Product information

HYBRIDUR® 870

Polymer Dispersion

DESCRIPTION

HYBRIDUR 870 Polymer Dispersion is an NMP-free, anionically-stabilized urethane-acrylic hybrid polymer dispersion. HYBRIDUR 870 exhibits rapid dry, excellent wetting, adhesion and barrier properties when used in air dried coatings. Further performance improvements can be obtained employing heat-cure or using additional crosslinkers. HYBRIDUR 870 provides typical polyurethane dispersion performance at improved economics.

HYBRIDUR 870 can be used for both clear and pigmented coating applications for interior and exterior exposure on a variety of substrates such as metal, wood, concrete and plastic. Performance of HYBRIDUR 870 based coatings is comparable to NMP containing grades such as HYBRIDUR 570.

TYPICAL PROPERTIES

Property	Value	Unit	Method
Appearance	Milky White Dispersion		
Solids	35-41	%	
Viscosity @ 25°C	50-150	mPa.s	ASTM D 523
pH @ 21°C	7.5 - 9.0		
Acid Number	16	mgKOH/g	calculated
Specific Gravity @ 21°C	1.03	g/ml	
Particle Size	Colloidal		
Particle Charge	Anionic		
Stabilising Amine	TEA		

ADVANTAGES

- NMP free and solvent free for maximum formulation latitude
- Excellent balance mechanical and chemical properties for all-round use
- Excellent wetting and adhesion (including Plastics)

APPLICATIONS

- Primer and topcoats on variety of substrates (metal, wood, plastics and concrete)
- Airless and conventional spray and roller applied coatings

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SHELF LIFE

At least 18 months from the date of manufacture in the original sealed container stored undercover at ambient temperature away from excessive heat and humidity.

STORAGE AND HANDLING

Refer to the Safety Data Sheet for HYBRIDUR 870 Polymer Dispersion.

TYPICAL HANDLING PROPERTIES

Property	Value	Unit	Method
MFFT	25	°C	ASTM D 2354 (55 µm DFT)
Solvent	< 0.1	%	
VOC	11	g/l	TEA
Typical cure schedule	2 - 7	days	

TYPICAL PERFORMANCE PROPERTIES*

Property	Value	Unit	Method
Gloss 60°	75-85		ASTM D 523
Persoz Hardness, 25°C	95	s	ASTM D 4366
MFFT	<4	°C	ASTM D 2354 (55 µm DFT)
Tensile Strength	18.0	MPa	ASTM D 638 (150 µm DFT)
Tensile Modulus	0.3	GPa	ASTM D 638 (150 µm DFT)
Tensile Elongation	250	%	ASTM D 638 (150 µm DFT)
Direct Impact Resistance	> 185	kg.cm	ASTM D 2794 (60 µm DFT, S36i steel panels)
Reverse Impact Resistance	> 185	kg.cm	ASTM D 2794 (60 µm DFT, S36i steel panels)
Double Rubs		Film Break Through	ASTM D 4752
Isopropyl alcohol	105		ASTM D 4752
2-butanone (MEK)	> 200		ASTM D 4752

* For details see formulation H870 CT02

FORMULATING HYBRIDUR 870 POLYMER DISPERSIONS

This supplementary information provides general formulation recommendations for Hybridur 870 Polymer Dispersion and starting point formulations for general purpose clear coats, primers and white topcoat. Formulation adjustments might be required for specific application conditions.

FILM FORMATION CO-SOLVENTS: As with any polymer dispersion the right choice of co-solvents is critical to achieve maximum performance properties.
Optimum performance with Hybridur 870 Dispersion is achieved with a combination of at least one hydrophilic and one hydrophobic co-solvent. From the range of hydrophobic co-solvents DPnB (dipropylene glycol n-butyl ether), Texanol Ester Alcohol or TPnB (tripropylene glycol n-butyl ether) are recommended. Recommendations for thr hydrophilic co-solvents include Proglyde DMM (dipropylene glycol dimethyl ether) or smaller propylene glycol ethers such as TPM (tripropylene glycol methyl ether) or if desired NMP (N-methylpyrrolidone). A combination of 6% of hydrophilic and 7% hydrophobic co-solvent (based on dispersion weight) is recommended for film formation under ambient conditions. Final coating performance is influenced by the choice of co-solvents. General trends are described below.

