

HYBRIDUR® 580 Polymer Dispersion**DESCRIPTION**

Hybridur Polymer Dispersions are a line of anionically stabilized urethane-acrylic hybrid polymers from Evonik. These innovative materials have been found to exhibit excellent wetting, adhesion, barrier and film properties when used in air dry, baked or crosslinked high-performance coatings on a wide variety of metal, wood, plastic and previously painted substrates. Hybridur dispersions offer the formulator a cost-effective alternative to standard polyurethane dispersions (PUDs) without sacrificing performance. They also offer enhanced performance properties over blends of PUDs and acrylic emulsions in coatings for primer, topcoat and clear coat applications.

Hybridur dispersions are easy to formulate and offer rapid dry times. They provide the same ease of use and VOC compliance of typical waterborne dispersions with the added benefits of outstanding barrier properties, durability and UV resistance in both air dry and baked systems.

Hybridur 580 dispersion was designed for use in wood coating applications or to provide an improved hardness material for use with Hybridur 570 dispersion in metal, concrete or plastic coating applications.

It is a hard, sandable and buffable polymer that must be adequately coalesced to deliver maximum performance. It has good UV and yellowing resistance on exterior exposure. It can be blended with Hybridur 570 to improve its film formation at reduced co-solvent levels. Performance can be enhanced by heating and/or by crosslinking.

SHELF LIFE

At least 24 months from the date of manufacture in the original sealed container at ambient temperature. Store away from excessive heat and humidity in tightly closed containers.

TABLE 1: TYPICAL DISPERSION PROPERTIES

Solids (%)	40-42
Viscosity	1.010 – 1.030 g/cm ³
Brookfield (cP)	50-150
Ford 4 (sec)	18
pH	7.5-8.5
Freeze-Thaw Stability Cycles	10+
Mechanical Stability	Good
Hot Box Stability	Good
Density, lb/gal	8.7
Particle Size	Colloidal
Particle Charge	Anionic
VOC, lb/gal (g/L)	1.35 (150)

TABLE 2: TYPICAL FILM PROPERTIES

Tensile Strength, psi	4,000
Elongation, %	120
Modulus, 100%	—
60° Gloss	85-

BENEFITS

- Outstanding adhesion to a wide variety of substrates, including plastics.
- Fast dry times— <30 minutes touch-dry, 1 h hard-dry.
- Superior chemical resistance properties.
- Resistance to a large variety of stains (particularly those required for KCMA1 and MFMA2 qualification), and mild acid and caustic resistance.
- Good UV stability and gloss retention for topcoats— $\Delta E < 2$ and 80% gloss retention after 1-year Florida exposure.
- Films with excellent mechanical properties, especially at low temperatures.
- Good mechanical and thermal dispersion stability. Passes 10 freeze-thaw cycles.
- Excellent early block and abrasion resistance.

FORMULATING DISPERSIONS OF HYBRIDUR 580 HYBRID POLYMER

FILM FORMATION: The performance of Hybridur 580 films is very dependent on the degree of film integrity. The addition of 7 pph or more co-solvent is recommended with optimum performance achieved at 15 pph co-solvent. Texanol, Arcosolv TPM, Arcosolv DPNB and their blends are recommended. For best results, co-solvent and surfactant should be pre-blended prior to the addition to the hybrid polymer.

WETTING/SPREADING: Aqueous dispersions of Hybridur 580 polymer are surfactant-free. A surfactant must be added for optimum wetting and spreading. The addition of 0.25-1.0% of BYK 346 or a blend of Surfynol® 465 surfactant and Aerosol OT75 is recommended.

FOAM CONTROL: Where foam may be a problem, it can be avoided by the addition of <0.3% of a defoamer such as SURFYNOL DF-58 or Foamaster VF. At this addition rate, film imperfections should not be evident.

