



Technical Data Sheet

DOWSIL™ 52 Additive

Ultra-high molecular weight silicone dispersion for slip, abrasion resistance, scratch resistance and anti-blocking in waterborne paints, inks and coatings

Features & Benefits

- Flowable liquid for processing ease
- Good compatibility with waterborne acrylic, alkyd, polyester, epoxy, PU and vinyl resin based coatings
- Imparts very low Coefficient of Friction
- Effective at very low addition levels
- Does not influence surface hardness
- No negative impact on water resistance
- Novel surfactant technology to deliver high molecular weight PDMS into waterborne Systems
- Easy to incorporate/disperse – can be added during let-down or post-addition
- Good compatibility in multiple coatings formulations
- Good slip, abrasion resistance, scratch resistance and anti-blocking
- Recoatable
- Good cost-in-use performance
- No impact on mechanical properties
- Suitable for use in exterior coatings
- Please contact your local customer center to receive the EU Food Profile

Composition

- Ultra-high molecular weight silicone dispersion
- 64% solids in water
- Not intentionally added APEO

Applications

- Wood coatings (acrylic and PUD based)
- Inks and overprint varnishes
- Interior and exterior paints

Visit dow.com/CustomerSupport to obtain food contact regulatory information, including FDA, EU, Swiss Ordinance and German BfR clearance.

Typical Properties

Specification Writers: These values are not intended for use in preparing specifications.

CTM ¹	Property	Unit	Result
0050	Viscosity	cP	3000-5000
0176	Appearance		Smooth milky white liquid
0208	Non-volatiles	%	62-67

1. CTM: Corporate Test Method, copies of CTMs are available on request.

Description

DOWSIL™ 52 Additive is a silanol functional, ultra-high molecular weight silicone dispersion in water (64% solids content).

How to Use

The low viscosity of DOWSIL™ 52 Additive facilitates the easy incorporation into waterborne formulations, allowing it to be added during the let-down or to be post-added.

DOWSIL™ 52 Additive is effective at low concentrations. It is used at typical concentrations of 0.01–3.5% as supplied in waterborne systems, based on total formulation. DOWSIL™ 52 Additive should be mixed before use. Pre-dilution with water can be made if required. The amount to use will vary depending on the coating formulation and should be checked before industrial use.

DOWSIL™ 52 Additive is compatible with acrylic, alkyd, epoxy, polyesters, polyurethane and vinyl based resin systems.

Slip Performance

Very low coefficient of friction (CoF) values are achievable with DOWSIL™ 52 Additive in acrylic and polyurethane based formulations

Acrylic-polyurethane Based Formulation

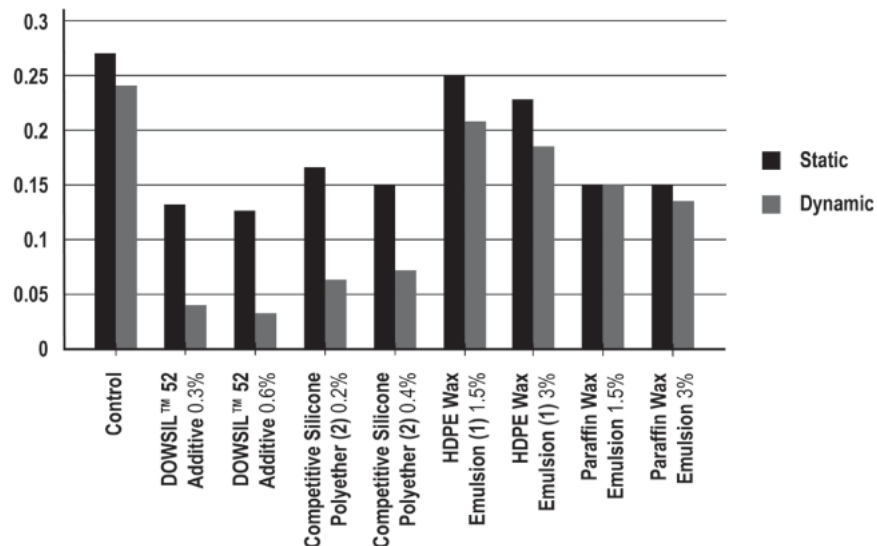


Figure 1: Coefficient of friction of a waterborne acrylic-polyurethane hybrid based wood coating with the addition of DOWSIL™ 52 Additive versus a competitive silicone polyether and wax emulsion additives. The best slip properties (lowest CoF) are seen with DOWSIL™ 52 Additive

