

CoatOSil™ DRI Waterborne Silicone



MARKETING BULLETIN

SILICONE - COATING RESIN

CoatOSil DRI waterborne silicone resin can help reduce water uptake and improve UV resistance in organic waterborne coating compositions. Its chemical structure enables CoatOSil DRI waterborne silicone resin to overcome the difficulties of combining silicone materials with organic waterborne resins.

CoatOSil DRI waterborne silicone resin has been shown to improve hydrophobicity and elongation properties when used as a co-binder with acrylic latexes, resulting in more flexible coatings and sealants. CoatOSil DRI waterborne silicone resin can also be considered as a sole binder when maximum thermal and UV stability is a priority. When applied alone, CoatOSil DRI waterborne silicone resin cures at room temperature to form an elastomeric film.

Key Features and Typical Benefits

- Enhanced water, UV, and mar resistance.
- Formation of a more flexible coating as a co-binder with acrylic latex, without detrimental effect to adhesion, re-coatability, and dirt pick up
- Compatibility with a variety of waterborne polymer systems, including many:
 - Acrylics
 - Styrene Acrylics
 - Epoxies
 - PUDs
 - Alkyds

Potential Applications

- Architectural Coatings
- Wood Coatings
- Concrete Coatings
- Roof Coatings



Typical Physical Properties

CoatOSil DRI waterborne silicone resin is a low viscosity emulsion with the following typical characteristics:

Property	Measure	Value
Appearance	n/a	White, opaque liquid
Actives Content	%wt	~ 45
Density at 25 °C	gm/cm ³	1.1
Viscosity at 25 °C	cps	~ 20
pH	pH	~ 11
Particle Size	nm	~ 120

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

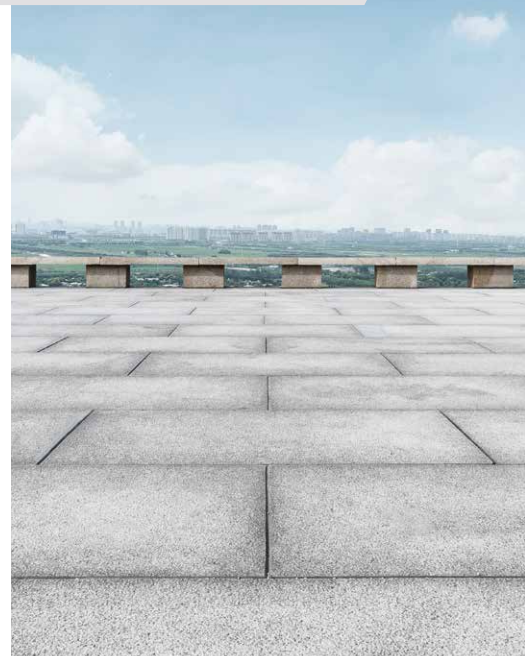


General Considerations for Use

Typical dosages of CoatOSil DRI waterborne silicone resin are between 5% and 30% when used as a co-binder in latex systems to improve water and UV resistance. To aid in evaluating the silicone for use as a sole binder, the typical physical properties of the neat product applied via drawdown and cured at room temperature are shown below:

Property	Measure	Value
Tensile	psi	~ 500
Elongation	%	~ 450
Hardness Shore A	Shore A	~ 30
Elastic Recovery	%	> 90
Tg	°C	- 41

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

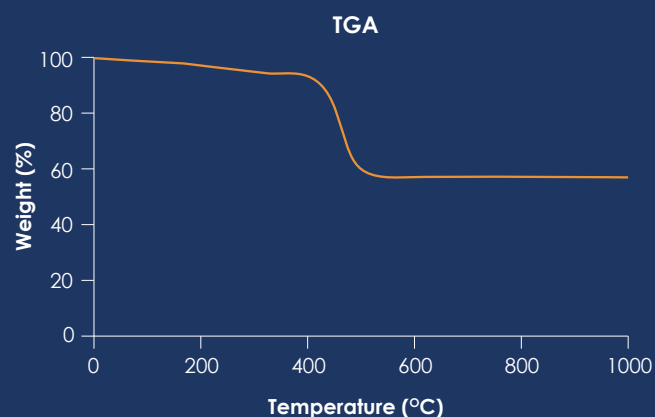


General Considerations for Use (continued)

Temperature Resistance Test

The cured films containing CoatOSil DRI waterborne silicone resin also exhibited compositional resistance to high temperatures. TGA data indicated the composition of cured films was stable until around 400 °C.

