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UNION CARBIDE CORPORATION
12840 SOUTH PULASKI ROAD
ALSIP, IL 60658
Coatings Materials Division
(312) 389-7000

May 26, 1982

Mr. Sal Lombardo
Spraflex Roofing System
313 Brydon Road
Dayton, Ohio 45419

Dear Mr. Lombardo:

As follow up to our recent phone discussion about exposure information of "UCAR" Acrylic flexible roof mastic and coating binders, I believe the following data and attachments illustrate the performance of these coatings.

Our most extensive exposure history has been with UCAR Latex 153 in the E-1297 (formerly 170HR 76 formulation) weather-barrier mastic. This information and pertinent comparative physical test data are found in one of the attachments. Identity of the commercial roof coatings are as follows:

CODE "B"	"KAXAN" 700
CODE "C"	"[illegible]SCO" AC-7
CODE "D"	"INSUL COUSTIC"
CODE "E"	"BEN FOSTER" SPM

Control "A" coating was a laboratory-made product based on the E-1297 formulation.

During the latter part of 1979 a considerable time was spent preparing test fence panels and building-roof test applications in South Charleston, W. VA. pertaining to UCAR Latex 153, 154, 163 prototype resins in mastic-like coatings.

The flexible weather-barrier coatings (E-1297) we discussed were applied by airless-spray in several coats to prepare the following panels:

(a) Flexible Urethane Foam
(b) Rigid Urethane Foam
(c) Black Unweathered Asphalt Roofing Shingles

A medium-blue tint was used on the two urethane test panels, while the untinted base was used over the asphalt shingles.

The urethane panels were exposed on a 45° Test Fence facing south for over four years in South Charleston followed by five years on a vertical south test fence at the Garland, Texas latex plant. The coated asphalt roofing panel was also moved to Texas but was remounted on a 45° S angle fence. The South Charleston, W. VA climate experiences many days of rain, fog, snow, sharp temperature drops, dew points

QUALITY EMULSION POLYMERS



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and freezing cycles throughout the year besides being a highly industrial environment. The Garland, Texas site offers a good UV source which cycles through hot dry summers and ice storms in the winter.

After the nine-year test exposure period the urethane panels were removed for thorough examination. They revealed outstanding flexibility with minimum chalking and moderate color fade. Each panel had a glass window insert to view the foam substrate. Even though glass screened out much of the available UV rays, there was dramatic disintegration and discoloration of the uncoated foams. In the case of the flexible foam there was complete dissipation of this substrate. These panels are one-of-a-kind and have been removed for exhibit use. Slight checking was found on the untinted thick coating over asphalt shingles after the 9½ years on 45° South test fences.

Weathered fiber-glass roof panels on the roof of Building 776 in "rocket hollow" at the West Virginia Technical Center had been coated with the same latex base mastic. Some concrete and wide wood-boards at the edges were also coated. The fiberglass panels had been set at an angle of about 15° facing north. As of June 6, 1978 an inspection showed it to be in excellent condition--tough looking--with no sign of cracking, flaking or other failure plus minimum dirt collection.

Since then equally successful exposures have been observed with commercial coatings based on the E-1297 type formulation at Union Carbide plant installations in Cartersville, Georgia; Louden, Tennessee and Texas City, Texas. Other similar exposures continue to show excellent 9-10 year performance on commercial buildings in the Chattanooga-Knoxville, Tennessee area.

Attached Table I lists some typical chemical resistance properties one can expect on coatings based on the "UCAR" flexible acrylic latex family.

Urethane adhesion can at times be a problem. It can be improved by addition of 0.5-1.0% by weight of a solvent compatible with the latex system and active on the urethane. Dimethylformamide (DMF) is most effective. CARBITOL Acetate and methyl ethyl ketone(MEK) will also work. These solvents temporarily soften the urethane substrate allowing the topcoat to bite.

Some failure may occur by adhesion loss over low-density concrete which had been foamed with gas self-generated by addition of aluminum powder. Over poorly drained concrete panels the addition of UCAR Acrylic 515 to either UCAR 153, 154 or 163 based coatings will reduce any adhesion loss due to excess alkalinity.

Concern with asbestos exposure has brought an emphasis on asbestos free systems. For example, the asbestos fibers in the E-1297 formulation could be replaced by 10 pounds of Mini-Fiber 13-040M from Mini-Fibers (Minifibers, Inc. in Weber City, Virginia).