**Slip Performance
(Cont.)**

Acrylic Based Formulation

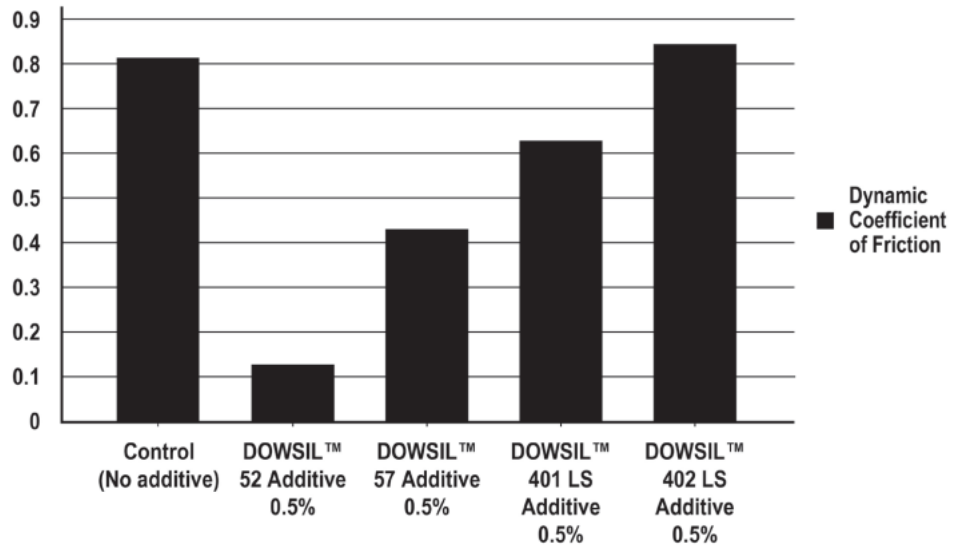


Figure 2: Coefficient of friction of a waterborne acrylic based ink with the addition of DOWSIL™ 52 Additive versus silicone polyether based additives. Additives were added at 0.5 weight percent in the total formulation. Again the best slip properties (lowest CoF) are seen with DOWSIL™ 52 Additive.

Polyurethane Based Formulation

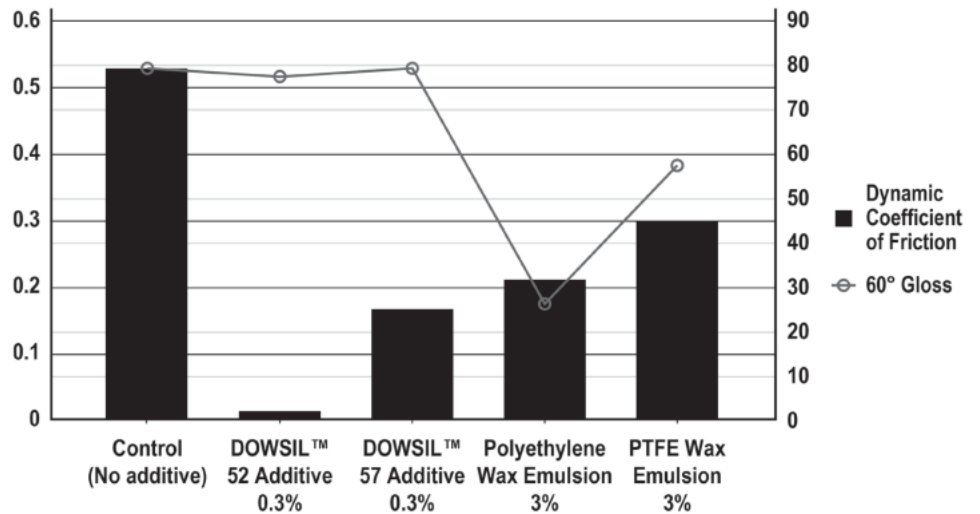


Figure 3: Coefficient of friction and 60° gloss of a waterborne acrylate-PU based gloss paint with the addition of DOWSIL™ 52 Additive versus wax additives. DOWSIL™ 52 Additive was added at 0.3 weight percent in the total formulation, one-tenth of the level of wax used. Waxes failed to achieve the very low CoF and had a significant impact on the gloss level.

Abrasion Resistance

With reduced coefficient of friction comes an improvement in abrasion resistance with the ultra-high MW DOWSIL™ 52 Additive (Figures 4, 5 and 6).

