CONCRETE PROTECTION
for Reinforced Benefits

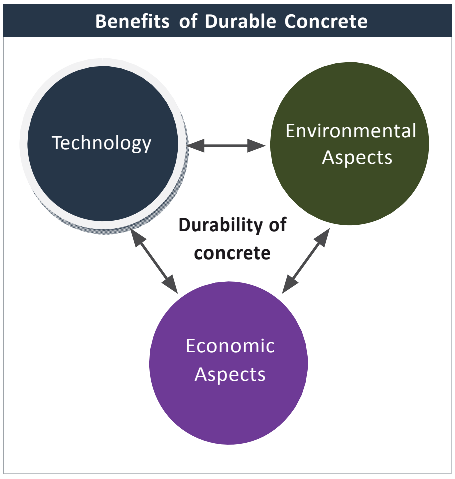
www.abolinco.com

LASTING PROTECTION FOR BUILDINGS FACADES & CONCRETE BASED BUILDING STUCTURES

Concrete is today's main building material. Our age of globalization requires a stable and fully-functional infrastructure that connects people and markets. This infra - structure is based on concrete. Modern road and bridge construction would be inconceivable without concrete, as would skyscrapers and industrial buildings. Bigger, higher, wider – the global construction boom constantly sets new challenges for materials and technology, as the size and number of buildings increase. That's why concrete will remain the No. 1 building material in the future.

Concrete in Danger

Concrete is a versatile building material, used especially in civil engineering in combination with steel. However, concrete and steel are vulnerable to harmful substances that penetrate into the building material by means of moisture. This can result in costly concrete damage due to reinforcement corrosion.



Concrete Needs Protection

Only effective preventive measures such as hydrophobic impregnation provide reliable protection for concrete structures. To this end, Abolin Co has developed environmentally compatible impregnating agents and highly effective techniques whose aim is to preserve the value of old and new buildings and protect them against weathering and structural damage.

Repair Is the Most Expensive Solution

Repairing concrete structures is up to ten times more expensive than preventive measures such as hydrophobic impregnation. With Abolin's innovative products for the water-repellent treatment of concrete, it's possible to prevent repair – and so avoid high costs and consumption of energy and resources.

Hydrophobic Impregnation Reduces Costs by up to 90%

It's estimated that a water-repellent treatment costs only 10% of extensive renovations.

Cost Benefits for Property Developers

The long-term cost savings for property developers are huge! Why is that? In fact the bulk of the costs – some 80% – are caused not by the actual repair work but by infrastructure measures (e.g. traffic diversions) and setting up the building site. In summary, we can see that more prevention = fewer repairs = Lower overall costs.

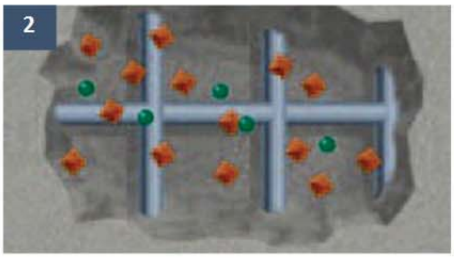
Concrete and Reinforced Concrete

Concrete and Reinforced Concrete are building materials that have significantly changed construction over recent years. Their development provided architects, builders and engineers with building materials that, in addition to offering excellent mechanical and physical properties (such as compressive and flexural strength), could be shaped in new and unprecedented ways. It became possible to erect imposing structures such as bridges, towers and skyscrapers, as well as more intricate structures. Its cost-effectiveness and durability also make concrete a vital building material for the future.

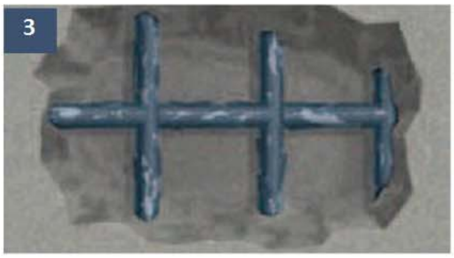
The Right Mix Is the Key

Concrete and reinforced concrete consist mainly of cement binder, sand aggregate and additives. In the case of reinforced concrete, the steel reinforcement improves the concrete's tensile strength. Water is also required – for hardening the cement and attaining the desired processing consistency. One way of determining concrete quality is by the water/cement value, the ratio of mixing water to cement. Excess water results in an increased number of capillary pores in the cement and thus a loss in rigidity. Correct processing and mixing of the ingredients is necessary to ensure a building material with excellent weathering and aging resistance. Other- wise, serious damage impends after a relatively short time.

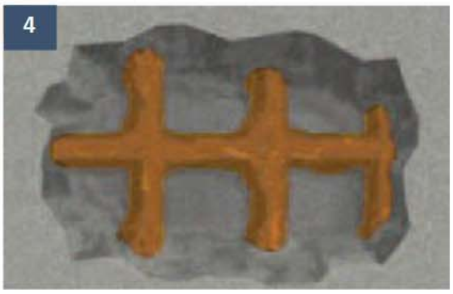
The reinforcement steel undergoes passivation in alkaline milieu.



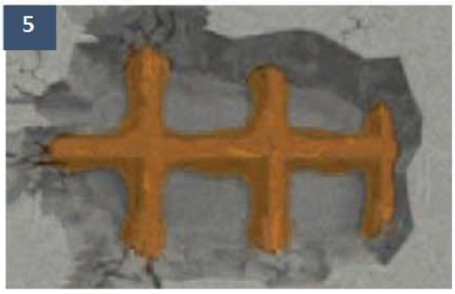
Dissolved salts, such as chlorides and acidic gases (e.g. CO2), pene-trate into the concrete and threaten the reinforcement.



The salts reach the steel and dissolve the protective layer. Pitting corrosion starts to occur.



The corrosion process results in a vol-ume expansion and pressure build-up in the structure.



Crack formation and spalling of the concrete are the result.

The viewer sees the corrosion damages like that.

Despite concrete's durability, serious concrete damage that endangers a building's existence frequently occurs. The main cause of concrete damage is reinforcement steel corrosion due to environmental influences.