A white topcoat based on UCAR Latex 153/UCAR Latex 366 is also included. Replacing UCAR Latex 366 with one of our new generation acrylic terpolymers such as UCAR Acrylic 515 should give even better durability.

We hope this information will assist you. Please feel free to call either your Union Carbide Sales Representative or myself if we can be of further assistance.

Very truly yours,

Henry A. Solle

Henry A. Solle

A22975

HAS/mcm

cc: G. S. Durrant

bcc: G. S. Griffiths
H. Mayfield
K. B. McGuinn
A. A. Mees
K. G. Morlock
G. V. Olhoft
D. E. Stockman

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UNION CARBIDE

Technical Information

Weather-Barrier Roof Coating and Lagging Compound

UCAR Latex 153

E-1297

Charge into Slow Speed/High Torque Sigma Blade Mixer or Ribbon Blender	Pounds	Gallons
UCAR Latex 153 (55% N.V.)	686.0	76.8
Calgon Water Conditioner (Merck)	3.0	0.2
Colloid 581-8 or 677 (Colloids)	3.0	0.3
Calidria HPO or SG-210 Fibers (Union Carbide)	12.0	0.6
Mineralite 3X (dry grd. Mica) (Mineral Mining)	140.0	6.0
Ti-Pure R-901 (DuPont)	10.0	0.3
Clay	50.0	2.3
Chlorowax 40 (Diamond Shamrock)	22.0	1.6
Antimony Oxide	2.0	0.1
Tricresyl Phosphate (TCP)	63.0	6.4
PMA-30 (Tenneco)	2.0	0.2
Dicalite WB-5 (Grefco)	70.0	4.2
	1063.0	99.0

Physical Properties

Consistency	Mastic (palming & trowel grade)
PVC	25%
Total Solids by Wt.	70.6%
Total Solids by Vol.	62.0%
Typical Tensile Strength	150-200 psi
Typical % Elongation	300-500%
Shore "A" Hardness (1 wk air-dry)	24
Low Temp. Flexibility (-15°C)	passes 1/2" rod
180° Peel Adhesion (wood & alum.)	> 15 lbs./inch
Color	Off-White

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Modifications:

1. Increase TiO_2 to 75 lbs./100 gallons for better whiteness and color retention.
2. For airless-spray and brush grade reduce with clean water to approximately 65% solids by weight.
3. Use ammonium hydroxide (28%) under good agitation to raise consistency.

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Union Carbide trial exhibit UC-870: Union Carbide Coatings Materials Division to Sal Lombardo (Spraflex Roofing S... Published by AsbestosClaims.Law
ACL Doc 16081 · Page 5 of 13 asbestosclaims.law/library/16081/5

TABLE I

CHEMICAL RESISTANCE TEST RESULTS
(ROOF MASTIC COATINGS WITH LATEX BINDERS)

20 CHEMICALS (HR.TEST)	A	B	C	D	E
BINDERS EMPLOYED	UCAR* ACRYLIC FLEXIBLE LATEXES	COMM. ACRYLIC LATEX	COMM. ACRYLIC LATEX	COMM. VINYL/ ACRYLIC LATEX	COMM. EVA LATEX
WATER (1 WEEK)	GOOD +	GOOD	GOOD	GOOD +	GOOD +
METHYL ETHYL KETONE	GOOD	GOOD	FAIR	FAIR	POOR
ETHYL BUTYL KETONE	POOR	POOR	POOR	POOR	POOR
TOLUENE	GOOD	GOOD	GOOD	FAIR	POOR
5% ALKALI	POOR	POOR	POOR	FAIR	FAIR
GLACIAL ACETIC ACID	POOR	POOR	POOR	POOR	POOR

*TYPICALLY REPRESENTATIVE OF UCAR LATEX 153, 154 and 163

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UCC-E-1297 (17-DHR-76)
ACRYLIC MASTIC ROOF COATING
VERSUS
COMMERCIAL LATEX MASTIC COATINGS

