® CO-858	Nonylphenol Ethoxylate	20	Nonionic	Liquid	80	0.01	41	16.0
IGEPAL® CO-880	Nonylphenol Ethoxylate	30	Nonionic	Solid	100	0.02	44	17.2
IGEPAL® CO-887	Nonylphenol Ethoxylate	30	Nonionic	Liquid	70	0.02	45	17.2
IGEPAL® CO-897	Nonylphenol Ethoxylate	40	Nonionic	Liquid	70	0.04	44	17.8
IGEPAL® CO-977	Nonylphenol Ethoxylate	50	Nonionic	Paste	70	0.05	44	18.2
IGEPAL® CO-987	Nonylphenol Ethoxylate	70	Nonionic	Paste	70	0.05	48	18.6
IGEPAL® CO-997	Nonylphenol Ethoxylate	100	Nonionic	Paste	70	0.1	50	19.0
IGEPAL® CTA-639W	Modified Alkylphenol Ethoxylate	9	Nonionic	Liquid	97	0.01	34	13.0
IGEPAL® DM-430	Dinonylphenol Ethoxylate	7	Nonionic	Liquid	100	—	—	9.5

FDA Status							
175.105	175.300	175.320	176.170	176.180	176.200	176.210	178.3400
●	–	–	●	–	–	●	–
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

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International Inventory Status Codes

● Listed | – Not Listed

Specialty Monomers

Trade Name	% of Solid	Tg (°C)	% Water	Inhibitor ppm	Specific gravity
PAM Technology Adhesion and Much More					
SIPOMER® PAM-100	100	-18	<1	MEHQ/~5000	1.2
SIPOMER® PAM-200	100	0	<1	MEHQ/~5000	1.1
SIPOMER® PAM-300	100	-40	<1	MEHQ/~5000	1.1
SIPOMER® PAM-4000	100		<0.25	MEHQ/~400	1.2
SIPOMER® PAM 5000	100		1.0 max	none	1.25
Polymerizable Stabilizers					
SIPOMER ® COPS-1			60	none	1.17
SIPOMER® COPS-3*	25		75	none	—
SIPOMER ® AES-100	97		<2.0	none	1.0
SIPOMER ® AAE-10	99		<0.3	none	—

* Asia - Latin America - MEA

* Remainder consists of acrylic acid (~20%) and higher adducts (~50%)
** Sipomer® BEM contains ~25% methacrylic acid
*** Sipomer® SEM-25 contains ~20% methacrylic acid
**** Sipomer® WAM II-25 contains ~25% methacrylic acid

International Inventory Status									Performance Features and Application
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)	China (JECSC)	Philippines (PICCS)	New Zealand (NZIoC)	
●	–	●	●	●	–	●	–	●	◗ Improved adhesion on metal, glass, and other inorganic substrates ◗ High mono/di alkyl phosphate ratio and low residual acid ◗ Improved latex stability
●	–	●	●	●	–	●	–	–	◗ Improved adhesion on metal, glass, and other inorganic substrates ◗ Excellent compatibility with most common organic systems ◗ High mono/di alkyl phosphate ratio and low residual acid ◗ Improved anti-corrosion properties ◗ Polymerizable surfactant
●	–	●	–	–	–	●	–	–	◗ Improved adhesion on metal, glass, and other inorganic substrates ◗ Excellent compatibility with most common organic systems ◗ High mono/di alkyl phosphate ratio and low residual acid ◗ Improved anti-corrosion properties ◗ Polymerizable surfactant
●	●	●	●	●	–	●	●	●	◗ Improved adhesion on metal substrate ◗ Improved latex stability ◗ Improved gloss
●	–	●	–	–	–				Improved scrub resistance when formulated into vinyl binders for high PVC paints
●	●	●	●	●	●	●	●	●	Reactive co-stabilizer providing: ◗ Low foaming latexes ◗ Better latex stability at low surfactant dosage ◗ Coatings with improved water and bleach resistance
–	–		–	–	–	●	–	–	Reactive co-stabilizer providing scrub/washability for high PVC coating formulation
●	–	●	–	–	–	–	–	–	Reactive co-stabilizer providing: ◗ Low foaming latexes ◗ Better latex stability at low surfactant dosage ◗ Coatings with improved water and bleach resistance
●	●	●	●	●	●	●	●	●	Nonionic reactive co-stabilizer: ◗ Low foaming latexes ◗ Better latex stability at low surfactant dosage ◗ Coatings with improved water and bleach resistance

International Inventory Status Codes

● Listed | – Not Listed

Specialty Monomers

Trade Name	% of Solid	Tg (°C)	% Water	Inhibitor ppm	Specific gravity
Resin Modifiers					
SIPOMER® IBOA	100	94	<0.05	MEHQ/112	0.985
SIPOMER® IBOMA	100	110	<0.05	MEHQ/108	0.983
SIPOMER® B-CEA	30*	37	0.5	MEHQ/1000	1.2
Rheology					
SIPOMER® BEM	50**		25	MEHQ/1000	1.06
SIPOMER® SEM-25	60***		20	MEHQ/600	1.07
SIPOMER® HPM 100	50		50	MEHQ/1000	1.06
SIPOMER® HPM 200	50		50	MEHQ/1000	1.06
SIPOMER® HPM 400	50		50	MEHQ/1000	1.06
Wet Adhesion					
SIPOMER® WAM	90		10	none	1.15
SIPOMER® WAM II	50***	87	30	HQ/1800	1.11

* Asia - Latin America - MEA

* Remainder consists of acrylic acid (~20%) and higher adducts (~50%)
** Sipomer® BEM contains ~25% methacrylic acid
*** Sipomer® SEM-25 contains ~20% methacrylic acid
**** Sipomer® WAM II-25 contains ~25% methacrylic acid

International Inventory Status									Performance Features and Application
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)	China (JECSC)	Philippines (PICCS)	New Zealand (NZIoC)	
●	●	●	●	●	●	●	●	●	High Tg hydrophobic monomer providing: ◗ Improved chemical and water resistance ◗ Better gloss and better mar resistance ◗ An excellent radiation curable reactive diluent
●	●	●	●	●	●	●	●	●	High Tg hydrophobic monomer providing: ◗ Improved chemical and water resistance ◗ Better gloss and better mar resistance ◗ Lower viscosity in high solid solvent based resin systems
●	●	●	●	●	●	●	●	●	Low Tg acidic monomer: ◗ Effective adhesion promoter for resins used in coatings and adhesives ◗ Improved peel strength for adhesives
●	●	●	–	●	–	●	●	●	Specialty monomer design for low shear HASE polymer
●	●	●	–	–	–	●	–	●	Specialty monomer design for mid to high shear HASE polymer
●	●	●	●	●	–				Specialty monomer design for mid shear HASE polymer
●	●	●	●	–	●				Specialty monomer design for newtonian HASE polymer
●	●	●	–	●	–				Specialty monomer design for low to mid shear HASE polymer
●	●	●	–	–	–	–	–	●	◗ Wet adhesion monomer for latex paints
●	●	●	●	●	●	●	●	●	◗ Wet adhesion monomer for latex paints

International Inventory Status Codes

● Listed | – Not Listed

Rhodoline® Defoamers

Product	Description	Product uses					
		APE Free	VOC Free	Contains Silicone Oil	Acrylic	Vinyl acrylics, VAE	SBR
RHODOLINE® DF 540*	Zero VOC white oil defoamer for in-process latex processing. BfR compliant	●	●	Yes	●	●	
RHODOLINE® 635	Zero VOC oil defoamer for in-process foam control	●	●	No	●	●	
RHODOLINE® 646	Zero VOC oil defoamer for in-process vinyl and natural latex foam control	●	●	Yes	●	●	
RHODOLINE® 670	Zero VOC oil defoamer for in-process vinyl latex processing	●	●	Yes	●	●	
RHODOLINE® 693	Phase stable defoamer used with SBR latex systems	●	●	Yes			●
RHODOLINE® 990	Oil-free defoamer for latex systems, minimum impact on gloss	●	●	No	●	●	●
RHODOLINE® 999*	Oil-free defoamer for latex systems, minimum impact on gloss	●	●	No	●	●	

*REACH Compliant

FDA Status				
175.105	176.170	176.180	176.200	176.210
●	●	●	●	●
●	●	●	●	●
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International Inventory Status					
US (TSCA)	Canada (DSL)	Europe (EINECS)	Australia (AICS)	South Korea (KECL)	Japan (MIT)
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FDA Listing Status Codes

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International Inventory Status Codes

● Listed | — Not Listed

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www.solvay.com

SOLVAY

asking more from chemistry®

SIPOMER®
Specialty Monomers
For enhanced performance

Novecare

Solvay Novecare Coatings

Novecare Coatings is a global leader in surfactant and specialty monomers committed to emulsion and specialty polymers. With over 40 years serving this industry, we have developed one of the most extensive portfolios of specialty monomers **(SIPOMER®s)** dedicated to improve architectural, industrial coatings and adhesives.

