Consumer Solutions

Construction Chemical Solutions for Building Materials Protection

Real solutions for real market needs

DOWSIL™

Real solutions for real market needs

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The suggestions in this brochure are made in good faith and are intended as a starting point. For additional information or clarification, contact Dow.

Nature can be a tough adversary. From the moment we start building a structure, the forces of nature are at work to damage it ... through water intrusion, sunlight, wind and abrasion, attack by organisms, and even spills and stains that affect appearance.

Advanced solutions from Dow incorporate new ideas in additives, processing techniques and product formulations to make construction materials more durable.

More durable materials = more durable buildings = better performance = lower cost and less impact on the environment

Technologies from Dow can help you invent the future of building materials protection with:

- Hydrophobic treatments
- Silicone resin and binding products
- Process aids
- Innovative collaboration to meet your specific needs
  - Solvent-based or water-based
  - Admixture or post-treatments
  - Low VOCs
  - Ease of use

Choose from a wide range of silanes, siloxanes, resins, additives, blends and emulsions to maximize substrate life, reduce maintenance, improve aesthetics and – most importantly – meet customer demands for superior performance.

Because selecting the right building materials protection products now can prevent costly repairs later!

Discover Innovative Technology from Dow

Color Enhancer for Natural Stone Substrates

Construction chemicals from Dow can reveal or intensify the beauty of natural stone and cementitious substrates. In addition to being excellent impregnation sealers for building materials, several of our construction chemicals also can be used to deepen tones to achieve a wet look. You can maintain the clear appearance or accentuate the color of building substrates as desired.

REINFORCED CONCRETE

Alkoxy silanes:

XIAMETER™ OFS-6341 Silane
XIAMETER™ OFS-2306 Silane
XIAMETER™ OFS-6403 Silane

Formulated water repellents:

DOWSIL™ IE 6683 Emulsion
DOWSIL™ IE 6694 Water Repellent
DOWSIL™ Z-6689 Water Repellent
DOWSIL™ IE 6682 Emulsion

WOOD

Additives for wood impregnation sealer

Formulated impregnants:

DOWSIL™ Z-6690 Water Repellent
DOWSIL™ 6691 Fluid
DOWSIL™ 1-6184 Water Repellent
DOWSIL™ IE 6683 Emulsion
DOWSIL™ 6696 Emulsion
DOWSIL™ 2-9034 Emulsion

Siliconate:

XIAMETER™ OFS-0777 Siliconate

FIBER-REINFORCED CEMENT (FRC)

Admixture:

DOWSIL™ Z-6289 Resin
DOWSIL™ BY 16-606 Fluid

Post-treatment:

DOWSIL™ IE 6682 Emulsion
DOWSIL™ 520 Dilutable Water Repellent Emulsion
DOWSIL™ IE 6683 Emulsion

GYPSUM

Siloxane:

XIAMETER™ MHX-1107 Fluid, 30cst

Siliconate:

XIAMETER™ OFS-0777 Siliconate
XIAMETER™ OFS-0772 Siliconate

Siloxane:

DOWSIL™ IE-2404 Emulsion

DECORATIVE CONCRETE, PRECAST CONCRETE, MORTAR, TILE GROUT, EIFS, RENDERS, STUCCO

Formulated water repellent:

DOWSIL™ IE 6683 Emulsion
DOWSIL™ IE 6686 Water Repellent
DOWSIL™ IE 6694 Water Repellent
DOWSIL™ Z-6689 Water Repellent

Admixtures:

DOWSIL™ Z-6289 Resin
DOWSIL™ IE 6692 Emulsion
DOWSIL™ IE 6686 Water Repellent
DOWSIL™ BY 16-846 Fluid
DOWSIL™ BY 16-606 Fluid

Dry powder:

DOWSIL™ GP SHP 50 Silicone Hydrophobic Powder
DOWSIL™ GP SHP 60 Plus Silicone Hydrophobic Powder

NATURAL STONE: SANDSTONE, GRANITE

Siloxane:

DOWSIL™ MH 1109 Fluid

Formulated water repellents:

DOWSIL™ 520 Dilutable Water Repellent Emulsion
DOWSIL™ IE 6683 Emulsion
DOWSIL™ IE 6694 Water Repellent
DOWSIL™ Z-6689 Water Repellent
DOWSIL™ MR-2404 Resin

Building Materials Protection Product Selection

Integral Water Repellent

Dry Mix

Hydrophober:
- DOWSIL™ GP SHP 50 Silicone Hydrophobic Powder
- DOWSIL™ GP SHP 60 Plus Silicone Hydrophobic Powder

Mortar/FRC/ Prefabricated Concrete

- DOWSIL™ Z-6289 Resin
- DOWSIL™ IE 6692 Emulsion
- DOWSIL™ IE 6686 Water Repellent
- DOWSIL™ BY 16-846 Fluid
- DOWSIL™ BY 16-606 Fluid

Antifoam:
- XIAMETER™ AFE-0400 Antifoam Emulsion[1]

Post-Treatment Water Repellentoating[1]

Solvent-Based

- DOWSIL™ Z-6689 Water Repellent
- DOWSIL™ MR-2404 Resin
- XIAMETER™ OFS-6341 Silane
- XIAMETER™ OFS-2306 Silane
- XIAMETER™ OFS-6403 Silane
- DOWSIL™ 6691 Fluid

Strengthening:
- XIAMETER™ OFS-6697 Silane

Water-Based

- DOWSIL™ IE 6683 Emulsion
- DOWSIL™ IE 6694 Water Repellent
- DOWSIL™ IE 6682 Emulsion
- DOWSIL™ 520 Dilutable Water Repellent Emulsion
- XIAMETER™ OFS-0777 Siliconate
- XIAMETER™ OFS-0772 Siliconate
- DOWSIL™ 2-9034 Emulsion
- DOWSIL™ 6696 Emulsion

For DPC[2] application:
- DOWSIL™ 1-6184 Water Repellent
- DOWSIL™ IE-6687 Emulsion

Architectural Coating[1]

Binding Hydrophobing

- DOWSIL™ IE-2404 Emulsion
- DOWSIL™ Z70 Emulsion
- DOWSIL™ IE 6683 Emulsion

[1]Additional antifoam emulsions are available. Please contact your Dow Technical Service associate for assistance.
[2]DPC = "damp proof coursing," which is not widely practiced in North America.

Physical and Chemical Properties of Silicones

Silicones are present in many forms and functionalities and can be used in combination to yield specific desired properties.

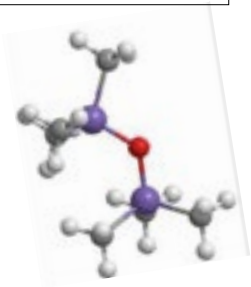
Silicone Chemistry: The Unique Properties of Silicones

Molecular Characteristics	Physicochemical Properties	Applications
• Highly open, flexible and mobile siloxane backbone: **- Si - O - Si - O - Si - O -** • High bond strength as compared to organics: **435 kJmol^{-1} Si-O** **vs. 350 kJmol^{-1} C-C**	• Low surface tension and energy • High spreading and wetting capabilities • Permeable to gas and water vapor • Heat and UV stability • Compatibility with organics • Weather resistance	• Lubricant • Anti-fouling • Release agent • Aesthetic feel (softness) • High-temperature processing • Can be sterilized • Hydrophobic/hydrophilic • Breathable – gas-permeable

The terminology around silicon chemistry can be confusing. The following table will help you understand how the various forms of silicon can be developed into formulations to protect or enhance your construction products.

