

ENCOR® 167S LATEX
 BINDER FOR HIGH PERFORMANCE SEALANTS



Product Benefits

ENCOR® 167S latex was developed as a binder for high performance sealants. It's excellent exterior durability and adhesion enables the formulator to prepare a broad range of ASTM C834 and C920 compliant sealants.

The binder's low glass transition temperature allows for the formulation of sealants with outstanding low temperature flexibility without the need for external plasticizers. The elimination of external plasticizer has the added benefit of improved dirt pick-up and mildew resistance.

Performance Benefits

- Excellent exterior durability
- Outstanding adhesion characteristics
- Excellent performance in plasticizer-free formulations

Typical Properties¹

Total Solids, % by weight	62
Weight per Gallon, lb	9.0
pH Value	5
Particle Size, <i>microns</i>	0.3
Viscosity, 25°C, cP (Brookfield, RVT #6, 60 rpm)	200
Minimum Filming Temperature (MFFT), °C	<0
Glass Transition Temp. (Tg), midpoint °C	-44

¹Typical values not to be construed as sales specifications.

* These products meet the standards of Arkema Coating Resin's EnVia® program. These products are designed to assist formulators in meeting their sustainability and regulatory goals in their finished products.



External plasticizers have traditionally been used in the formulation of water-based caulks and sealants to improve the lower temperature performance characteristics.

Plasticizer migration can create a host of problems, including:

- Paint discoloration
- Glossing
- Dirt and mildew pickup

Plasticizer migration can result in glossing in paint.

Figure 1, illustrates the impact of plasticizer migration on the gloss level of paint applied over caulk-filled nail holes.



Figure 1

Figure 2



Dirt and mildew pickup related to plasticizer migration are additional concerns that plague professional and DIY painters.

By eliminating plasticizer or adjusting P/B ratios, ENCOR® 167S latex allows manufacturers to tailor formulations to their specific performance and cost requirements.

Figure 2, illustrates the negative impact the use of plasticizer in a conventional caulk formulation can have on dirt pickup and mildew resistance.

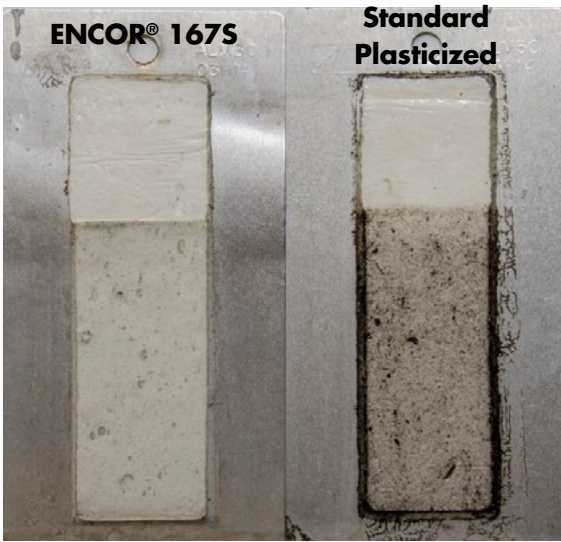


Figure 3, illustrates the negative impact of plasticizer on the dirt pick up and mildew resistance of sealants formulated to conform with ASTM C920. The sealants were exposed for 24 months.

