

Sancure[®] OM-945

Waterborne Oil-Modified Urethane Dispersion

Lubrizol

TECHNICAL DATA SHEET

DESCRIPTION

Sancure[®] OM-945 is a high solids, aliphatic, oil-modified urethane (OMU) dispersion designed for low VOC, single-pack, interior and exterior wood finishes for professional contractor-applied and do-it-yourself (DIY) consumer markets. **Sancure[®] OM-945** dispersion employs proprietary Lubrizol self-crosslinking chemistry combined with oxidative curing technology to ensure a high level of durability for residential and commercial wood floor finish applications. It also eliminates many potential health and environmental hazards associated when external crosslinkers are used in conventional two-component systems.

The polymer itself crosslinks on application and continues as it dries – as a result, wood finishes produced with **Sancure[®] OM-945** dispersion demonstrate excellent floor-wear characteristics such as resistance to water, chemicals, alcohol and abrasion. **Sancure[®] OM-945** dispersion is designed to provide exceptional flow and leveling during application, and rapid hardness development.

Sancure[®] OM-945 dispersion is uniquely designed for higher solids at 45%, unlike conventional waterborne OMU technology. The higher polymer solids combined with exceptional compatibility with colorants and pigments; including TiO₂ slurry, make this polymer suitable for water-based line-marking paints for gymnasiums and trim enamels – with faster drying and recoatability.

SUGGESTED APPLICATIONS

- Contractor-applied finishes for commercial and sports floors
- Exterior clear and pigmented stains for wood decks and furniture, including wood composites
- Do-it-yourself (DIY) coatings for residential wood floors and furniture
- Line-marking paints for gymnasiums and sports floors

PERFORMANCE BENEFITS

- One component, oxygen crosslinking – additional crosslinker not required
- Low VOC formulations, higher film build
- Low odor, quick dry: multiple coats per day
- Exceptional pigment compatibility
- Exceptional outdoor durability, non-yellowing coatings, Inherent UV- and mildew-resistance
- Excellent floor-wear and water-, alcohol- and household cleaners-resistance
- Easy-to-apply and water clean-up

PHYSICAL PROPERTIES*

Appearance (wet)	Milky white dispersion – Dries clear
Total solids by weight, %	45.0
Total solids by volume, %	43.0
MFFT, °C	10
Density, pounds/gallon (gm/cm ³)	8.8 (1.06)
Brookfield viscosity, 25°C cps, #3 spindle	1000 max
pH	8.0
VOC, gm/liter (lb/gallon)	100 (0.8)
Volatile solvents content, wt %	4.1 (N-Methyl-2-Pyrrolidone: 2.9, Triethyl Amine: 1.2)
Freeze-thaw stability	Pass

*Property values represent typical results only and are not to be considered specifications.

