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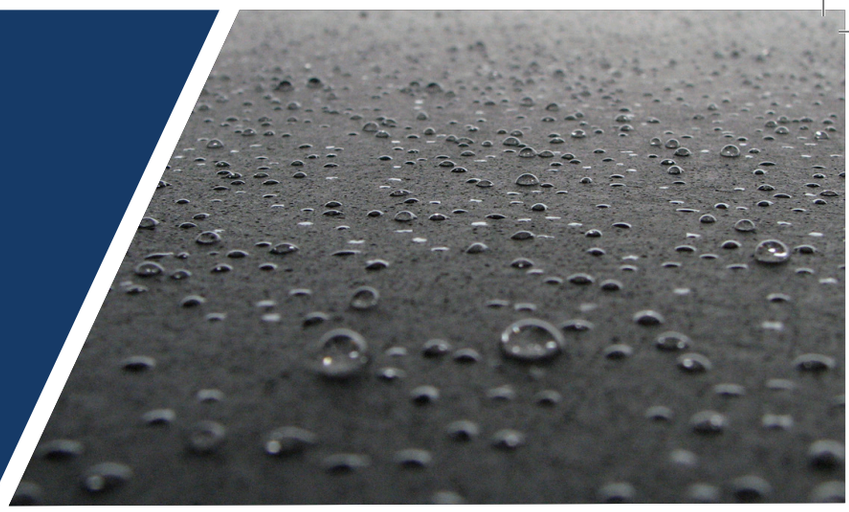
CoatOSil™ F Polysiloxane Emulsion



MARKETING BULLETIN

COATINGS ADDITIVES - MASONRY WATER REPELLENTS

CoatOSil F emulsion is a waterborne, solvent-free, polysiloxane additive for use in waterborne paint formulations to enhance performance and durability. It is an excellent candidate to consider for use in exterior and interior architectural paints.

Paints containing CoatOSil F emulsion typically demonstrate improved resistance to UV, water, alkali and efflorescence. Additionally, durability of color retention and water resistance can be extended by 50% or more. CoatOSil F emulsion can be added during paint manufacturing or premixed with the existing binder emulsion.

Key Features and Typical Benefits

- Long-term durability
- Outstanding water resistance after weathering
- Improved color retention and reduced chalking after weathering
- Excellent alkali and efflorescence resistance
- Ease of formulation
- Low VOC
- Excellent scuff resistance
- MIT-free biocide

Typical Physical Properties for CoatOSil F Emulsion

Appearance	Milky-white Emulsion
Active Substance Content	60% by weight
Specific Gravity	1.0
pH	5.5 - 7

Typical properties are average data and are not to be used as or to develop specifications.

General Considerations for Use

CoatOSil F emulsion can be used in a wide range of formulations, including primers and exterior/interior architectural paints, and it can be added in the letdown stage during paint manufacturing under normal mixing conditions. The typical use-level starting point range is 1-3 wt% CoatOSil F emulsion based on the total formulation weight. CoatOSil F emulsion can also be added to the binder emulsion beforehand, using the blend ratio appropriate to match the recommended dosage levels in the target paint formulations and to meet the desired performance targets. For further details on formulation and samples of CoatOSil F emulsion, please contact your local representative.

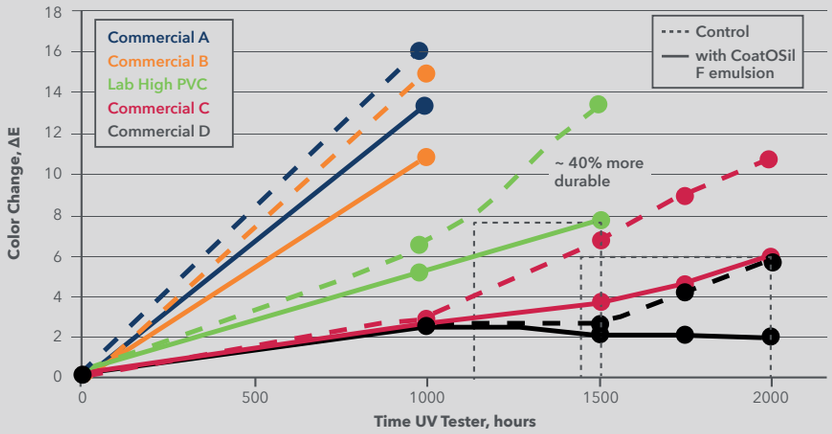
Performance Testing

Accelerated Weathering:

Accelerated weathering testing results, based on ASTM D4587-11, for four commercial waterborne exterior paints (A-D) and one 65% PVC (pigment volume concentration) lab paint formulation, are shown in Figure 1. A 3 wt% CoatOSil F emulsion based on total formulation weight was post-added to all paints.

Figure 1:

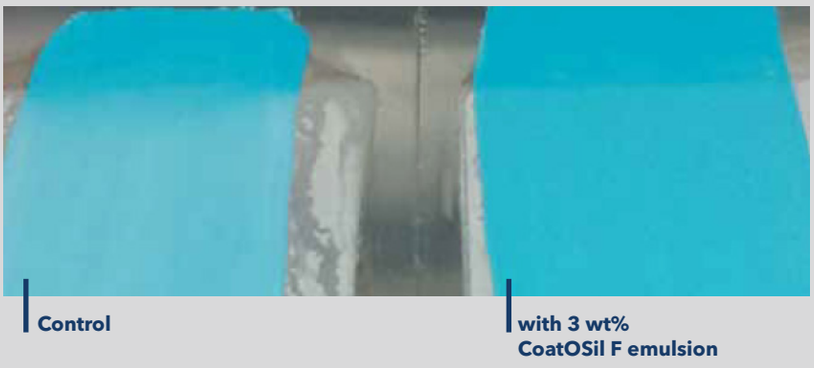
Reduced Color Fading from CoatOSil F Emulsion after Accelerated Weathering



During early weathering stage, corresponding control and CoatOSil F emulsion-containing paints performed similarly. However, control paints eventually began showing sudden degradation in terms of chalking and color fading, while CoatOSil F emulsion-containing paints showed significantly better performance at the same test duration. CoatOSil F emulsion-containing paints reached the same color change after ~50% or longer duration compared to the respective control paints. Figure 2 shows panels with a lab high-PVC formulation after 1500 hours of weathering. The top regions were not exposed during accelerated weathering. Improvement in color retention can be clearly seen with CoatOSil F emulsion in the bottom regions.

Figure 2:

Reduced Color Fading from CoatOSil F Emulsion after Accelerated Weathering



Note: Test data. Actual results may vary.

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In some formulations, addition of CoatOSil F emulsion increased water contact angle, but dramatic beading effect was not seen immediately when compared to the respective control paint. However, during weathering, water contact angle continuously reduced for control paints, but the same paints containing CoatOSil F emulsion reached a significantly higher contact angle after early weathering and it was retained for a longer time. To illustrate this, Figure 3 shows a commercial paint formulation (A) where water droplets were placed on regions that were exposed (bottom) and not exposed (top) to accelerated weathering for 1000 hrs. After weathering, there was significant water spreading and absorption in the control paint, while the paint containing CoatOSil F emulsion showed excellent water resistance.

Figure 3:

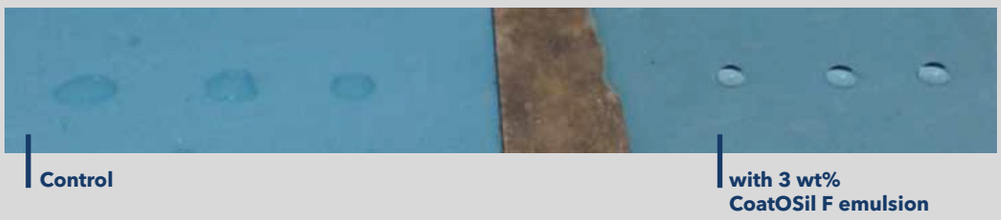
Improved Water Resistance After Accelerated Weathering

Exterior Weathering:

To validate accelerated weathering results, real-world exposure studies were performed. Figure 4 shows water resistance after 18 months weathering for commercial formulation C. Paint containing CoatOSil F emulsion continued to demonstrate excellent water resistance, whereas the control film showed significant water absorption.

