ISOCRYL® EP-570
MATTING HARDENER
FOR POWDER COATINGS

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GENERAL DESCRIPTION

Isocryl® EP-570 is a glycidyl-functional acrylic hardener designed to produce low gloss, exterior-durable polyester powder coatings. Benefits include consistent gloss, smooth matte appearance and dependable performance. "One-shot" low gloss coatings can be produced by using Isocryl® EP-570 in conjunction with 30-35 acid value polyesters. Standard polyester resins used for TGIC, Primid or Araldite PT-910 powder coatings are well suited for use with Isocryl® EP-570.

A key advantage of Isocryl® EP-570 is its improved burnish resistance over conventional matting hardeners and its predecessor resins Isocryl® EP-550 and EP-560. In addition, Isocryl® EP-570 has substantially improved compatibility with polyester/TGIC and epoxy resin based powder coatings. Furthermore, ESCAT 22 is essential to the formulation to achieve good mechanical and solvent resistance properties.

KEY ATTRIBUTE SUMMARY

- Exterior durable
- Outstanding burnish resistance
- Efficient matting capability with excellent smoothness
- Improved compatibility with non-acrylic powder coatings
- Good adhesion and impact resistance when used in conjunction with ESCAT 22
- Formulation flexibility for performance and cost
- Excellent storage stability of finished powder coating

TYPICAL PROPERTIES*

Appearance	Ground Flakes
Softening Point, RING AND BALL	140 °C minimum
Non-Volatile, weight %	98.5% minimum

* Not to be used for specification purposes

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: AICS (Australia), DSL (Canada), ECL (Korea), ECN (Taiwan), EINECS (Europe), ENCS (Japan), IECSC (China), NZIoC (New Zealand), PICCS (Philippines), TSCA (USA).

PACKAGING (NET WEIGHT)

44 lb. / 20 kg in fiberboard boxes with polyolefin liner

PRODUCT AVAILABILITY

This product is commercially available andt may require lead time.

STORAGE AND HANDLING

Keep container tightly closed and store in a dry, well ventilated area away from heat and sources of ignition. Shelf life of unopened containers is one year from date of shipment. See SDS for detailed information.

FORMULATING AND PROCESSING GUIDELINES

- A ratio of 75:25 polyester to Isocryl® EP-570 provides a good compromise of performance to cost.
- ESCAT 22 at 10% of the EP-570 content affords ideal mechanical and solvent resistance properties.
- Good premix is essential for obtaining a homogeneous appearance and best possible performance.
- Extrusion conditions should be optimized for appearance and resultant gloss. Scale-up from laboratory to full production may require fine-tuning.
- Twin-screw single extrusion is recommended for optimum dispersion. The effect of high shear extrusion conditions has been simulated by re-extrusion of a black formulation as shown in a table on page 3. Excessive extrusion may result in some pre-reaction of the powder formulation which can increase gloss, adversely affect flow, impact resistance, burnish resistance and solvent resistance.

POWDER COATING FORMULATIONS

The basic binder content ratio should consist of 75 parts polyester and 25 parts Isocryl® EP-570. The catalyst ESCAT 22 is necessary to obtain good mechanical and solvent resistance properties.

The best compromise between cost and performance is achieved with standard polyester resins having acid values of about 30-35 mg KOH/g, for example those designed for curing with TGIC, Primid or Araldite PT-910. Viscosity of the polyester should have little effect on the resultant matte finish with Isocryl® EP-570. Obtaining semi-gloss formulations can be accomplished with the first generation product Isocryl® EP-550.

	White formulation	**Black formulation**
Polyester (AV = 30 mg KOH/g)	50.5	50.5
Isocryl® EP-570	16.8	16.8
ESCAT 22	1.7	1.7
Resiflow® P-67	1.0	1.0
Barium Sulfate	10.0	30.0
Titanium Dioxide	30.0	-
Carbon Black	-	1.0

Overall coating properties will depend on formulation raw materials, relative amounts of these ingredients, processing parameters including premix and extrusion, and adequate cure conditions for the powder coating.

NECESSITY OF ESCAT 22

The incorporation of ESCAT 22 into the formulation affords excellent mechanical properties, improved burnish resistance and improved solvent resistance. Use of 10% ESCAT 22 calculated on content of Isocryl® EP-570, or approximately 1.5 to 2% based on the total formulation, will provide the best results. Higher concentrations of ESCAT 22 can cause higher gloss, texture and reduce flow. ***It should be noted, however, that ESCAT 22 may not improve the inherently poor mechanical properties associated with superdurable polyester resins.*** Formulations using a superdurable polyester with Isocryl® EP-570 and ESCAT 22 may have acceptable low gloss, smoothness, solvent resistance but limited mechanical properties such as flexibility and impact.