Figure 3

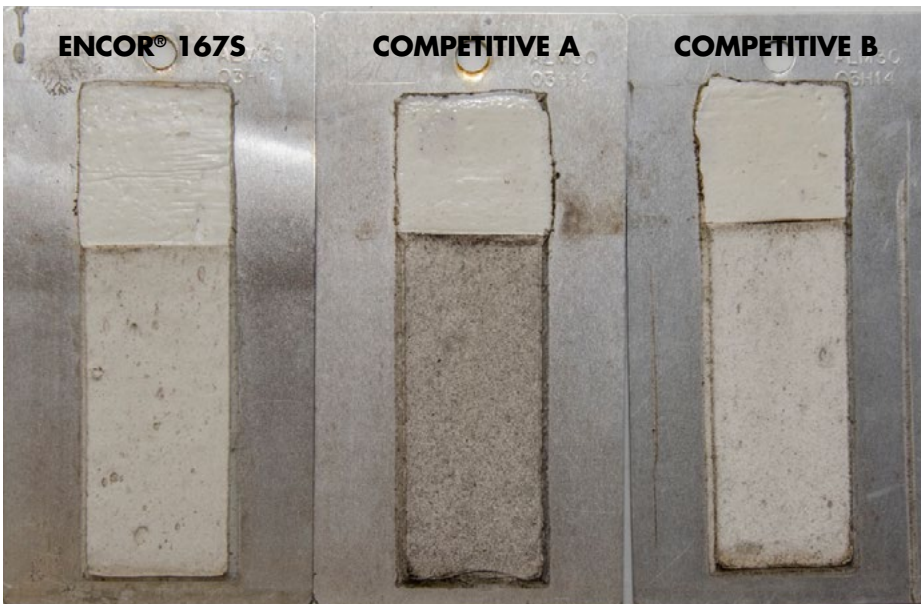


Figure 4, illustrates the superior performance of ENCOR® 167S latex relative to other plasticizer-free formulations. The sealants were exposed for 24 months.

Figure 4

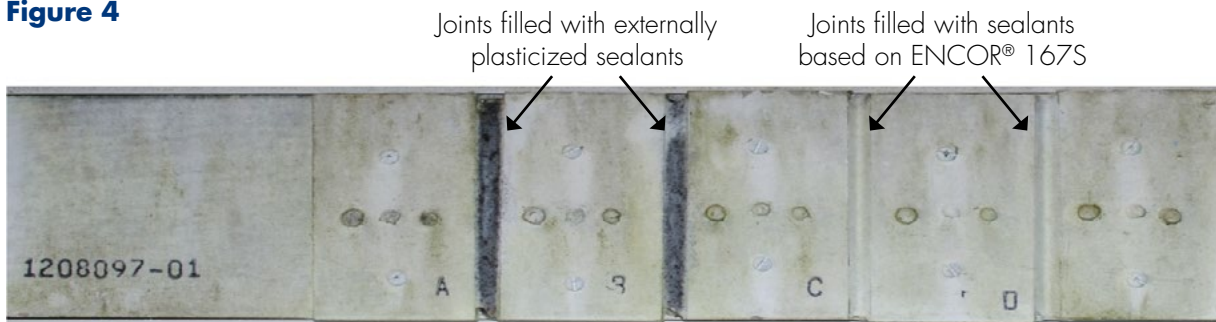


Figure 5, illustrates the superior performance of ENCOR® 167S latex relative to externally plasticized formulations. The sealants were exposed for 24 months.

Figure 5

Formulating ASTM C834 compliant sealants

Low temperature flexibility and extension recovery are two performance characteristics.

Table 1, illustrates the superior performance delivered by ENCOR® 167S latex when compared to conventionally plasticized sealant binders. ENCOR® 167S latex delivers the required low temperature flexibility and extension recovery even at higher pigment to binder ratios.

	Conventional A 2.7 P/B <u>40% plast</u>	Conventional B 2.7 P/B <u>40% plast</u>	ENCOR® 167S 2.7 P/B <u>0% plast</u>	ENCOR® 167S 3.0 P/B <u>0% plast</u>
<i>ASTM C734</i>				
Low Temp Flex. -18° C	Pass	Pass	Pass	Pass
<i>ASTM C736</i>				
Recovery Adhesion Loss				
Failure	None	None	None	None
Recovery	100%	100%	100%	100%