VISCOSITY CONTROL: Viscosity modifiers should be kept to a minimum, however, where they must be employed, associative thickeners such as Acrysol RM2020NPR/RM8W at a 10:1 ratio, Acrysol RM-825, or Acrysol SCT-275 should be incorporated. The addition of less than 1 pph should be sufficient. Full viscosity development may take 12 hours.

GLOSS REDUCTION: For satin finishes, either a wax or a silica flattening agent can be employed. The addition of 2 pph Acematt TS 100 will reduce the 60° gloss below 30. The further addition of 0.4 pph Aerosil 972 will lead to further gloss reduction and will reduce the tendency for phase separation. Similarly, the addition of 2 pph Neptune I wax will reduce the gloss value to approximately 30 without hurting intercoat adhesion.

PIGMENTATION: Hybrid polymer dispersions will accept predispersed pigments. For high gloss coatings, grinding TiO₂ with Disperbyk-190 is recommended.

Abrasion/Mar Resistance: The addition of less than 2 pph Michemlube 110, 162 or 190 wax should lead to improved abrasion resistance. For satin finishes, Neptune I wax can be employed.

UV RESISTANCE: Although films of HYBRIDUR 580 polymer have excellent resistance to the action of UV radiation by themselves, a UV stabilizer may be added to protect the coated substrate. A blend of 1.0 part Tinuvin 384 and 0.5 part Tinuvin 292 should be dissolved in a solution of co-solvent and surfactant before being added to a 100-part Hybridur 580 polymer dispersion.

CROSSLINKING: Hybridur dispersions can be crosslinked with polyaziridine, carbodiimide, epoxies, metal ion crosslinkers and

epoxy silane crosslinkers at ambient or bake conditions depending upon the crosslinker selected. A 5-15 minute flash time prior to heating is recommended.

CLEAN-UP: Processing and application equipment used for Hybridur coatings should be cleaned immediately after use, before the coating dries. For best results, rinse and flush thoroughly with water using mechanical agitation such as brushing or wiping if possible. This may be followed by a thorough rinse and flush with acetone or methanol. Hybridur coatings which are allowed to dry may be difficult to clean. When drying occurs, a thorough wipe with a methanol soaked towel may be necessary.

HEATING: The performance of Hybridur 580 polymer films can be enhanced by heating. Twenty minutes at 200-250°F or 5 minutes at 300°F is suggested.

FORMULATIONS: Please contact your local Evonik representative for more details.

TRADEMARKS AND SUPPLIERS

Acematt TS-100	Degussa
Acrysol RM-825, SCT-275, RM2020NPR, RM8W	Rohm & Haas
Aerosil 972	Degussa
Aerosol OT	Cytec
Byk 346, Disperbyk-190	Byk Chemie
Foamaster VF	Cognis
Michemlube 110, 162, 190	Michelman Inc.
Neptune I	Shamrock Technologies
Surfynol 465, DF58	Air Products and Chemicals, Inc.
Tinuvin 384, 292	Ciba-Geigy
TS-100	Degussa
Texanol	Eastman Chemical
DPNB, TPM	Lyondell

STARTING POINT FORMULATION HYBRIDUR® 580 CLEAR COATING FOR INTERIOR WOOD

Formulation – HY580CW01

MATERIAL	POUNDS	GALLONS	SUPPLIER
HYBRIDUR® 580 Dispersion	671.23	77.16	Evonik
BYK®-024 (Defoamer)	2.14	0.25	Byk-Chemie
ARCOSOLV® TPM (Solvent)	47.03	5.88	Lyondell
ARCOSOLV® DPNB (Solvent)	47.03	6.19	Lyondell
BYK®-346 (Surfactant)	4.28	0.51	Byk-Chemie
TAFIGEL® PUR 50 Thickener	4.28	0.53	King Industries
Water	79.09	9.48	
Total	855.08	100.00	

Formulation Characteristics

The following are typical properties* only and are not intended to be specifications.