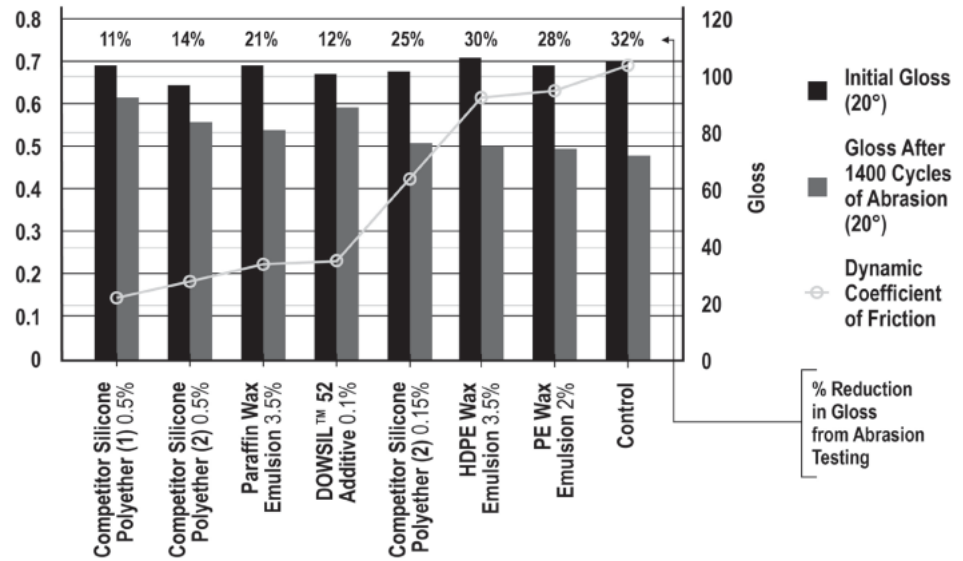


Figure 4: Slip and abrasion resistance of a waterborne acrylic wood coating with the addition of DOWSIL™ 52 Additive versus competitive additives. For high gloss systems, DOWSIL™ 52 Additive at 0.1 weight percent has little impact of gloss while providing good slip and abrasion resistance at much lower levels (0.1% versus 3.5%) than competitor waxes.

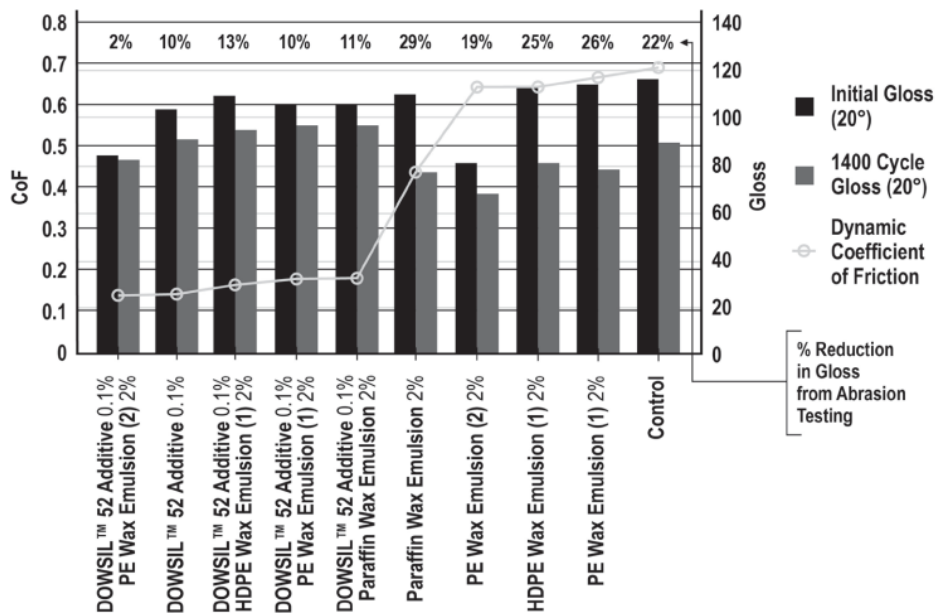


Figure 5: Slip and abrasion resistance of a waterborne acrylic wood coating with the addition of DOWSIL™ 52 Additive in combination with wax emulsions. DOWSIL™ 52 Additive alone or in combination with wax performs significantly better for slip and abrasion resistance than the control without additive and the samples containing only the wax emulsion.

Abrasion Resistance (Cont.)