Note: Test results. Actual results may vary.



Water Vapor Transmission

Based on a customized E96 principle, the “wet” method was used: i.e. water vapor (100% RH) transmits through a (sealed) cup mouth of CoatOSil DRI film in a 50% RH/23C chamber. Two CoatOSil DRI film samples with different DFT (635µm and 381µm) were tested.

The following 2 sets of data were obtained.

For a 635µm DFT of CoatOSil DRI film sample:

WVTR = 106 g/m²/24h

For a 381µm DFT of CoatOSil DRI film sample:

WVTR = 123 g/m²/24h

Water Vapor Transmission Rate measured as grams per 24hrs per square meter area with defined thickness



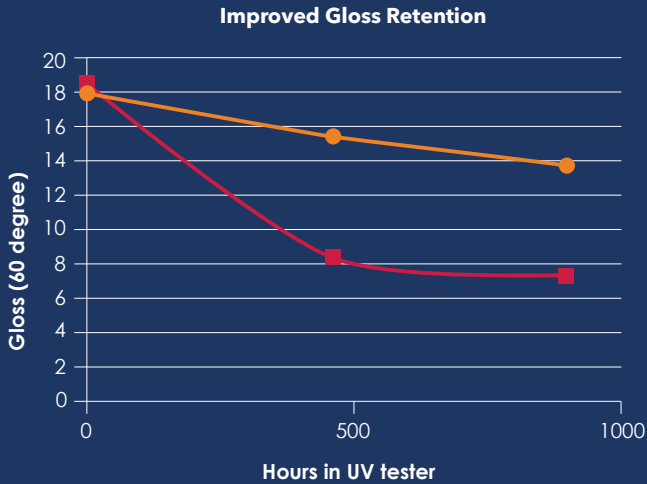
Application Example

Gloss Retention and Color Stability Test

CoatOSil DRI waterborne silicone resin can be formulated into coatings as a co-binder with the main binder, such as acrylic latex, PUD, epoxy, etc.

In our testing, the addition of CoatOSil DRI waterborne silicone resin in an acrylic latex (within 20~40 wt% based on the weight of the main binder) resulted in significant improvement to gloss retention and color stability.

Paint Sample	Color Change (ΔE) After QUV 1000 hrs
Control	1.5
Control + 14% CoatOSil DRI waterborne silicone resin	1.8
Improvement %	29



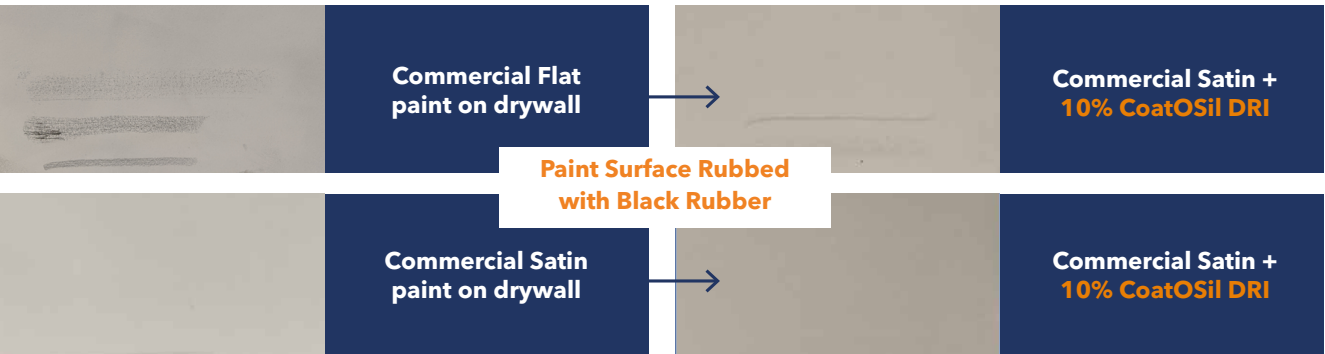
Key:

● Control ■ CoatOSil DRI waterborne silicone resin

Note: Test results. Actual results may vary.

