

GENERAL DESCRIPTION

Isocryl® H-1871 is a solid, hydroxyl-functional acrylic resin specifically designed for one-shot, low to mid-gloss, exterior durable polyurethane powder coatings. Isocryl® H-1871 is used in conjunction with conventional or superdurable hydroxyl polyesters to be cured with blocked isocyanate or uretdione hardeners. Formulations with 60° gloss ranging from 5-50% are possible depending on the binder composition, pigmentation, choice of flow control agent, and addition of organic acid such as DDDA.

Two key benefits of using Isocryl® H-1871 with 30-40 hydroxyl value polyesters are (a) reduced amount of required curing agent compared to formulations based on combining high and low OH value polyesters and (b) consistent gloss reproducibility. Resiflow® P-64F, which has a dramatic influence in the matting mechanism of Isocryl® H-1871, is the recommended flow control agent for formulations based on Isocryl® H-1871. Powder coatings formulated with Isocryl® H-1871 demonstrate good storage stability and are not sensitive to processing conditions in the extruder. As with any raw material, laboratory evaluation is required for each formulation to determine the optimum concentration of Isocryl® H-1871, best processing method and application equipment settings. Powder coatings containing Isocryl® H-1871 may require lower kV settings on corona application equipment to achieve the best appearance.

PRODUCT ATTRIBUTES

- Exterior durable
- One shot low to mid-gloss polyurethanes
- Low Crosslinker Demand
- Smooth Appearance
- Reproducible Gloss
- Resiflow® P-64F is essential to matting
- Adjustable gloss
- Use with standard or superdurable polyesters
- Use with caprolactam-blocked or uretdione hardeners
- Good mechanical and solvent resistance properties
- Good physical and chemical package stability
- Excellent burnish resistance, especially at lower gloss levels

TYPICAL PROPERTIES*

Appearance	Clear Flakes
Non-Volatile, weight %	99.0% minimum
Softening Point, RING & BALL	115 -125°C
Specific Gravity (25/25)	1.0 – 1.2
Hydroxyl Equivalent Weight	1871
Hydroxyl Value	30

* Not to be used for specification purposes

FORMULATING WITH ISOCRYL® H-1871

Table 1: Illustrative Resins, Crosslinkers and Flow Control Agent

Product	Description	Hydroxyl value and/or Equivalent Weight
Isocryl® H-1871	Hydroxyl Acrylic resin	30 OH, 1871 eq.wt.
Rucote 102, Bayer	Standard durable OH polyester	40 OH, 1403 eq.wt.

**ISOCRYL® H-1871
MATTING ACRYLIC RESIN
FOR POWDER COATINGS**

Experimental Product



THE EDGE OF INNOVATION

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Crylcoat 4890-0 (690), Cytec	Superdurable OH polyester	30 OH, 1870 eq.wt.
Crelan NI-2, Bayer Vestagone B-1530, Evonik	e-caprolactam blocked isocyanate hardeners	280 eq.wt.
Crelan EF-403, Bayer	Uretdione hardener	310 eq.wt.
Vestagone BF-1540, Evonik	Uretdione hardener	265 eq.wt.
Resiflow® P-64F	Specialty Flow Control Agent	n/a
Butaflow BT-71	Dibutyltin dilaurate / silica mix	n/a

Gloss is affected by these parameters:

- Resin portions of Isocryl® H-1871 and polyester in binder
- Nature of the hydroxyl polyester used, standard or superdurable
- Nature of the isocyanates: caprolactam-blocked or uretdiones
- Effect of pigmentation
- Effect of acid groups from the polyester, the FCA or addition of organic acid (DDDA)

