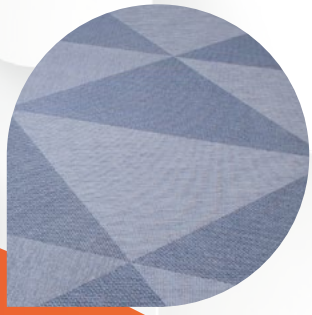
Celanese

The chemistry inside innovation™

Celanese Emulsions for Adhesives, Carpets and Paints & Coatings

GUIDE FOR ASIA PACIFIC



Formulating your vision with our expertise

The company

We are a global technology and specialty materials company based in Dallas, Texas, operating in key geographic locations worldwide. We are continuously working on innovation and process improvement and are always looking for exciting new opportunities. In all the industries we serve, our products hold leading positions worldwide. We are offering an advanced product portfolio complemented by large global production capacity, operating efficiencies, proprietary production technology and competitive cost structures.

Our two business segments

- Acetyl Chain: acetic acid, vinyl acetate monomer, other acetyl derivatives, EVA polymers, emulsions polymers, redispersible polymer powders and specialty additives & Acetate Tow: cellulose derivatives
- Engineered Materials: specialty thermoplastics and food ingredients

Celanese Emulsion Polymers business

- Partnering with our customers to fulfill real industry and consumer needs
- Global expertise in its wide array of applications
- Manufacturer of both high-pressure (VAE) and conventional (atmospheric, ATM) dispersions

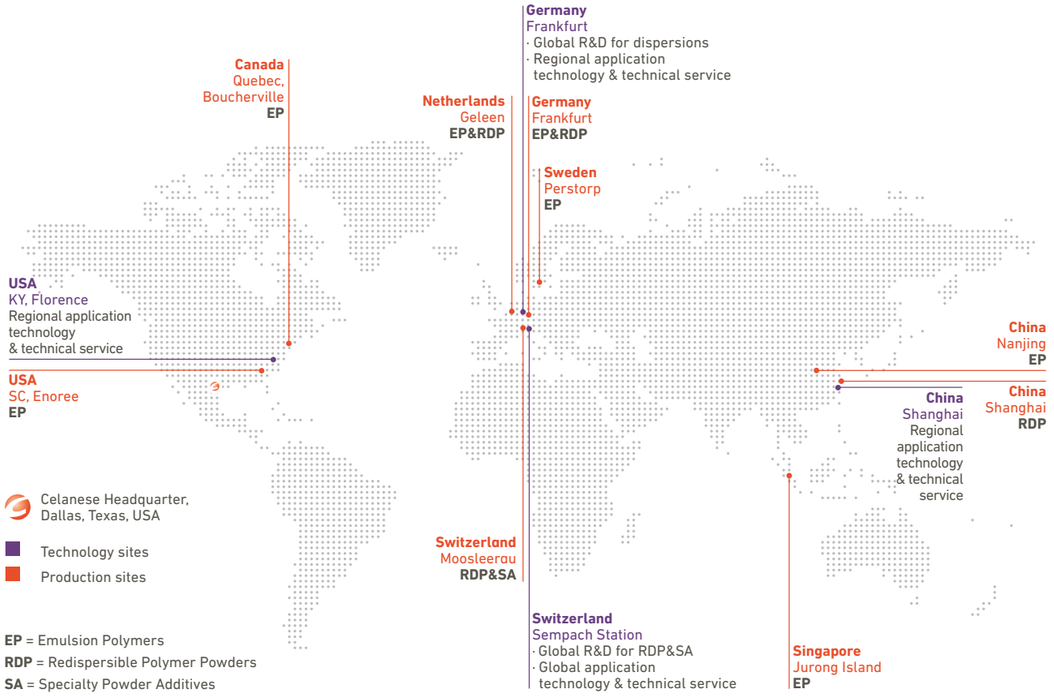
Celanese Emulsion Polymers is one of the largest and most experienced suppliers of dispersion technology for waterborne coatings in the world. We have been an active leader in adhesives for decades, and we have gained deep understanding of the markets, products, applications and issues affecting our industry today.

Understanding customer and industry needs

The Celanese technical team consistently strives to meet the needs of our customers, including their formulated coating products. We are constantly updating our laboratory with modern equipment to aid us in designing and adapting our products to meet real-world application profiles to enable product testing according the latest standards and norms.