Figure 4:

Water Resistance Testing after 18 Months of Real-World Exposure Testing



Efflorescence Resistance:

As shown in Figure 5, the addition of 5 wt% CoatOSil F emulsion showed significant improvement in efflorescence resistance tested using an in-house accelerated test method. Samples were placed vertically in salt solution which migrated through capillary action and white deposits were monitored over paint surface.

Figure 5:

Improved Efflorescence Resistance

Note: Test data. Actual results may vary.

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Scuff Resistance

CoatOSil F showed significant improvement in scuff resistance. To illustrate this, Table 1 shows the interior high gloss paint formulation at 16% PVC.

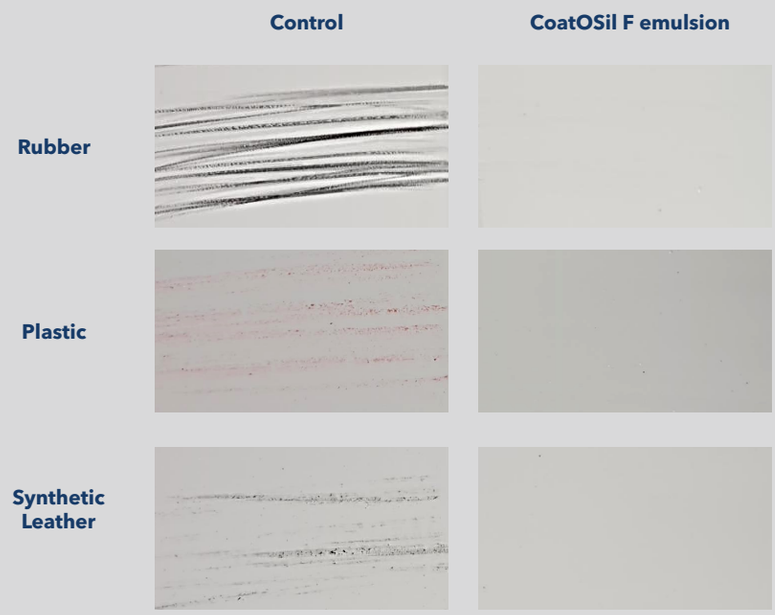
As shown in Figure 6 the addition of 1,5% active content of CoatOSil F showed the reduction of scuff marking with respect of CoatOSil F sample and the control sample using in-house test method. The samples were prepared by applying the test paint to a sealed panel with 7 mil bird applicator and dry at room temperature for minimum 7 days before test. Several scuffing objects as rubber, plastic and synthetic leather were used at the same force for control and test samples.

Table 1 Interior High Gloss Paint Formulation

Ingredients	Function	Gloss, 16% PVC Amount (gm)
MILLBASE		
Demineralized water	Water	10,68
Propylene glycol	Solvent	1,45
Sodium salt of maleic acid copolymer (25% solid)	Pigment dispersant	0,82
Nonionic surfactant	Wetting agent	0,09
Mineral Oil Defoamer	Defoaming	0,13
TiO_2	Mineral pigment	21,24
Rheology additive	Low shear builder/anti settling	0,09
Amino methyl propanol (95%)	pH adjustment	0,14
High Speed Disperser for 30 min at 2500 RPM		
LETDOWN		
Nonionic associative thickener	High shear thickener	2,16
Acrylic latex (50% solid, MFFT 16°C)	Binder	48,48
Demineralized water	Water	10,19
Ester alcohol	Coalescent	0,97
Nonionic surfactant	Surfactant	0,09
Mineral Oil Defoamer	Defoaming	0,06
CoatOSil™ F	Scuff resistant additive	2,5
In-can preservative	Biocide	0,09
Dry-film preservative	Biocide	0,24
Nonionic associative thickener	Mid shear thickener	0,58
Mixing for 30 min at 800-1000 RPM		
TOTAL		**100.00**

Figure 6

Improved Scuff resistance



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