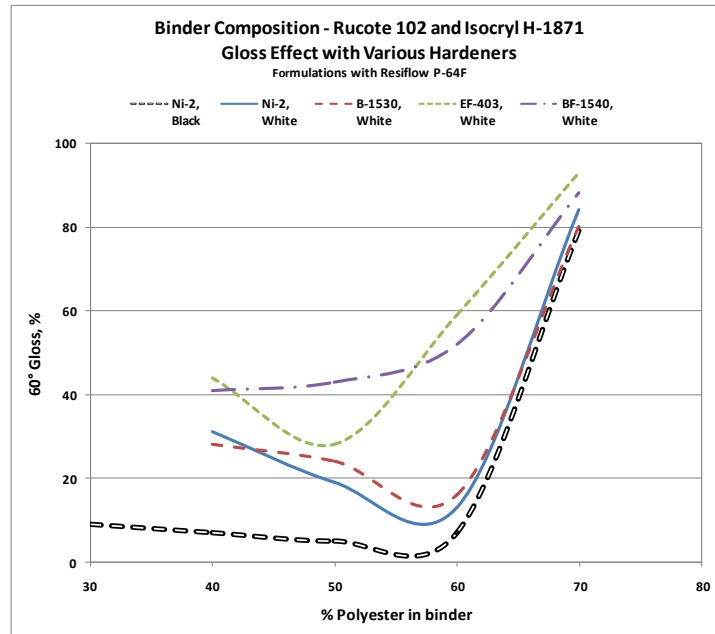
INFLUENCE OF HARDENERS

An initial formulation with a 50:50 weight combination of polyester and Isocryl® H-1871 is recommended. The minimum glosses are typically achieved in this range. Blocked isocyanate hardeners tend to yield the lowest gloss values and smoother films for formulations with Isocryl® H-1871. Optimal matting properties and smooth films are best achieved with Resiflow® P-64F. All formulations presented here were cured 10' x 200°C (metal temperature).

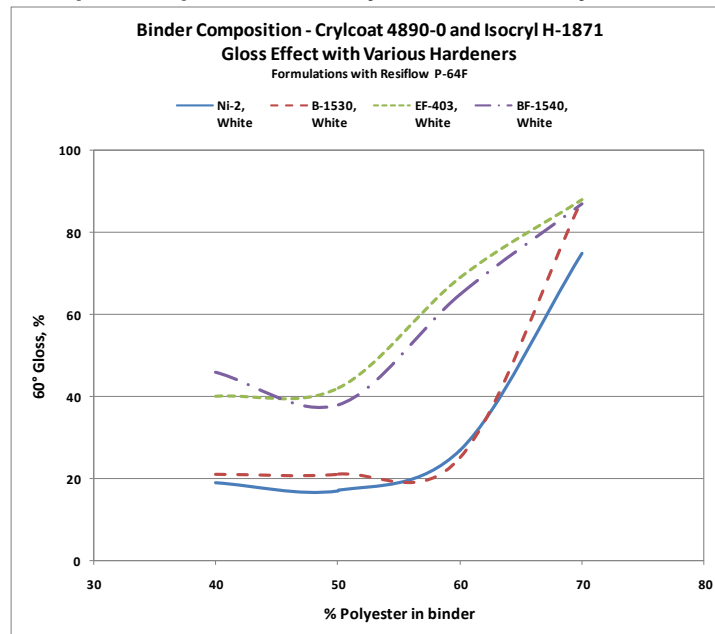
Table 2

White formulations	Rucote 102				Crylcoat 4890-0			
	Ni-2	B-1530	EF-403	BF-1540	Ni-2	B-1530	EF-403	BF-1540
If formulated with:								
Polyester	29.07	29.07	28.62	29.31	29.70	29.70	29.29	29.91
Isocryl® H-1871	29.07	29.07	28.62	29.31	29.70	29.70	29.29	29.91
Hardener	10.16	10.16	11.07	9.68	8.90	8.90	9.71	8.48
Ti-Pure R-960, DuPont	30	30	30	30	30	30	30	30
Benzoin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Butaflow BT-71	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Resiflow® P-64F	1	1	1	1	1	1	1	1
60° gloss	19	24	30	43	17	21	42	38

INFLUENCE OF BINDER RATIO and NATURE OF POLYESTER
Graph 1: Standard Durable Polyester with Isocryl® H-1871



Graph 2: Superdurable Polyester with Isocryl® H-1871



INFLUENCE OF PIGMENTATION

STARTING POINT FORMULATIONS

Table 3 (50:50 binder ratio of Rucote 102 to Isocryl® H-1871, Crelan NI-2, Resiflow® P-64F)

	Clear	White	Gray	Brown	Black
Rucote 102, Bayer	41.5	29.07	29.7	29.7	29.07
Isocryl® H-1871	41.5	29.07	29.7	29.7	29.07
Crelan NI-2, Bayer	14.5	10.16	10.4	10.4	10.16
Ti-Pure R-960, DuPont		30	15		
Sachtofine P, Sachtleben			13	10	30
Monarch 800, Cabot			0.5	1	0.5
Bayferrox 130BM				4.25	
Bayferrox 3950				13.25	
Benzoin	0.7	0.5	0.5	0.5	0.5
Butaflow BT-71, Estron	0.3	0.2	0.2	0.2	0.2
Resiflow® P-64F, Estron	1.5	1	1	1	1
60° gloss	27	19	12	8	5

The clear and white formulations produce higher glosses than the darker pigmented ones. The glosses of formulations listed in Table 3 can be adjusted up and down by the two methods explained next.

1. Addition of DDDA (to lower gloss).
2. Exchanging some of the Resiflow® P-64F with PL-200 (to increase gloss)

INFLUENCE OF ADDING ORGANIC ACID (TO REDUCE GLOSS)

Gloss is dramatically influenced by the choice of flow control agent. Using Resiflow® P-64F (carboxyl functional) yields lower gloss compared to formulations with Resiflow® PL-200. Matte finishes using Resiflow® P-64F can be lowered additionally by incorporating DDDA (0.5-1%); little effect has been demonstrated by using DDDA in formulations with Resiflow® PL-200.

