

HYBRIDUR[®] 570

Polymer Dispersion

DESCRIPTION

Hybridur Polymer Dispersions are a line of anionically stabilized acrylic-urethane 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 570 polymer dispersion can be used for both clear and pigmented (gloss) coating applications in both interior and exterior exposures on metal, wood, concrete and plastic substrates. Coatings based on Hybridur 570 exhibit excellent corrosion resistance, weathering resistance and water hold out. Performance can be enhanced by heating and/or by crosslinking. Hybridur 570 can be modified with Hybridur 580 to improve hardness. Hybridur 570 should be the first choice for corrosion resistant metal coating applications.

TYPICAL DISPERSION PROPERTIES

Property	Value	Unit
Solids	40-42	%
Viscosity:	1.010 – 1.030	g/cm ³
Brookfield	50–150	cP
Ford 4	21	sec
pH:	7.5–8.5	
Freeze-Thaw Stability Cycles	10+	
Mechanical Stability	Good	
Hot Box Stability	Good	
Density	8.6	lb/gal
Particle Size	Colloidal	
Particle Charge	Anionic	
VOC	1.35 (150)	lb/gal (g/L)

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.

TYPICAL FILM PROPERTIES

Property	Value	Unit
Tensile Strength,	3800	psi
Elongation	200	%
Modulus	2,200	100%
60° Gloss	85-87	

BENEFITS

- Outstanding adhesion to a wide variety of substrates, especially plastics.
- Fast dry times— <30 minutes, touch-dry, 1 h hard-dry
- Salt spray resistance of >250 hours, achievable as a direct-to-metal primer.
- Superior chemical and water resistance properties.
- Good UV stability and gloss resistance 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 resistance.

FORMULATING DISPERSIONS OF HYBRIDUR 570 HYBRID POLYMER

FILM FORMATION: The performance of Hybridur 570 films is very dependent on the degree of film integrity. The addition of 7 pph or more Texanol, Arcosolv TPM, Arcosolv DPNB and their blends are recommended to aid film formation. 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 570 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 570 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 570 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 570 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	Evonik
Tinuvin 384, 292	Ciba-Geigy
TS-100	Degussa
Texanol	Eastman Chemical
DPNB, TPM	Lyondell
Density, lb/gal	8.6
Particle Size	Colloidal



STARTING POINT FORMULATION HYBRIDUR® 570 GLOSS WHITE COATING

ONE-COMPONENT POLYURETHANE-ACRYLIC HYBRID COATING PREPARED WITH A RESIN-FREE GRIND FORMULATION – HY570MWT01

MATERIAL	POUNDS	GALLONS	SUPPLIER
Resin-Free Grind: Add the following into a clean container under mild agitation and mix until dissolved			
Water (Deionized)	23.79	2.85	
Disperbyk® -190 (Dispersant)	28.22	3.20	Byk-Chemie
DEE FO® PI-4 (Defoamer)	0.62	0.08	Ultra Additives
Continue agitation while adding the pigment below.			
TI-PURE® R706 (TiO₂ Pigment)	235.31	706	DuPont
Increase speed to high and disperse to Hegman ≥ 7 grind. Temperature must not exceed 140°F. Reduce speed and add the following with medium agitation until blended.			
Water (Deionized)	20.91	2.51	
Blend: Add the following into a separate, clean container under mild agitation and mix until blended.			
HYBRIDUR® 570 Dispersion	686.68	79.89	Evonik
Pre-blend the next 4 items before adding to the HYBRIDUR 570 Dispersion.			
BYK® -346 (Surfactant)	1.34	0.16	Byk-Chemie
DOWANOL® DPnB Glycol Ether	17.20	2.26	Dow Chemical
TEXANOL® Ester Alcohol	15.45	1.95	Eastman
SURFYNOL® DF-58 Defoamer	0.31	0.04	Evonik
Final Blend: Slowly add the resin-free grind to the blend and mix with mild agitation until homogeneous.			
Total	1029.83	100.00	

FORMULATION CHARACTERISTICS

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

Weight Solids, %	52.4	PVC, %	17.1
Volume Solids, %	41.2	VOC, lb/gal (g/l)	1.66 (199)
Viscosity, cP	500	Density, lb/gal (g/ml)	10.26 (1.23)

* Properties (except viscosity) reported are based on theoretical calculations.



TYPICAL COATING PERFORMANCE PROPERTIES

The following are typical properties only and are not intended to be specifications. Coating properties were tested over cold rolled steel with a zinc phosphate treatment (Bonderite 952) unless otherwise specified. Coatings were applied using conventional air spray and were allowed to dry at 70°F and 50% relative humidity for 10 days. Dried film thickness was approximately 3.0 mil.

Drying Time, min (ASTM D 5895-96)		Impact Resistance (ASTM D 2794)	
Set-to-Touch	15	Direct and Reverse, in-lb	> 160
Tack Free	20	Hardness	
Dry Hard	40	Perso, s (ASTM D 4366)	112
Adhesion		Double Rubs (ASTM D 4752)	
Dry Tape (ASTM D 3359)	5A	Toluene	> 200
Wet Tape (24 hr @ 70 °F)	4A	MEK	> 200
Gloss, 60° (ASTM D 523)	75 - 80		

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