PROPERTIES	A	B	C	D	E
Mastic Materials Tested	E-1297 (17-DHR-76) thinned 8:1 with water	Commercial Acrylic "A"	Commercial Acrylic "B"	Commercial Vinyl/ Acrylic	Commercial EVA
Solids (% by Weight)	64.0	60.7	65.2	57.5	58.2
Wt./Gallon (lbs.)	10.4	9.8	10.5	10.5	11.5
F/T Stability (cycles)	5+	None	5+	5+	None
120°F Stability (Days)	10+	10	10+	10+	10+
Shore "A" Hardness (1/8" thick, 1 wk dry)	29	36	29	26	45
Dry-to-Touch - 30 mils Minutes	30	90	30	30	30
Dry-to-touch - 12.5 mils Minutes	180	180	180	120	120
Alum. Cup Shrinkage(5/8"deep)					
Adhesion	Excellent	Excellent	Excellent	Fail	Excellent
Cohesion	Excellent	Excellent	Excellent	Excellent	Excellent
Shrinkage	Moderate	Moderate	Moderate	Moderate	Moderate
Vertical Channel Slump	None	None	None	1/8"	> 2"
1/8" Mandrel Bend Test 38°F	OK	OK	OK	OK	Failed
1/8" Mandrel Bend Test 5°F	OK	OK	OK	Failed	Failed
Tensile Strength (psi)	200	267	246	1548	731
Elongation (%)	500	497	355	40	149
*APA-Boiling Water (10 cycles)	SB	HB/4 cycles	SB	LB/3 cycles	LB/3 cycles
Adhesion(1 wk dry)1/16"film					
Wood	Good	Good	Good	Good	Good
Aluminum	Good	Good	Good	Fair	Poor
Steel	Good	Good	Good	Poor	Good
Glass	Good	Good	Good-	Fair	Poor
20 Hrs. Chemical Resistance					
Toluene	Good	Good	Good	Fair	Poor

NOTE * LB - Light Blistering
SB - Slight Blistering
HB - Heavy Blistering

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INDUSTRIAL MAINTENANCE PAINTING EDITION

REPRINT

Improved Acrylic Coatings Show Gains in Roof Service

Data favorable from recent heavy-duty industrial tests

By J. A. Moore
Union Carbide Corp.

UNION CARBIDE
Coatings Materials

Solvents • Resins • Latexes • Plasticizers
Monomers • Resin Intermediates
Paint Additives

Union Carbide Corporation
270 Park Avenue, Fifth Floor, New York, N. Y. 10017

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Improved Acrylic Coatings Show Gains in Roof Service

Data favorable from recent heavy-duty industrial tests

By J. A. Moore
Union Carbide Corp.

WHILE THE ROOFING industry has used latex coatings for many years in decorative applications, certain shortcomings have tended to limit these water-based materials to the specialty realm.

Recent technological advances, however, have led to the development of acrylic latex coatings for many of the more exacting roofing applications.

This family of coatings is now marked by greatly improved adhesion, elongation and flexibility as the result of a concentrated research and development program.

Although the roof represents a relatively new surface for acrylic latex coatings, a great deal of experience already has been accumulated. New coatings based on a specially-developed acrylic latex binder have been applied by three large U.S. corporations at widely scattered plant sites.

Included are a metals manufacturer in West Virginia, a tobacco company in North Carolina and a chemicals producer in Texas. Maintenance spokesmen for the firms have agreed that the acrylic applications are providing some unique advantages.

TOPCOAT FOR URETHANE

At a major metals manufacturing facility in West Virginia, an acrylic latex system was employed to protect ¾-inch sprayed urethane foam roof insulation from damage by the elements and exposure to ultraviolet degradation. (See Figure 1).

Company maintenance engineers disclosed that the acrylic water-based coating was selected primarily because of anticipated durability and the consequent savings in material and labor costs. Previously, an asphalt system had been used as a protective coating for the urethane insulation.

However, because of short-term weatherability, the asphalt system required repair or replacement every two to three years (Figure 2). The acrylic latex coating was designed to provide long-term service under a guarantee by the coatings manufacturer. The foam protection job involved the roofs of two single-story storage sheds where leak-proof roofs were required to prevent damage to metal coil stored in the sheds.

Before the acrylic system was sprayed on, damaged areas in the foam insulation were repaired. Then two different color coats of the acrylic latex were applied. Use of two colors—green and gray—aided in achieving uniform coverage. Dry film thickness for the two coats was 50 mils.

Sixteen hundred gallons of acrylic coating were required to coat a 30,000 square-foot area. A two-man spray team equipped with a 28-to-1 ratio pump and a .029 tip spray gun was able to coat 5,000 square feet of roof per eight-hour working day.