Global reach

The global research and development center for Celanese dispersions is located in Germany. The center closely cooperates with the other Celanese regional application development centers in the USA, and in China. These regional facilities enable us to rapidly develop new products and assist customers in the region with their development projects. We have manufacturing plants and technical support in all major regions.



Celanese Emulsions for Adhesives

Adhesive solutions

Globally, adhesives are Celanese's largest market for polymer emulsion applications. We have an experienced technical service team that understands well the needs of the Asian adhesives market and offers a wide range of emulsions. We are able to provide on-site technical support. By optimizing Celanese emulsions, the formulated adhesives can run smoothly and efficiently in the machines, with ideal coating weight, reduced downtime for cleaning and increased production speed to meet the demands of daily industry.

Celanese offers the following adhesive solutions:

- Packaging and paper processing
- Construction and flooring
- Cigarette adhesives
- Film material lamination
- Adhesives for textile laminating

Emulsion products for packaging and paper converting

Celanese has a wide range of emulsions for use in the packaging and paper converting industries. Our dispersions are suitable for a wide range of sizing methods and the use of our emulsions contribute to the excellent performance of adhesives on difficult substrates and high-speed mechanical sizing.

Emulsion products for woodworking and flooring

Celanese emulsions have excellent water and heat resistance and are used in a wide variety of woodworking applications. Whether your adhesive is for window frames, joinery or PVC veneers, or for the demanding market of laminate flooring, you'll get more from your use of Celanese dispersions

Emulsions for cigarette production

Celanese polymer dispersions provide technical solutions for high-performance adhesives used in cigarette production. Our products can be used not only for cigarette stick jointing and lapping, but also for cigarette carton and carton packaging. Our VAE emulsions meet low VOC, low formaldehyde standards for these adhesive applications.

Our comprehensive product portfolio accommodates all line speeds and provides excellent performance on difficult-to-bond substrates.

Textile laminating emulsion products

Celanese has a long history of experience in the textile industry and our technology provides excellent performance in textile applications. Celanese emulsions are high-performance polymers with high bond strength, good washing resistance and excellent setting properties to meet the increasingly demanding requirements of the industrial textile materials.

Commonly requested Celanese Emulsions for Adhesives*

Product	Specifications									Packaging & Converting					Product
Celvolit®	Solids %	Viscosity mPa·s (25 °C)	Spindle rpm (25 °C)	Tg °C (on set point) Heat rate 10°C/min	Tg °C (middle point) Heat rate 10°C/min	MFFT °C	pH	Stabilization	Features/Benefits	Kraft	Coated	PVC	Polymeric film	Film Lamination	Celvolit®
Vinyl Acetate/ Ethylene Copolymers															
149	55.5	3200–4400	4/20	2	9	0	4.5	PVOH	Excellent heat resistance, good bonding strength on different substrates, good shear resistance and fast setting.	●	●	●	●	●	**149**
1405	60.0	400–1600	2/20	4	11	0	4.5	PVOH	Extremely low VOC grade, fast setting speed and extremely low VOC, good bonding on different substrate with excellent heat resistance.	●	●	●	●	●	**1405**
1466	55.5	5000–6500	4/20	0	4	0	4.5	PVOH	Fast setting, excellent heat resistance and yellowing resistance, high bonding strength and high water resistance for textile materials.	●	●	●	●	●	**1466**
1475	55.5	1500–3000	3/20	-18	-12	0	4.5	PVOH	Extremely low VOC grade, high ethylene content, excellent wetting and bonding on low polar surface, good wet tack and long open time, suitable for machine and manual operation.	●	●	●	●	●	**1475**
1476	55.5	3000–5000	4/20	-4	0	0	4.5	PVOH	Fast setting, excellent heat resistance and yellowing resistance, good bonding strength on lacquer, film and textile substrates, soft glue film.	●	●	●	●	●	**1476**
1488 (SG)	55.5	4500-6500	4/20	2	6	0	4.5	PVOH	Excellent thicken responding with plasticizer and solvent, high wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive applications.	●	●	●	●	●	**1488 (SG)**
1490	60.0	1000–3000	2/20	-28	-22	0	5	Surf./PVOH	High wet tack and fast setting speed, long open time, excellent adhesion on difficult surface like UV, PP, PE, PET with good cold resistance.	●	●	●	●	●	**1490**
1491	55.5	3000–5000	3/20	2	9	0	4.5	PVOH	Good shear resistance, fast setting speed and extremely low VOC, good bonding on different substrate with excellent heat resistance.	●	●	●	●	●	**1491**
1495	55.5	100–1000	2/20	-3	1	0	4.5	PVOH	Extremely low VOC, good adhesion on tobacco packaging substrates, designed for high speed tobacco side seaming and packaging adhesive.	●	●	●	●	●	**1495**
1498 (SG)	55.5	3000–4500	3/20	3	6	0	4.5	PVOH	Good thicken responding with plasticizer and solvent, high wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive applications.	●	●	●	●	●	**1498 (SG)**
1499 (SG)	55.5	1500–2500	4/60	2	6	0	4.5	PVOH	High wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive application including paper converting and woodworking.	●	●	●	●	●	**1499 (SG)**
Vinyl Acetate based polymers															
Vinamul® 8482CN	53.0	1000–3000	4/20	37	41	15	4.5	PVOH	High wet tack and fast setting speed, good machinery stability, suitable for roller, nozzle operation.	●	●				**Vinamul® 8482CN**