Table 1

Formulating ASTM C920 compliant sealants

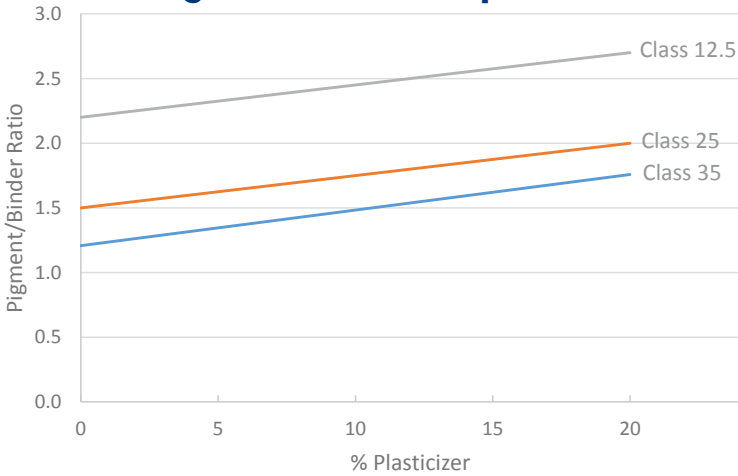


Figure 6

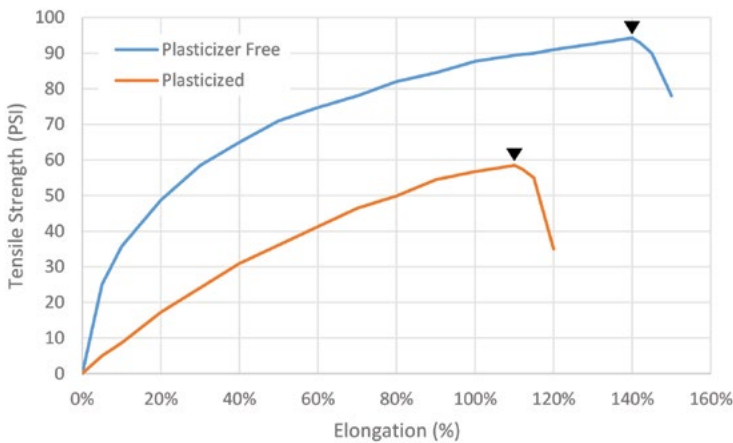


Figure 7

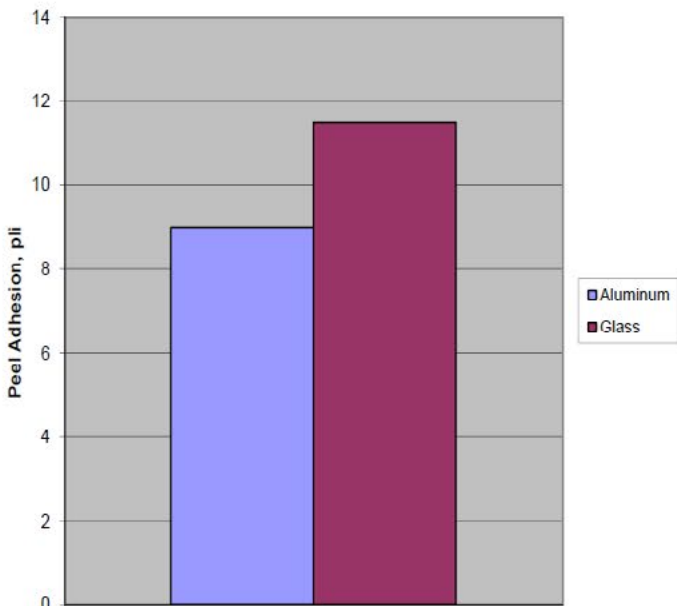


Figure 8

ASTM C719 Cyclic Movement and ASTM C793 Low Temperature Flexibility

Figure 6, illustrates the formulation space for ASTM C920 sealants. With ENCOR® 167S latex, ASTM C920 Class 35 performance can be achieved without the need for external plasticizer at a pigment/binder ratio of 1.2.

External plasticizer may be employed with ENCOR® 167S latex to achieve desired performance at higher pigment to binder ratios.

Tensile-Elongation Comparison

Figure 7 is a comparison of the tensile-elongation performance of a conventional sealant using an external plasticizer (30% based on polymer solids) compared to a plasticizer-free formulation based on ENCOR® 167S latex.

ASTM C794 Adhesion-in-Peel

Figure 8, illustrates the superior peel adhesion of sealants formulated with ENCOR® 167S latex. A sealant with greater than 5 pli adhesion to both aluminum and glass substrates was formulated at a pigment to binder ratio of 1.5 without the need of external plasticizer.

Formulating Guidelines

Dispersant Choice

Many standard dispersants work well with ENCOR® 167S latex, Coadis 173, Rhodaline 226-35 and Tamol 851 are all excellent choices.