Chlorides Spoil the Cost Balance

Fresh concrete is highly alkaline, which passivates the reinforcement steel (1).
The greatest damage, which occurs, e.g., when the reinforcement steel corrodes, is caused by water-borne salts, particularly chloride ions. They are absorbed by the concrete, typically in the form of road salt or seawater). This particularly affects highway structures, but also buildings in coastal regions.

Corrosion Attacks Steel

Ultimately, the salt transported into the concrete by water (2) causes the steel's passivating layer (protective layer) to dis-solve. Under the influence of oxygen and moisture, the steel begins to rust and pitting corrosion starts to occur (3). Since the iron's corrosion process involves a drastic volume expansion (bursting force) (4), the concrete layer above the reinforcement spalls (5), resulting in serious concrete damage (6).

Concrete has two Arch- Enemies:

Water Soluble Salts and Gases

Freeze/Thaw Cycles, Road Salts and Sea Salt Attack Concrete

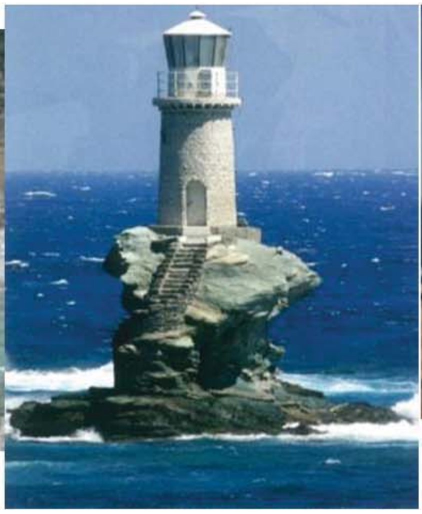
Concrete damages always involve moisture. Although water is important in making concrete, it can also be destructive. Furthermore, it carries aggressive substances such as chloride ions from road salts into the concrete. Water is also a reaction medium and partner for destructive chemical processes that particularly attack the reinforcement steel by corrosion.

Concrete Absorbs Water

When concrete and other mineral building materials come into contact with water, they absorb an amount which depends on their porosity. This contributes to the following forms of damage:

Typical Structural Damage

- **Concrete destruction by corrosion of the reinforcing steel (chloride induced)**
- **Chemical corrosion, e.g. binder transformation by acidic gases (SO_2, NO_2, CO_2)**
- **Cracks by swelling and shrinkage**
- **Frost damage and freeze/thaw damage by road salts**
- **Efflorescence and salt damage by hydration and crystallization**
- **Lime leaching**
- **Rust stains**
- **Dirt pick-up and stains**
- **Fungal, moss, lichen and algal growth**



Hydrophobic Impregnation ENHANCES CONCRETE'S DURABILITY

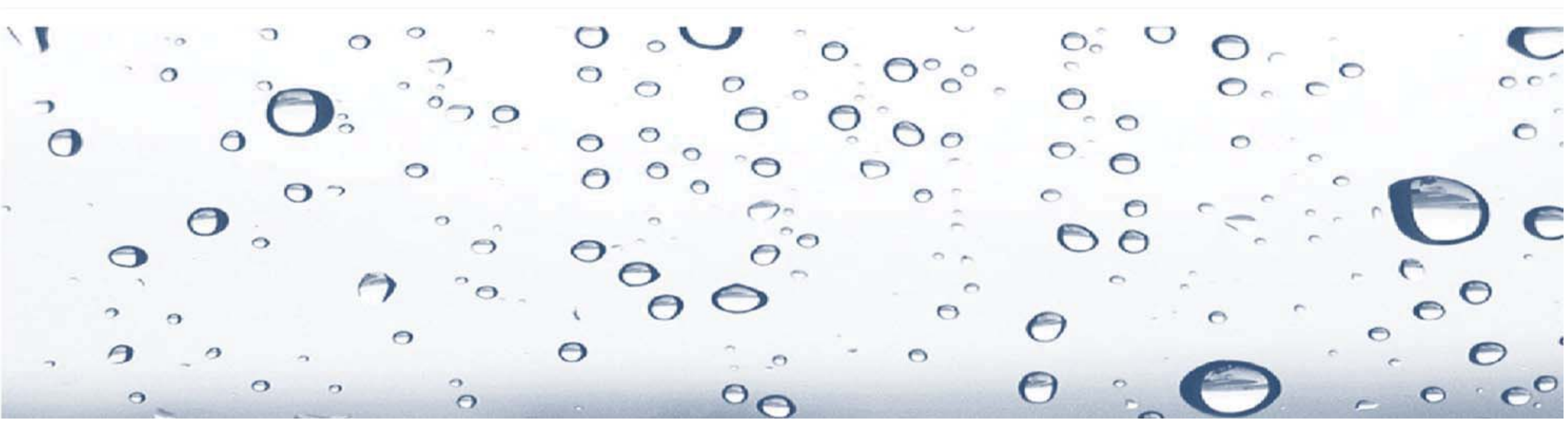
Much of the damage caused by moisture can be prevented, or at least reduced or kept at bay for longer, by means of hydrophobic impregnation.

Defense against Water and Harmful Substances

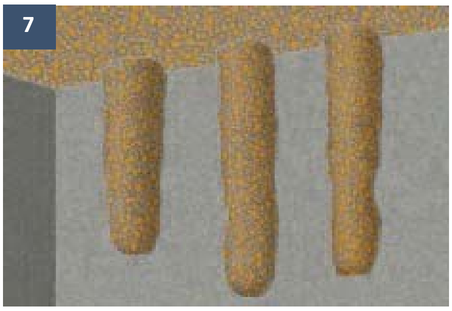
Absorption of harmful substances, which may lead to the structural damage described above, is usually the outcome of contact between the building material and water. This is an example of capillary water absorption, and also occurs when splashes of water land on de-icing salt. Forming a hydrophobic zone greatly reduces the amount of water and harmful substances which are absorbed. The building fabric remains drier as a result and is consequently less susceptible to the damage mechanisms described above.