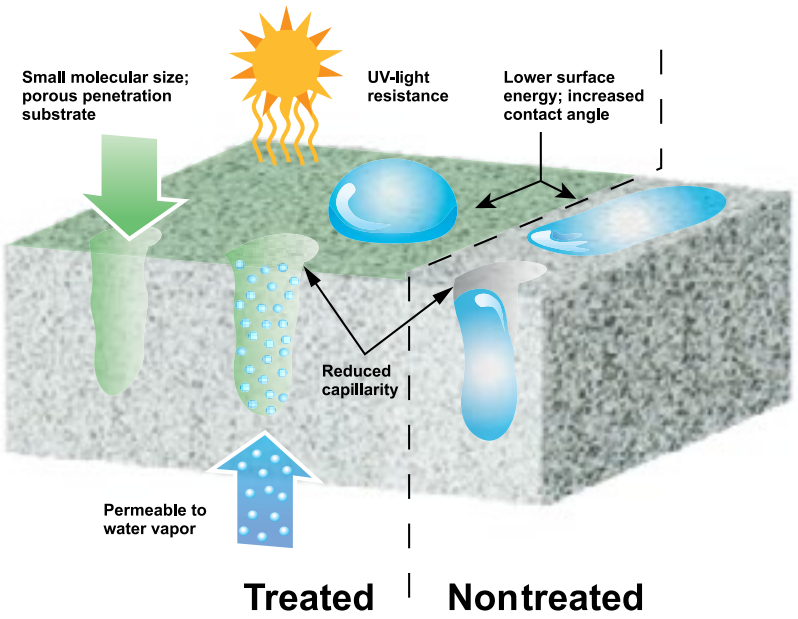
Silicon Chemistry Glossary

Silicon → Silica → Silane → Siloxane	Features
Silicon = Si. Second most abundant element on Earth. Atomic number 14. Able to form four stable bonds like carbon.	Unique reactivity allows chemistry similar to carbon, but – especially when bonded to oxygen – forms a longer, stronger, more flexible chemical bond.
Silica = SiO_2. The simplest compound of silicon. Very common as sand or quartz (crystalline) or refined forms such as silica fume, precipitated or fumed silica (amorphous).	Silica is used as a mineral reinforcement for many filled polymer systems and exists in many useful forms. Silica fume (microsilica) is an extremely effective pozzolanic material used in concrete to increase strength and chemical resistance and decrease porosity.
Silane. A molecule comprised of one central silicon atom with four attachments. The attachments can be any combination of organic or inorganic groups.	Alkoxy silanes with attached alkyl groups are efficient and effective water repellent treatments for concrete and masonry. Silanes with both organic and inorganic attachments are used as coupling agents with many useful variations.
Silicone or Siloxane. An oligomeric or polymeric compound with repeating Si-O (siloxane) "units."	Inherently resistant to UV, heat and oxidative degradation, silicones can be made as linear fluids, functional polymers and resins. By varying structure, attachments and molecular weight, they can be made into thousands of useful products.
Silicone Emulsion. In silicone technology, typically a silicone polymer suspended in water by means of stabilizing surfactants. More than one ingredient can be suspended within an emulsion.	Emulsion technology allows waterborne formulations to be used to deliver many types of ingredients that would otherwise require solvents or would be too viscous to use effectively.
Formulations and Blends. Multi-ingredient compositions intended for specific uses.	Formulated products can take advantage of more than one type of material in a common package. For example, silane reactivity and penetration can be combined with siloxane mobility and water beading. Blends and formulations can be made with basic fluids, diluted with solvent, made into emulsions or even transformed into powders.



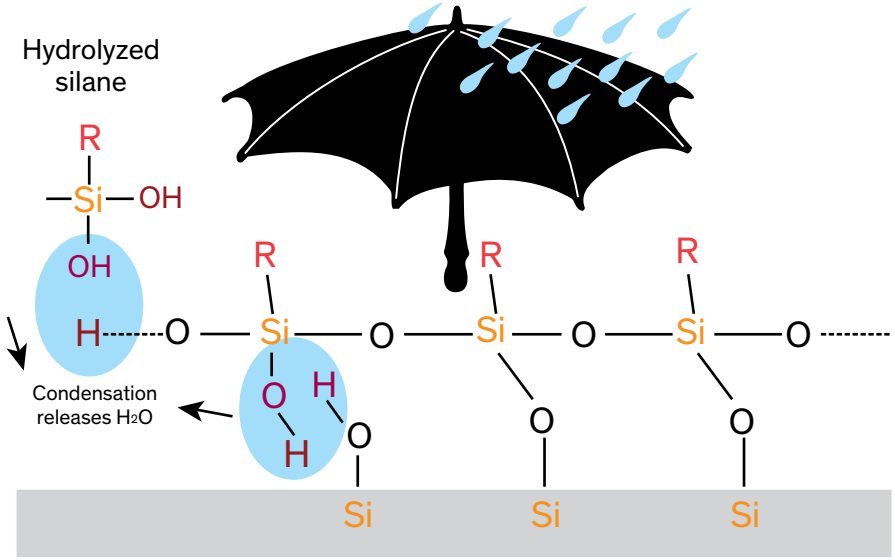
Silicone-Based Technology for Long-Lasting Protection

Figure 1. Silicone-based products penetrate deeply, forming a repellent layer within the substrate.