Leveraging our portfolio of chemistries and local application expertise, we continue designing structures that will help you solve today's challenges and define tomorrow's standards.

CONTENTS

Note: These products are produced at worldwide locations through the Novecare division of the Rhodia subsidiaries of the Solvay group.

SIPOMER®
“So little delivers so much”

SIPOMER®s are very efficient. In most application, addition of 0.5 to 3% of these monomers deliver significant performance and bring functionality to your polymers.

By leveraging our diverse chemistry platforms, Solvay designs solutions adapted to both monomer systems and formulation performance. Whether your formulation is waterborne, solventborne or you seek support in transitioning towards waterborne, **SIPOMER®s** will deliver in the following properties:

From Technology to Solutions

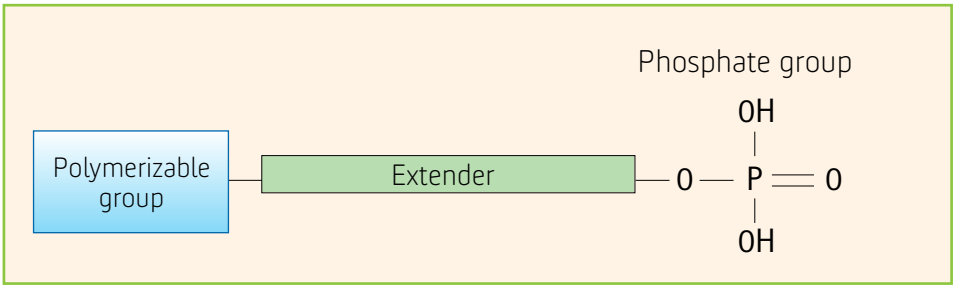
Process
- Clean EP Process
- Improved mechanical, thermal & salt stability
- Limit foaming

Adhesion
- Wet Adhesion
- Metal & Inorganic
- Wood
- Interaction with Pigments

Surface Properties
- High Scrub
- Gloss
- Low water sensitivity
- EZ Clean
- Scratch resistance

Mechanical Properties
- Tg depletion
- Tg Increase
- Peel Strength

SIPOMER® PAMs
"Adhesion and Much More"



	Reactive Group	Nature of Extender	Application
SIPOMER® PAM 100	Methacrylate	Hydrophilic	Industrial
SIPOMER® PAM 200	Methacrylate	Hydrophobic	Industrial/ Architectural / Adhesive
SIPOMER® PAM 300	Acrylate	Hydrophobic	UV/EB Cure
SIPOMER® PAM 4000	Methacrylate	~	Architectural
SIPOMER® PAM 5000	Allyl Ether	Slightly Hydrophilic	Architectural

Applications 0.5 to 1 wt% PHM

Concrete Concrete

After 2000 scrub cycles

Performance Benefits

- Improves binder robustness
- Adhesion to metal
- Adhesion to inorganic substrate
- Adhesion to glass
- Scrub resistance
- Color development
- Gloss enhancement

Uses

SIPOMER® PAMs are available in a variety of structures compatible with most coatings chemistries, technologies and applications.

Effective in Different Polymer Systems	Effective on a Variety of Substrates
Acrylic	Aluminium (plain and chromated)
Styrene/acrylic	Cold rolled steel
VeoVa/acrylic	Zinc phosphated steel
Vinyl VeoVA	Iron phosphated steel
Polyurethane (via acrylic polyols)	Galvanized steel
	Stainless steel
	Glass
	Concrete

SIPOMER® PAMs
"Adhesion and Much More"

Technologies for different markets

SIPOMER® PAMs in various resins by either emulsion or solution polymerization.

	SIPOMER® PAM-100	SIPOMER® PAM-200	SIPOMER® PAM-300	SIPOMER® PAM-4000	SIPOMER® PAM-5000
EMULSION POLYMERIZATION					
> You want to add the phosphate monomer with no other modification to an existing latex recipe.	SIPOMER® PAM-100 can be added to the monomer feed in acidic form or to a separate feed in neutralized form.	Due to its surfactantcy properties, SIPOMER® PAM-200 may generate problems such as secondary nucleation.		SIPOMER® PAM 4000 is perfectly suited to be used in monomer mix	SIPOMER® PAM 5000 is perfectly suited to be used in monomer mix
> You want to minimize or or eliminate the primary surfactant.	*reduce the total amount of surfactant needed * cannot be used as a primary surfactant.	Reduce drastically the use of surfactant or may be used as the sole surfactant in emulsion polymerization.		*reduce the total amount of surfactant needed *cannot be used as a primary surfactant.	*reduce the total amount of surfactant needed *cannot be used as a primary surfactant.
> You want to stabilize a pre-emulsion without any conventional surfactant.	Not Surface active	SIPOMER® PAM-200 may be used as a sole emulsifer to stabilize pre-emulsion.		Not Surface active	Not Surface active
SOLUTION POLYMERIZATION					
> Water soluble	SIPOMER® PAM-100 is more hydrophilic and totally soluble in water when neutralized.	Due to poor solubility in water, using SIPOMER® PAM-200 may lead to micellar polymerization.	Due to poor solubility in water, using SIPOMER® PAM 300 may lead to micellar polymerization.	Water Soluble	Water Soluble
> Solventborne (Polyacrylate Polyols…)	SIPOMER® PAM-100 can be used to make resins but might have compatibility issues with some polymers.	SIPOMER® PAM-200 is soluble in a broad range of monomers and solvents.	SIPOMER® PAM-300 is soluble in a broad range of monomers and solvents and suitable for UV/EB applications.		
UV/EB Cure					
UV/EB cure			The acrylic functionality of SIPOMER® PAM-300 provides a higher reactivity in radiation cure application		

Best Possible Not suitable

Example: Car Refinish: More cars coated with fewer problems

Direct-to-metal substrates represent a significant field for innovation yielding process simplification and environmentally friendly solutions such as:

- Direct-to-metal priming that consolidates a complex process into one step
- Shift from solventborne to waterborne resin systems

Standard primers for car refinishing are based on 2K polyurethane solventborne resin systems. Either **SIPOMER® PAM-100** or **SIPOMER® PAM-200,** based on the formulation and technology used, will be effective in improving metal adhesion of such systems.

Thanks to their superior MAP/DAP ratio, SIPOMER® PAM-100 and SIPOMER® PAM-200 are easily incorporated into polyurethane systems with minimum impact on viscosity. SIPOMER® PAM 200 can be used in polyurethane waterborne systems where it provides improved adhesion with system and stabilization features.

Adhesion Data in 2K Polyurethane Solventborne Systems SIPOMER® PAM-200 can significantly improve the dry and wet adhesion on both aluminum and cold-rolled steel. SIPOMER® PAM is used to make acrylic polyols.

ALUMINUM			
IMMERSION HOURS	DRY	2	4
Control	1B	0B	0B
1% PAM	3-4B	0B	0B
4% PAM	5B	0B	0B

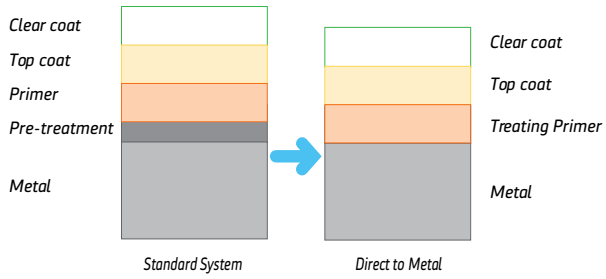
Adhesion is evaluated according to ASTM D3359 test: OB poor adhesion - 5B perfect adhesion.