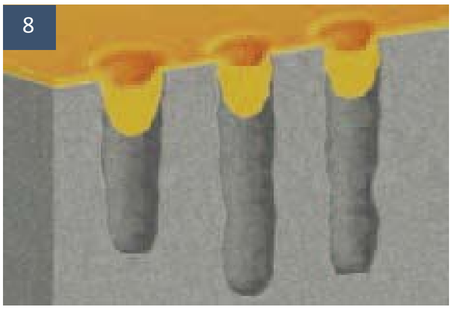
Silanes Can Rescue Concrete Structures

The most efficient way of protecting concrete is to prevent water uptake. The past decades have shown that silanes with long alkyl chains (e.g. isooctyl) are the ideal product class for this. Their current dominance in masonry protection stems from their outstanding water-repellency and durability. Silanes outperform rival product classes in their resistance to physical, chemical and microbiological attack. Provided that the right product is chosen, impregnation with silane wills pre- serve a structure for a long time.



CONCRETE NEEDS EFFECTIVE AND LONG LASTING PROTECTION





7. Water-repellent treatment the capillaries remain open.

8. Film-forming coating – the capillaries are sealed.

The concrete's pores remain open after water-repellent treatment, so that water - vapor and gas diffusion is not measurably influenced. Thus, a concrete's natural properties are retained, and even when the surface is damaged (crack formation) it remains adequately protected.

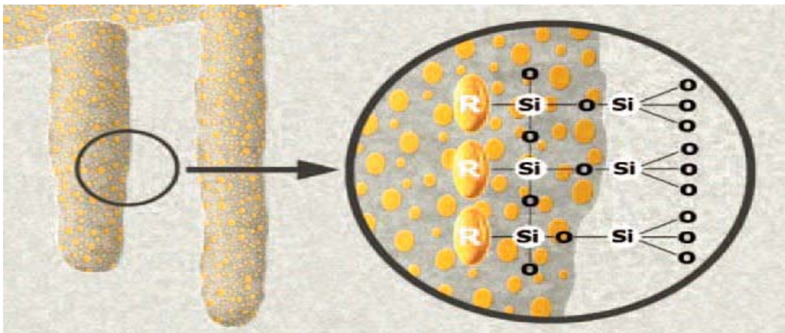
As a result, the water-repellent treatment has a significantly longer service life. These are clear advantages over film-forming coatings, which easily flake off as they don't allow water to pass out. Moreover, a damaged protective film quickly leads to concrete damage, as water and aggressive substances can then easily penetrate.

Hydrophobizing and Film-Forming Measures

There are generally two methods available: hydrophobic Impregnation and film-forming coatings. In both cases, protection against moisture is central since water plays a key role by transporting corrosive substances, e.g. road salts, as well as facilitating the corrosion mechanisms.

Abolin Co, Water Repellents Achieve:

- Drastic reduction in water uptake
- Chloride barrier and thus protection against reinforcement corrosion
- Retention of high water-vapor permeability
- Extensive penetration
- High UV resistance
- Surfaces not rendered shiny or tacky, or caused to yellow
- Adequate resistance to alkalis
- Safe use
- Exemplary environmental compatibility



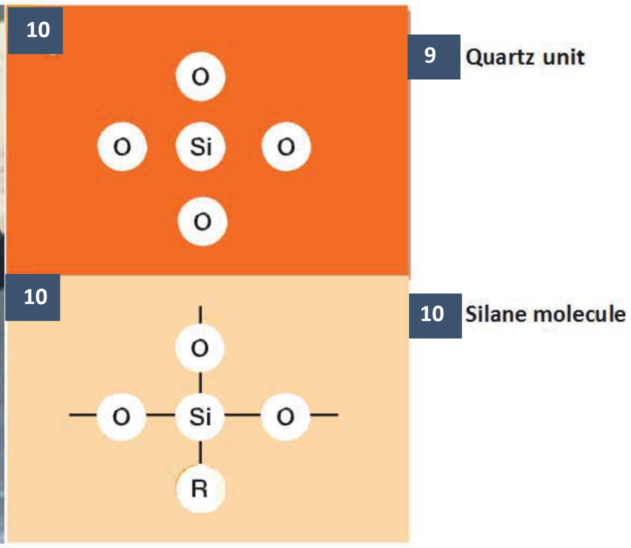
The Silane Docks onto the Concrete to Develop the Water-Repellent Effect

Silanes as Ideal Water-Repellent Agents in Abolin Co, Products Solutions

Organosilicon compounds have a long track record as water-repellent agents. They feature excellent water repellency without significantly impairing the water- vapor permeability, and long durability, which stems from silanes' high resistance to external influences such as UV radiation, thermal stress, aggressive substances and microbes. This is due to extremely stable covalent bonds between the silane and the silicate matrix of the pores and capillary walls in the concrete.

Silanes for water-repellent treatment of concrete must possess two specific properties: they must penetrate well into the relatively dense concrete and resist degradation by the high alkalinity found especially in fresh concrete. The purpose of hydrophobic impregnation is to protect exposed exterior walls from moisture and associated damage by applying a color- less, non-film-forming agent that prevents capillary uptake of water and the aggressive substances dissolved in it. Because the capillaries remain open, the substrate retains its vapor permeability.

Cool Barrier Grip SILANES – RELIABLE VEHICLES OF Hydrophobic Impregnation



Fully-cured silane's close structural resemblance to quartz is the reason for its high affinity for silicate building materials, and for the exceptional durability of the hydrophobic impregnation.

Tried and Trusted

Organosilicon compounds have been recognized as the ideal active agents for the hydrophobic impregnation of absorbent mineral building materials for over 40 years now. The compounds work by binding strongly to the building material to form extremely stable Si-O-Si structures, similar to silicone resin.

We can see the close similarity if we compare the molecular structure of a fully reacted silane (10) with that of natural quartz (9). The fully reacted silane is simply quartz modified with organic groups. This close structural resemblance is the reason for the high affinity of silicone resins for silicate building materials, and for the exceptional durability of the water-repellent treatment. The organic group R makes the silane- treated construction material outstandingly water repellent. Since it is, moreover, extremely resistant to many chemical, physical and biological influences, the hydrophobic effect lasts for decades.

Today, alkylalkoxysilanes such as iso octyltriethoxysilane set the standard in terms of highly efficient penetration and excellent resistance to high alkalinity.