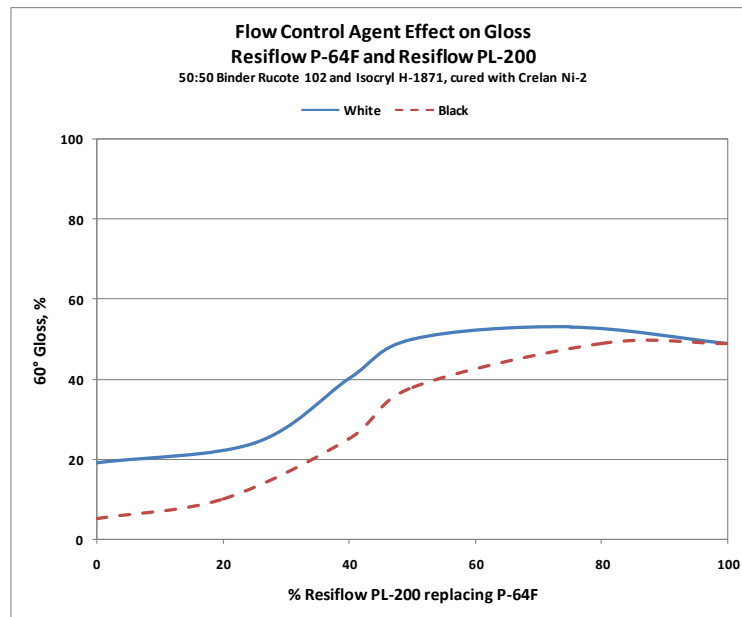
Table 4 (50:50 binder ratio of Rucote 102 to Isocryl® H-1871, Crelan NI-2, Resiflow® P-64F)

	Rucote 102				Crylcoat 4890-0	
White Formulations	PL-200	PL-200 + DDDA	P-64F	P-64F + DDDA	P-64F	P-64F + DDDA
Rucote 102, Bayer	29.07	29.07	29.07	29.07		
Crylcoat 4890-0, Cytec					29.7	29.7
Isocryl® H-1871	29.07	29.07	29.07	29.07	29.7	29.7
Crelan NI-2, Bayer	10.16	10.16	10.16	10.16	8.90	8.90
Ti-Pure R-960, DuPont	30	30	30	30	30	30
Benzoin	0.5	0.5	0.5	0.5	0.5	0.5
Butaflow BT-71, Estron	0.2	0.2	0.2	0.2	0.2	0.2
Resiflow® PL-200, Estron	1	1				
Resiflow® P-64F, Estron			1	1	1	1
DDDA		0.5		0.5		0.5
60° gloss	49	56	19	9	17	11

INFLUENCE OF FLOW CONTROL AGENT (TO INCREASE GLOSS)

Graph 3: Gloss Adjustment by mixtures of Flow Control Agents Resiflow® P-64F and PL-200

The graph below depicts white and black formulations from Table 3 above, where the flow control agent starts with 1% Resiflow® P-64F and transitions to 1% Resiflow® PL-200. Resiflow® P-64F is an essential formulation element to achieve optimal matting properties and smooth films. Formulations using a classical flow control agent such as PL-200 will have higher glosses. As illustrated, it is possible to adjust the gloss by using combinations of the Resiflow® P-64F and PL-200.



OVERVIEW OF TECHNICAL POINTS

- For low to mid-gloss polyurethane powder coatings
- Low crosslinker demand
- Adjustable 60° gloss range from 5-50%
- Resiflow® P-64F is a key element for effective matting
- Alternative to high / low OH polyurethane method
- Standard or Superdurable polyesters
- Start with 50% replacement of polyester
- Caprolactam-blocked or uretdione hardeners
- Excellent burnish resistance, especially at lower gloss levels

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), EINECS (Europe), IECSC (China), TSCA (USA).

PACKAGING (NET WEIGHT)

55 lb. / 25 kg in fiberboard box with polyolefin liner.

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Experimental Product



THE EDGE OF INNOVATION

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PRODUCT AVAILABILITY

This product is experimental and subject to change. It is available in commercial quantities. Please contact your Estron Sales Representative for lead time and availability.

* Not to be used for specification purposes

STORAGE AND HANDLING

Keep container tightly closed and store in a dry, well ventilated area away from heat and sources of ignition. Store at less than 100°F (38°C). Shelf life of unopened containers is one year from date of shipment. See SDS for additional information.

CONTACT INFORMATION

807 N. Main Street
P.O. Box 127
Calvert City, KY 42029 USA

(270) 395-4195 PHONE
(270) 395-5070 FAX

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TDS Revised by: A. Buckhalter

TDS Approved by: F. Allen