Weight Solids, %	34.1	PVC, %	0
Volume Solids, %	31.8	VOC, lb/gal (g/l)	2.86 (343)

* Properties reported are based on theoretical calculations.

Typical Coating Performance Properties

The following are typical properties only and are not intended to be specifications.

Gloss, 60° (ASTM D 523)		Chemical Spot Tests, 1 hour exposure (ASTM D 1308)	
Immersion (ASTM D 870)		10% H ₂ SO ₄	no effect
Water (24 hr @ 70°F)	no effect	10% NaOH	no effect
Abrasion, mg loss (ASTM D 1044)		Household Ammonia	no effect
(Taber, 1000 g, 1000 cycles, CS17)	64	Vinegar	no effect
Immersion (ASTM D 870)		Olive Oil	no effect
Water (24 hr @ 70°F)	no effect	Fantastic Cleaner	no effect
IDouble Rubs (ASTM D 4752)		Household Bleach	no effect
MEK	<200		

STARTING POINT FORMULATION HYBRIDUR® 580 CLEAR COATING FOR EXTERIOR WOOD

Formulation – HY580CW02

MATERIAL	POUNDS	GALLONS	SUPPLIER
HYBRIDUR® 570 Dispersion	345.21	40.16	Evonik
HYBRIDUR® 580 Dispersion	345.21	39.69	Evonik
Water	69.04	8.27	
Troysan® 174 (biocide)	1.38	0.16	Troy Corporation
<i>Blend: Pre-blend the following 5 items before adding to the HYBRIDUR® Polymer Dispersions above.</i>			
ARCOSOLV® DPNB (solvent)	34.52	4.55	Lyondell
ARCOSOLV® TPM (solvent)	34.52	4.32	Lyondell
BYK®-346 (surfactant)	5.52	0.66	Byk-Chemie
TINUVIN® 384 Light Stabilizer	6.90	0.78	Ciba
TINUVIN® 292 Light Stabilizer	3.45	0.41	Ciba
<i>Add the following ingredients to the mixture above.</i>			
FOAMASTER® VF (defoamer)	1.38	0.18	Cognis
ACRYSOL® RM-2020NPR (thickener)	3.45	0.41	Rohm and Haas
Troysol™ LAC (surfactant)	0.69	0.08	Troy Corporation
Polyphase® P-20-T (fungicide)	2.76	0.33	Troy Corporation
Total	854.03	100.00	

Formulation Characteristics

The following are typical properties* only and are not intended to be specifications.

Weight Solids, %	36.7	PVC, %	0
Volume Solids, %	34.8	VOC, lb/gal (g/l)	2.37 (284)

* Properties reported are based on theoretical calculations.

Typical Coating Performance Properties

The following are typical properties only and are not intended to be specifications.

Gloss, 60° (ASTM D 523)	85/63	Chemical Spot Tests, 1 hour exposure (ASTM D 1308)	
Immersion (ASTM D 870)		10% NaOH (on glass)	no effect
Water (1 week @ 70°F)	no effect	14% NH ₄ OH (on glass)	no effect
Abrasion, mg loss (ASTM D 1044)		Formula 409 (on glass)	no effect
(Taber, 1000 g, 1000 cycles, CS17)	57	10% HCl (on steel)	no effect
Sand Abrasion Wear (ASTM D 968)		Ethanol/water (on steel)	no effect
Thickness (mils) removed after 40 L	0.15	QUV-A (ASTM D 4587) on Cedar Siding, % 60°/20° gloss retention	
Dry Block/Tack		1000 hours	98 / 87
After 24 hours dry @ 70°F	none	4700 hours	92 / 60
After 30 minutes dry at 120°F	none	Immersion (ASTM D 870)	
Wet Block/Tack		Water (24 hr @ 70°F)	no effect
After 24 hours dry @ 70°F	slight		
After 30 minutes dry at 120°F	none		

Epoxy Curing Agents and Modifiers

HYBRIDUR® 580 Polymer Dispersion

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For Technical Information and Support:

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