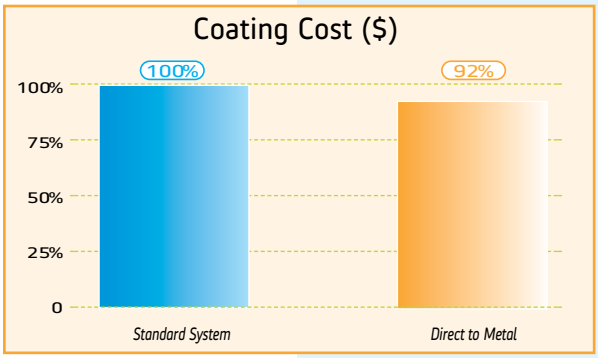
COLD-ROLLED STEEL						
IMMERSION HOURS	DRY	2	4	8	24	48
Control	5B	4-5B	2B	0B	0B	0B
1% PAM	5B	2B	2B	1B	0B	0B
4% PAM	5B	5B	5B	5B	4-5B	4-5B

SIPOMER® PAMs
"Adhesion and Much More"

Automotive Refinish: Direct-to-Metal (DTM) Benefits

Ready-to-apply top coat with DTM primer in 30 minutes instead of 12 hours with standard systems



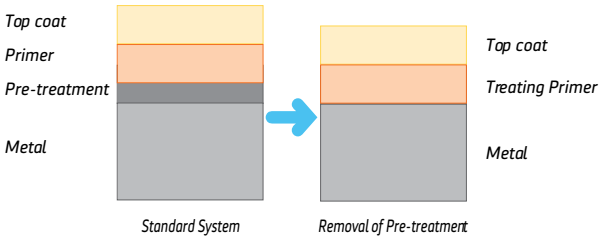


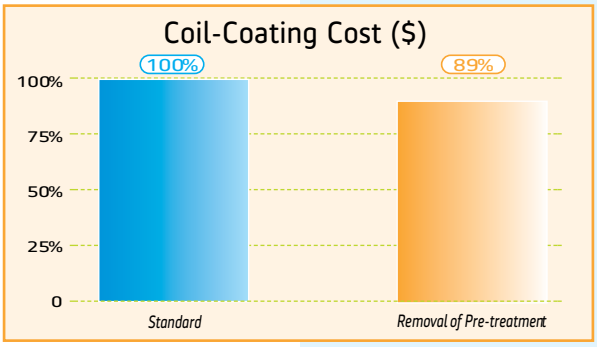
Example: Coil Coating: Improved efficiency and environmentally friendly

Coil coating is a continuous and highly automated process whereas the metal coil is unwound and both the top and bottom sides are cleaned, chemically treated, primed, oven cured, top coated, oven cured again, and rewound for shipment. Thanks to this process, large coils can be coated at high speed before fabrication. Resins incorporating **SIPOMER® PAMs** will boost primer adhesion and anti-corrosion properties eliminating the need for pre-treatment step(s) translating into less waste, energy & process time.

Benefits :

- Process savings: one step vs. two steps
- Eliminate waste treatment and reporting/regulation requirements Linked to the use of heavy metals such as chrome and phosphorous.





Example: Maintenance Coatings: An environmental solution that works!

Organic coatings play an important role in corrosion protection. One of the key challenges to convert solventborne systems to more sustainable, waterbased formulation resides in significant loss in adhesion and anticorrosion performances.

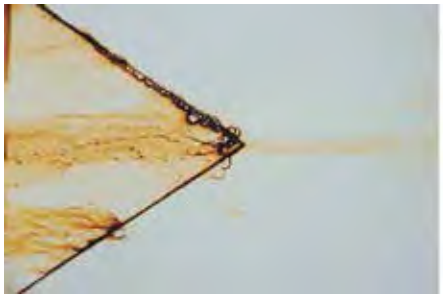
Thanks to their excellence in metal adhesion, **SIPOMER® PAM-100 /200** boost the performance of acrylic waterborne resins enabling matching performance versus solvent borne anticorrosion coatings, allowing low VOC coatings formulations and consumers who are demanding new products that meet or exceed the requirements for lower VOC coatings.

Good Adhesion Results

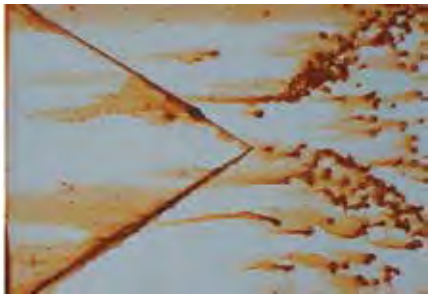
SIPOMER® PAM-200 was used to modify a waterborne styrene/acrylic resin. An anticorrosion paint was formulated and tested for adhesion and corrosion-resistance properties. Compared with a control paint formulated without **SIPOMER® PAM-200**, the results are below:

	PAINT-BASED ON S/A LATEX WITH 1%		PAINT-BASED ON S/A CONTROL LATEX		*S/A: Styrene/Acrylic*
	CROSSHATCH RESULTS AFTER WATER IMMERSION		CROSSHATCH RESULTS AFTER WATER IMMERSION		*Adhesion is evaluated according to ASTM D3359 test: 0B poor adhesion – 5B perfect adhesion. Adhesion is evaluated after 24 hours and after 520 hours of immersion in water.*
	24 hrs	520 hrs	24 hrs	520 hrs	
> Cold-rolled steel	5B	5B	4B	2B	
> Iron phosphate steel	5B	5B	1B	1B	
> Zinc phosphate steel	3B	3B	0B	0B	

Good Anti-Corrosion Results



Corrosion resistance on cold-rolled steel after 520 hours of Salt Spray Test Paint based on S/A latex with 1% Sipomer PAM-200



Corrosion resistance on cold-rolled steel after 520 hours of Salt Spray Test Paint based on control latex

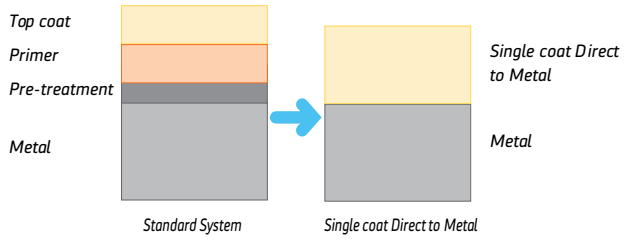
Anticorrosion is evaluated according to ASTM B117 testing reference: Standard Test Method of Salt Spray

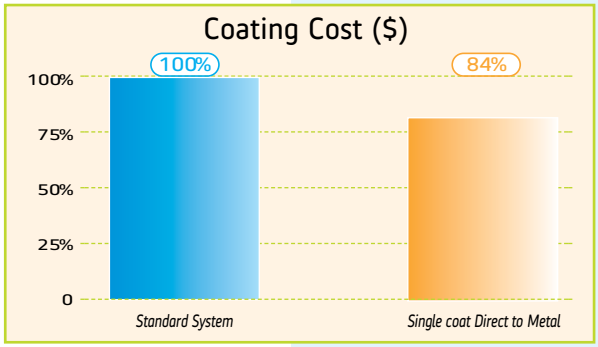
SIPOMER® PAMs
"Adhesion and Much More"

Special-Purpose Coatings: Improved performance and efficiency

This segment includes coatings for various metal substrates mainly applied by Original Equipment Manufacturers. This market ranges from coatings for large vehicles, such as trucks, farm tractors and cranes to house appliances. Different technologies compete in this market with the objective of a single, multipurpose coating applied directly to metal. The result is elimination of pre-treatment and fewer steps in the process!

Either **SIPOMER® PAM-100** or **SIPOMER® PAM-200**, based on the formulation and technology used, can boost acrylic resin performances in terms of adhesion and corrosion resistance and offer a viable solution for directto-metal applications.





