

Description

Lubrizol Carboset® CA-600 is a water-based, 100% acrylic, self cross-linking, nano-polymer emulsion specifically developed for horizontal masonry clear, stain and opaque coatings. High performance coatings can be formulated at <100 g/l VOC to protect and enhance the appearance of a variety of concrete based construction materials for residential and commercial applications.

CST CA-600 provides a unique combination of properties for a wide range of horizontal masonry coatings. **CST CA-600** based coatings do not blush, have great exterior durability, and adhere well leading to long lasting, attractive coatings. They also provide good chemical resistance enhancing appearance by resisting discoloration from dirt and spills. **CST CA-600** based coatings do not yellow and can enhance the color of the substrate when applied in 2 coats. Good early water resistance and fast dry time provide for faster application and fewer concerns for rain after application. Contractors have reported that **CST CA-600** based coatings are easier to apply when used side by side with existing commercial coatings. **CST CA-600** can be used in clears, stains and fully pigmented systems directly on cementitious substrates, in cementitious coatings, over acid stains and over substrates previously treated with latex coatings leading to greater formulation flexibility.

Suggested Applications

Cementitious surfaces – driveways, sidewalks, patios, pavers, overlays, decorative concrete, garage floors
Clear sealers, transparent stains, opaque stains
Exterior and interior

Advantages

Excellent blush resistance
Good early water resistance
Short dry time
Odorless
Excellent exterior exposure / weathering
Water-borne
Wet-on-Wet Application
Covers well over acid stains
Chemical resistance
Alkaline & efflorescence resistance
Provides color enhancement
Early block resistance

Non-yellowing
Hot tire pickup resistance
Low coalescent demand

Benefits

High performance coatings - protect / enhance appearance
Application flexibility / fewer complaints
Faster application and facility use
Reduced application restrictions due to odor to customers
Long lasting, quality coatings
Easy application and clean up
Can be applied to damp or wet concrete
Broad application space / formulation flexibility
Minimizes discoloration from dirt / spills
Can be used on high pH substrates (Hot concrete)
Enhances color and substrate appearance
Reduces dirt pickup and improves appearance
Allows for coated substrates to be stacked
Enhances substrate appearance
Enhances substrate appearance
Meets or exceeds environmental regulations

Physical Properties¹

Appearance	Milky white emulsion	Freeze/Thaw Stability	Yes*
Solids, weight (%)	42	Thermal Stability	Yes
Solids, volume (%)	41	Mechanical Stability	Yes
Density (g/ml)	1.060	Tg (°C)	55
Density (lbs/gallon)	8.8	MFFT (°C)	~35°C
Viscosity, Brookfield (cps)	41	pH	8.3

* requires up to 24 hours to thaw

1) Property values represent typical results only and are not considered specifications.

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TYPICAL PERFORMANCE DATA

The model formulation for clear coatings (shown in Table 3) was used to test 3 commercially available polymers promoted for horizontal concrete coatings and CST CA-600 in a common formulation. Performance properties were tested side-by-side for comparison. Overall performance of the CST CA-600 ranked highest among the commercially available polymers as shown in Table 1.

Table 1 – Competitive Polymer Comparative Study

	Clear Coatings			
	Carboset	Competitive Polymers		
	CA-600	A	B	C
CLEAN, LONG-LASTING COATINGS				
Water Immersion – Film cured 2 hr				
Blush resistance	10	5	5	3
Recovery (after blushing)	NA	0	0	10
Cross Hatch Adhesion – 1 Day Dry	5	5	5	3
CONSISTENT COATING APPEARANCE				
Weathering (Exterior Exposure)				
Non-Yellowing	Pass	Fail	Fail	Pass
Chemical Resistance – Stain 1 hr				
Dirty motor oil	10	9	9	8
Brake fluid	9	1	1	1
Windshield Washing Fluid - Blue	10	10	9	9
TSP	10	9	9	10
Skydrol	9	1	1	1
Ethylene Glycol	10	10	9	10
Wet Look – Gloss				
Gloss 60°	44	23	37	29
Gloss 85°	52	49	58	36
Hot Tire Pickup				
Tire Mark / Imprint	8	6	6	6
Adhesion	10	10	10	0
APPLICATION FLEXIBILITY				
Alkaline resistance	Pass	Fail	Fail	Fail
Acid stain coverage	Pass	Fail	Fail	Pass
ENVIRONMENTALLY COMPLIANT				
VOC (g/l)	98	98	98	98
IN-CAN STABILITY				
KU Viscosity, 4 Weeks 140 F	Pass	Pass	Pass	Pass
Freeze/Thaw, 3 cycles @ 0 F	Pass	Pass	Pass	Pass