They are colorless, low molecular (and thus low viscosity), highly penetrating liquids that are generally applied to concrete in undiluted form. There, they react with moisture, liberating alcohol, and form extremely stable bonds with the pores and capillary walls of the concrete.

After the reaction, the iso-octyl group juts out into the centre of the capillaries and pores, which is the reason behind hydrophobic impregnation's high effectiveness.

Optimum Silane Efficiency

Today's scientific findings confirm silanes' excellent and long-lasting effectiveness as concrete water repellents. However, for optimum effect, two points must be observed during processing:

- Liquid water repellents must generally be applied in several coats to achieve the required active concentration and penetration depth.
- On vertical and particularly overhead surfaces, the material could potentially run off before it penetrates into the concrete. In such cases, products with higher viscosity such as Cool Barrier Grip Creme are ideal for attaining an adequate contact time.

Cool Barrier Grip SILANES – EXPERT IN Masonry Protection

Abolin's protective coating systems covers an extensive range of applications, from preservation of historic buildings to concrete protection. Ongoing product development ensures that products are continually adapted to meet market requirements.

The mechanisms of water uptake by building materials are as varied as the possible forms of damage to the building. This chapter deals with the mechanisms of capillary water uptake, condensation, and hygroscopic water uptake, as well as the consequences for the building fabric.

The term "water-repellent treatment" refers to the treatment of mineral substrates, especially facades of fair- faced masonry and concrete, with hydrophobic impregnating agents. The term "impregnating agent" is frequently used on its own in this context, since it is considered self - evident that these agents are hydro- phobic, that is, water-repellent. By definition, however, "to impregnate" just means to saturate an absorbent material with a low-viscosity, capillary- active liquid.

It follows that impregnations – also of masonry – do not necessarily imply water- repellent treatment. They may serve, for example, to strengthen and consolidate the masonry, or to imbue it with biocidal properties. The purpose of water-repellent treatment is to protect exposed facades from moisture and attendant damage by applying a colorless, non-film-forming agent which prevents capillary uptake of water and the aggressive substances dissolved therein. Because the impregnation does not block the capillaries, the substrate retains its vapor permeability.

Capillary Water Uptake

Capillary water uptake is responsible for the penetration of large volumes of water into the building material within a short time. The amount of water absorbed depends primarily on the radius of the capillary pores in the building material. There are three pore categories: Micropores have a radius of less than 10-7m, gel pores less than 10-8m. These small pores do not permit capillary water transport. Water can only penetrate these pore spaces in the form of vapor. Consequently, building materials in which micropores dominate are practically impervious to water penetration by capillary action. They are likewise difficult to impregnate, since the water repellents cannot penetrate into these pores, either.

Pores with a radius of between 10-7m and 10-4m are referred to as macropores or capillary pores. These pores support capillary action, and are able to transport water and other liquids in the building material to a degree dependent on their capillarity.

Building materials with a high proportion of such pores are generally well suited for impregnation with water repellents.

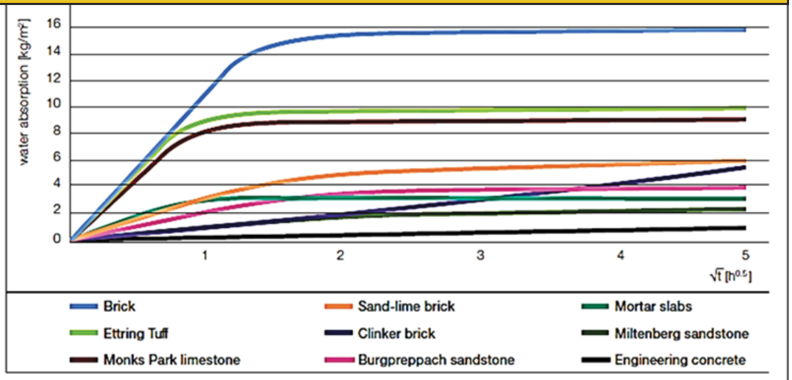
Air pores, as the third pore category, have a radius exceeding 10-4 m. These large pores, like micropores, are unsuitable for capillary water transport.

Capillary water absorption by mineral building materials is usually according to the "square-root-of-time law." If water absorption W is plotted against the square root of the time t, a straight line is obtained, at least for the initial phase of capillary absorption. The gradient is referred to as the water-absorption coefficient, or often just as the w value.

Fig. 1 shows characteristic water-absorption curves for different building materials. The w values range from 0.15 $kg/m^2h^{0.5}$ for the very dense bridge concrete to 11.5 $kg/m^2h^{0.5}$ for the highly absorbent brick.

$W = w\sqrt{t}$
W water absorption
w water absorption coefficient $[kg/m^2h^{0,5}]$
t absorption time [h]

Fig. 1



Unlike the various film-forming coatings, building materials that have been treated with a water repellent retain their vapor permeability. This is because organosilicon water repellents do not seal the pores at the surface of the mineral masonry substrate, but form a very thin layer on the pore walls. Siliconized pores are no longer wetted by water, and capillary water uptake is prevented.

Hygroscopic Water Absorption

The presence of soluble salts increases the equilibrium moisture content of building materials due to the salts' hygroscopicity, i.e. their ability to attract water vapor. The extent of this hygroscopic moisture absorption is determined primarily by the chemical nature of the salts, by their concentration in the masonry, and by the moisture content of the ambient air. Hygroscopic water absorption is especially serious when nitrates are present in the masonry.