The acrylic system cures rapidly. On clear warm days it is tack-free within an hour and it can withstand exposure to precipitation 12 hours after application.

An advantage of the coating, according to the contractor, is low odor and the absence of toxicity or flammability problems. Cleanup is an easy task, since the material is water-dilutable.

SEALER COATING

At Winston-Salem, N.C., the R. J. Reynolds Tobacco Co. reported good results from the coating after it was used as an exterior sealer on corrugated steel tobacco sheds. The problem with the sheds was the loss of adhesion and subsequent failure of previous coatings because of moisture vapor from the curing tobacco.

T. M. Womble, Jr., project engineer at Reynolds, noted that the vapor blistering called for yearly repairs. "Since this maintenance was very expensive, we decided to try another sealer coating system," said Womble, adding that metal roof deck coatings must have outstanding adhesion.

They also require exceptional flexibility and elongation to withstand thermal expansion and contraction and wind movement, he observed.

SOME TEST READINGS

Before adopting the acrylic, product samples were sent to the Pittsburgh Testing Laboratory for accelerated weathering evaluation. The coating was reported to have displayed UV resistance under test conditions equivalent to three years of exterior exposure.

On the basis of this and other accelerated weathering studies, it was concluded that at least five years of coating durability could be expected. No blistering problems have yet been detected with the new water-based material, according to the engineers.

PLANT MAINTENANCE

A Union Carbide Corp. plant in Texas City, Tex., used a similar latex system to coat the exterior wall surfaces and roofs of corrugated galvanized steel buildings for protection against progressive corrosion damage (Figure 3).

"Rusting was particularly evident on southeast exposures due to prevailing southeast wind," reported B. C. Wright, maintenance department head at Union Carbide. "Some areas of the surface had rusted through."

Before application of the new acrylic-type coating, rust formations were removed by brush blasting. A reinforcing fiberglass membrane was employed to bridge flexible joints and repair holes in the damaged metal substrate.

Wright related that two coats of the acrylic latex coating were applied, achieving a thick, 40-mil dry film thickness. The two-coat application of acrylic, which reduced the sag of wet coating from the ridges into the furrows of the corrugated metal roof deck, produced a more uniform film thickness.

E-1297 UCAR 153
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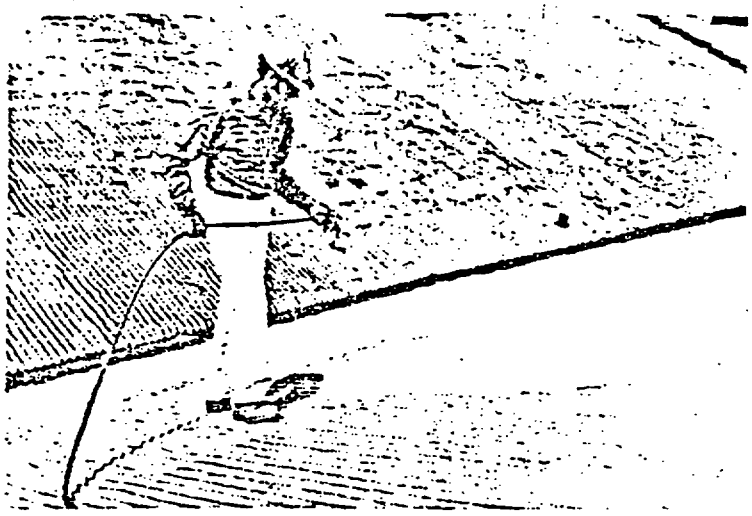


Figure 1.—Acrylic latex top coat is applied to increase durability of urethane foam roofing insulation on galvanized steel storage shed in West Virginia. Previous asphalt protective system shown in Figure 2 (bottom photo) provided only short-term weathering protection for foam surface. Dark areas indicate ultraviolet degradation.

The maintenance chief reported that the coating exhibited more than 200 per cent elongation at 35 degrees F.

Union Carbide has used the latex system to coat a welding shop, paint shop, maintenance office building, salvage building and marine terminal building. It was applied by Courtney & Co. of Houston, Tex., using a 30-to-1 ratio pump.

AIRCRAFT HANGER JOB

An aircraft hanger roof coating application at the McGhee-Tyson Air Base in Knoxville, Tenn., attracted considerable attention.