CoatOSil DRI Waterborne Silicone Resin as a Post-Add Modifier for Architectural Paints

Using a commercial flat paint and a commercial satin paint formulation, drywall was painted and tested by rubbing a black rubber stopper on both samples. Sample with CoatOSil DRI waterborne silicone resin exhibited significantly better scuff resistance than the Control sample.



Application Example (continued)**CoatOSil DRI Waterborne Silicone Resin as a Post-Add Modifier for Wood Coatings**

As a post-add additive CoatOSil DRI waterborne silicone resin can help improve UV resistance and certain stain/chemical resistance, as well as reduce water absorption and tannin leaching (when exposed to environmental elements) of existing waterborne wood Coatings.

In accelerated weathering (coated panels exposed to 500 hours of QUVA) panels utilizing CoatOSil DRI waterborne silicone resin as post-add additive exhibited better UV resistance over commercial wood stain & sealer.

Note: Test results. Actual results may vary.

Water absorption test on coated wood panels:

After coatings were left dry for 7 days, panels were weighed. Panels were placed with coated-side down into water. The wood floated on the surface with only the coated sides exposed to water, simulating the effect of standing water on a deck. The panels were left in the water for 24 hours and then removed from the water and gently shaken to remove excess water. Panels were left to dry for 24 hours before reweighing. The weight difference was compared as % weight of water absorbed.

When formulated into the main binder as a co-binder, CoatOSil DRI waterborne silicone resin can help to improve water resistance and flexibility. Additional performance features, such as chemical resistance, can be achieved by incorporating CoatOSil DRI waterborne silicone resin in combination with CoatOSil MP 200 epoxy silane oligomer, which brings an additional crosslinking point to the curing system.

Table 6: Gloss loss and color change measurement of coated wood panels - **Comparison After 500 Hours QUVA**

Coated Wood Sample	Loss % 60-degree gloss	Color change ΔE
Control	25	33.74
Post-add 10% CoatOSil DRI Resin	4	21.51

CoatOSil DRI Waterborne Silicone Resin as Additive Helps Stop Tannin Leaching in Water



Table 7: Water absorption measurement of coated wood panels - **Water Absorption Comparison**

Coated Wood Panel	Water adsorbed %
Control	4.3
Post-add 10% CoatOSil DRI Resin	3.0
Improvement %	~ 30

Application Example (continued)

CoatOSil DRI Waterborne Silicone Resin with CoatOSil MP 200 epoxy silane for Wood Coatings

A reformulation of a 29% PVC (Pigment Volume Concentration) white wood coating with the replacement of 10% (dry/dry) of the existing WB acrylic binder with CoatOSil DRI silicon resin and 0.5% of CoatOSil MP 200 epoxy silane can help to improve the wet adhesion on direct wood like pine.

One coat of the same white paint is applied with a brush directly on oak at 100µm wet. After 7 days of drying at room temperature, the panels are put in a climatic chamber for 48h at 40°C, 100% HR. The objective is to accelerate the tannin bleeding contained into the wood, which is seen as a yellowish/brownish aspect in the surface of the coating. The combination of CoatOSil DRI silicon resin and CoatOSil MP 200 epoxy silane can improve the tannin bleeding resistance in one coat.



CoatOSil DRI Waterborne Silicone Resin for Concrete Sealers

As shown in the picture below, 6-month aged Concrete, stepping stone, red brick and Greystone paver were treated with diluted CoatOSil DRI waterborne silicone resin (10% in Water, ~4.5% coating solid) resulting in excellent water beading effects on the surface.