Good results without pre-treated substrate

SIPOMER® PAM-100 was used to modify a waterborne styrene/acrylic resin. The resin was formulated in a clearcoat and tested for adhesion on untreated, coldrolled steel. Wet adhesion was evaluated under different test conditions:

- Water-spots test
- Immersion test
- After 24 hours recovery

	Control 2%	PAM-100
4-hour spot test	0B (0%)	4B (95%)
4-hour immersion test	0B (0%)	3B (92%)
24-hour recovery test	0B (0%)	5B (100%)

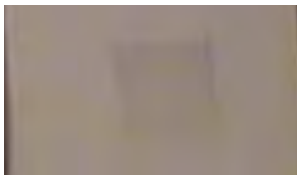
Anticorrosion is evaluated according to ASTM D3359
OB: poor adhesion 5B: perfect adhesion

Conclusions

SIPOMER® PAM-100 and **SIPOMER® PAM-200** specialty monomers enable process simplification and cost savings for the industrial coatings market. Whether your application is automotive refinishing, coil coatings,maintenance or special purpose coatings, the benefits of using the SIPOMER® PAMs include:

- Elimination of costly metal pre-treatment step
- Reduction of layers in the coating system
- Cost saving of labor required for the coating application
- A shift from heavy metals-based conversion coatings to organic
- A shift from solventborne to waterborne systems

SIPOMER® PAM-4000 – Metal Adhesion Promoter

BLANK	SIPOMER® PAM 4000
	

Cross-hatched Tape Adhesion Test - Cold Steel

Monomer Ratio (BOTM)	
MMA	51.5
BA	46.5
MAA	1
SIPOMER® PAM-4000	1

Surfactant Charge (BOTM)	
Rhodapex RS-610 A25	0.5 in Kettle 1.0 in Pre-emulsion

Initiator System:
Thermal, Ammonium Persulfate

Seed:
20% Initiator Solution / 4% Pre-Emulsion

Particle Size :
126 nm

Latex Stability :
Freeze/Thaw Stability - 5+ cycles
Heat Stability (60C) - 30+ days

SIPOMER® PAMs
"Adhesion and Much More"

High Scrub for high PVC binders in Architectural coatings with SIPOMER® PAM-5000

Latex Property Results

	Benchmark	SIPOMER® PAM 5000
Particle size (nm)	119	126
Solids content (%)	50.30%	50.10%
Grit / 120mesh (ppm)	92	22
Coagulum	Clean	Clean
Viscosity @ 20 rpms (mPa)	548	494
Viscosity @ 50 rpms (mPa)	386	252

Matte Paint Application Data
Scrub Resistance Results (PVC = 82)

Scrub Resistance Measurement	Benchmark	1 % SIPOMER® PAM 5000
ISO test first serial (µ)	36	17
DIN scrub resistance (cycles)	1050	4000

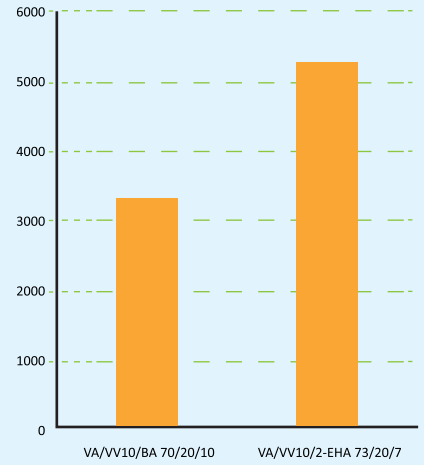
Improve Scrub Resistance in High PVC Paints

SIPOMER® PAM-5000 – Styrene/Acrylic Starting Point Recipe

Monomer Ratio (BOTM)	
Styrene	49.5
BA	47.5
AA	2
SIPOMER® PAM-5000	1.0 (in Kettle Charge)

Surfactant Charge (BOTM)	
Rhodapex® LA-40S	0.1 in Kettle Charge 0.9 in Pre-emulsion
Rhodafac® RS-610A25	1.0 in Pre-emulsion
Initiator System: Thermal, Ammonium Persulfate	
Seed: 20% Initiator Solution / 4% Pre-Emulsion	
Particle Size: 120 nm	
Latex Stability: 5 cycles of Freeze/Thaw Stability	

Number of cycles
DIN scrub resistance at 85 % PVC



High PVC Vinyl VeoVA paint formulation

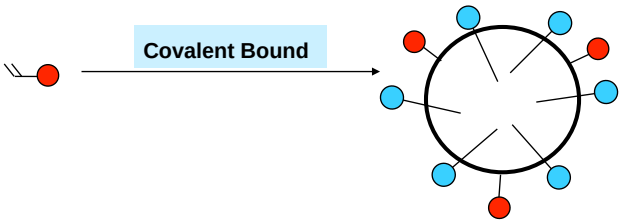
	Ingredients	Parts per weigh
Initial Reactor Charge	Demineralised water Rhodafac® RS 710-E (10%aq. Sol. At pH 7-8) Potassium persulphate	399 25 1
Pre-emulsion	Demineralised water Rhodafac® RS 710-E (10%aq. Sol. At pH 7-8) Sodium bicarbonate Vinyl VeoVA* 2-Ethylhexyl acrylate SIPOMER® COPS-1 (40% aq. Sol.) Acrylic acid Vinyl acetate SIPOMER® PAM 5000 (30% aq. Sol. At pH 5) Silquest A 171	393 45 3 200 70 9.4 1.5 730 33.2 2.5
Initiator solution	Demineralised water Potassium persulphate	120 1
Other		
Line one	Demineralised water Ter-butyl hydroperoxyde (70% aq. Sol.)	20 1.4
Line two	Demineralised water Bruggolite FF6M	20 1.2
Neutralisation	AMP 95 until pH of 8-8.5	8.3
Biocide	Parmetol K40	2

General Guidance for use of SIPOMER® PAM Monomers

	DO	DON'T
> Storage –Feedings tanks	**Do use stainless steel or plastic containers to store solutions of SIPOMER® PAM.**	Don't use iron containers that can be corroded by acidic SIPOMER® PAM releasing metal ions that could trigger the polymerization.
> Pre-emulsion stability (SIPOMER® PAM-200)	**Do neutralize to pH > 6 to achieve good stability.**	
> High reactivity	**Do follow the order of introduction of our starting recipes. Put SIPOMER® PAM in the kettle when the reaction temperature is met. Do feed separately or in the monomer mixture/pre-emulsion.**	Don't introduce SIPOMER® PAM in the initial charge before heating. Don't mix with the solution of the initiator. This would rapidly polymerize even without heating.
> Heat stability of polymer	**Do neutralize the polymer before heating at elevated temperature (> 140° C).** **Copolymers are more stable and can be handled above 200° C. This is strongly dependent on the nature of the polymer and must be checked case by case.**	Don't heat acidic homopolymers to temperatures above 140° C.
> Hydrolytic stability	**Do keep between pH = 5 and pH = 9 for long time storage or when using at temperatures above 60° C.**	Don't use diluted SIPOMER® PAM very acidic (pH < 3) or basic (pH > 10) conditions. This would hydrolyze the ester linkage and the phosphate group.
> Corrosion	**Do neutralize with a non volatile base and add corrosion inhibitor. Keep the coating at pH > 9 for good anticorrosion properties.**	Don't use SIPOMER® PAM in acidic form when post neutralization is not possible.

SIPOMER®
Polymerizable Stabilizer

Stabilizers



	Reactive Group	Nature of Extender	« Head » group
SIPOMER® COPS	Allyl ether	Hydrophobic	Sodium Sulfonate
SIPOMER® AAE10	Allyl ether	Hydrophilic	Ethoxylate
SIPOMER® AES-100	Allyl ether	Hydrophilic	Ammonium Sulfate

SIPOMER® COPS-1 is a 40% aqueous solution of sodium 1-allyloxy-2-hydroylpropyl sulfonate:

CH2 = CH - CH2 - O - CH2 - CH(OH) - CH2 - SO3Na

Even at levels as low as 0.5 - 1.0% (based on total monomer), **SIPOMER® COPS-1** provides latex stability, such as shelf life, freeze/thaw and mechanical and chemical stability. It also provides block resistance for the final polymer.