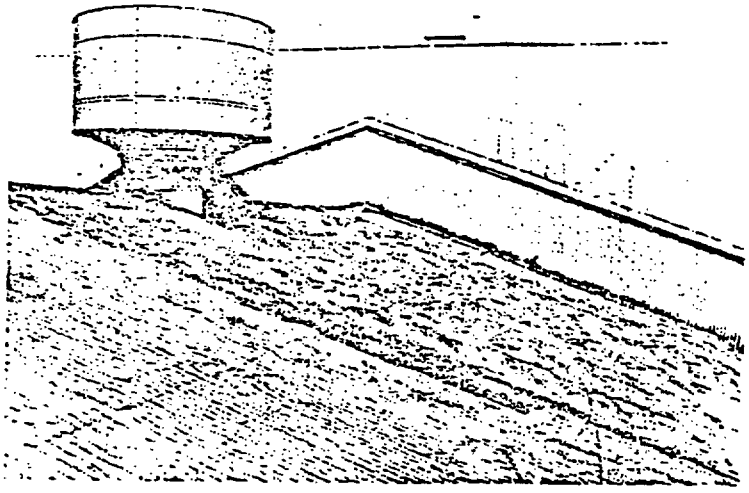
A coating of the new acrylic type was used to replace an aluminum-pigmented asphalt system that had deteriorated, allowing leakage through seams in the galvanized steel roof, said Lt. Col. David L. Carter, base civil engineer. He added that the application "looks good" after two years of service and that repair bills apparently will be reduced.

Substrate preparation was required because of disintegration of the previous coating, Col. Carter said.

"The roof was swept with brooms to remove loose dirt and chalky material. Then a primer was applied to tie down and seal the substrate. Finally, two coats of the acrylic were applied over the 40,500 square-foot area at a dry film thickness of 50 mils."

A buff color coating was used on the roof, the officer said, so that the light shade would reflect rather than absorb sunlight, thereby reducing interior building temperatures during hot weather. The buff color also looks attractive on the aircraft hanger.

Available in custom colors, the new coatings family provides an alternative to the traditional somber appearance of many roofing materials and it is said to satisfy not only the aesthetic but economic points of view as well. ■



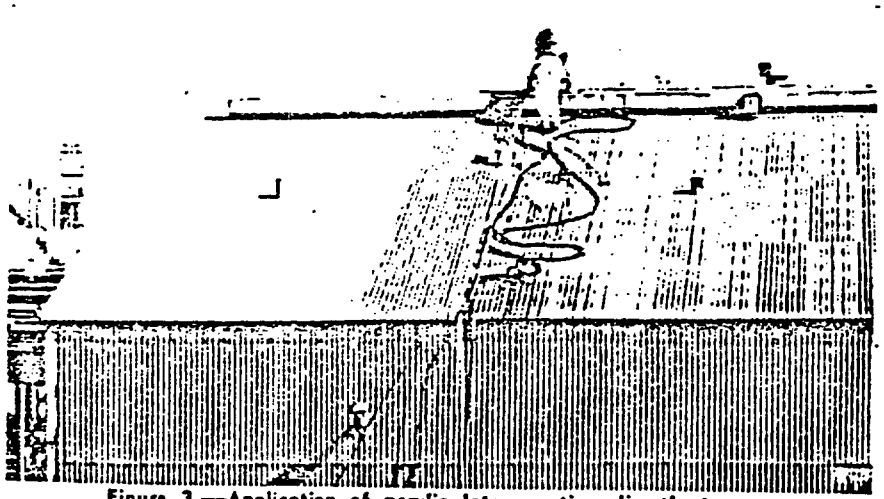


Figure 3.—Application of acrylic latex coating directly to unprimed surface of galvanized steel building is shown at Union Carbide Corp.'s Texas City, Tex., plant. The coating is for protection against continuing deterioration in a corrosive atmosphere.