Generation of Water Beading Effect with CoatOSil DRI Waterborne Silicone Resin (10% in Water)



Application Example (continued)

Prevention of Black Marking on Concrete with CoatOSil DRI Waterborne Silicone Resin (10% in Water)

Preparation of coated concrete panels for Hot tire pickup tests: In this study, three different waterborne technologies were used for comparison: a commercial 1k waterborne epoxy garage floor coating, a diluted Acrylic latex coating (10% in water, ~5% solid), and diluted CoatOSil DRI waterborne silicone resin (10% in water, 4.5% solid). Concrete plaques (3 x 6 inch, no primer, no acid etching) were washed with soap water and dried for 24 hours. ~3 grams of each of the three waterborne coating samples were applied onto the concrete plaques respectively using 1/4 inch nap 'Best' Premium White Woven Roller. All coated plaques were dried at RT for 7 days. While the sealed surfaces to be tested were soaked with moist cheesecloth for one hour, the tire sections were also soaked in water at 140-degree Fahrenheit for one hour. Next, the tire sections were clamped tightly to the surfaces of coated plaques, and the clamped tire/concrete plaques were placed in an oven at 140-degree Fahrenheit for 1 hour. After the tire sections were removed, Imprint (10 for No imprint, 0 for severe imprint), Adhesion (10 for No removal, 0 for complete removal), Black Marking (10 for No mark, 0 for severe mark) on the sealed concrete surfaces were measured and compared.

Concrete panel coated with Commercial 1K WB Epoxy garage floor coating

Adhesion - 10 | Imprint - 2
Black Marking - 4



Concrete panel coated with diluted Acrylic latex (10% in water, 5% solid)

Adhesion - 10 | Imprint - 2
Black Marking - 2



Concrete panel coated with diluted CoatOSil DRI (10% in water, 4.5% solid)

Adhesion - 10 | Imprint - 2
Black Marking - 10



Enhanced Color on Red Brick Using CoatOSil DRI Waterborne Silicone Resin (10% in Water)

CoatOSil DRI waterborne silicone resin (10% in water) as a sealer showed excellent resistance to black marking while maintaining good adhesion.

Also as shown in the picture below, treatment of red brick with diluted CoatOSil DRI waterborne silicone resin (10% in water) not only enhanced the natural color of the brick, but also eliminated the chalky, gritty feeling on untreated brick and generated a soft feel-to-touch surface.



Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Limitations

Customers must evaluate Momentive Performance Materials products and make their own determination as to fitness of use in their particular applications.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.momentive.com or, upon request, from any MPM representative.

For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.



Customer Service Centers

Worldwide Email:
commercial.services@momentive.com

AMERICAS

+1 800 295 2392

Toll free*

+ 704 805 6946

Direct Number

LATIN AMERICA

BRAZIL

+55 11 4534 9650

Direct Number

MEXICO

+52 55 2169 7670

Direct Number

*All American countries

ASIA PACIFIC

CHINA

800 820 0202

Toll free

+86 21 3860 4892

Direct number

JAPAN

+81 3 5544 311

Direct number

KOREA

+82 2 6201 4600

Direct number

EMEAI- EUROPE, MIDDLE EAST, AFRICA & INDIA

EUROPE

+ 390510924300

Direct number

INDIA, MIDDLE EAST & AFRICA

+ 91 44 71212207

Direct number*

*All Middle Eastern countries,
Africa, India, Pakistan,
Bangladesh, Sri Lanka.

SOUTH EAST ASIA, AUSTRALIA & NEW ZEALAND

+60 3 9206 1543

Direct number*

*South East Asia countries
(Malaysia, Singapore,
Thailand, Indonesia,
Vietnam, Philippines,
Cambodia, Myanmar /
other countries located in
Pacific region).