April 2008

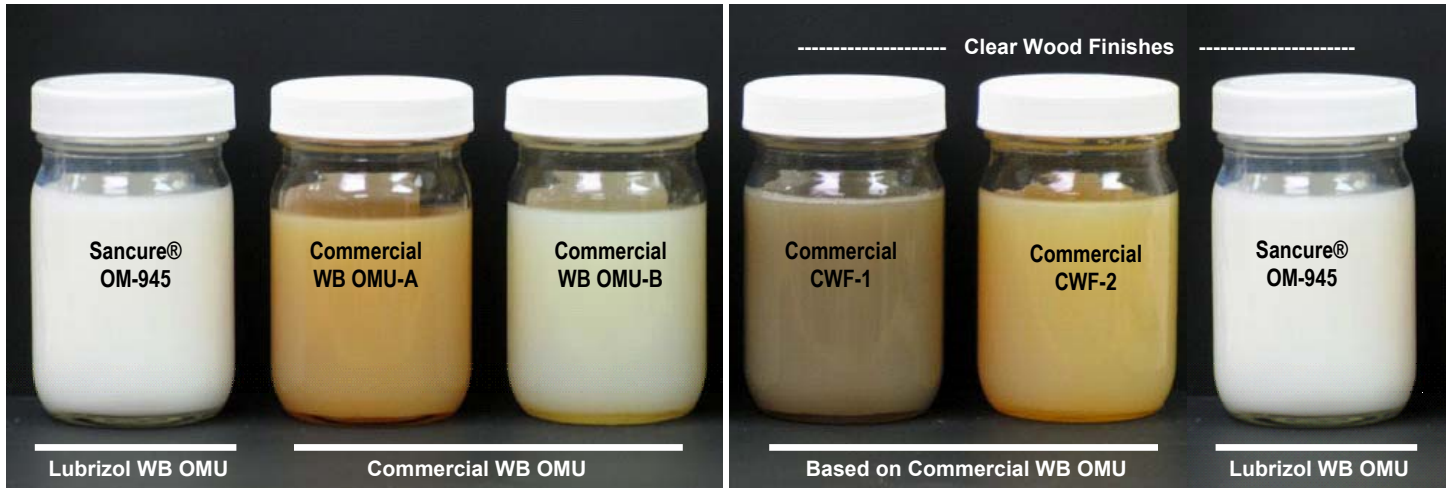
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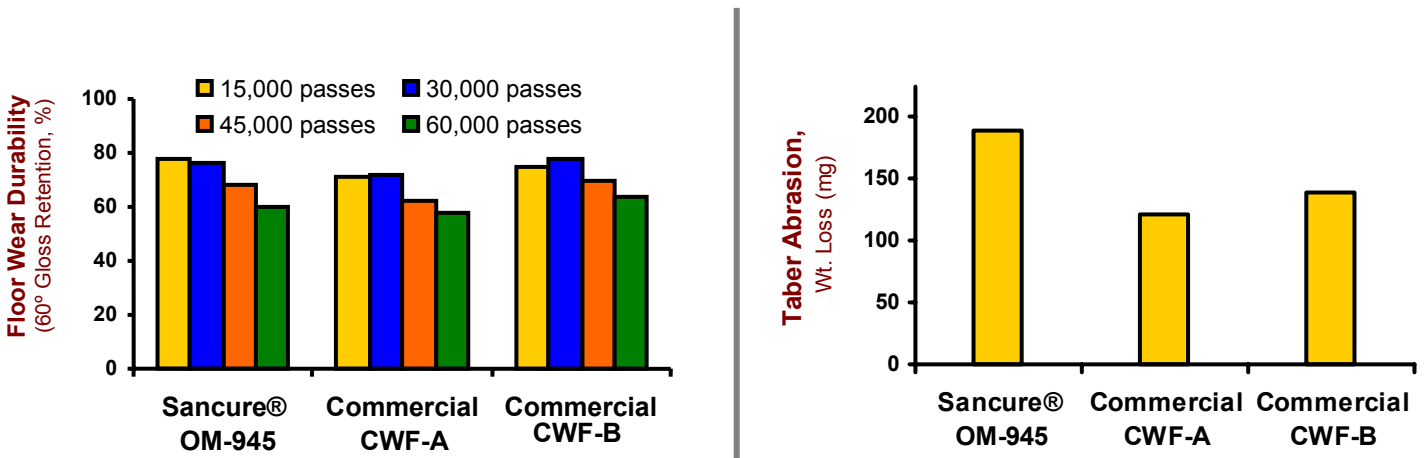
NON-YELLOWING POLYMER WITH EXCEPTIONAL OUTDOOR DURABILITY

SOLUTION COLOR STABILITY UPON HEAT AGING – after 4 weeks at 120°F (49°C):



The above photographs show excellent solution color stability of **Sancure® OM-945** dispersion (no color change), after heat aging at 120°F (49°C) for 4 weeks compared to conventional waterborne oil-modified urethanes (OMU) and store-bought wood finishes made with such polymers. Wood finishes made with **Sancure® OM-945** dispersion showed minimum viscosity change compared to commercial benchmarks.

FLOOR WEAR DURABILITY – Comparison Between Real-Life Floor Wear and Taber® abrasion:



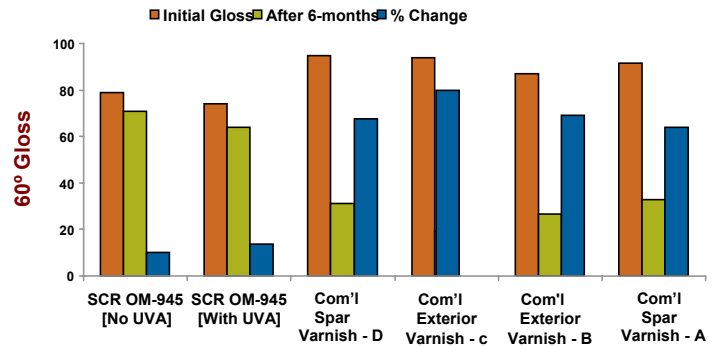
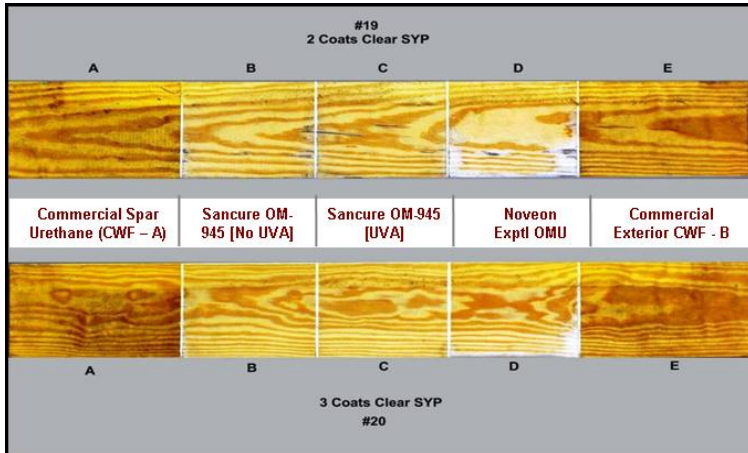
Floor wear testing: 3-coats of each system were applied on 1'x 1' red oak wood panels (in triplicate) and allowed to dry for 7 days under ambient conditions before allowed for light commercial traffic. At 4 wk intervals (about 15,000 passes), all test panels were lightly cleaned with household surface cleaner before 60°-gloss measurements. The comparison between the gloss retention value after real-life floor wear and Taber® abrasion (ASTM D-4060-90) are shown above.

NOTE: For reliable predictability of floor wear characteristics of wood finish, we recommend in using above two tests in conjunction with each other; as accelerated durability tests - such as Taber abrasion, often present a challenge in correlating weight loss from high-speed abrasion cycles and an ability of a coating to retain gloss during real-life floor wear. Typically, soft-thermoplastic coatings tend to melt during such abrasion cycles and stick to the leather wheel and showing lower weight loss; while the thermosetting coatings show higher weight loss – not necessarily indication of weaker floor wear durability.

TYPICAL PERFORMANCE DATA

South Florida Natural Weathering (45° South) – After 6 Months
Clear Gloss Finish – 2- and 3-Coats on Southern Yellow Pine

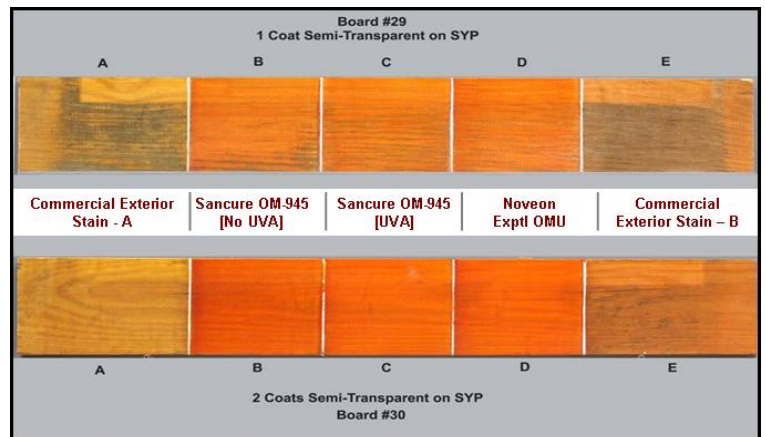
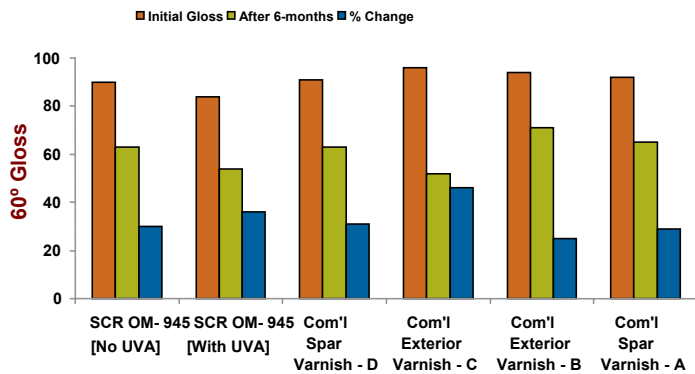
South Florida Natural Weathering (45° South) – 60° Gloss after 6 Months
Clear Gloss Finish – 3-Coats on Southern Yellow Pine



Sancure® OM-945 dispersion is suitable for clear and pigmented exterior wood finishes, with inherent stability for color change and gloss retention upon exposure to natural sun-light/UV radiations and resistant to mildew-growth under humid conditions. Coatings based on Sancure® OM-945 dispersion have shown excellent flexibility and film integrity under broad climatic conditions.