With **SIPOMER® COPS-1**, the levels of conventional can be reduced significantly. Surfactants are key component in providing stability to latex.

However their migration to the interface causes water sensitivity to the dry polymer film.

SIPOMER® COPS-1 reacts with other reacts with other comonomers through the chemical (covalent) bond. The sulfonate group will remain at the surface of the particle providing very good stability to the latex. Since the functionality is anchored to the polymer backbone, it will not migrate after film formation and thus cannot modify interfacial properties. As a result of the reduction of conventional surfactant, the foaming tendency of the latex and the water sensitivity of the polymer film are both reduced.

Key Features

- Improve mechanical stability
- Improve thermal stability
- Improve salt stability
- Decrease need in surfactant
- Reduce foaming & water sensitivity

Applications

- Use 0.5 Wt% based on total monomer (BOTM)
- All acrylic, styrene acrylic, vinyl acrylic, vinyl VeoVA

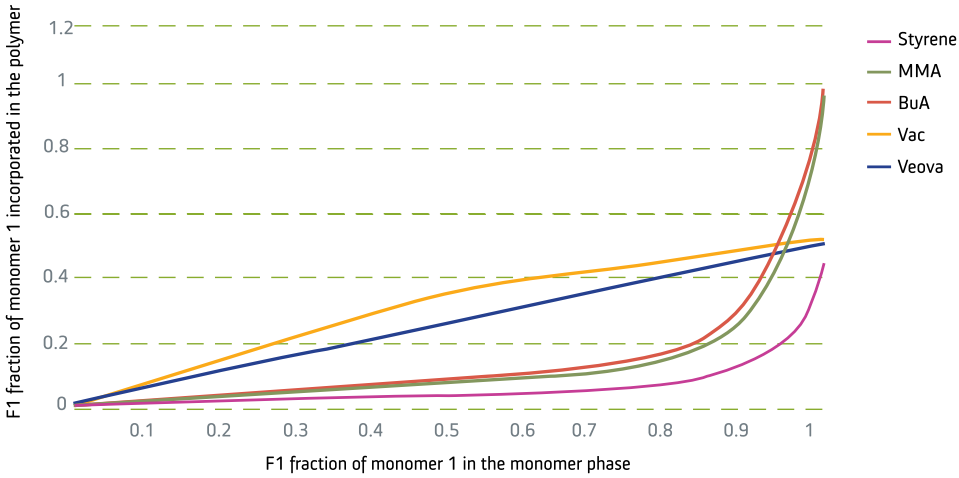
SIPOMER® COPS-1
Polymerizable Stabilizer

Reactivity Ratio Data for SIPOMER® COPS-1 (M1)

M_2	r_1	r_2
Styrene	0.0001	29.4900
Methyl Methacrylate	0.0483	19.6200
Butyl Acrylate	0.0411	15.0034
Vinyl Acetate	0.0001	1.5162
Veova 10	0.0002	3.1700

The reactivity ratio data show that the r1 values for **SIPOMER® COPS-1** are close to 0, suggesting that homopolymerization of this monomer is unlikely. There is no need for adding an inhibitor to this monomer. As shown on the Mayo representation below, the most favorable reactivity ratios were found for **SIPOMER® COPS-1** with vinyl acetate and VeoVA 10. However, **SIPOMER® COPS-1** can also work very effectively in acrylic and styrene/acrylic systems.

Mayo Curves for SIPOMER® COPS-1



SIPOMER® COPS-1
Polymerizable Stabilizer

Addition of SIPOMER® COPS-1

SIPOMER® COPS-1 improves Freeze/Thaw Stability

Latexes	Acrylic control	Acrylic with COPS-1	Styrene/acrylic control	Styrene/acrylic with COPS-1
Surfactant % BOTM	Rhodacal® DS4 1	Rhodacal® DS4 1	Rhodapex® LA40S 1.5	Rhodapex® LA40S 1.5
SIPOMER® COPS-1 % BOTM	0	0.5	0	0.5
Particle size (nm) Solids (%)	17.9 49.8	186 49.9	175 51.1	149 51.1
Freeze thaw cycles	0	5	0	5

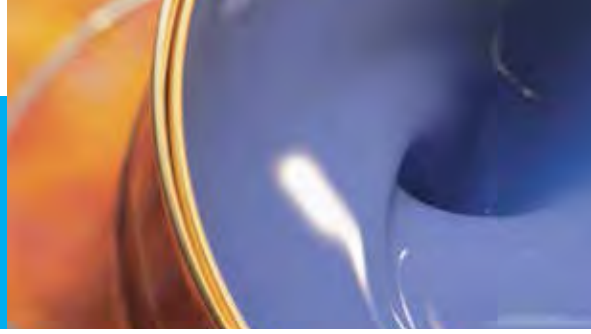
Rhodacal DS4: Sodium dodecylbenzene sulfonate (23%)
Rhodapex LA40S: Sodium dodecyl ether sulfate; 4 EO (32%)

Freeze/thaw test
Procedure: Latex was placed in -15C conditions for 12 hours and thawed back to RT for 8 hours. Cycles were repeated 5 times.

SIPOMER® COPS-1 improves mechanical stability

Latexes	Acrylic control	Acrylic with SIPOMER® COPS-1
Surfactant % BOTM	Rhodacal® DS4 1	Rhodacal® DS4 1
SIPOMER® COPS-1 % BOTM	0	0.5
Particle size (nm) Solids (%)	179 49.8	186 49.9
Waring blender 5 minutes at 20,000 rpm	Failed	Passed

Mechanical test procedure:
Pour 200 mL of latex into a Waring blender. Mix latex at 20,000 rpm under high shear for 5 minutes. If the latex does not completely coagulate after 5 minutes of mixing, it "passes." If it coagulates within 5 minutes of mixing, it fails.



SIPOMER® COPS-1 improves chemical stability

Latexes	Acrylic Control 1	Acrylic Control 2	Acrylic with SIPOMER® COPS-1	Acrylic with nonionic surfactant
Anionic surfactant Rhodapex® LA40S (%BOTM)	1.0	1.5	1.0	1.5
Nonionic surfactant (% BOTM)	0	0	0	1.0
SIPOMER® COPS-1 (% BOTM)	0	0	0.5	0
% CaCl2 added to latex for immediate coagulation	3	6	5	5

Latex Chemical Stability:
The ability of latex to resist coagulation in the presence of salts. (Salt used is Calcium chloride)

Procedure:
Add CaCl2 at different levels to the latex until immediate coagulation is observed.
The data above should be read as follows:
CaCl2 was added (in term of weight % compared to total latex -% BOTL):
«3%» means that the system was stable at 2% of CaCl2
«6%» means that the system was stable at 5% of CaCl2

Comments:
By adding COPS-1, the chemical stability results are improved. To have the same effect in terms of chemical stability, normally non ionic surfactant is used. COPS-1 improves chemical stability without increasing the amount of free surfactant.

Substitution of surfactant by SIPOMER® COPS-1 in a latex formulation

Latexes	Acrylic control	Acrylic with SIPOMER® COPS-1
Surfactant % BOTM	Rhodacal® DS4 1.0	Rhodacal® DS4 0.5
SIPOMER® COPS-1 Particle size (nm)	0 179	0.5 196
Solids (%) Wet coagulum (% BOTL)	49.8 0.7	50.6 0.7
Freeze/Thaw cycles Mechanical stability	1 Passed	5 Passed
Foaming height (mL)	200	120

Mechanical test procedure:
Pour 200 mL of latex into a Waring blender. Mix latex at 20,000 rpm under high shear for 5 minutes. If the latex does not completely coagulate after 5 minutes of mixing, it "passes." If it coagulates within 5 minutes of mixing, it fails.