TYPICAL PERFORMANCE DATA

A comparative study was performed with commercially available clear coatings for horizontal concrete applications. Coatings were tested along with CST CA-600 (model formulation for clear coating shown in Table 3).

Table 2 – Commercial Paint Comparative Study

	Clear Coatings		
	Carboset	Commercial Sealer	
	CA-600	A	B
CLEAN, LONG-LASTING COATINGS			
Water Immersion – Film cured 2 hrs			
Blush resistance	10	8	0
Recovery (after blushing)	NA	10	0
Cross Hatch Adhesion – 1 day dry	5	5	1
CONSISTENT COATING APPEARANCE			
Weathering (Exterior Exposure)			
Non-Yellowing	Pass	Fail	Fail
Chemical Resistance – Stain 1 hr			
Dirty motor oil	10	8	9
Brake fluid	9	0	0
Windshield Washing Fluid - Blue	10	8	9
TSP	10	0	0
Skydrol	9	9	9
Ethylene Glycol	10	9	10
Wet Look – Gloss			
Gloss 60°	44	31	36
Gloss 85°	52	33	43
Hot Tire Pickup			
Tire Mark / Imprint	8	2	6
Adhesion	10	10	10
APPLICATION FLEXIBILITY			
Alkaline resistance	Pass	Fail	Fail
Acid stain coverage	Pass	Fail	Fail
EASE OF APPLICATION	Excellent	Poor	Poor
ENVIRONMENTALLY COMPLIANT			
VOC (g/l)	98	189	>250
IN-CAN STABILITY			
KU Viscosity, 4 Weeks 140 F	Pass	Pass	Pass
Freeze/Thaw, 3 cycles @ 0 F	Pass	Fail	Pass



Early water resistance, also known as early blush resistance demonstrates the quick property development of a coating system. In this test (Photo-2), clear coatings are applied to a black Mylar chart which is impervious to water. The coatings are cured for 2 hours then immersed in water. This test simulates a sudden thunder-burst which can delay the application of the coating or destroy the coating which has already been applied. In either case, this feature will be greatly appreciated by homeowners as well as contractors on tight time constraints.

Photo-1 shows how the Carboset CA-600-based clear coating (center sample) performs in comparison to a commercially available clear sealer (left sample) sold for this application as well as a commercially available polymer (right sample) sold for this application.

Photo-1

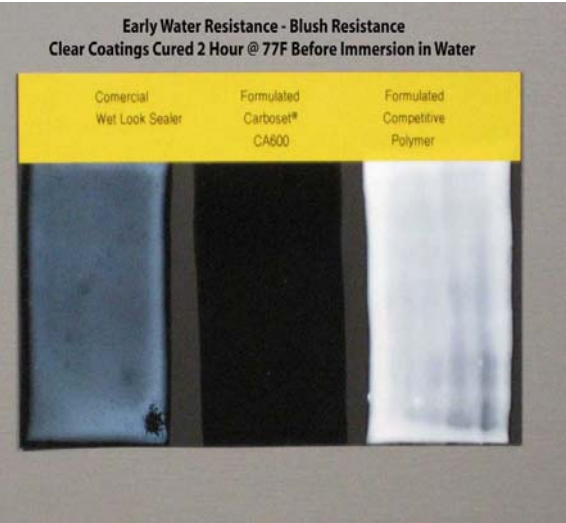


Photo-2



Carboset CA-600 out-performs leading commercial polymers in a common formulation and commercial sealers for chemical resistance. Many different stains were tested during the development of Carboset CA-600. However, two were found to be among the most aggressive; brake fluid and dirty motor oil. It is important to note that dirty motor oil contains by-products of the combustion process therefore is much more severe for testing purposes than clean motor oil.