* Celanese offers a broader range of products for adhesives applications than those listed here.
For more information on how we can support your adhesive formulation goals, contact your Celanese representative

● = recommended ● = usable

Commonly requested Celanese Emulsions for Adhesives*

Product	Specifications									Woodworking				Tobacco Industry			Textile		Product
Celvolit®	Solids %	Viscosity mPa·s (25 °C)	Spindle rpm (25 °C)	** Tg °C (on set point)	** Tg °C (middle point)	MFFT °C	pH	Stabili-zation	Features/Benefits	General wood glue	D4	EPI	PVC Lamination	Tipping	Side Seaming	Packaging	Lamination	Stiffness agent	Celvolit®
Vinyl Acetate/ Ethylene Copolymers																			
149	55.5	3200–4400	4/20	2	9	0	4.5	PVOH	Excellent heat resistance, good bonding strength on different substrates, good shear resistance and fast setting.		●	●	●				●		**149**
1405	60.0	400–1600	2/20	4	11	0	4.5	PVOH	Extremely low VOC grade, fast setting speed and extremely low VOC, good bonding on different substrate with excellent heat resistance.		●	●	●	●	●	●			**1405**
1426 (SG)	55.0	100–1200	62/60	-	10	0	4.5	Surf./PVOH	High water resistance, specially designed for EPI wood glue, with the advantage of high boiling water resistance, fast setting speed after formulation.		●	●							**1426 (SG)**
1466	55.5	5000–6500	4/20	0	4	0	4.5	PVOH	Fast setting, excellent heat resistance and yellowing resistance, high bonding strength and high water resistance for textile materials.		●	●	●				●		**1466**
1475	55.5	1500–3000	3/20	-18	-12	0	4.5	PVOH	Extremely low VOC grade, high ethylene content, excellent wetting and bonding on low polar surface, good wet tack and long open time, suitable for machine and manual operation.					●		●			**1475**
1476	55.5	3000–5000	4/20	-4	0	0	4.5	PVOH	Fast setting,excellent heat resistance and yellowing resistance, good bonding strength on lacquer, film and textile substrates, soft glue film.		●	●	●				●		**1476**
1488 (SG)	55.5	4500-6500	4/20	2	6	0	4.5	PVOH	Excellent thicken responding with plasticizer and solvent, high wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive applications.		●	●	●				●		**1488 (SG)**
1491	55.5	3000–5000	3/20	2	9	0	4.5	PVOH	Good shear resistance, fast setting speed and extremely low VOC, good bonding on different substrate with excellent heat resistance.		●	●	●	●	●	●			**1491**
1495	55.5	100–1000	2/20	-3	1	0	4.5	PVOH	Extremely low VOC, good adhesion on tobacco packaging substrates, designed for high speed tobacco side seaming and packaging adhesive.		●	●	●	●	●	●			**1495**
1496	55.5	1600–2600	3/20	23	26	10	4.5	PVOH	Excellent shear resistance, fast setting speed and extremely low VOC, designed for high speed, boric acid free tobacco glue formulation.					●	●	●			**1496**
1498 (SG)	55.5	3000–4500	3/20	3	6	0	4.5	PVOH	Good thicken responding with plasticizer and solvent, high wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive applications.		●	●	●						**1498 (SG)**
1499 (SG)	55.5	1500–2500	4/60	2	6	0	4.5	PVOH	High wet tack and fast setting speed, excellent heat resistance and good adhesion, suitable for general adhesive application including paper converting and woodworking.		●	●	●						**1499 (SG)**
Vinyl Acetate based polymers																			
Vinamul® 8482CN	53.0	1000–3000	4/20	37	41	15	4.5	PVOH	High wet tack and fast setting speed, good machinery stability, suitable for roller, nozzle operation.	●								●	**Vinamul® 8482CN**