SIPOMER® COPS-3
Polymerizable Stabilizer

SIPOMER® COPS-3

Product Specifications	
Appearance	Transparent liquid
Active content	39.0-42.0
Color APHA	200 Max
pH (10% aqueous solution)	6.0 - 9.0
Ionic type	Anionic

Features:

- Good pigment binding power
- High PVC paints system
- Anti-corrosion properties
- Improved color acceptance
- Good stain and block resistance
- Improve adhesion to different inorganic substrate
- Applicable to most of monomers systems: SA, FA, VA, VeoVA, etc.

Improve Water-Resistance & Corrosion Inhibition

50wt% SA latex: 1% of Rhodapex® LA 40S; 0.5% of BOTM COPS-3

Without COPS-3	With COPS-3
	

- Glass substrate: 100 um film
- Soaking into water for 24 hrs

Without COPS-3	With COPS-3
	

- Substrate: Iron phosphate panel
  Curing @ room temperature, 60-70% RH

COPS-3 in Vinyl VeoVA System

- 55% Vinyl VeoVA System: VAM/VeoVA-10:70:30
- 1% BOTM of COPS-3
- 0.3% BOTM of RS610-A25 & 2% BOTM of Rhodasurf® 6530

	Commercial SA	Without COPS-3	COPS-3
Particle size (nm)	~150	262.2	238.7
75 PVC paints			
Scrub resistance	550	405	1168

SIPOMER® AES 100
Copolymerizable Stabilizer

SIPOMER® AES-100

Latex	
MMA	52
BA	47
MAA	1

Particle Size: 150 nm

Surfactant	
Type	Rhodapex® LA40S
Amount in Kettle:	0.10%
Amount in Feed:	0.90%

In situ-seeded pre-emulsion

Amount of AES-100	0%	1%	1%
Way of Addition of AES-100		Feed	Kettle
Dry Grit	130 ppm	10 ppm	70 ppm
Mechanical Stability	3'	9'	9'
F/T stability	0	> 5	> 5
Calcium Stability	2%	5%	6%

Key Benefits

- Reduce Grit
- Increase stability (mechanical, FT, chemical)

Dry Grit: Filtration on 100 micron net

Mechanical Stability: Waring Blender 22.000 rpm (time to coagulation)

Calcium Stability: CaCl2*2H2O/Dry latex ratio (concentration to coagulate a 30 % diluted latex)

SIPOMER® WAM
Wet Adhesion Monomer

"The 1% that makes the difference"

	Reactive Group	Binders
SIPOMER® WAM	Allyl Ether	Both acrylic & vinyl copolymers
SIPOMER® WAM II	Methacrylamide	Acrylics

Superior wet-adhesion properties

SIPOMER® WAM was custom designed to combine the benefits of amine and ureido functionalities in a single monomer. The Table below shows the synergistic effects of this combination.

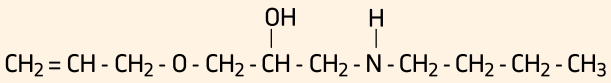
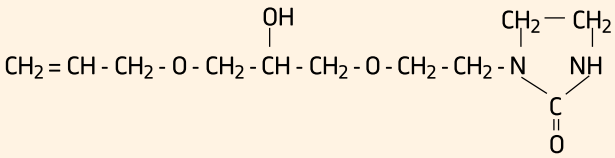
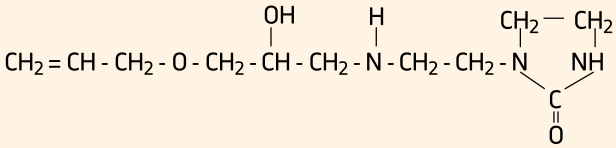
SIPOMER® WAM is incorporated into all-acrylic and vinyl-acrylic polymer systems through its allylic functionality. It provides wet adhesion in two ways:

- The ureido ring promotes interaction with the substrate via its high polarity and hydrogen bonding.
- The amine functionality provides an additional site for interaction with substrate and pigment.

SIPOMER® WAM modifies the latex binder, enabling it to wet the pigment particles more effectively, due to reduced interfacial tension.

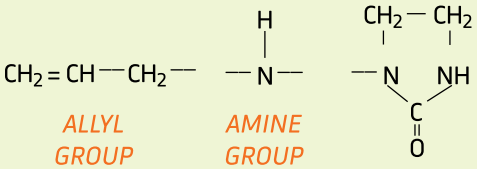
SIPOMER® WAM into the polymer backbone greatly improves wet-adhesion of both all-acrylic and vinyl-acrylic latex paint systems for both interior and exterior applications.

Effects of Amine and Ureido Functionalities, Alone and In Combination

Wet Adhesiopn Monomer (1 % in All-Acrylic Latex)	All-Acrylic Paint Gardner-Scrub*
Amine Functionality Alone 	420
Ureido Functionality Alone 	1 280
Amine and Ureido Functionality Together 	1 500 +

* *Cycles to failure*

Sipomer WAM
Structure



Incorporation into polymer backbone through allylic functionality.

Promotion of adhesion via dual mechanism:

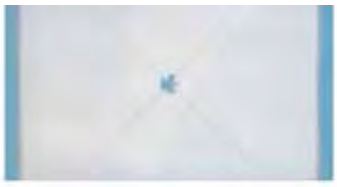
- *Ureido ring - promotes interaction via high polarity and hydrogen bonding*
- *Amine functionality - site for interaction with anionic substrate and pigment*

Lab tests demonstrate exceptional wet adhesion

Test after test has proven that all-acrylic and vinyl-acrylic polymers containing **SIPOMER® WAM** provide latex paints with the best and most cost-effective wet-adhesion properties available. In a Wet Pick Adhesion Test, latex with **SIPOMER® WAM** showed greater wet adhesion as indicated by the substantially smaller area of peeling. And in a Wet Adhesion Abrasion Test, the latex paint containing **SIPOMER® WAM** demonstrated outstanding wet-scrub performance.

Results of Wet Pick Adhesion Test

Latex paint before Wet Pick Adhesion Test.



Latex paint, without Sipomer WAM, after Wet Pick Adhesion Test.

Latex paint, with Sipomer WAM, after Wet Pick Adhesion Test.

Results of Abrasion Test

Latex paint before Wet Adhesion Abrasion Test.

Latex paint, without Sipomer WAM, after Wet Adhesion Abrasion Test.

Latex paint, with Sipomer WAM, after Wet Adhesion Abrasion Test.

SIPOMER® WAM-based paints compared to commercial products

As shown in the Table below, polymers containing **SIPOMER® WAM** were evaluated against commercial wet adhesion systems. Paints based on **SIPOMER® WAM** exhibited superior wet-adhesion properties as well as greater shelf stability and improved color stability. When effective use levels were measured, **SIPOMER® WAM** also proved to be the most cost-effective wet-adhesion promoting system available.

Gardner Scrub Test Results with SIPOMER® WAM-Based Paints Versus Commercial Standards

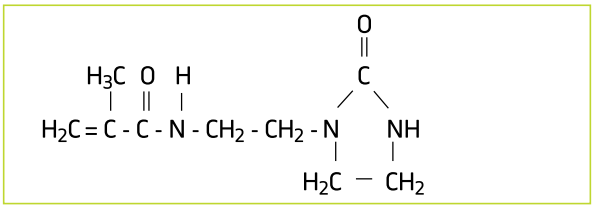
	Edge Abrasion, Cycles	Failure, Cycles		Edge Abrasion, Cycles	Failure, Cycles
All-Acrylic Latexes			Vinyl-Acrylic Latexes		
Control	17	47	Control	14	52
Solvay (1% WAM)	1050	1500 +	Solvay (1% WAM)	1000	1500 +
Commercial General Purpose	224	1500 +	Commercial General Purpose	600	1500 +
Commercial Premium	979	1500 +			

SIPOMER® WAM II
Wet Adhesion Monomer

Innovative chemical structure

With **SIPOMER® WAM II**, emulsion polymerization producers can formulate products with an easy-to-use wet-adhesion monomer which is effectively polymerized in both redox and thermal processes.

MAEEU



The MAEEU advantage is its ability to easily copolymerize in all-acrylic, vinyl-acrylic and styreneacrylic latex systems.

