

**ISOCRYL[®] EP-575
MATTING HARDENER FOR
POLYESTER POWDER COATINGS**



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GENERAL DESCRIPTION

ISOCRYL[®] EP-575 is a glycidyl-functional acrylic copolymer designed for use as a hardener capable of producing matte exterior-durable polyester powder coatings with excellent impact and chemical resistance compared to previous generations of acrylic matting hardeners. Additional benefits include smooth cured film appearance and low contamination characteristics.

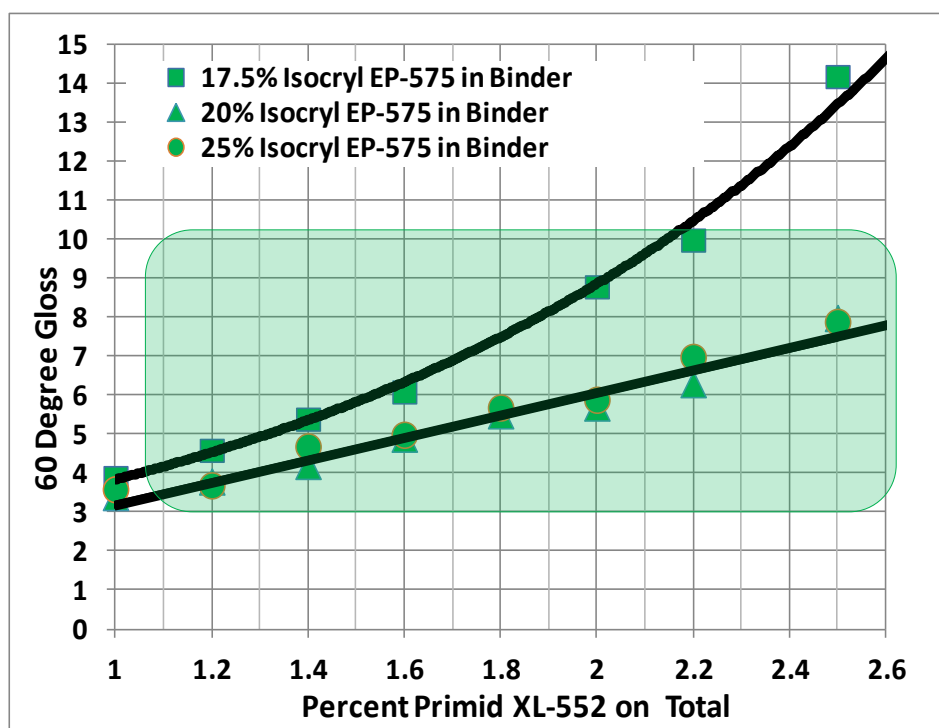
TYPICAL PROPERTIES*

Appearance	Clear Flake
Non-Volatile, weight %	98.5% minimum
Theoretical Epoxy Equivalent Weight	480-530

* Not to be used for specification purposes

FORMULATING GUIDELINES

- In standard white and black formulations, a binder comprising 20-30% ISOCRYL[®] EP-575 acrylic resin with 70-80% linear carboxy polyester (acid value = 30 - 35mgKOH/g, T_g = 55 - 60°C) provides coating compositions with optimal mechanical and chemical resistance in the matte range.
- ISOCRYL[®] EP-575 coating compositions require use of a secondary crosslinking additive such as Primid XL-552 (EMS-CHEMIE) to achieve outstanding impact resistance, chemical resistance and adhesion. Primid XL-552 levels at 1 – 2.5% based on total formulation weight generally provide optimal performance.



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Figure 1. Representative gloss response of ISOCRYL® EP-575 formulations to changes in Primid loading. White formulations at three levels of ISOCRYL® EP-575 in the binder (17.5, 20, 25%) were prepared using Crylcoat 2437-0, 0.5% Benzoin, 1% Resiflow® P-67, and 30% Ti-Pure R-960, applied to cold-rolled steel panels, and cured for 15 min. at 200°C, at coating thickness of 50-65um.