EMMAQUA (Arizona) Weathering – 60° Gloss after 233 MJ/m³
Clear Gloss – 3-Coats on Southern Yellow Pine

South Florida Natural Weathering (45° South) – After 6 Months
Semi-Transparent Stain – 1- and 2-Coats on Southern Yellow Pine



TYPICAL PERFORMANCE DATA

	Floor Finishes Using Sancure® OM-945		Leading Commercial
	Model Formula OM-945-01 CLEAR GLOSS	Model Formula OM-945-02 CLEAR SATIN	OMU Wood Finish¹ CLEAR GLOSS
Waterborne	Yes	Yes	Yes
Gloss ² 20°	78	3	79
Gloss ² 60°	91	18	90
König Hardness (Oscillations)			
One day	43	50	47
Seven day	75	68	65
Taber Abrasion³ (mg, weight loss)	191	202	138
Coefficient of Friction⁴ (ASTM D-2047)	0.50	0.51	0.31
Black Heel Resistance⁵			
One day	7	8	6
Seven day	8	9	8
Finger-nail Mar Resistance⁶	9	10	8
Scratch Resistance⁷ (% 60° Gloss Retention)	59	91	46
Package Stability – after 4 weeks at 120°F (49°C):			
Solution Color	No change - Excellent	No change – Excellent	Turned dark brown
Viscosity	No change	No change	Significant rise in visc.
Chemical Resistance⁸ (after seven day air dry): One hour spot test; covered under watch-glass.			
Water	5	5	5
409 Cleaner	3	3	4
Spic & Span	5	5	5
Windex	3	3	4
1.4% Ammonia	3	3	3
Vinegar	5	5	5
Grape Juice	5	5	5
50% Clorox Bleach	5	5	5
Olive Oil	5	5	5
Mustard	3	3	3
50% Ethanol	4	5	3
70% IPA	4	4	4

1. Store bought contractor-grade, waterborne OMU based floor finish
2. On Leneta® charts (Form 3C): 3.0 mil WFT after overnight dry under ambient conditions
3. Taber Abrasion (ASTM D4060-90): CS-17 Wheels, 1000 gram load, 1000 cycles
4. Coefficient of Friction (ASTM D-2047): On three 9 x 9 inch maple panels; three coats of each test wood finish were applied with 2" foam brush at about 3 hr. intervals with light sanding between coats. Test panels were allowed to cure for 7-days at 77 ± 5°F and 50 ± 5% relative humidity, before testing for coefficient of friction using the James Machine, run 4- cycles on each panel, turning the panel 90° after each cycle. The coefficient of friction value is determined by averaging the values of all 12- cycles.
5. Black Heel Mark – Pendulum Scuff Test: 10 = No scuff marks, 0 = Severe scuff marks
6. Finger-nail mar test (after 7 day air dry): 10 = No marks, 0 = Scratch mark on coating
7. Scratch Resistance: 60° gloss retention after 200 scrubs with a weighted abrasive pad, 100% = No change in gloss
8. Chemical resistance: 5 = No effect, 0 = Severe effect

RECOMMENDED FORMULATIONS

CLEAR GLOSS FLOOR FINISH MODEL FORMULA OM-945-01

	<u>Pounds</u>	<u>Gallons</u>	<u>Use/Function</u>
Sancure® OM-945 Dispersion	610.0	69.0	OMU Dispersion
Water	216.2	26.0	---

Premix the following items separately.

Add under continuous agitation and let mix for at least 20 minutes.

Butyl Carbitol	33.2	4.2	Coalescent
Hydro-Cure® III (9% Mn)	1.4	0.2	Metal Drier
Hydro-Cem® (5% Ca)	0.7	0.1	Metal Drier
BYK® 347	1.0	0.1	Leveling aid
Tafigel® PUR 60	0.3	0.1	Thickener
BYK 028	2.0	0.2	Defoamer
Tego Glide® 410	<u>2.0</u>	<u>0.2</u>	Leveling aid
	866.8	100.1	

Total Solids, wt %	32.4
Total Solids, vol %	30.3
Weight/Gallon	8.7
VOC - g/l	189.2
VOC - lb/gal	1.58
pH	7.8
Viscosity, cp (#2, 20 rpm)	100.0