Thickener Choice

- HEC thickeners are preferred, high molecular weight products are more efficient than lower molecular weight grades.
- ASE and HASE thickener types such as Rheotech 46, Acrysol ASE 60, Rheotech 4200 and Acrysol TT-615 may also be employed
- HEUR thickener types should be avoided because of undesirable flow characteristics

Plasticizer Type and Level

- ENCOR® 167S latex does not require plasticizer to achieve low temperature performance however its use can allow for higher P/B ratios
- ENCOR® 167S latex is compatible with many of the newer non-phthalate plasticizers such as K-Flex 850S, Benzoflex LC-531 and Santicizer Platinum P-1000
- 10 wt% of plasticizing agent based on latex solids is sufficient to achieve Class 25 performance at P/B of 1.7
- 20 wt% of plasticizing agent based on latex solids is sufficient to achieve Class 25 performance at P/B of 2.0

Calcium Carbonate Grade

- Performance differences can be anticipated with different sources of ground calcium carbonates due to natural variations in quality of calcium carbonate source. Trace minerals and salts in the ground calcium carbonate can negatively impact performance. Any new grade of calcium carbonate should be tested for suitability.
- Calcium carbonate with an average particle size of 6-10 um is preferred when formulating sealants.

Silane

- The additional of a low level of silane improves the adhesion characteristics to glass under wet conditions
- Silquest A-187 is recommended but other grades may be used.

Biocides/Mildewcides

- Biocides and mildewcides are necessary to achieve the desired product shelf-life and maximum exterior performance.
- Kathon LX is the recommended package biocide
- There are several recommended mildewcides and either Polyphase 663 or Busan 1192D are good choices

Formulating Suggestions

ASTM C834 Formulation

Ingredient	Pounds	Gallons	Sealant Properties	
Water	128.4	15.41	Pigment to Binder ratio	2.7
Propylene Glycol	11.5	1.24	Density, lbs/gal	13.0
Cellosize ER-15M	2.0	0.17	Solids, wt%	75
Triton X-405	9.7	1.06	CARB VOC, %	1.2
COADIS 173	2.3	0.24	SCAQMD VOC, g/l	53
Kathon LX 1.5%	1.3	0.15		
ENCOR® 167S latex	426.8	47.96		
Calcium Carbonate, 6 microns	684.0	30.37		
Ti-Pure R-902	7.4	0.23		
Silquest A187	1.0	0.11		
Ammonium Hydroxide, 28%	1.9	0.26		
Mineral Spirits	14.7	2.33		
Polyphase 663	3.5	0.49		
TOTAL	1294	100.00		

ASTM C920 Formulation

Ingredient	Pounds	Gallons	Sealant Properties	
Mineral Oil	32.0	4.64	Pigment to Binder ratio	1.5
Propylene Glycol	24.0	2.80	Density, lbs/gal	11.5
Cellosize QP 30,000	13.1	1.13	Solids, wt%	73
Triton X-405	9.6	1.05	CARB VOC, %	1.0
COADIS 173	1.4	0.15	SCAQMD VOC, g/l	66
Kathon LX 1.5%	1.2	0.14		
ENCOR® 167S latex	490.0	55.07		
Water	103.8	12.45		
Calcium Carbonate, 6 microns	448.5	19.92		
Ti-Pure R-902	7.2	0.22		
Silquest A187	1.2	0.13		
Ammonium Hydroxide, 28%	2.2	0.29		
Mineral Spirits	9.6	1.52		
Polyphase 663	3.5	0.48		
TOTAL	1147.4	100.00		

Product Safety

Before handling the materials listed in this bulletin, read and understand the product MSDS (Material Safety Data Sheet) for additional information on personal protective equipment and for safety, health and environmental information. For environmental, safety and toxicological information, contact our Customer Service Department at 1-866-837-5532 to find an MSDS, or visit our web site: www.arkemacoatingresins.com

No chemical should be used as or in a food, drug, medical device, or cosmetic, or in a product or process in which it may contact a food, drug, medical device, or cosmetic until the user has determined the suitability and legality of the use. Since government regulations and use conditions are subject to change, it is the user's responsibility to determine that this information is appropriate and suitable under current, applicable laws and regulations.

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Storage and Handling

Follow procedures typically recommended for polymer dispersions. Use corrosion-resistant storage tanks and piping. Air-operated diaphragm pumps are preferred.

Packaged material should be stored indoors in the original unopened and undamaged container, in a dry place. Exposure to direct sunlight should be avoided.

Avoid extreme temperatures. Do not freeze; store between 40-90°F (4-32°C).

For more details, refer to "*Storage and Handling of Arkema Coating Resins Products – A Basic Guide*".



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