EFFECT OF ESCAT 22

One part ESCAT 22 per ten of EP-570 is recommended

		No ESCAT 22	**With ESCAT 22**	More ESCAT 22
Polyester (AV = 30 mg KOH/g)		50.5	50.5	50.5
Isocryl® EP-570		16.8	16.8	16.8
ESCAT 22		**-**	**1.7**	**3.4**
Resiflow® P-67		1	-	-
Barium sulfate		30	30	30
Carbon black		1	1	1
10 min @ 200°C	gloss @ 20° (%)	0.1	0.2	1.8
	gloss @ 60° (%)	**1.5**	**2.8**	**18**
	gloss @ 85° (%)	4.5	6.6	42
	Solvent resistance[a]	**0**	**3**	**4**
	reverse impact (in.lb)	**0**	**160**	**160**
	burnish resistance[a]	**1**	**4**	**5**
Gel time @ 200°C (s)		80	37	39
Remark		dead matte	**smooth**	bad flow

[a] 1 = poor, 5 = best

EFFECT OF STOICHIOMETRY

A ratio of 75:25 polyester to Isocryl® EP-570 provides a good compromise of properties and cost. A ratio of 80:20 results in some compromise of properties. The effect of stoichiometry on a black formulation is summarized in the table below.

Polyester:Isocryl® EP-570		80:20	75:25	70:30
10 min @ 200°C	gloss @ 20° (%)	0.3	0.2	0.6
	gloss @ 60° (%)	3.7	2.8	6.9
	gloss @ 85° (%)	6.3	6.6	17
	Solvent resistance[a]	2	3	4
	Reverse impact (in.lb.)	< 160	160	160
	Burnish resistance	4	4	5
gel time @ 200°C (s)		97	37	39
Remark		sparkling	very smooth	medium flow

[a] 1 = poor, 5 = best

EFFECT OF RE-EXTRUSION (simulating excessive extrusion)

		One extrusion	Two extrusions
10 min @ 200°C	gloss @ 20° (%)	0.2	0.2
	gloss @ 60° (%)	2.8	2.3
	gloss @ 85° (%)	6.6	17.6
	Solvent resistance[a]	3	4
	Reverse impact (in.lb.)	160	> 80
	Burnish resistance [a]	4	1-2
15 min @ 160°C	gloss @ 20° (%)	2.7	1
	gloss @ 60° (%)	22	12
	gloss @ 85° (%)	55	43
gel time @ 200°C (s)		37	29
Remark		smooth	lower flow

[a] 1 = poor, 5 = best

EFFECT OF CURE TEMPERATURE

The optimal baking conditions must be determined for each formulation, but basically these systems are not considered "low-bake". Standard oven conditions of 180-200°C should suffice for most formulations. Data indicate that gloss can increase with lower bake temperatures, even with longer bake times. Mechanical properties and solvent resistance are also adversely affected. The effect of cure temperature on 60º gloss is shown below.

Color	10 min @ 200°C	15 min @ 180°C	15 min @ 160°C
black	2.8	-	22
white	4.5	5.5	-

CROSS CONTAMINATION

GMA acrylic resins are known to be highly contaminating. The following table summarizes the results of a simple study conducted by purposefully post blending white powder coating formulations of various chemistries with 1 part per 1,000 of Isocryl® EP-570 black powder coating. This most closely simulates grinder or spray booth contamination.

White powders	Isocryl® EP-570	Competitive product
50:50 hybrid	5	1-2
93:7 TGIC	5	1-2
95:5 Primid XL-552	2	1

[a] 1 = high contamination, 5 = little contamination (best result)

COMPARISON BETWEEN ISOCRYL® EP-550, EP-560 and EP-570

The following table compares the properties of the Isocryl® line of matting hardeners.

Properties	Isocryl® EP-550	Isocryl® EP-560	**Isocryl® EP-570**
Gloss @ 60° (%)	< 10	< 5	**< 5**
Gloss @ 85° (%)	> 10	< 10	**< 10**
Gloss adjustment	easy	very difficult	**difficult**
Burnish resistance	poor	poor	**good**
Compatibility	poor	good	**good**
Mechanical properties[a]	excellent	excellent	**good**
Storage stability of powder[b]	poor	poor	**excellent**

[a] Using ESCAT 22 [b] At elevated temperatures

SUMMARY

The best overall properties are obtained with Isocryl® EP-570 for:

- Storage stability of the finished powder coating
- Burnish resistance, a notable advantage for matte coatings
- Flow and surface appearance
- Good mechanical and solvent resistance properties

CONTACT INFORMATION

807 N. Main Street
P.O. Box 127 (270) 395-4195 PHONE
Calvert City, KY 42029 USA (270) 395-5070 FAX

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