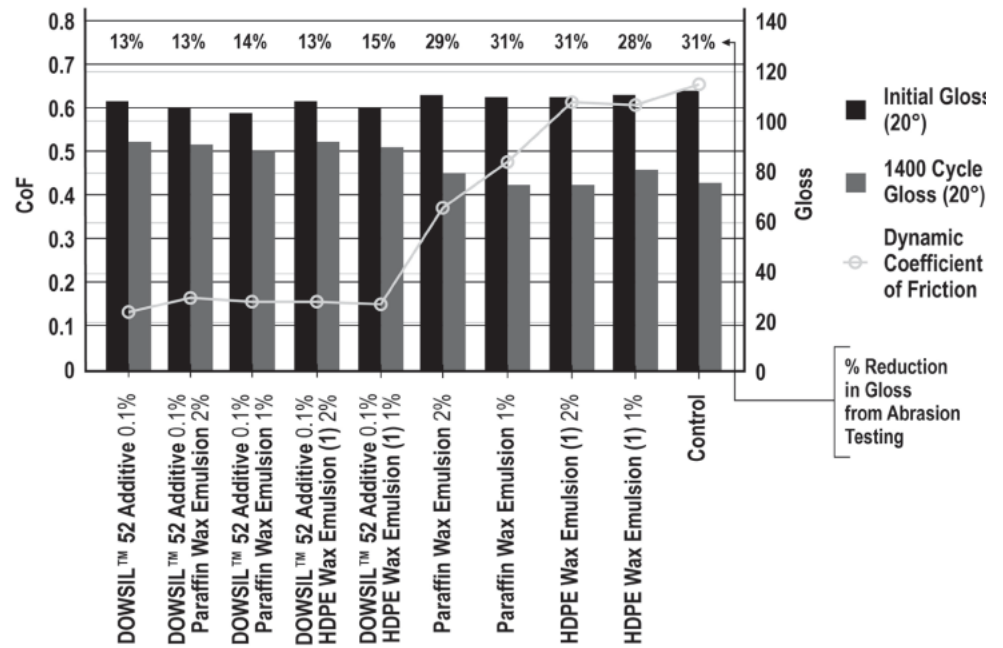


Figure 6: Slip and abrasion resistance of a waterborne acrylic wood coating with the addition of DOWSIL™ 52 Additive in combination with wax emulsions. DOWSIL™ 52 Additive alone or in combination with wax performs significantly better for slip and abrasion resistance than the control without additive and the samples containing only the wax emulsions.

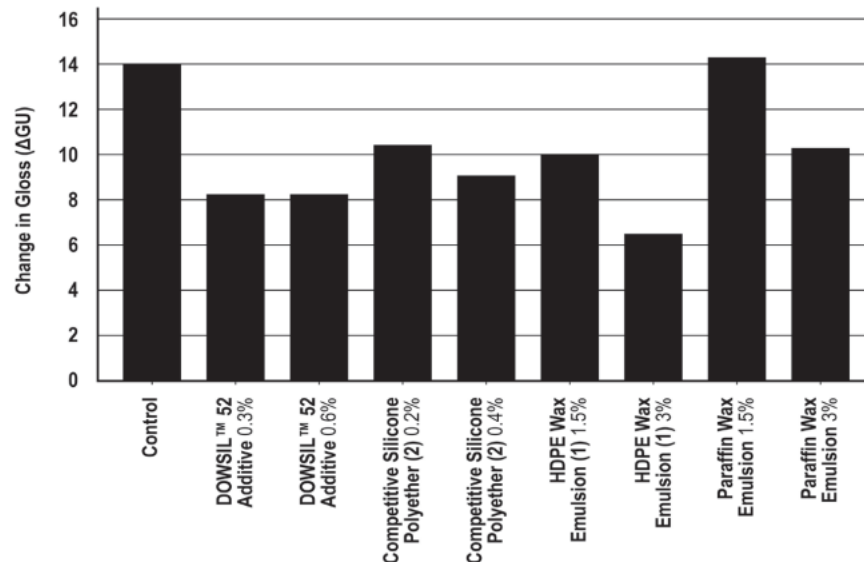


Figure 7: Scratch resistance of a waterborne acrylic-polyurethane hybrid based wood coating with the addition of DOWSIL™ 52 Additive versus a competitive silicone polyether and wax emulsion additives. The difference in gloss before and after quartant abrasion testing was used to determine the scratch resistance. DOWSIL™ 52 Additive at 0.3 and 0.6% performed well versus the competitive silicone polyether and paraffin wax emulsion. It also performed well versus the HDPE wax emulsion at 1.5%. The HDPE wax emulsion at 3% performed better than DOWSIL™ 52 Additive; however, it was tested at five times the level of DOWSIL™ 52 Additive in order to see the scratch resistance benefit.