It may be concluded from the above comments about the various water-up- take mechanisms that provided the building material has pores which do permit capillary action, or the salt content – at least in the surface zone – is not excessively high, capillary moisture absorption without doubt poses the most serious problem. In this case, water-repellent treatment is certainly one of the best ways to protect the masonry from moisture damage. Unlike film-forming coatings, such as those based on acrylic, polyurethane or epoxy resins, Cool Barrier Grip organosilicon water repellents do not seal the pores at the surface of mineral masonry, but simply form a very thin layer on the pore walls

Cool barrier Grip Water repellents fulfill the following requirements:

- Drastic reduction in water uptake
- Retention of high water-vapor permeability
- Extensive penetration
- Adequate resistance to alkalis
- Resistance to UV light
- Surfaces not rendered shiny or tacky, or caused to yellow
- Environmental compatibility

Water under Pressure is a Problem

Ground water can be a serious problem in cellars, as can driving rain for highly exposed facades. The larger the pores in the building material are, the greater the problem. Since the pores are open, a water-repel- lent treatment obviously cannot always protect a building material from ground water or driving rain. However, properly applied water repellents are perfectly sufficient to render many standard building materials, such as sand-lime brick, clinker brick and plasters, resistant even to driving rain with velocities of 100 km/h and more. "Properly applied" in this context means, for example, that the water repellent produces a hydrophobic zone which is not merely superficial but extends to a good depth.

Water Vapor Can Diffuse

Since the pores in hydrophobically treated masonry remain open, the building material retains its vapor permeability, or "breathability." Accordingly, the passage of water vapor is impaired only slightly, if at all. This is of great importance, since moisture contained in the building material can diffuse to the outside in the form of water vapor without causing any damage, e.g. blistering and subsequent spalling, which frequently occur with thick surface coatings.

The most important criteria which water repellents must satisfy are reduction in water uptake, penetration by the hydrophobic active agent, permeability to gas and water vapor.

Capillary Water Uptake

The most important requirement which a water repellent must fulfill is a significant reduction in capillary water uptake. A common specification is that the amount of water absorbed by a building material during 24 hours' immersion in water be reduced by at least 80 %.

Depth of Penetration

In order that the reduced tendency to absorb water may be long-lasting, it is obviously not sufficient if the water-repel- lent effect is limited to the surface of the building material. It is essential that the hydrophobic zone extend deep below the surface, but it is difficult to give a general answer to the frequently-asked question as to exactly how deep. Of course, from a technical point of view, there is nothing against striving for maximum possible penetration, but it must be remembered that this is only achieved by applying a large quantity of active agent, which incurs high costs. For many substrates, a penetration depth in the order of a few millimeters is technically adequate and economically acceptable.

Gas Permeability

The term "gas permeability", when used in the context of water repellents, refers primarily to the impregnated structure's permeability to water vapor and carbon dioxide. Water-vapor permeability is essential for allowing any moisture beneath the surface to dry.

Table 1 shows, the Abolin's agents reduced the water vapor permeability by less than 20%.

Table 1

Mortar slabs (water/cement ratio)	Dilution	Abolin's agent absorption [g/m^2]	Weight loss [g/d]	Water-vapor permeability [g/m^2d]
Untreated	-	-	0.70	110.6
Cool Barrier Grip IPA	1:9	480	0.65	102.3
Cool Barrier Grip Crème	undiluted	300	0.57	89.7

The Effectiveness of Abolin's Products

Tables 2a and 2b below show test results for water uptake, beading and penetration depth of Abolin's products applied to different substrates. Normal tap water was used as diluent for the aqueous products. All substrates were impregnated by means of immersion (immersion times: 1 minute for mortar and concrete, 5 minutes for all other substrates). Water absorption was determined 14 days after impregnation, again by way of immersion (specimens were covered with 5 cm of water, in accordance with EN 12859). To determine the penetration depth, a specimen of each product was broken 14 days after Impregnation and dyed water was dripped onto the fracture surface.

Table 2a

Sand-lime brick	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	12.9
Cool Barrier Grip IPA	1:9	557	0.5-2	1	1.0
Brick	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	18.2
Cool Barrier Grip IPA	1:9	1669	32-48	2	0.50
Clinker-brick	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	2.6
Cool Barrier Grip IPA	1:9	124	4-9	2	0.13
St. Margaret limestone	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	12.4
Cool Barrier Grip IPA	1:4	1213	11-20	3	9.5
Volcanic Tuff	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	17.8
Cool Barrier Grip IPA	1:4	667	2.5-4	1	1.9
Yellow Sandstone	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h
Untreated	-	-	-	5	5.8
Cool Barrier Grip IPA	1:4	311	1.5-5	3	2.7

Table 2b

Mortar slabs (water/cement ratio 0.5)	Dilution	Absorption [g/cm²]	Penetration depth [mm]	Beading effect	Water absorption [%] 24h	Water absorption [%] 28d
Untreated	-	-	-	5	6.9	7.6
Cool Barrier Grip IPA	1:4	210	1-3	2	1.0	4.0
	1:1	216	2-4	2	0.9	3.3
Cool Barrier Grip Creme	undiluted	200*	4-8	2	0.5	1.9
	undiluted	400*	8-12	3	0.4	1.6
Concrete (grade C30/37)	**Dilution**	**Absorption [g/cm²]**	**Penetration depth [mm]**	**Beading effect**	**Water absorption [%] 24h**	**Water absorption [%] 28d**
Untreated	-	-	-	5	3.1	3.6
Cool Barrier Grip IPA	1:1	76	1-2	2	0.5	2.4
Cool Barrier Grip Creme	undiluted	200*	2-8	2	0.1	0.7
	undiluted	400*	6-12	3	0.1	0.3

*Applied by brush

MASONRY PROTECTION AGENTS
EN 1504-2

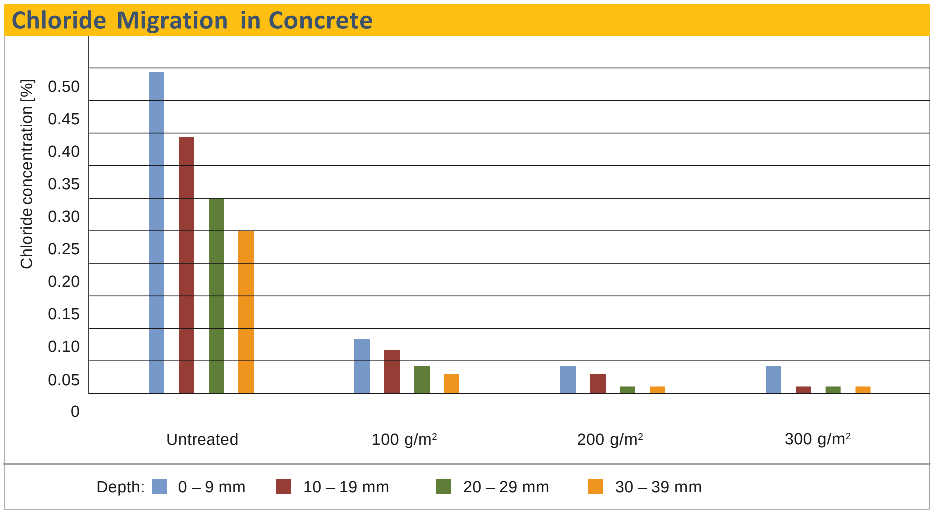
Cool Barrier Grip Crème – the Expert
- Certified to EN 1504-2
- Water-repellent cream
- Aqueous
- Solvent-free
- Silane-based
- For concrete and reinforced concrete
- Use undiluted