- TPnB and Texanol provide good water resistance but result in slower property development
- DPM should be avoided due to poor film Formation
- NMP improves water resistance

Generally, best results are achieved when co-solvents and surfactants are pre-blended prior to the addition to the Hybridur 870 Polymer Dispersion.

ADDITIVES FOR DISPERSING, WETTING AND FOAM CONTROL: Hybridur 870 Dispersion is surfactant-free. For wetting and spreading, the addition of Surfynol® 420 or Surfynol 440 provides good appearance in topcoat formulations. Surfynol DF-58, DF-62 or Byk-024 at 0.1% (total formulation weight) have shown to be effective for defoaming in topcoats.
Generally, it is beneficial to avoid additives that contain Mineral oils or DPM solvent, as these will result in lower gloss. Hybridur 870 Dispersions accepts pre-dispersed pigments. For high-gloss coatings, a resin-free-grind of TiO_2 with Surfynol CT-171 or Disperbyk-190 is recommended.

Viscosity modifiers should be kept to a minimum. However, where they must be employed, associative thickeners such as Acrysol RM-2020NPR in combination with Acrysol RM-8W can be incorporated at a 10:1 ratio or, alternatively, Tafigel PUR-60 can be used. The addition of less than 1% should be sufficient. Full viscosity development may take 12 hours.

UV stabilizer may be added to improve protection of the coating and substrate. Good results have been achieved using a blend of 1.0% Tinuvin 384 and 0.5% Tinuvin 292 dissolved in co-solvent and surfactant, before adding to 100 parts of the Hybridur 870 Dispersion.

PERFORMANCE ENHANCEMENT THROUGH HEAT-CURE AND CROSSLINKING: In general, heating can be employed to enhance Performance of Hybridur polymer films. Twenty minutes at 100 to 125°C or 5 minutes at 150 °C and a five to ten minute flash time prior to heating is recommended.

Barrier properties can be further enhanced by use of additional crosslinkers. Crosslinkers that are suitable in combination with Hybridur dispersions are polyaziridines, carbodiimides, epoxies, epoxysilanes and appropriate metal ions.

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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 that have dried may require a thorough wipe with a methanolsoaked towel.

TRADEMARKS AND SUPPLIERS:

Surfynol® DF-58, DF-62, 420, 440, CT-171	
Surfynol® DF-66, CT-231	
Envirogem® AD01	Evonik
Acrysol® RM-2020NPR, RM-8W	Rohm and Haas
Dowanol® DPNB, TPM; Proglyde® DMM	Dow Chemical
Byk®-024; Disperbyk®-190	Byk-Chemie
Tafigel® PUR 60, PUR 61	Münzing Chemie GmbH
Texanol® Ester Alcohol	Eastman Chemical
Tinuvin® 384, 292	Ciba Specialty Chemicals
Ti-Pure® R-706, R-960	DuPont
Kemira® 650	Kemira Pigments
Talc 10M2	Luzenac
Micro	Sachtleben

STARTING POINT FORMULATION

GLOSSY CLEAR COAT (HY870MCTO1)

Nb.	Blend	Weight [%]	Volume [%]	Supplier
1.	Hybridur 870 Dispersion	90.10	89.20	Evonik
2.	Proglyde DMM	5.50	6.20	Dow
3.	Dowanol DPnB	2.20	2.40	Dow
4.	Texanol Ester Alcohol	2.00	2.05	Eastman Chemical
5.	Surfynol 420	0.10	0.05	Evonik
6.	Surfynol DF-58	0.10	0.10	Evonik
	TOTAL	**100.00**	**100.00**	

Pre-blend components 2-6 and add slowly while stirring to Hybridur 870(1)

Calculated technical data	Value	Unit
Weight solids	36	%
Volume solids	34	%
Density	1.0	g/ml
PVC	0	%
VOC	108	g/l

GLOSSY CLEAR COAT, LOW VOC (HY870CTO2)

Nb.	Blend	Weight [%]	Supplier
1.	Hybridur 870 Dispersion	95.6	Evonik
2.	Dowanol TPnB	2.4	Dow Chemical
3.	EnviroGem AD01	1.9	Evonik
4.	Surfynol DF-58	0.1	Evonik
	TOTAL	**100.00**	