Most siloxanes and silanes are very small molecules and, when applied to the surface of a suitable substrate, penetrate deeply. They react with the substrate and themselves to provide durability. When cured, they allow water vapor transmission while preventing liquid water – which could contain dissolved chloride ions or acids – from passing into the substrate.

Figure 2. SiOH groups chemically bond to the substrate and condense to form a polymer film on the surface.



SiOH groups formed when the silane reacts with water (hydrolysis) can further react with SiOH groups (via condensation) in the substrate and form chemical attachments. Condensation also occurs between silanes, forming an Si-O-Si polymer. The alkyl groups (R groups) orient away from the surface to very effectively repel water.

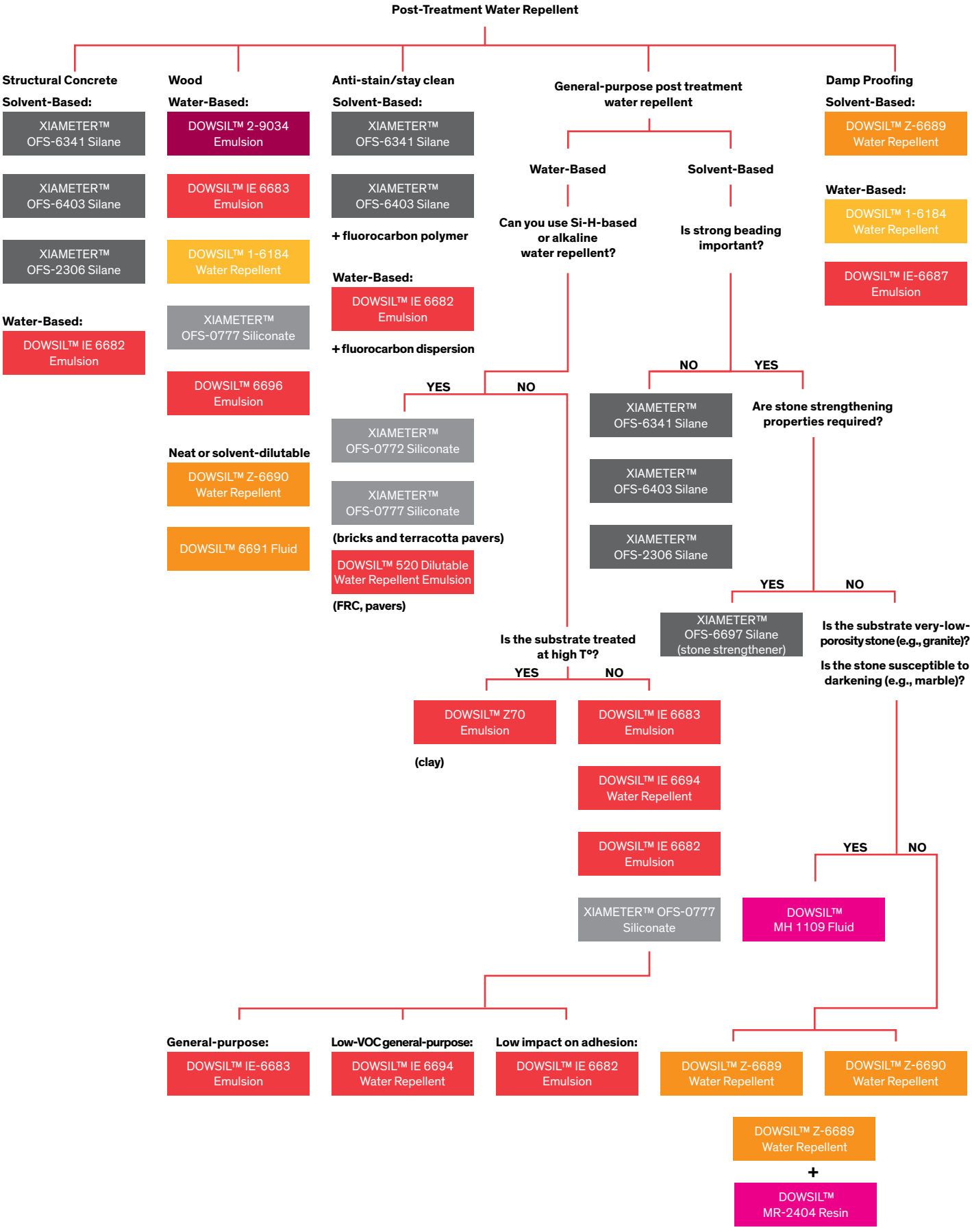
Product Properties

Product Type	Product Name	Dilution System (if needed)	General Description	Substrate/pH Type	Active Ingredient %	Typical Actives Usage Level	Specific Gravity	Flash Point, °C (°F)
Silane/ Siloxane Emulsions (Water-Dilutable)	DOWSIL™ 520 Dilutable Water Repellent Emulsion	Water	Silane/SiH siloxane emulsion blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	40	5 to 20	0.99	> 100 (212)
	DOWSIL™ IE 6682 Emulsion	Water	Silane/alkoxy resin	Post-treatment ("primer") for concrete or cementitious materials	52.5	5 to 20	0.95	> 100 (212)
	DOWSIL™ IE 6683 Emulsion	Water	Silane/siloxane resin blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	40	5 to 20	1	> 100 (212)
	DOWSIL™ IE-6687 Emulsion	Water	Silane/functional resin emulsion blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	52.5	5 to 20	0.98	> 100 (212)
	DOWSIL™ IE 6692 Emulsion	Water	Silane/functional silicone emulsion blend; contains no free siloxane	Integral water repellent	52.5	0.1 to 0.4 vs. dry composition	0.95	> 100 (212)