Cool Barrier Grip SWR – the Generalist
- Certified to EN 1504-2
- Liquid water repellent
- Monomeric silane
- For concrete and reinforced concrete
- Use undiluted

Cool Barrier Grip WWR – the Specialist
- Certified to EN 1504-2
- Solvent-free silicone microemulsion concentrate
- Silane/siloxane-based
- Impregnating agent for concrete and reinforced concrete
- Impregnating agent for in-plant-manufactured building materials
- Use diluted in water

Hydrophobic Impregnation Agents – Test Results – DIN EN 1504-2

				Applications				
				Drying rate coefficient	Absorption ratio	Absorption rate after exposure to alkali	Freeze-thaw salt stress test	Depth of penetration
				EN 13579	EN 13580	EN 13580	EN 13581	EN 14630
				Class I: > 30 % Class II: > 10 %	< 7,5%	< 10%	Cycles treated vs. control	Class I: < 10 mm Class II: ≥ 10 mm
	Actives	Type	Use					
Cool Barrier Grip Creme	80%	Silane	Ready to use	Class I	+	+	> 20	Class II
Cool Barrier Grip SWR	> 98%	Silane	Ready to use	Class I	+	+	> 20	Class II
Cool Barrier Grip WWR	100 %	Silane Siloxane	Dilute to 25% actives	Class I	+	+	Not Tested	Class I



Chloride migration in concrete (strength class C35/45). Untreated specimens and those treated with Cool Barrier Grip CREME. Specimens conditioned for 10 days in 10% NaCl solution.

SPECIAL CONSTRUCTION CHEMICALS GRIP SILICONES

COOL BARRIER GRIP CREME

MASONRY WATER REPELLENTS

Product description

COOL BARRIER GRIP CREME is aqueous, solventless, creamy, silane-based water repellent. It is a high quality specialty product for hydrophobic impregnating of both normal and reinforced concrete.

Special features

COOL BARRIER GRIP CREME is characterised by:

- excellent penetration
- solventless, aqueous and environmentally compatible
- low volatility
- high resistance to alkalis
- thixotropic and may so be applied without loss of material

Treated concrete will have the following permanent properties:

- greatly delays chloride and water absorption by concrete
- no loss in breathability
- improved durability against freeze-thaw de-icing salt stress
- enhanced durability
- provides good adhesion for paints

COOL BARRIER GRIP CREME is a unique impregnating agent because it is thixotropic. It has an outstanding ability to impregnate high-quality concrete and reinforced concrete. Unlike conventional liquid products, COOL BARRIER GRIP CREME can be applied in just one coat of the desired thickness (at the very most, two coats). The silane active ingredient penetrates the substrate within 30 minutes to several hours, the exact time depending on the porosity and thus quality of the concrete. On reaction with the substrate, it releases ethanol and is converted into a polymeric silicone resin. A creamy layer forms initially, but this then disappears completely. As the active ingredient is the same as in conventional liquid impregnating agents, impregnation with COOL BARRIER GRIP CREME does not clog the pores or capillaries, nor does it affect its ability to "breathe".

COOL BARRIER GRIP CREME is designed to penetrate deeply into concrete so as to afford optimum protection against absorption of water and pollutants as well as freeze / thaw cycles.

This effect should not be confused with the "beading" effect imparted by impregnating agents that is often referred to as water repellency. Beading is only a surface effect, and it plays a secondary role in protecting the substrate. Concrete treated with COOL BARRIER GRIP CREME has initially only a moderate beading effect but this increase after the surface has been wetted.

Application

COOL BARRIER GRIP CREME is recommended particularly for impregnating and priming concrete and reinforced concrete used in building bridges, roads and buildings In principle, COOL BARRIER GRIP CREME may be used on any alkaline substrate that has been treated previously with concentrated or undiluted impregnating agents, such as alkoxysilanes.

Processing

The work performed (preparing the concrete surface, setting up a reference surface, application and quality control) must follow the applicable regulations.

- Concrete should not be impregnated until at least four weeks after it has been produced so that the setting of the cement is not affected.
- New surfaces that are still unsoiled must be cleansed of coarse particles and dust deposits by sweeping or, if necessary, using compressed air. Surfaces already weathered, and those heavily soiled by oil, rubber residue, etc., must first be cleaned using superheated steam or high-pressure water before commencing treatment. It is imperative that the water used be siphoned off immediately to prevent saturation of the concrete.
- Impregnation should always be performed on superficially dry concrete, i.e., when the surface of the concrete appears evenly dry, no more damp patches are visible and the moisture content equilibrium is established. To this end, moisture in the surface zone of the concrete is measured using a suitable technique. The surface-zone moisture content of the concrete (from the surface to a depth of 20 mm) should not exceed 4 wt%.

COOL BARRIER GRIP CREME best applied to the concrete by the airless technique, undiluted and in the desired thickness. Brushes, lambskin rollers or spatulas may be used for smaller areas.
Up to 400g/m² may be applied in one operation to vertical surfaces and roofs, without loss off material. The exact amount depends on the absorbency of the substrate.
At higher application rates, the impregnating agent might liquefy at the top of the concrete and it might start to run off. A second coat of COOL BARRIER GRIP CREME may be applied at any time, but is usually unnecessary.
- In the event of unexpected rain, cover surfaces already impregnated and halt all further impregnation. COOL BARRIER GRIP CREME should not get into direct contact with bitumen. The resistance of insulant against COOL BARRIER GRIP CREME has to be determined depended on temperature.