Graph 1 – Chemical Resistance

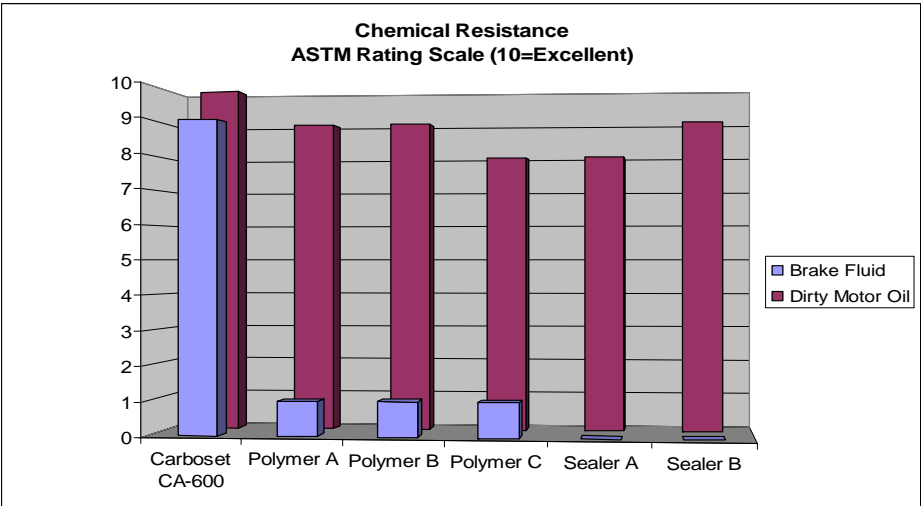


Photo – 3 In this example, the effect of high pH (10% NaOH) on the clear films is very apparent after 3 days at room temperature. The film segments were placed in 10% NaOH for 3 days then removed. Whitening and gradual loss of film integrity were apparent in the 2 clear coatings prepared with competitive polymers A and B. However, the 3rd sample (right sample) which is a clear coating containing Carboset CA-600 remained clear and unaffected by the high pH conditions.

Dirt pick-up resistance is difficult to measure in a clear coating. However, Photo – 4 shows an exposure panel where 2 coats of clear coatings were applied over the same white house paint. The panel was exposed for 4 months in an industrial area where industrial pollutants and airborne particulates are at very high levels. The coating on the left contains Carboset CA-600; the coating on the right contains a competitive polymer. Severe color change seen as graying of the film on the right is a result of airborne pollutants and particulates imbedded in the film. Yellowing is also very apparent in the right side sample.

Photo - 3

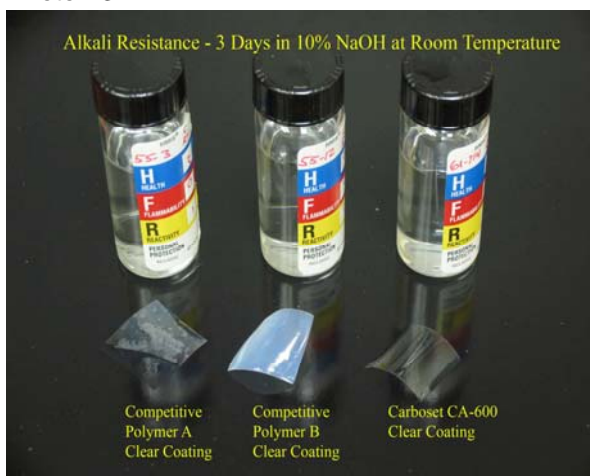


Photo - 4



Photo - 5



The color enhancement in this project shows-off the beauty of the stamped concrete which had aged and become dull and lifeless. A new clear coating based on Carboset CA-600 has brought new life to this patio. After 6 months of exposure through cold, rain and snow, this project still maintains its color, shine and beauty.