Disclaimer

THE MATERIALS, PRODUCTS AND SERVICES OF MOMENTIVE PERFORMANCE MATERIALS INC. AND ITS SUBSIDIARIES AND AFFILIATES (COLLECTIVELY "SUPPLIER"), ARE SOLD SUBJECT TO SUPPLIER'S STANDARD CONDITIONS OF SALE, WHICH ARE INCLUDED IN THE APPLICABLE DISTRIBUTOR OR OTHER SALES AGREEMENT, PRINTED ON THE BACK OF ORDER ACKNOWLEDGMENTS AND INVOICES, AND AVAILABLE UPON REQUEST. ALTHOUGH ANY INFORMATION, RECOMMENDATIONS, OR ADVICE CONTAINED HEREIN IS GIVEN IN GOOD FAITH, SUPPLIER MAKES NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, (i) THAT THE RESULTS DESCRIBED HEREIN WILL BE OBTAINED UNDER END-USE CONDITIONS, OR (ii) AS TO THE EFFECTIVENESS OR SAFETY OF ANY DESIGN INCORPORATING ITS PRODUCTS, MATERIALS, SERVICES, RECOMMENDATIONS OR ADVICE. EXCEPT AS PROVIDED IN SUPPLIER'S STANDARD CONDITIONS OF SALE, SUPPLIER AND ITS REPRESENTATIVES SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS OR SERVICES DESCRIBED HEREIN.

Each user bears full responsibility for making its own determination as to the suitability of Supplier's materials, services, recommendations, or advice for its own particular use. Each user must identify and perform all tests and analyses necessary to assure that its finished parts incorporating Supplier's products, materials, or services will be safe and suitable for use under end-use conditions. Nothing in this or any other document, nor any oral recommendation or advice, shall be deemed to alter, vary, supersede, or waive any provision of Supplier's standard Conditions of Sale or this Disclaimer, unless any such modification is specifically agreed to in a writing signed by Supplier. No statement contained herein concerning a possible or suggested use of any material, product, service or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Supplier covering such use or design, or as a recommendation for the use of such material, product, service or design in the infringement of any patent or other intellectual property right.

BEFORE HANDLING ANY PRODUCTS MENTIONED, REVIEW THE LATEST SAFETY DATA SHEET (SDS) AND LABEL FOR PRODUCT SAFETY INFORMATION, SAFE HANDLING INSTRUCTIONS, PERSONAL PROTECTIVE EQUIPMENT IF NECESSARY, EMERGENCY SERVICE CONTACT INFORMATION, AND ANY SPECIAL STORAGE CONDITIONS REQUIRED FOR SAFETY. MOMENTIVE MAINTAINS AN AROUND-THE-CLOCK EMERGENCY SERVICE FOR ITS PRODUCTS. SDS FOR MOMENTIVE PRODUCTS ARE AVAILABLE AT WWW.MOMENTIVE.COM OR, UPON REQUEST, FROM ANY MOMENTIVE REPRESENTATIVE. USE OF OTHER MATERIALS IN CONJUNCTION WITH MOMENTIVE PRODUCTS MAY REQUIRE ADDITIONAL PRECAUTIONS. PLEASE REVIEW AND FOLLOW THE SAFETY INFORMATION PROVIDED BY THE MANUFACTURER OF SUCH OTHER MATERIALS.

THE MATERIALS, PRODUCTS AND SERVICES OF MOMENTIVE PERFORMANCE MATERIALS INC. AND ITS SUBSIDIARIES AND AFFILIATES (COLLECTIVELY "SUPPLIER"), ARE SOLD SUBJECT TO SUPPLIER'S STANDARD CONDITIONS OF SALE, WHICH ARE INCLUDED IN THE APPLICABLE DISTRIBUTOR OR OTHER SALES AGREEMENT, PRINTED ON THE BACK OF ORDER ACKNOWLEDGMENTS AND INVOICES, AND AVAILABLE UPON REQUEST. EXCEPT AS PROVIDED IN SUPPLIER'S STANDARD CONDITIONS OF SALE, SUPPLIER AND ITS REPRESENTATIVES SHALL IN NO EVENT BE RESPONSIBLE FOR ANY LOSS RESULTING FROM ANY USE OF ITS MATERIALS, PRODUCTS OR SERVICES DESCRIBED HEREIN.

Nothing in this or any other document, nor any oral recommendation or advice, shall be deemed to alter, vary, supersede, or waive any provision of Supplier's standard Conditions of Sale or this Disclaimer, unless any such modification is specifically agreed to in a writing signed by Supplier.

Momentive and the Momentive logo are registered trademarks of Momentive Performance Materials Inc.

The use of the "TM" symbol designates registered or unregistered trademarks of Momentive Performance Materials Inc. or its affiliated companies.