PARALOID™ AU-1033 Acrylic Polyol with Low Isocyanate Demand

Description

PARALOID AU-1033 acrylic polyol is specifically designed to crosslink with isocyanates at ambient temperatures. Coatings based on these resins achieve fast lacquer-like dry properties with some trade-off in flexibility and impact resistance. Typical uses of these coatings are recreational equipment, fleet refinishing, and other areas not requiring a high degree of chemical resistance.

Coatings based on PARALOID AU-1033:

- Provide lacquer-like dry properties which reduce equipment downtime
- Reduce formulation costs because of lower isocyanate demand
- Maintain film integrity when exposed to corrosive chemicals
- Maintain gloss and color thereby reducing the need to repaint

Typical Physical Properties
These properties are typical but do not constitute specifications.

Non-volatiles Content % (measured at 105°C)	50
Solids Content % (measured at 150°C)	46.5
Viscosity at 25°C, cps	6000
Solvent	PA Acetate/Ethyl benzene/VM+P naphtha 55/25/20
Hydroxyl Equivalent Weight Solids Basis	1,000
Density, lb/gal As Supplied	8.5
Bulking Values, gal/lb As Supplied	0.118
Tg, °C	65
Molecular Weight, (Mw)	35,000

Application and Performance Properties of Urethane Coating Based on PARALOID AU-1033/Desmodur N75BA	
Application Properties; 2 mils dry, on treated aluminum panels	
Set to Touch Time, minutes	30-50
Tack Free Time (500 grams Zapon), minutes	50-100
Viscosity Profile; Pot Life	**#4 Ford Cup, Seconds**
Initial	21
1 Hour	23
3 Hours	27
5 Hours	40
Performance Properties (2 Weeks Ambient Cure)	
Hardness:	
Pencil	4H
Knoop Hardness Number	10
Gloss:	70-75
20°	85-90
60°	
Flexibility	
1/8" Mandrel	cracks
1/2" Mandrel	no cracks
Impact Resistance (in-lb):	
Direct	20
Reverse	2
Chemical Resistance (Pencil Hardness)	
Initial	4H
6 Hr. 10% NaOH	2H
6 Hr. 10% HCl	2H
6 Hr. 10% Acetic Acid	HB
30 Min. Cleaning Solution	F
(50/47/3 Butyl Cellosolve/water/ammonia)	
30 Min. Toluene	6B
30 Min. PM Acetate	3H

Formulating Suggestions

The two-component formulation given herein is recommended for initial evaluation of PARALOID AU1033. The recommended ratio (solids basis) for PARALOID AU-1033 aliphatic isocyanate is 83.4/16.6 weight percent. This corresponds to a slight excess of isocyanate resin (1.0/1.05 meq hydroxyl/isocyanate). For best pot life, polyurethane grade solvents are recommended and contamination with water should be avoided. The following formulating suggestions are offered:

Catalyst Suggestions

Coatings using PARALOID AU-1033 develop properties more rapidly with the use of a tin catalyst such as Dabco™ T12 (dibutyltin dilaurate). In practice, we recommend levels of 0.01 to 0.05% based on vehicle solids. Zinc octoate at levels of 0.02 to 0.06% is also recommended. The lower levels appear to be better for chemical resistance properties and extended pot life, while the higher provides very rapid dry times.

Flow Aid

In many formulations, the addition of a flow aid is beneficial. Either SF1023 Silicone or Byk™ 300 can be tried in this application at a maximum of 0.1% on total resin solids.

UV Absorbers

The addition of UV absorbers and light stabilizers (1% each of Tinuvin™ 328 and Tinuvin 292 on total resin solids) can enhance the weathering properties of acrylic urethane coatings.

Isocyanate

Aliphatic (hexamethylenediisocyanates; HMDI) isocyanates are recommended for best weathering properties. The isocyanurates of HMDI, such as Desmodur™ N3300 and Luxate HT2000, impart better appearance durability in PARALOID AU-1033 urethane coatings than the biurets of HMDI, such as Desmodur N75. Either Desmodur N3300 or Luxate HT2000 can be substituted *on an equal solids basis* for Desmodur N75BA in the formulation given herein.

Colorants

Most colors can be produced using a sand mill grind in PARALOID AU-1033. In some instances, it may be preferable to use a grinding medium such as PARALOID DM55. If predispersed colorants are preferred, we recommend the use of acrylic-based colorants.