FORMULATION

Table 3 – Model Formulation
**HORIZONTAL MASONRY <100 g/l VOC CLEAR COATING
MODEL FORMULATION CA600-1**

Material	Pounds	Gallons	Wt %	Use
Water	318.6	38.2	37.1	Water
Surfynol® 104H	7.8	1.0	0.9	Surfactant
BYK® 333	0.5	0.1	0.1	Flow Agent
BYK® 028	2.0	0.2	0.2	Defoamer
Dowanol® DPnB	10.0	1.3	1.2	Cosolvent
Dowanol® PPH	9.0	1.0	1.0	Cosolvent
Benzoflex® 50	7.0	0.7	0.8	Plasticizer
Carboset® CA-600	500.0	56.8	58.2	Polymer
Ammonia	1.0	0.1	0.1	pH Buffer
Acrysol® RM8W	3.2	0.4	0.4	Thickener
Acticide® MBS	1.7	0.2	0.2	In-Can Preservative
Totals	860.2	100.00	100.0	

Formula Constants		Typical Properties	
Non-volatile (Wt. %)	26.3	Viscosity, mPas	142-175
Non-volatile (Vol. %)	23.9	Viscosity – Stormer, KU	65-75
Density	1.032	pH	8.8 – 9.2
Wt./Gal., lbs.	8.6		
VOC – gm./liter	96.1		
VOC – lbs./gallon	0.8		
PVC, (%)	NA		
Pigment to Binder Ratio	NA		

FORMULATING GUIDE

Coalescing Aids

Prior to any testing, good film formation is critical. Film defects can lead to failures in some or all your test results. To ensure good film formation a good coalescing system is needed. The following products have been used successfully however based on your own needs different combinations and ratios may need to be tested in your customized formulations.

Dowanol® DPnB	Dow Chemical Co.
Dowanol® PPH	Dow Chemical Co.
Dowanol® PnB	Dow Chemical Co.
Dowanol® EB	Dow Chemical Co.
Citroflex® A4	Moreflex Corp.
Benzoflex® 50	Velsicol corp.
KP140®	Chemtura Corp.

Flow Agents

A good quality flow agent may be needed to provide your film the ability to fill large, small and microscopic voids which are inherent in concrete substrates.

BYK® 333	BYK-Chemie
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Defoamer

Uniform film formation is critical. To eliminate the possibility of foam bubbles interfering with good film formation and flow a good quality defoamer may be needed. The following products can be used.

Silfoam® SE21	Wacker
BYK® 028	BYK-Chemie

In-Can and Film Preservatives

Waterbased coatings inherently provide a nutrient source for many types of microorganisms. Good housekeeping which includes regular disinfection of tanks, transfer lines, storage containers, pumps, etc is your first line of defense against contamination and out-of-control growth of bacteria, mold and algae in a production environment. A second line of defense is provided by the in-can preservative used in the formulation to protect the product after it is filled and packaged for storage. In-can preservatives such as the following products can be used to protect the product in the wet state.

Acticide® MBS	Actichem
Mergal K10N	Troy, Corp.
Mergal 399	Troy, Corp.

Film preservatives for concrete application may or may not be necessary. The following products are zero VOC film preservatives which can be used if desired.

Acticide® PA	Actichem
Polyphase® 663	Troy, Corp.

Surfactants

Surfactants are critical in clear coats to provide the flow and penetration need to fill large, small and microscopic voids inherent in a concrete substrate. A good quality, water-soluble surfactant with excellent wetting will be needed.

Novec™ FC-4434	3M Specialty Mineral Division
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Rheology

Carboset CA-600 is compatible with a wide range of rheological additives such as the following products.

Solthix® A100	Lubrizol
Acrysol® RM825	Rohm & Haas

Stability

Store this product in its original closed container. Avoid direct sunlight and excessive heat and cold temperatures. For best results, use within 6 months from date of manufacture.

Raw Materials

®Solthix is a registered trademark of Lubrizol
 ®Acrysol is a registered trademark of Rohm & Haas
 ®Acticide is a registered trademark of Actichem
 ®Benzoflex is a registered trademark of Velsicol Corp.
 ®BYK is a registered trademark of BYK-Chemie
 ®Citroflex is a registered trademark of Moreflex Corp.
 ®Dowanol is a registered trademark of Dow Chemical Co.
 ®KP140 is a registered trademark of Chemtura Corp.
 ®Mergal is a registered trademark of Troy Corp.
 ™Novec is a trademark of the 3M Corp.
 ®Polyphase is a registered trademark of Troy Corp.
 ®Silfoam is a registered trademark of Wacker Silicones