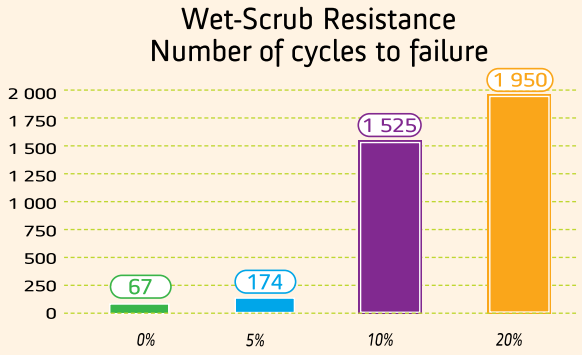
SIPOMER® WAM II provides enhanced wet-adhesion, wet-scrub resistance and solvent resistance in a wide range of latex systems. SIPOMER® WAM II's improved performance is the result of MAEEU (methacrylamidoethyl-ethyleneurea), an advanced ureido-based adhesion promoting monomer.

SIPOMER® WAM II in Latex Blends

In Solvay's emulsion polymerization laboratories, wet adhesion in a latex containing Sipomer WAM II blended with conventional latexes was tested. In four sample blends, increasing amounts (0%, 5%, 10% and 20%) of an acrylic latex containing Sipomer WAM II were combined with a commercial vinyl-acrylic latex.
The wet-scrub resistance was then measured in each of the four samples.

Test Results

- The bar on the left indicates the wet-scrub resistance of the pure commercial vinyl-acrylic latex. It withstood only 67 cycles until failure.
- From left to right, the bars demonstrate that by increasing the percentage of the acrylic blend latex containing Solvay's Sipomer WAM II, the number of cycles directly increases.



Acrylic Latex Containing Solvay's Sipomer WAM II
Comparable scrub resistance is achieved when the latex containing Sipomer WAM II is used with commercial acrylic and stryrene-acrylic latexes.

Dramatically improved wet-scrub resistance

Wet-Scrub Resistance Test

Results of tests conducted in Solvay's emulsion polymerization laboratories clearly validate the superior performance of latex paints which incorporate **Sipomer WAM II**.

1. Before Scrub Test

- Two flat latex paint formulations at 43% PVC were prepared and applied.
- The left strip does not contain **Sipomer WAM II**.
- The right strip does contain Solvay's advanced **Sipomer WAM II**.

Latex paint without Sipomer WAM II | Latex paint with Sipomer WAM II

2. After 85 Cycles

- Without **Sipomer WAM II**, the paint on the left fails after 85 cycles, indicating poor wet adhesion and scrub resistance.
- The **Sipomer WAM II** based paint is still intact.

Latex paint without Sipomer WAM II | Latex paint with Sipomer WAM II

3. After 2000 Cycles

- Even after 2000 cycles, Solvay's **Sipomer WAM II** demonstrates outstanding wet scrub resistance.

Latex paint without Sipomer WAM II | Latex paint with Sipomer WAM II

Similar results with SIPOMER® WAM II in semi-gloss paint

When all-acrylic latexes containing **SIPOMER® WAM II** were formulated into a semi-gloss paint at 23% PVC, improved wet-scrub resistance was demonstrated. The paint formulated without **SIPOMER® WAM II** began lifting from the substrate at 95 cycles. The paint formulated with **SIPOMER® WAM II** exhibited outstanding scrub resistance, completely covering the substrate after 2000 cycles.

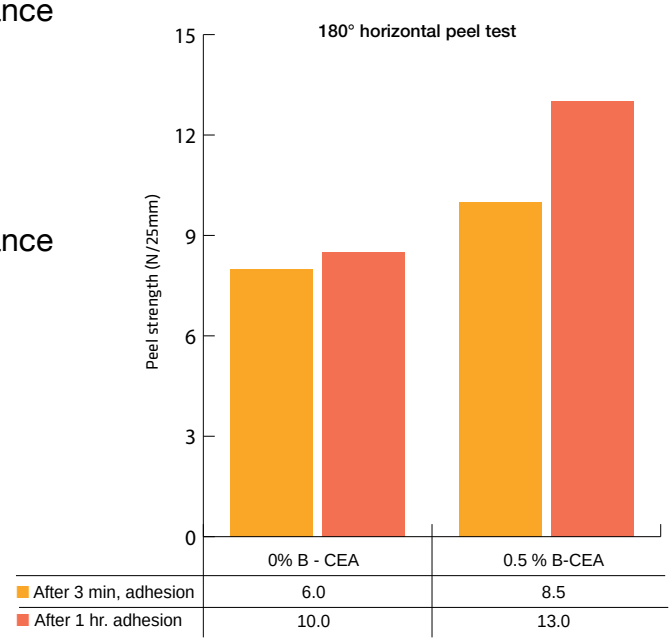
SIPOMER®
Resin Modifiers

SIPOMER® IBOA
Radiation curing resins application
- Improves toughness, chemical and abrasion resistance
- Reactive Diluent
- Radcure polymerizable

SIPOMER® IBOMA
Clear coat application
- Improves toughness, chemical and abrasion resistance
- Easily incorporated in resins (methacrylate)

SIPOMER® ß-CEA
Adhesives application
- Lowers Tg
- Improves adhesion

"Improved peel strength"
100% Acrylic Pressure Sensitive Adhesive



	0% B - CEA	0.5 % B-CEA
After 3 min, adhesion	6.0	8.5
After 1 hr. adhesion	10.0	13.0

SIPOMER® BEM – SIPOMER® SEM – SIPOMER® HPM series
Rheology

By combining its experience in specialty monomers and emulsion polymerization, Solvay extended the available range of specialty methacrylic esters monomer for HASE thickeners.

SIPOMER® BEM
SIPOMER® BEM delivers low shear efficiency.

SIPOMER® HPM 400
SIPOMER® HPM 400 delivers low to mid shear efficiency. SIPOMER® HPM 400 allows to easily match cellulosic thickeners profiles.

SIPOMER® HPM-100
SIPOMER® HPM 100 delivers mid shear efficiency.

SIPOMER® SEM 25
SIPOMER® SEM 25 delivers mid to high shear efficiency.

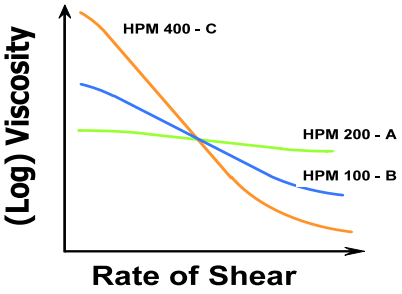
SIPOMER® HPM 200
SIPOMER® HPM 200 delivers high shear efficiency. SIPOMER® HPM 200 allows to easily match Newtonian thickeners profiles.

Solvay SIPOMER® HPMs are 50 Wt% active specialty methacrylic monomers designed to easily access desired rheology profiles. Working with SIPOMER® HPMs provides choice in profile and significant cost saving versus “generic” HASE.

Properties
Solvay SIPOMER® HPMs were incorporated in standard HASE polymer recipes and benchmarked versus well known “generic” HASE at equal viscosity (95KU) in 30 Wt% solid latex (table 1) as well as at equal use level in flat paints (table 2). While the HPM 200 based thickener presents a very performant solution as Newtonian ICI builder, the HPM 100 based HASE combines KU building and improved ICI viscosity. Whereas cellulosic replacement is targeted, HPM 400 based system offers matching profile with higher efficiency.