Storage

The 'Best use before end' date of each batch is shown on the product label.

Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

Safety notes

Comprehensive instructions are given in the corresponding Material Safety Data Sheets. They are available on request from Abolin Co Greece subsidiaries.

Product data

Typical general characteristics	Inspection Method	Value
Appearance		white or yellowish creme
Active substance		approx. 80 wt. %
Density		approx. 0,9 g/cm³
Flash Point	ISO 3679	64 °C
These figures are only intended as a guide and should not be used in preparing specifications		

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0921	
Abolin Co Greece Athens 18 Galaxia Str 12462 Haidari	
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EN 1504-2:2004	
Surface protection products - Hydrophobic impregnation EN 1504-2:ZA.1a	
No. 0921 - CPR - 2171	
Depth of penetration	Class II ≥ 10mm
Water absorption and resistance to alkali	Absorption ratio < 7,5% compared with the untreated specimen < 10% after immersion in alkali solution
Drying rate for hydrophobic impregnation	Class I > 30%
Loss of mass after freeze-thaw salt stress	Fulfilled (weight loss at least 20 cycles later than treated sample)
Release of dangerous substances	NPD

SPECIAL CONSTRUCTION CHEMICALS GRIP SILICONES

COOL BARRIER GRIP SWR

MASONRY WATER REPELLENTS

Product description

COOL BARRIER GRIP SWR is a mixture of octyltriethoxysilanes isomers, with isooctyltriethoxysilane as the main component.

COOL BARRIER GRIP SWR is used in undiluted form for the hydrophobic priming and impregnation of concrete and reinforced concrete or as an admixture for the integral waterproofing of fresh concrete.

In addition COOL BARRIER GRIP SWR is suitable for the hydrophobic treatment of fillers and pigments.

Special features

COOL BARRIER GRIP SWR is characterised by:

- Excellent penetrating power
- (when applied retroactively)
- no solvents, environmentally compatible
- low volatility
- high resistance to alkalis

Treated concrete will have the following permanent properties:

- dramatic reduction in chloride and water absorption
- no loss in breathability
- reduces loss of concrete due to freeze / thaw action in the presence of de-icing salt
- enhanced durability
- provides good adhesion for paints

In the construction material, COOL BARRIER GRIP SWR reacts with atmospheric moisture and / or the water in the building material's pores, eliminating alcohol. The active thus substance formed greatly reduces the concrete's absorbency in the active zone (penetration depth after additional treatment), but without blocking any pores or capillaries. The impregnated building material retains very high water-vapor permeability.

Application

COOL BARRIER GRIP SWR is recommended for the hydrophobic impregnation and priming of concrete and reinforced concrete in road, bridge and building construction. It is also ideal as a waterproofing concrete admixture. In addition it is suitable for the hydrophobic treatment of fillers and pigments.

Processing

Processing as a Hydrophobic Impregnating Agent for Concrete

The work performed (preparing the concrete surface, setting up a reference surface, application and quality control) must follow the applicable regulations.

- Concrete should not be impregnated until at least four weeks after it has been produced so that the setting of the cement is not affected.
- New surfaces that are still unsoiled must be cleansed of coarse particles and dust deposits by sweeping or, if necessary, using compressed air. Surfaces already weathered, and those heavily soiled by oil, rubber residue, etc., must first be cleaned using superheated steam or high-pressure water before commencing treatment. It is imperative that the water used be siphoned off immediately to prevent saturation of the concrete.
- Impregnation should always be performed on superficially dry concrete, i.e., when the surface of the concrete appears evenly dry, no more damp patches are visible and the moisture content equilibrium is established. To this end, moisture in the surface zone of the concrete is measured using a suitable technique.

The surface-zone moisture content of the concrete (from the surface to a depth of 20 mm) should not exceed 4 wt%.

- Evenly apply the impregnating agent to the building material in two coats, wet-on-wet. The two coats are absolutely essential to prevent the formation of defects in the impregnated surface. Do not allow puddles to form. The impregnating agent is applied by flow coating at reduced pressure. A lambskin roller may be used afterward for more even coverage.
- In the event of unexpected rain, cover surfaces already impregnated and halt all further impregnation.
- COOL BARRIER GRIP SWR should never come in direct contact with bitumen.

The resistance of insulating materials to COOL BARRIER GRIP SWR must be tested on a case-by-case basis for the required temperatures.

SPECIAL CONSTRUCTION CHEMICALS GRIP SILICONES

Processing as a Concrete Admixture (Water Resisting Admixture)

COOL BARRIER GRIP SWR is approved as a water resisting admixture under EN 934-2:2009 Tab. 9.

The recommended admixture range is 0.1 % to 1.0 % of the cement content. A significant reduction in water up-take can already be achieved at a concentration of 0.2 % of the cement.
COOL BARRIER GRIP SWR is added either simultaneously with or immediately after the mixing water – it should never be added along with other additives. We recommend testing compatibility with other concrete admixtures separately. A longer mixing time will thoroughly distribute the product within the overall system, which in turn will make it highly effective.

An initial test according to EN 206-1 and EN 1045-2 must be conducted for each new concrete composition. Finer adjustment of the fresh and set concrete properties by, for instance, varying the binder content pursuant to EN 206-1 and EN 1045-2 is recommended on a case-by-case basis. The concrete may harden more slowly during the first days in isolated cases.

When used in concrete goods or similar concrete products according to EN 1338, 1339 or EN 1340, an initial-type test (cf. section 6.2 of the respective standard) is recommended.

Storage

The containers must be protected against sunlight.
The 'Best use before end' date of each batch is shown on the product label.
Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

Safety notes

Comprehensive instructions are given in the corresponding Material Safety Data Sheets.
They are available on request from Abolin Co Greece subsidiaries.