Pre-blend components 2-4 and add slowly while stirring to Hybridur 870

Calculated technical data	Value	Unit
Weight solids	41	%
Volume solids	38	%
Density	1.0	g/ml
PVC	0	%
VOC	36	g/l

Coating performance data	Value	Unit
Gloss 60°	80	
Persoz Hardness	101	s
MFFT	<4	°C
Impact resistance / Direct and Reverse	> 185	cm/kg
Tensile Strength	10.8	MPa
Tensile Modulus	0.3	GPa
Tensile Elongation	245	%
Double Rubs IPA	75	

GLOSSY CLEAR COAT, LOW VOC (HY870CTO3)

Nb.	Blend	Weight [%]	Supplier
1.	Hybridur 870 Dispersion	95.6	Evonik
2.	Dowanol DPnB	2.4	Dow Chemical
3.	EnviroGem AD01	1.9	Evonik
4.	Surfynol DF-58	0.1	Evonik
	TOTAL	**100.00**	

Pre-blend components 2-4 and add slowly while stirring to Hybridur 870

Calculated technical data	Value	Unit
Weight solids	41	%
Volume solids	38	%
Density	1.0	g/ml
PVC	0	%
VOC	36	g/l

Coating performance data	Value	Unit
Viscosity at 23°C	150	mPa.s
Gloss 60°	90	

WHITE GLOSS TOPCOAT (HY870MWTO1)

Nb.	Grind	Weight [%]	Volume [%]	Supplier
1.	D.I. water	2.20	2.60	
2.	Disperbyk 190	2.60	2.95	Byk Chemie
3.	Surfynol DF-58	0.05	0.05	Evonik
4.	Ti-Pure R706	21.40	6.40	DuPont
5.	D.I. water	1.90	2.30	Evonik
Nb.	**Letdown**			
6.	Hybridur 870	64.75	76.50	Evonik
7.	Proglyde DMM	4.00	5.30	Dow
8.	Dowanol DPnB	1.60	2.00	Dow
9.	Texanol Ester Alcohol	1.40	1.80	Eastman Chemical
10.	Surfynol DF-58	0.05	0.05	Evonik
11.	Surfynol 420	0.05	0.05	Evonik
	TOTAL	**100.00**	**100.00**	

- After grinding components 1-4, add water (5)
- Slowly add mixture of components 1-5 to Hybridur 870 (6) while stirring
- Pre-blend components 7-11 and add slowly while stirring

Calculated technical data	Value	Unit
Weight solids	48	%
Volume solids	37	%
Density	1.2	g/ml
PVC	17	%
VOC	93	g/l

Coating performance data	Value	Unit
Gloss 60°	84	
Persoz hardness	78	s
Reverse impact resistance	> 185	cm/kg
Dry tape adhesion (ASTM D 3359)	4A	
Dry scrape (ASTM D 2179A)	> 10.5	kg
Double rubs IPA	50	
Double rubs MEK	>200	

WHITE TOPCOAT (HY870MWTO2)

Nb.	Grind	Weight [%]	Volume [%]	Supplier
1.	D.I. water	4.50	5.48	
2.	Surfynol DF-66	0.15	0.18	Evonik
3.	Surfynol CT-231	1.55	1.84	Evonik
4.	Kemira 650	14.00	4.26	Kemira Pigments
5.	Talc 10M2	5.25	2.24	Luzenac
6.	Sachtleben micro	3.50	0.97	Sachtleben
7.	Tafigel PUR-61	0.20	0.23	Münzing Chemie
8.	D.I. water	5.00	6.09	
Nb.	**Letdown**			
9.	Hybridur 870	60.75	71.85	Evonik
10.	Dowanol DPnB	4.50	6.09	Dow
11.	Surfynol DF-66	0.10	0.12	Evonik
12.	Surfynol 420	0.50	0.65	Evonik
	TOTAL	**100.00**	**100.00**	

- After grinding components 1-7, add water (8)
- Slowly add mixture of components 1-8 to Hybridur 870 (9) while stirring
- Pre-blend components 10-12 and add slowly while stirring

Calculated technical data	Value	Unit
Weight solids	49	%
Volume solids	39	%
Density	1.2	g/ml
PVC	19	%
VOC	65	g/l

Coating performance data	Value	Unit
Viscosity at 23°C	600	mPa.s
Gloss 60°	40	

Hybridur® is a registered trademark of Evonik Industries AG or one of its subsidiaries.

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