TYPICAL PERFORMANCE DATA

Dry film clarity	Excellent
UV resistance	Excellent
Gloss: 20° / 60°	78 / 91
Tack free time, min	30 min
Recoat time, min	90 min
Mar Resistance - Overnight	Good
Mar Resistance - 3 days	Excellent

CLEAR SATIN FLOOR FINISH MODEL FORMULA OM-945-02

	<u>Pounds</u>	<u>Gallons</u>	<u>Use/Function</u>
Sancure® OM-945 Dispersion	596.0	67.4	OMU Dispersion
Water	216.9	26.0	---

Add following slowly under continuous agitation
and let mix for at least 5-10 minutes.

ACEMATT® TS-100	8.5	0.5	Flattening agent
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Premix the following items separately.

Add under continuous agitation and let mix for at least 20 minutes.

Butyl Carbitol	41.0	5.2	Coalescent
Hydro-Cure® III (9% Mn)	1.4	0.2	Metal Drier
Hydro-Cem® (5% Ca)	0.7	0.1	Metal Drier
BYK® 347	1.0	0.1	Leveling aid
Tafigel® PUR 60	0.3	0.1	Thickener
BYK 028	2.0	0.2	Defoamer
Tego Glide® 410	<u>2.0</u>	<u>0.2</u>	Leveling aid
	869.8	100.0	

Total Solids, wt %	32.5
Total Solids, vol %	30.2
Weight/Gallon	8.7
VOC - g/l	209.0
VOC - lb/gal	1.7
pH	7.8
Viscosity, cp (#2, 20 rpm)	100.0

TYPICAL PERFORMANCE DATA

Dry film clarity	Excellent
UV resistance	Excellent
Gloss: 20° / 60°	3/18
Tack free time, min	30 min
Recoat time, min	90 min
Mar Resistance - Overnight	Excellent
Mar Resistance - 3 days	Excellent

RECOMMENDED FORMULATIONS

Clear Gloss Exterior Varnish Model Formula OM-945-03

	Pounds	Gallons	Use/Function
Sancure OM-945 Dispersion	655.0	74.1	OMU Dispersion
Water	155.92	18.72	--

Total Solids, Wt %	36.3
Total Solids, Vol %	34.3
Weight/Gallon	8.7
VOC – g/l	1.5
VOC – lb/gal	183
pH	8
Viscosity, cp (#2, 20 rpm)	100.0

Premix the following items separately.
Add under continuous agitation and let mix for at least 20 minutes

Butyl Carbitol KP-140®	36.84	4.64	Coalescent
Hydro-Cure® III (9% Mn)	8.00	0.94	Plasticizer
BYK® 028	1.77	0.21	Metallic Drier
BYK® 347	2.0	0.22	Defoamer
Tinuvin 1130	2.0	0.24	Leveling aid
Tinuvin 292	5.76	0.59	UV Stabilizer
	2.87	0.34	UV Stabilizer – HALS
	870.16	100.0	

Typical Performance Data

Application Method	Foam or bristle brush
Number Coats	3 coats
Dry film clarity	Excellent
UV resistance	Excellent
Gloss: 20° / 60°	76/89
Tack free time, min.	30 min.
Recoat time, min.	90 min.

Interior Gloss Enamel / Line Marketing Paint Model Formula OM-945-04

	Pounds	Gallons	Use/Function
Charge to letdown tank			
Sancure®OM-945 Dispersion	563.5	64.0	OMU Dispersion
Foamstar®A34	2.0	0.2	
Water	47.3	5.7	---
Ethylene Glycol	25.9	2.8	Defoamer
Proxel GXL	1.0	0.1	Biocide
Foamstar® A34	2.0	0.2	Defoamer
Aquaflow® NHS 300®	11.9	1.4	Rheology modifier
AMP95®	2.5	1.0	Neutralizing Amine
Kronos®4311	308.2	15.9	TiO2 Slurry
Texanol™	16.0	2.0	Coalescent
Butyl Carbitol	7.9	1.0	Coalescent

Total Solids, wt %	49.0
Total Solids, vol %	36.0
Weight/Gallon	10.38
VOC – g/l	187
VOC – lb/gal	1.56
pH	7.8
Viscosity, KU/ICI	121/3.0