	Active HASE Wt%	Brookfield (cP)	ICI (P)
HPM 200 based hase - A	1.87	1400	2.55
Benchmark 1	3.17	1350	2.25
HPM 100 based hase - B	0.56	6800	0.6
Benchmark 2	0.57	4600	0.5
HPM 400 based hase - C	0.42	7600	0.25
Benchmark 3	0.36	7200	0.22
HEC	0.76	7600	0.25

Table 1: All paint latex system were adjusted to 95 (±2) KU stormer viscosity



	HPM 400 based HASE	Benchmark 3	HPM 100 based HASE	Benchmark 2	HPM 200 based HASE	Benchmark 1
Usage (Wt% Active)	0.5	0.5	0.5	0.5	1.6	1.6
Equilibrium Stormer Viscosity (KU)	78.6	83.5	100.6	94.6	100.3	113.4
Equilibrium ICI (P)	0.7	0.6	1	1	2.05	1.5
Gloss, 20° / 60° / 85°	1.3/2.4/5.9	1.3/2.3/5.5	1.3/2.4/6.1	1.3/2.5/7.1	1.3/2.6/7.8	1.3/2.5/7.0
	Used as KU builders				Used as ICI builders	

Table 2: SIPOMER® HPMs based HASE bench marked at equal use level in a flat paint formula

SIPOMER® Product Performance

Trade name	% of Solid	Tg (°C)	% Water	Inhibitor ppm	Specific gravity	Internati US (TSCA)	Canada (DSL)	Europe+ (EINECS)	Australia (AICS)
Adhesion and Much More									
SIPOMER® PAM-100	100	-18	<1	MEHQ/~5000	1.2	●	–	●	●
SIPOMER® PAM-200	100	0	<1	MEHQ/~5000	1.1	●	–	●	●
SIPOMER® PAM-300	100	-40	<1	MEHQ/~5000	1.1	●	–	●	–
SIPOMER® PAM-4000	100		<0.25	MEHQ/~400	1.2	●	●	●	●
SIPOMER® PAM 5000	100		1.0 max	none	1.25	●	–	●	–
Polymerizable Stabilizers									
SIPOMER® COPS-1	–		60	none	1.17	●	●	●	●
SIPOMER® COPS-3*	25		75	none	–	–	–		–
SIPOMER® AES-100	97		<2.0	none	1.0	●	–	●	–
SIPOMER® AAE-10	99		<0.3	none	–	●	●	●	●
Resin Modifiers									
SIPOMER® IBOA	100	94	<0.05	MEHQ/112	0.985	●	●	●	●
SIPOMER® IBOMA	100	110	<0.05	MEHQ/108	0.983	●	●	●	●
SIPOMER® B-CEA	30*	37	0.5	MEHQ/1000	1.2	●	●	●	●

\+ Availability is based on REACH status

* Asia - Latin America - MEA
* Remainder consists of acrylic acid (~20%) and higher adducts (~50%)
** Sipomer® BEM contains ~25% methacrylic acid
*** Sipomer® SEM-25 contains ~20% methacrylic acid
**** Sipomer® WAM II-25 contains ~25% methacrylic acid

onal Inventory Status

South Korea (KECL)	Japan (MIT)	China (JECSC)	Philippines (PICCS)	New Zealand (NZIoC)	Performance Features and Application
●	–	●	–	●	– Improved adhesion on metal, glass, and other inorganic substrates – High mono/di alkyl phosphate ratio and low resididual acid – Improved latex stability
●	–	●	–	–	– Improved adhesion on metal, glass, and other inorganic substrates – Excellent compatibility with most common organic systems – High mono/di alkyl phosphate ratio and low resididual acid – Improved anti-corrosion properties
–	–	●	–	–	– Improved adhesion on metal, glass, and other inorganic substrates – Excellent compatibility with most common organic systems – High mono/di alkyl phosphate ratio and low resididual acid – Improved anti-corrosion properties – Polymerizable surfactant
●	–	●	●	●	– Improved adhesion on metal substrate – Improved latex stability – Improved gloss
–	–				Improved scrub resistance when formulated into vinyl binders for high PVC paints
●	●	●	●	●	Reactive co-stabilizer providing: – Low foaming latexes – Better latex stability at low surfactant dosage – Coatings with improved water and bleach resistance
–	–	●	–	–	Reactive co-stabilizer providing scrub/washability for high PVC coating formulation
–	–	–	–	–	Reactive co-stabilizer providing: – Low foaming latexes – Better latex stability at low surfactant dosage – Coatings with improved water and bleach resistance
●	●	●	●	●	Non ionic reactive co-stabilizer – Low foaming latexes – Better latex stability at low surfactant dosage – Coatings with improved water and bleach resistance
●	●	●	●	●	High Tg hydrophobic monomer providing: –Improved chemical and water resistance – Better gloss and better mar resistance – An excellent radiation curable reactive diluent
●	●	●	●	●	High Tg hydrophobic monomer providing: – Improved chemical and water resistance – Better gloss and better mar resistance – Lower viscosity in high solid solvent based resin systems
●	●	●	●	●	Low Tg acidic monomer: – Effective adhesion promoter for resins used in coatings and adhesives – Improved peel strength for adhesives

International Inventory Status Codes

● Listed | – Not Listed

SIPOMER® Product Performance continued

Trade name	% of Solid	Tg (°C)	% Water	Inhibitor ppm	Specific gravity	Internatio			
						US (TSCA)	Canada (DSL)	Europe+ (EINECS)	Australia (AICS)
Rheology									
SIPOMER® BEM	50**		25	MEHQ/1000	1.06	●	●	●	–
SIPOMER® SEM-25	60***		20	MEHQ/600	1.07	●	●	●	–
SIPOMER® HPM 100	50		50	MEHQ/1000	1.06	●	●	●	●
SIPOMER® HPM 200	50		50	MEHQ/1000	1.06	●	●	●	●
SIPOMER® HPM 400	50		50	MEHQ/1000	1.06	●	●	●	–
Wet Adhesion									
SIPOMER® WAM	90		10	none	1.15	●	●	●	–
SIPOMER® WAM II	50***	87	30	HQ/1800	1.11	●	●	●	●

+ Availability is based on REACH status

* Asia - Latin America - MEA
* Remainder consists of acrylic acid (~20%) and higher adducts (~50%)
** Sipomer® BEM contains ~25% methacrylic acid
*** Sipomer® SEM-25 contains ~20% methacrylic acid
**** Sipomer® WAM II-25 contains ~25% methacrylic acid

Recommended product formulations

Product	Starting Formulations
> Sipomer COPS-1	Acrylic Latex Formulation: 0.5% Anionic Surfactant/0.5% Sipomer COPS-1 (1% BOTL) Styrene/Acrylic Latex Formulation: 1.5% Anionic Surfactant/0.5% Sipomer COPS-1 Acrylic Synthesis (52 MMA/46.5 BA/1.0 MAA/0.5 Sipomer COPS-1)
> Sipomer PAM-100	Latex Synthesis: Acrylic Copolymer with 2% Sipomer PAM-100 Styrene Acrylic Latex Recipe with 1% Sipomer PAM-100 Vinyl Acetate/Acrylic Latex with Sipomer PAM-100
> Sipomer PAM-200	Latex Synthesis: Acrylic Latex Recipe with 1% Sipomer PAM-200 Acrylic Polyol Recipe
> Sipomer WAM	Thermal All-Acrylic Process Thermal Styrene-Acrylic Process Redox Vinyl-Acrylic Process (80 VAc/19 BA/1 WAM)
> Sipomer WAM-II	All-Acrylic Blend Latex, Thermal Process (51 MMA/46.1 BA/0.9 MAA/2 MAEEU) All-Acrylic Thermal Process (52 MMA/46 BA/1 MAA/1MAEEU) Styrene-Acrylic Thermal Process (45 S/53.2-EHA/1 MAA/1 MAEEU) Vinyl-Acrylic Thermal Process (80 VAc/18.5 BA/0.5 MAA/1 MAEEU) Thermal Vinyl-Veova 10 Process (70.0 VA/28.5 V-10/0.5 MAA/1 MAEEU)

nal Inventory Status					
South Korea (KECL)	Japan (MIT)	China (JECSC)	Philippines (PICCS)	New Zealand (NZIoC)	Performance Features and Application
●	–	●	●	●	Specialty monomer design for low shear HASE polymer
–	–	●	–	●	Specialty monomer design for mid to high shear HASE polymer
●	–				Specialty monomer design for mid shear HASE polymer
–	●				Specialty monomer design for newtonian HASE polymer
●	–				Specialty monomer design for low to mid shear HASE polymer
–	–	–	–	●	Wet adhesion monomer for latex paints
●	●	●	●	●	Wet adhesion monomer for latex paints

International Inventory Status Codes

● Listed | – Not Listed

For technical data sheets and other products, visit our website: www.solvay.com

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