Defoamer

Dehydran ARA7219 has been found to be an effective air release agent at 0.1 to 0.2% (on total paint weight) to minimize foam, particularly in airless spray applications.

Acrylic Urethane White Enamel Formulation based on PARALOID AU-1033 (Sand Mill Grind)		
Materials	**Pounds**	**Gallons**
Acrylic Component A		
PARALOID AU-1033	91.9	10.94
Solvent Blend*	92.6	12.52
TiPure™ R-960	173.9	5.25
Sand grind the above for 20 minutes, filter and letdown with the following:		
PARALOID AU-1033	416.2	49.55
Solvent Blend*	12.6	1.70
Byk™ 300	0.3	0.04
	787.5	80.00
Isocyanate Component B		
Desmodur™ N-75BA	67.6	7.58
PM Acetate (PUG)	99.7	12.42
	167.3	20.00
Component A and B Totals	954.8	100.00
Physical Constants		
Solids by Weight, %	50.2	
Solids by Volume,%	35.8	
Pigments Volume Concentration, %	14.7	
Pigment/Binder Ratio	36/64	
Acrylic/Isocyanate Weight Ratio	83.4/16.6	
Acrylic/Isocyanate Equivalent Ratio	1.0/1.05	
Viscosity, #4 Ford Cup, sec., as made	50-60	
Viscosity, #4 Ford Cup, sec., diluted to spray	21	
PM Acetate/Ethyl Benzene/VM+P Naphtha	55/20/25	

*Solvent Blend

Sources of Materials Recommended

Designation	Description	Supplier
PARALOID DM-55	Dispersing Resin	The Dow Chemical Company 100 Independence Mall West Philadelphia, PA 19106 215-592-3000
Byk 300	Flow Aid	Byk-Chemie USA 524 South Cherry Street Wallingford, CT 06492 203-265-2086
Dabco T-12	Tin Catalyst	Air Products & Chemicals Inc. P.O. Box 538 Allentown, PA 18105 800-345-3148
Dehydran ARA-7219	Defoamer	Henkel Corporation Process Chemicals Division 350 Mt. Kemble Avenue Morristown, NJ 07960 201-267-1000
Desmodur N-75BA Desmodur N-3300 Desmodur N-3390	Aliphatic Isocyanate	Bayer Corporation 100 Bayer Road Pittsburgh, PA 15205 412-777-2000
Colortrend 844 Series	Predispersed Colorants	DeGussa (Creanova) 220 Davidson Avenue Somerset, NJ 08873 732-560-6724
PM Acetate	Solvent	Lyondell Chemical 3801 West Chester Pike Newtown Square, PA 19023 610-359-2000
SF-1023	Flow Aid	General Electric Company Mechanicville Road Waterford, NY 12188 518-237-3330
VM+P Naphtha	Solvent	Union Oil Company of California Union Chemicals Division Schaumburg, IL 60195 312-490-2500
Tinuvin 328 Tinuvin 292	UV Absorbers	CIBA Specialty Chemicals 540 White Plains Road Tarrytown, NY 10591 800-200-8224
TiPure R-960	Titanium Dioxide	E. I. duPont de Nemours & Company, Inc. Chemicals & Pigments Dept. Wilmington, DE 19898 800-441-9442
Luxate HT2000	Aliphatic Isocyanate	Lyondell Chemical 3801 West Chester Pike Newtown Square, PA 19073 610-359-2000

Safe Handling Information

The Dow Chemical Company Material Safety Data Sheets (MSDS) contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Under the OSHA Hazard Communication Standard, workers must have access to and understand MSDS on all hazardous substances to which they are exposed. Thus, it is important that you provide appropriate training and information to your employees and make sure they have available to them MSDS on any hazardous products in their workplace.

The Dow Chemical Company sends MSDS on non-OSHA-hazardous as well as OSHA-hazardous products to its customers upon initial shipment, including samples. If you do not have access to one of these MSDS, please contact your local Dow representative for a copy.

Updated MSDS are sent upon revision to all customers of record. In addition, MSDS are sent annually to all customers receiving products deemed hazardous under the Superfund Amendments and Reauthorization Act.

MSDS should be obtained from suppliers of other materials recommended in this bulletin.

The Dow Chemical Company is a member of the American Chemistry Council and is committed to ACC's Responsible Care®Program.

August 1988
81B31