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PIGMENTATION OF LATEX ROOF COATINGS

- ALMOST ANY COMMON EXTENDER IS EMPLOYED
- DRY AND WET-GROUND MICA
- COARSE CLAYS AND LIMESTONE AS MAJOR INERTS
- FINER EXTENDERS WHERE ONLY LESS THAN 3/4 LB/GAL.
- ACICULAR ZINC OXIDE AT 1/2 to 3/4 LB/GAL. FOR ANTIMILDEW
- TiO_2 IN INTERMEDIATE COATINGS--USE 1/2 to 3/4 LB/GAL.
- TiO_2 IN TOPCOATS-- USE 1.5 to 2.25 LB/GAL.
- FOR TEXTURE FINISH--USE 1/2 to 3/4 LB/GAL PERLITE,PUMICE, SAND OR VERMICULITE
- TO RESIST MUDCRACKING-- USE FIBROUS FILLERS SUCH AS:

  ASBESTOS SHORT FIBERS
  LONG-FIBER TALCS
  "MINI FIBER" (polyethylene fibers)
  NEW PRODUCT "ARAMID FIBERS" (Expensive)

FIRE-RETARDANT CHEMICALS

- ANTIMONY OXIDE PLUS A HALOGEN CONTAINING ADDITIVE--1/4 LB/GL.
- CHLORINATED WAX (70% GRADE-SOLID FORM)-- 3/4 to 1-LB/GAL
- ALUMINA TRIHYDATE-- 3/4 LB/GAL. (REDUCES SMOKE DEVELOPMENT)
- FYROL CEF , TCP, and TBF PLASTICIZERS--15-20% ON LATEX NV.
- VERMICULITES AND PUMICE FILLERS ASSORB HEAT

MISC. ADDITIVES

- 100% SOLIDS LONG-OIL ALKYD MODIFIER FOR CHALK ADHESION (USE ABOUT 15 to 25 PERCENT ON TOTAL BINDER NV.)
- ANTI-MILDEW AGENTS--"NOPCOCIDE N-96" AT 8 to 10 LB/100 GALS.
- 300 MESH FINE-GROUND CA CO_3--SPRINKLED ON WET COATING (REDUCES SURFACE TACK ON VERY FLEXIBLE FILMS)
- THICKENERS--"CELLOSIZE" -- 4 to 5 LBS/100 GALS.

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UNION CARBIDE

Technical Information

Interior-Exterior Flexible White Topcoat

SJG-688

UCAR Latex 153/366

	Pounds	Gallons
Charge the Following Ingredients into Mixer Under Agitation:		
Water	277.0	33.2
Dowicil 75 (Dow)	1.5	0.2
"Calgon" Water Softener (Merck)	4.0	0.3
SAG-4220 Defoamer	2.0	0.2
CELLOSIZE QP-4400 (Sift in Slowly)	3.0	0.3
(mix 5 minutes, then continue)		
Composition T (Merck)	2.0	0.2
Ethylene Glycol	30.0	3.3
Tronox CR-820 or Ti-Pure R901 (Kerr-McGee or DuPont)	225.0	6.8
PMA-30 (Tenneco)	5.0	0.3
Mineralite 3X (Mineral Mining)	100.0	4.4
Asp 400 (China clay) (Engelhard)	75.0	3.5
Disperse in High Speed Mill to Hegman 4, then add with Agitation:		
UCAR Latex 153	237.0	32.1
SAG-4220 Defoamer	2.0	0.2
28% Ammonium Hydroxide (add slowly)	4.0	0.5
UCAR Latex 366	100.0	11.0
Water	29.5	3.5
	1147.0	100.0

Physical Properties

PVC	39.4%
Total Solids by Weight	53.4%
Total Solids by Volume	37.3%
Contrast Ratio (6 mil Drawdown)	0.97
Viscosity (KU)	75-85
Wt./gallon	11.5 lbs.

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Technical Information

PHYSICAL CHARACTERISTICS OF EXTERIOR/INTERIOR WHITE TOPCOAT BASED ON UCAR LATEX 153/366

(5JG-688)

PROPERTIES TESTED	RESULTS
Viscosity (Stormer - reg. paddle)	75-85 KU
pH	8.4
Contrast Ratio (6 Mil. Wet Drawdown)	0.97
Brightness (Photovolt-Green Filter)	89.0%
Mandrel 0°F Flexibility (1/4" rod)	No cracking of 2-3 mil film
Adhesion to "Liquid White Plastic" film	Excellent by tape test
Accelerated Weathering (QUV Box)	
(over "Liquid White Plastic" film) 10-100% R.H. at 122°F to 140°F cycling every four hours	No loss of adhesion, lifting, blistering or discoloration after 100 hours (4 months outdoors)
Freeze-Thaw Stability (0°F)	Increases 10 KU after 3 cycles - film drawdown was smooth
Can Stability (120°F)	
1 week	No Viscosity change/pH 7.0
2 weeks	+ 2 KU / pH 7.0

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