	DOWSIL™ IE 6694 Water Repellent	Water	Low-VOC (<100 g/L) silane/siloxane emulsion blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	60	5 to 20	1.02	> 100 (212)
	DOWSIL™ 6696 Emulsion	Water	Silane/siloxane emulsion	Wood	40	5 to 10	0.99	> 100 (212)
	DOWSIL™ Z70 Emulsion	Water	Silanol-functional siloxane emulsion	Hydrophobic additive for paint and render; used on cementbased materials; post-treatment for substrates with pH 7-10; admixture for substrates where pH is not a concern	60	0.15 to 0.5	0.99	> 100 (212)
Water-Based Siloxane	DOWSIL™ 1-6184 Water Repellent	Water	Water-soluble siloxane	pH neutral to 10	98	3.5 to 7.5	1.05	27 (81)
Silane/ Siloxane Blends (Solvent-Dilutable)	DOWSIL™ Z-6689 Water Repellent	Solvent	Solventless silane/siloxane blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	98	5 to 15	0.96	10 (50)
	DOWSIL™ Z-6690 Water Repellent	Solvent	Silane/siloxane blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	> 99	5 to 15	1.02	44 (111)
	DOWSIL™ 6691 Fluid	Solvent	Solventless silane/siloxane blend	Multisurface water repellent; neutral and moderately alkaline substrates; pH 7-10	> 99	5 to 15	1.025	100 (212)
Silicone Resin Emulsion	DOWSIL™ IE-2404 Emulsion	Water	Silicone resin emulsion	Renders/paints/stucco on cementitious material	50	3 to 10	1.02	>100 (212)
	DOWSIL™ IE - 6686 Water Repellent	Water	Emulsion of silicone resin	Cement-based materials	30	0.2 to 0.8 vs. cement content	0.99	50 (122)
Hydrophobic Powders	DOWSIL™ GP SHP 50 Silicone Hydrophobic Powder	Dry ingredient	Silane/siloxane-based powder	Hydrophobic powder additive in cementitious-based materials	20	0.2 to 1	0.61	>100 (212)
	DOWSIL™ GP SHP 60 Plus Silicone Hydrophobic Powder	Dry ingredient	Resin/siloxane-based powder	Hydrophobic powder additive in cementitious-based materials	20	0.1 to 1	0.7	>100 (212)