No Negative Impact on Other Key Properties

While achieving good slip, scratch/abrasion resistance and anti-blocking properties are important, a good formulation must balance these key benefits versus potentially negative attributes an additive can bring to the formulation.

This can include negative impacts on the water resistance, intercoat adhesion and recoatability. In a PUD-based formulation, DOWSIL™ 52 Additive has not been found to impact these key properties significantly (Table 1).

Table 1: Water resistance and intercoat adhesion of a waterborne PUD based wood coating with the addition of DOWSIL™ 52 Additive.

	Water Resistance	Intercoat Adhesion	Recoatable
PUD-based Wood Coating with DOWSIL™ 52 Additive 0.15%	No discoloration or blistering	100%	Yes

Test Protocols (Table 1)

In the water resistance test, 3 drops of water were placed on the panel after the wood coating dried for 24 hours. The water was covered with a watch glass and allowed to stay on the coating for 24 hours. After the water was removed, any discoloration or blistering was noted.

To test intercoat adhesion and recoatability, a first coat containing DOWSIL™ 52 Additive was applied to the substrate and allowed to dry for 24 hours. A second coat (without DOWSIL™ 52 Additive) was then applied and allowed to dry. The intercoat adhesion was evaluated by cross-hatch testing, and the recoated appearance was noted.

Dial-in Performance

The degree to which a formulator requires slip or scratch/abrasion resistance will change depending on the end application or customer specification.

Figure 8 demonstrates how the performance can be “dialed in” depending on the end use requirements, here shown by increasingly lower CoF values with increased addition of DOWSIL™ 52 Additive.

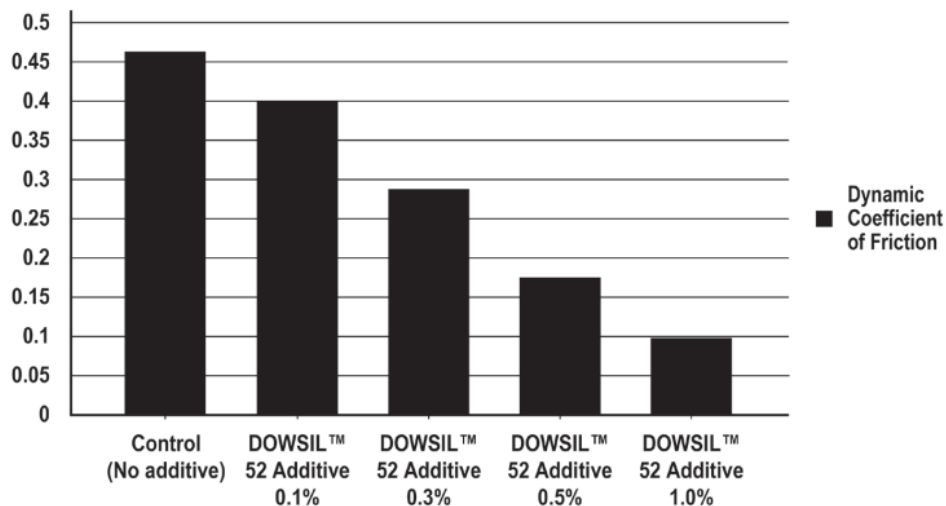


Figure 8: Coefficient of friction of a waterborne overprint varnish with the addition of DOWSIL™ 52 Additive at different addition levels in the total formulation.

**Handling
Precautions**

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED IN THIS DOCUMENT. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE ON THE DOW WEBSITE AT DOW.COM, OR FROM YOUR DOW SALES APPLICATION ENGINEER, OR DISTRIBUTOR, OR BY CALLING DOW CUSTOMER SERVICE.

**Packaging
Information**

This product is available in 18 kg pails, 190 kg drums and 1070 kg IBCs.

Samples are available in 120 ml containers.

Limitations

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

**Health and
Environmental
Information**

To support customers in their product safety needs, Dow has an extensive Product Stewardship organization and a team of product safety and regulatory compliance specialists available in each area.

For further information, please see our website, dow.com or consult your local Dow representative.

**Disposal
Considerations**

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Dow Technical Representative for more information.

**Product
Stewardship**

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

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