Product data

Typical general characteristics	Inspection Method	Value
Appearance		clear, colorless
Active sIliane		approx. 99 wt. %
Density at 25 °C		approx. 0,879 g/cm³
Flash Point	ISO 3679	> 40 °C
Molecular weight		approx. 276 g/mol
Viscosity, dynamic at 25 °C	DIN 51562	1,9 mPa.s
Boiling point / Boiling range at 1013 hPa		236 °C

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EN 1504-2:2004

Surface protection products - Hydrophobic impregnation
EN 1504-2:ZA.1a

No. 0921 - CPR - 2171

Depth of penetration	Class II ≥ 10mm
Water absorption and resistance to alkali	Absorption ratio < 7,5% compared with the untreated specimen < 10% after immersion in alkali solution
Drying rate for hydrophobic impregnation	Class I > 30%
Loss of mass after freeze-thaw salt stress	Fulfilled (weight loss at least 20 cycles later than treated sample)
Release of dangerous substances	NPD

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SPECIAL CONSTRUCTION CHEMICALS GRIP SILICONES

COOL BARRIER GRIP WWR

MASONRY WATER REPELLENTS

Product description

COOL BARRIER GRIP WWR is a solventless silicone microemulsion concentrate based on silanes and siloxanes that is diluted with water to yield a microemulsion.

Dilute, aqueous solutions of COOL BARRIER GRIP WWR are high-quality, specialty water repellents for hydrophobic impregnation and priming normal and reinforced concrete as well as water resisting admixtures for non-load bearing manufactured concrete products.

Special features

COOL BARRIER GRIP WWR is characterised by:

- good depth of penetration
- dilutable with water, and free of solvents
- low volatility
- high resistance to alkalis

Treated concrete will have the following permanent properties:

- greatly delays chloride and water absorption by concrete
- no loss in breathability
- improved durability against freeze-thaw de-icing salt stress
- enhanced durability
- provides good adhesion for paints

In the construction material COOL BARRIER GRIP WWR reacts with atmospheric moisture and / or the water in the building material's pores, eliminating alcohol. The active thus substance formed greatly reduces the concrete's absorbency in the active zone (penetration depth after post treatment), but without blocking any pores or capillaries. The impregnated building material retains very high water-vapor permeability.

Application

COOL BARRIER GRIP WWR is recommended as a hydrophobic impregnation agent and primer for normal and reinforced concrete for bridges, roads and buildings as well as water resisting admixtures for non-load bearing manufactured concrete products.

COOL BARRIER GRIP WWR forms dilute solutions immediately on being poured into drinking water. Ready-to-use silicone microemulsions activated in this way must be used up on the day of preparation.

The recommended dilution ratio is 1:3 to 1:14 (1 pbw COOL BARRIER GRIP WWR + 3 to 14 pbw water).

For the hydrophobic impregnation of high-grade, load bearing concrete, a dilution ratio of 1 part COOL BARRIER GRIP WWR and 3 parts of water is required, as the product has been approved according to EN 1504-2 in that for dilution rate.

Processing

Processing as a Hydrophobic Impregnating Agent for Concrete:

The work performed (preparing the concrete surface, setting up a reference surface, application and quality control) must follow the applicable regulations.
Concrete should not be impregnated until at least four weeks after it has been produced so that the setting of the cement is not affected.
- New surfaces that are still unsoiled must be cleansed of coarse particles and dust deposits by sweeping or, if necessary, using compressed air. Surfaces already weathered, and those heavily soiled by oil, rubber residue, etc., must first be cleaned using superheated steam or high-pressure water before commencing treatment. It is imperative that the water used be siphoned off immediately to prevent saturation of the concrete.
- Impregnation should always be performed on superficially dry concrete, i.e., when the surface of the concrete appears evenly dry, no more damp patches are visible and the moisture content equilibrium is established. To this end, moisture in the surface zone of the concrete is measured using a suitable technique.
The surface-zone moisture content of the concrete (from the surface to a depth of 20 mm)should not exceed 4 wt%.
- Evenly apply the impregnating agent to the building material in two coats, wet-on-wet. The two coats are absolutely essential to prevent the formation of defects in the impregnated surface. Do not allow puddles to form. The impregnating agent is applied by flow coating at reduced pressure (1-2 bar). A lambskin roller may be used afterward for more even coverage.
- In the event of unexpected rain, cover surfaces already impregnated and halt all further impregnation

SPECIAL CONSTRUCTION CHEMICALS GRIP SILICONES

Processing as a Concrete Admixture (Water Resisting Admixture)

The recommended admixture range of a 1:9 dilution of COOL BARRIER GRIP WWR is 1.0% to 5.0 % of the cement content. A significant reduction in water uptake can already be achieved at a concentration of 1.0 % of the cement. COOL BARRIER GRIP WWR is added either simultaneously with or immediately after the mixing water – it should never be added along with other additives. To keep a constant w/c value the total mixing water is reduced by amount required earlier for dilution.
We recommend testing compatibility with other concrete admixtures separately. A longer mixing time will thoroughly distribute the product within the overall system, which in turn will make it highly effective.

When used in concrete goods or similar concrete products according to EN 1338, 1339 or EN 1340, an initial-type test (cf. section 6.2 of the respective standard) is recommended.

Storage

The 'Best use before end' date of each batch is shown on the product label.

Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

Safety notes

Comprehensive instructions are given in the corresponding Material Safety Data Sheets.
They are available on request from Abolin Co Greece subsidiaries.

Product data

Typical general characteristics	Inspection Method	Value
Appearance		clear, yellowish
Active slliane		approx. 100 %
Density at 25 °C	DIN 51757	0,900 - 1,000 g/cm³
Flash Point	DIN 53213	25 °C
Viscosity, dynamic at 25 °C	DIN 51562	1 - 10 mPa.s

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EN 1504-2:2004	
Surface protection products - Hydrophobic impregnation EN 1504-2:ZA.1a	
No. 0921 - CPR - 2171	
Depth of penetration	**Class II ≥ 10mm**
Water absorption and resistance to alkali	**Absorption ratio < 7,5% compared with the untreated specimen < 10% after immersion in alkali solution**
Drying rate for hydrophobic impregnation	**Class I > 30%**
Loss of mass after freeze-thaw salt stress	**NPD**
Release of dangerous substances	**NPD**

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