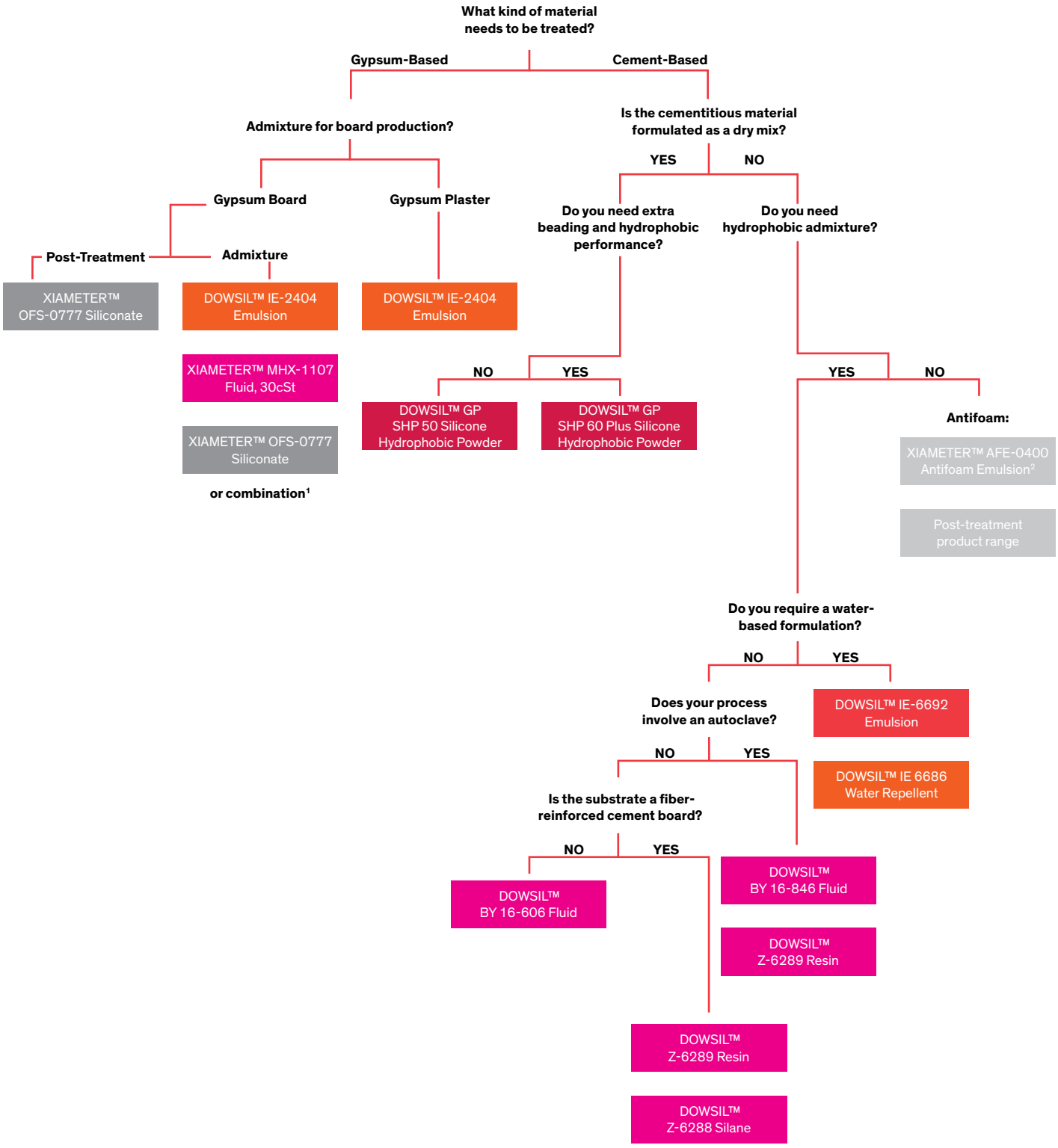
Product Type	Product Name	Dilution System (if needed)	General Description	Substrate/pH Type	Active Ingredient %	Typical Actives Usage Level	Specific Gravity	Flash Point, °C (°F)
Specialty Fluids	DOWSIL™ BY 16-846 Fluid	Solvent[1]	Functional siloxane	As an admixture-type additive for neutral and alkaline factory manufactured ALC boards; for autoclave	100	0.1 to 3	0.92	> 100 (212)
	XIAMETER™ MHX-1107 Fluid, 30cSt	Solvent	Linear SiH-functional siloxane	Gypsum	100	0.1 to 2	1	93 (200)
	DOWSIL™ MH 1109 Fluid	Solvent	SiH-functional siloxane	Natural stone: limestone, sandstone, marble, granite; pH neutral to 12	100	5 to 30	0.98	30 (86)
	DOWSIL™ Z-6289 Resin	Solvent[1]	Alkoxy-functional silsesquioxane	Fiber-reinforced composites, concrete, masonry; admixture or post-treatment	100	0.1 to 0.5 vs. dry composition	0.98	> 100 (212)
	DOWSIL™ MR-2404 Resin	Solvent	Alkyl-functionalized low-viscosity silicone resin	Neutral and alkaline mineral substrates such as brick, sandstone or cement-based materials	> 88	2 to 10	1.1	95 (203)
	DOWSIL™ BY 16-606 Fluid	Solvent[1]	Functional siloxane	As an admixture-type additive for neutral and alkaline factory manufactured ALC boards; for air cure	100	0.1 to 3	0.94	> 80 (176)
	XIAMETER™ PMX-0930 Silanol Fluid	Solvent	Silanol-functional siloxane	Perlite admixture or post-treatment material	100	0.5 to 5	0.98	100 (212)