Typical Performance Data

Application method	Roller or brush
Number Coats	1-2 coats
Gloss: 20° / 60°	74 / 78
Tack free time	1-2 hours
Recoat time	4-6 hours
Block resistance 1- and 3-day	8 / 10
Wet Adhesion: 1- and 3-day	5 / 5
Intercoat Adhesion	Excellent

Premix the following items separately

	Pounds	Gallons	Use/Function
Charge to letdown tank			
Water	16.5	1.9	---
Strodex® PK-90	4	0.4	Surfactant
Tamol® 165A	2.0	0.2	Surfactant
Polyphase® P20T	3.0	0.2	Mildewcide
Polyphobe	20.0	2.2	Thickener
Water	<u>6.0</u>	<u>0.7</u>	---
	1038.2	100.0	

FORMULATION SUGGESTIONS AND RAW MATERIAL INFORMATION

For optimum film formation under broad drying conditions, additional coalescing solvents are required in coatings based on **Sancure® OM-945** dispersion – either DB (Butyl Carbitol)[™] or Dowanol[™] DPM (dipropylene glycol methyl ether) are excellent choices for clear wood finishes; typical use levels are 10 to 15% on resin solids for a 30 to 36% weight solids formulation.

Use of **SOLSPERSE® 40000** Hyperdispersant at 1.0 to 2.0 pounds per 100 gallons formulation helps with fumed silica and other inorganic pigment dispersion quality and improves final appearance of coating.

BYK® 347 at 1.0 to 4.0 pounds per 100 gallons formulation helps with flow and leveling, in combination with HEUR type rheology modifiers such as Tafigel® PUR60 or similar are recommended for improved application feel.

Additionally, the following additives were evaluated in formulations based on **Sancure® OM-945** dispersion and found to be effective: Tego Glide® 410 at 2.0 pounds per 100 gallons for flow and leveling, 1-2 pounds of either Tego Foamex® 822 BYK® 028 at 1.0 to 2.0 pounds per 100 gallons for defoaming. Wax emulsions such as **Aquaslip™ 952** or Michem® 39235 can be added for early mar resistance.

We recommend in using **LANCO™ LIQUIMATT 6024** matting agent dispersion; to replace conventional fumed silica, for better compounding ease, for wood finish with uniform appearance and improved abrasion resistance.

Primary driers made for use in waterborne applications such as Manganese, Cobalt, and Cerium are compatible with **Sancure® OM-945 dispersion** formulations; as is calcium. Primary driers enhance the early cure, which is reflected in performance properties. Ultimately, performance will reach the same level with or without driers. Primary driers in clear wood formulations have been observed to react with wood tannins and cause discoloration of the finish. The use of a stain-blocking sealer will prevent this from occurring. The best method for adding driers is to premix them with coalescing solvents and additives, and then add slowly to the polymer dispersion with continuous agitation.

The following raw materials were found acceptable for use in **Sancure® OM-945** dispersion formulations.

COALESCENT SOLVENTS

ARCOSOLV® DPM (Lyondell Chemicals Co.)
Butyl CARBITOL[™] (Dow Chemical)
Texanol[™] (Eastman Chemical Co.)

DRIERS

9% Manganese Hydro-Cure® III (OMG, OM Group)
5% Calcium Hydro-Cem® (OMG, OM Group)

PIGMENT DISPERSANTS/SURFACTANTS

SOLSPERSE® 40000 (Lubrizol)
Strodex® PK-90 (Dexter)
BYK® 347 (BYK Chemie)

ANTI-MAR ADDITIVES

Aquaslip™ 952 (Lubrizol)
Michem® 39235 (Michelman, Inc.)
Byk® 333 (BYK-Chemie)
TegoGlide® 410 (Tego Chemie)
Aquacer® 531 (BYK-Cera)

DEFOAMERS

Foamex® 822 (Tego Chemie)
BYK® 028 (BYK Chemie)
Foamstar® A34 (Cognis Corporation)

BIOCIDES/MILDEWCIDES

Proxcel® GXL (Avecia)
Polyphase® P20T (Troy Chemical Corporation)

THICKENERS

Tafigel® PUR60 (Munzing Chemical)
Acrysol[™] RM-8W (Rohm & Haas)
Polyphobe® 102 (Dow Chemical)
Aquaflow NHS300® (Hercules)

FLATTING AGENTS

LANCO™ LIQUIMATT 6024 (Lubrizol)
LANCO™ LIQUIMATT 6375 (Lubrizol)
ACEMATT® TS100 (Degussa)

OTHER INGREDIENTS

Kronos® 4311 (Kronos)
AMP95® (Angus)