STARTING POINT FORMULATIONS

Component	Matte Standard Durable White Isocryl® EP-575 Formulation	Matte Standard Durable Black Isocryl® EP-575 Formulation
	Parts (%)	Parts (%)
Isocryl® EP-575 (Estron)	13.4	13.2
Crylcoat 2437-0 (Allnex)	53.5	52.7
Primid XL-552 (EMS-CHEMIE)	1.6	1.6
Resiflow® P-67 (Estron)	1.0	1.0
Benzoin (Estron)	0.5	0.5
Tioxide (Huntsman)	30	--
Carbon Black BPL (Cabot)	--	1
Blanc Fixe F (Sachtleben)	--	30
TOTAL	100.0	100.0
Coating Property**		
20° Gloss	1.9	0.3
60° Gloss	4.9	2.8
85° Gloss	17	14.2
Reverse Impact (in.-lb.)	160	120
Burnish Resistance (0-5 scale, 5 = best)	3	3
Chemical Resistance (MEK Double Rubs to Failure)	240	230

Figure 2. Component mixtures were mixed using a Strand mill for 10-20 seconds to ensure adequate pre-mixing and then extruded on a Baker Perkins MP19PC 19mm twin screw extruder at 200 RPM with barrel temperature setpoints: Zone 1: 85°C, Zone 2: 85°C, Zone 3: 95°C, Zone 4: 95°C. Extrudates were chipped by hand, milled using a Strand mill, and then sieved through a 90um sieve. Finished powders were sprayed on QD-35 untreated cold-rolled steel panels and cured for 15 minutes at 200°C, producing coated panels with 50-60um film thickness.

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- Within the 1 – 2.5% Primid loading range at Isocryl® EP-575 binder contents of 20 - 30%, increasing the Primid level may slightly increase gloss and can be used to improve impact and chemical resistance if necessary when formulating with certain polyesters.
- Primid XL-552 loadings lower than 1% on total formulation or ISOCRYL® EP-575 binder loadings lower than 17.5% combined with low Primid loadings can result in decreased impact resistance and chemical resistance with most polyesters and are not recommended.
- As illustrated in Figure 1, the combination of medium to high Primid loadings with ISOCRYL® EP-575 binder loadings lower than 20% may result in gloss values outside of the matte range as well as a non-linear gloss response to Primid loading, and is not recommended.
- ISOCRYL® EP-575 binder content in the 20 - 25% range generally is optimal to achieve a matte high impact-resistant coating with standard polyesters. With certain polyesters such as super-durable resins ISOCRYL® EP-575 binder content may be optimized at 25 - 30% if necessary to decrease the gloss into the target range and improve impact resistance.

PROCESSING GUIDELINES

- Application and cure conditions may be optimized based upon the flow characteristics and reactivity of individual formulations and substrate thickness. Generally, standard ISOCRYL® EP-575 formulations should be applied at about 2 – 2.5 mils (~50 - 65um) and cured at 200°C for 15 minutes to achieve full cure and optimal coating properties. Cure cycles less robust than 180°C for 20 minutes may result in decreased degree of cure leading to reduced chemical resistance, impact resistance, and adhesion. See Figure 2.

Percent ISOCRYL® EP-575 in Binder (%)	% Primid XL-552 (on Total Formulation)	Cure Temp. (°C)	Cure Time (min.)	60 Degree Gloss	Reverse Impact (in.lb.)
25	1.4	200	10	4.9	150
25	1.4	200	15	4.7	150
25	1.4	200	20	4.5	150
25	1.4	180	20	5.8	150
25	1.4	160	20	8.9	40
25	1.4	140	20	49.2	0

Figure 2. Gloss and reverse impact at different cure temperatures and cure times. White formulations with 25% ISOCRYL® EP-575 in the binder were prepared using 1.4% Primid XL-552 (EMS-CHEMIE) Crylcoat 2437-0 (Allnex), 0.5% Benzoin (Estron), 1% Resiflow® P-67 (Estron), and 30% Ti-Pure R-960 (DuPont). Formulations were spray-applied to cold-rolled steel panels, and cured as noted, at coating thicknesses of 50-65um.

- Acrylic / polyester powder coating systems are generally sensitive to many variables, including composition, equipment, processing and application conditions, all of which can affect the gloss, smoothness, and impact resistance of the resulting coatings. Accurate charging of raw materials and consistent processing are essential. Natural lot-to-lot variation in polyester resins, acrylic resins, and other components, as well as potential variation in raw material charging and equipment/processing

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variables necessitate gloss and mechanical property checks on a per-batch basis. Pre-batch test shots and adjustment procedures are recommended to ensure batch-to-batch consistency.

REGULATORY LISTINGS

The components in this material are either listed or exempt from listing due to polymer exemption criteria for the following chemical listing inventories: EINECS (Europe), TSCA (USA), DSL(Canada), ZNIOc(New Zealand), REACH (Europe) pre-registered.

PRODUCT AVAILABILITY

Samples are available for screening evaluations. Larger quantities are also available for extended testing or commercial use, though a 4-6 week lead time may be required.

STORAGE AND HANDLING

Keep container tightly closed and store in a dry, well ventilated area away from heat and sources of ignition. Store ISOCRYL® EP-575 and finished formulations containing ISOCRYL® EP-575 at < 35°C for optimal performance. See SDS for detailed information.

CONTACT INFORMATION

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