Siloxane/Organic Emulsion	DOWSIL™ 2-9034 Emulsion	Water	Silane/organic polymer emulsion	Hydrophobic additive for wood sealer formulations	50	2 to 8	0.94	> 100 (212)
Siliconates	XIAMETER™ OFS-0772 Siliconate	Water	Sodium methyl siliconate	Neutral, bricks, ceramics; pH neutral to 10	32	0.5 to 3	1.25	> 100 (212)
	XIAMETER™ OFS-0777 Siliconate	Water	Potassium methyl siliconate	Neutral, bricks, ceramics; pH neutral to 10	40	0.5 to 3	1.29	> 100 (212)
Alkyl Alkoxy Silanes	XIAMETER™ OFS-6264 Silane	Solvent	Alkyl methoxy silane	Alkaline or neutral substrates such as concrete, mortar and brick, stone; pH slightly alkaline to 12	97	5 to 100	0.93	26.6 (79)
	XIAMETER™ OFS-6341 Silane	Solvent	Alkyl ethoxy silane	Alkaline or neutral substrates such as concrete, mortar and brick, stone; pH slightly alkaline to 12	98	5 to 100	0.88	65 (149)
	XIAMETER™ OFS-6403 Silane	Solvent	Alkyl ethoxy silane	Alkaline or neutral substrates such as concrete, mortar and brick, stone; pH slightly alkaline to 12	98	5 to 100	0.88	62 (144)
	XIAMETER™ OFS-6697 Silane	Solvent	Tetraethoxysilane	Alkaline or neutral substrates such as concrete, mortar and brick, stone; pH slightly alkaline to 12; may be used as densifier for concrete	99	5 to 100	0.93	54 (113)
	XIAMETER™ OFS-2306 Silane	Solvent	Alkyl methoxy silane	Alkaline or neutral substrates such as concrete, mortar and brick, stone; pH slightly alkaline to 12	96	5 to 100	0.92	32 (90)