* Celanese offers a broader range of products for adhesives applications than those listed here.
For more information on how we can support your adhesive formulation goals, contact your Celanese representative.
** Heat rate 10°C/min

● = recommended ● = usable

Celanese Emulsions for Carpet

Innovation and solutions in carpet backing applications

Our Celanese Shanghai Technology Center is equipped with a world-class application and development laboratory. This facility features the most advanced testing equipment with thermal desorption and GC-Mass for VOC testing of floor coverings such as latex and carpet. Our senior experts offer customized products and applications to meet your desired carpet backing performance, including low VOC and low odor solutions.

Our VAE polymers can help you meet your performance requirements for tuft bind as well as your need for a low odor, low VOC alternative to current chemistries.

We offer binders for the use in the following carpet backing adhesive applications:

- carpet tile
- woven carpet
- manual carpet

The use of Celanese VAE emulsions

VAE emulsions can help customers' carpet products pass the Green Label GB18587 to meet the China market regulations and also the CRI Green Label Plus for the International market.

It is important to produce high quality carpet that meets environmental requirements. In terms of bonding performance Celanese VAE emulsions have good adhesion to nylon, polypropylene and other chemical fibers, thus ensuring the excellent pull-out force of carpet products. At the same time, Celanese VAE emulsions have good adhesion to secondary backing materials such as PVC and asphalt, and can produce a strong bond to the secondary backing after underlayment.

In terms of process performance, our VAE emulsions have good compatibility with various additives and fillers.

The main characteristics of our products include:

- Low odor and low VOC
- Excellent tuft bond and penetration
- Good backing adhesion
- Good additive and filler compatibility

Product	Specifications							Applications				Features									Product
Celvolit®	Solids %	Viscosity mPa·s (25 °C)	Tg °C	MFFT °C	pH	Stabilization	Features/Benefits	PVC tile carpet	Woven carpet	Manual carpet	Textile coating & lamination adhesives	Low VOC	Low TVOC	Tuft bind	Stifness	Water resistance	Penetra-tion	Foaming	Anti sediments	SBR compati-bility	Celvolit®
Vinyl Acetate / Ethylene Copolymers																					
1501 (SG)	55.5	3000–4500	6	0	4.5	Polyvinyl alcohol	For use in textile and carpet coatings applications. Good adhesion and good wet tack properties. Provides adhesion to a wide variety of porous and nonporous fiber with a medium hand feel.	●	●	●	●	●	●	●	●	●	●	●	●		**1501 (SG)**
1526 (SG)	60.0	700–2500	16	0	4.5	Polyvinyl alcohol	Easy foaming and roller coating property. Good penetration to carpet tuft. High tuft bonding and delamination. Excellent water resistance.	●	●	●		●	●	●	●	●	●	●	●		**1526 (SG)**
1588	55.5	500–2000	5	0	4.5	Polyvinyl alcohol & Surfactants	Easy foaming and roller coating property. Good penetration to carpet tuft. High tuft bonding and delamination. Excellent water resistance.	●	●	●		●	●	●	●	●	●	●	●	●	**1588**
E190HS	60.0	400–1600	11	0	4.3	Polyvinyl alcohol	Advantage of high filler loading. Good penetration to textile. High tuft bonding strength. Compatible with a variety of plasticizers, solvents, fillers and other modifiers.	●	●	●		●	●	●	●	●	●	●	●		**E190HS**

● = recommended ● = usable

Celanese Emulsions for Paints & Coatings

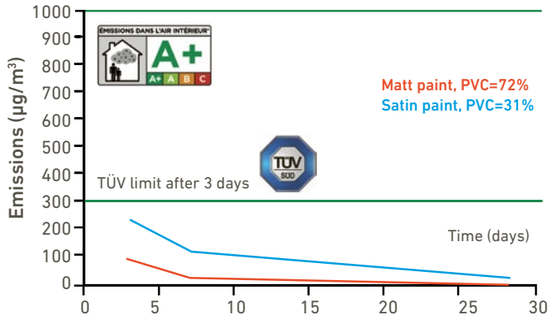
Celanese VAE dispersions are the premium class for low emission, environmentally friendly paints for the use in the following applications:

- Interior wall and ceiling paints
- Low VOC interior paints
- Paints with good wet scrub resistance
- Semi-gloss paints with good blocking resistance

Coalescent free formulation for low VOC interior paints

All around the world, the paint and coatings industry is under pressure to reduce VOC emissions. Although most interior decorative paints are already water-based, many formulations based on traditional polymers still contain solvents and coalescing agents which can affect the indoor air quality of the painted rooms. The use of VAE dispersions with MFFT 0 °C enables the formulation of paints without any solvents and coalescing agents. Detectable emissions after 28 days are far below the A+ TVOC limit of 1000 µg/m³, which is required by the French "Decret". Even after just seven days, the TVOC emissions are far below the requirements of some non-mandatory labels (e.g. TÜV Süd). Beside the impact on indoor air quality, interior paints formulated with Celanese's VAE technology also perform excellent on wet scrub resistance, hiding power and block resistance.

Emission behavior of optimized interior paints based on VAE-Copolymers

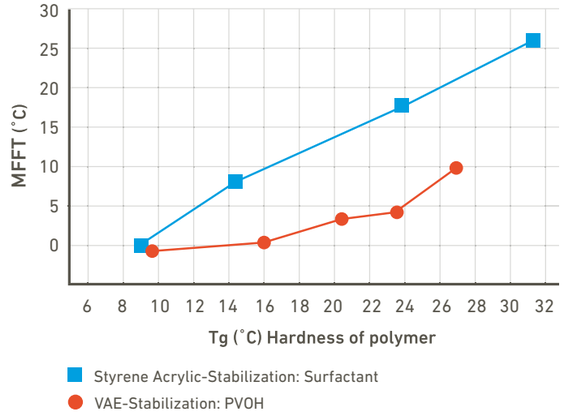


VAE dispersions show a unique feature called "hydroplastification". Due the hydrophilic nature of VAE polymers, water acts as a coalescing agent (softening the polymer) during the film formation. As a result, VAE dispersions show a substantially higher Tg, at the same MFFT compared to competitive chemistries (e.g. S/A).

Increased hiding power in paints above critical PVC

VAE dispersions also have a positive impact on the hiding power of high PVC interior paints where the polymer acts as spacer between pigments and fillers. By using VAE dispersions, paint manufacturers are able to reduce the use of titanium dioxide, which has a direct positive impact on the paint formulation costs. In paints above critical PVC, VAEs offer a better hiding power than S/A over the full spreading rate range.

Hydroplastification effect with VAE copolymers



This substantially higher Tg of VAE dispersions, develops a much better surface hardness compared to soft S/A dispersions, resulting in much better wet scrub resistance.

Product	Specifications						Applications					Features						Product
	Solids %	Viscosity mPa·s (25 °C)	Tg °C	MFFT °C	pH	Stabilization	Features/Benefits	Interior paints	Plaster & texture coatings	Satin paints	Primer	Thixotropic paints	Low VOC	Low emission	Wet scrub resistance	Film builds	Hiding power / Opacity	Freeze-thaw stability	
Vinyl Acetate / Ethylene Copolymers																			
Celvolit® 1602 (SG)	55	100–700	12	0	4.5	Surfactants & Protective colloids	Is the first-choice binder for low emission interior matt and satin paints. The formulated paints offer excellent wet scrub resistance and hiding power. Due to the optimized shear stability, this versatile binder can also be formulated into low emission plasters and textured coatings.	●	●	●	●	●	●	●	●	●	●	●	**Celvolit® 1602 (SG)**
EcoVAE® 1608	55	500–3000	10	0	4.5	Surfactants & Cellulose derivatives	A cellulose derivative stabilized VAE dispersion particularly suited for thixotropic paints. This versatile binder is ideal for low emission interior matt to satin paints, plasters, textured coatings and deep shade paints.	●	●	●	●	●	●	●	●	●	●	●	**EcoVAE® 1608**
EcoVAE® 1609 (SG)	55	800–3000	10	0	4.5	Surfactants & Protective colloids	One of ours best in class VAE binder to offer in this region. This binder is suitable for various decorative coatings system due to its better opacity coverage, lower VOC and emission.	●	●	●	●	●	●	●	●	●	●	●	**EcoVAE® 1609 (SG)**

● = recommended ● = usable

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