[1]Products can be used under certain conditions in water-containing mixtures. Please consult your Dow Technical Service associate or refer to the specific product data sheet for additional details.

Building Materials Protection Selection Tree



Admixture Product Selection Tree



[1]For formulating safe and effective gypsum admixtures, contact your Dow Technical Service associate.
[2]Additional antifoam emulsions are available. Please contact your Dow Technical Service associate for assistance.

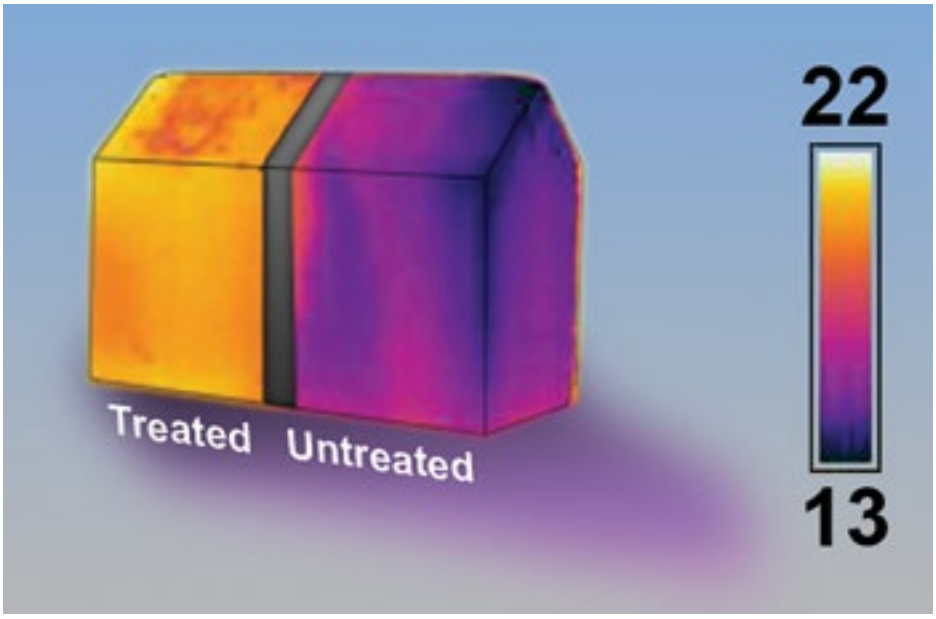
Protecting Buildings Saves Energy

Beyond the cost savings of longer-lasting, more durable buildings, Dow's building materials protection products can save energy costs, too. Treating substrates with hydrophobic materials from Dow makes your buildings more energy efficient, reducing two leading causes of structure heat loss:

- Heat loss from evaporation of absorbed water in untreated materials – As water evaporates, changing from liquid to vapor, it draws heat energy, cooling the substrate and structure and increasing energy consumption.
- Thermal conductivity – Testing shows that thermal conductivity of wet material is higher than that of dry material.

Hydrophobing technologies from Dow keep substrates dry, reducing thermal conductivity and increasing your energy efficiency.

Figure 3. Infrared imaging of treated and untreated substrates.



The reduced heat loss from evaporation of treated, dry substrates compared to untreated, wet substrates is visibly demonstrated with infrared imaging.

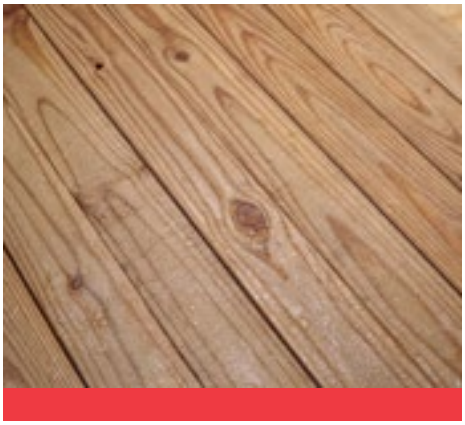
Let us help you invent the future of building materials protection.

Contact Us

Dow is collaborating with industry professionals around the world to improve the energy efficiency of buildings, offer longlasting solutions and provide excellent technical support. Taking a holistic approach, Dow brings together expertise from across the company to help customers find answers to a wide range of high performance building challenges.

Dow has sales offices, manufacturing sites, and science and technology laboratories around the globe.

For the most up-to-date information about DOWSIL™ construction chemical solutions for building materials protection, visit **consumer.dow.com/buildingmaterialsprotection**.



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The information contained herein is offered in good faith and is believed to be accurate. However, because conditions and methods of use of our products are beyond our control, this information should not be used in substitution for customer's tests to ensure that our products are safe, effective and fully satisfactory for the intended end use. Suggestions of use shall not be taken as inducements to infringe any patent.

Dow's sole warranty is that our products will meet the sales specifications in effect at the time of shipment.

Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted.

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