

PROTECTOSIL CIT

Advanced Organofunctional Silane based Corrosion Inhibitor Treatment

Description

PROTECTOSIL CIT penetrates deeply into concrete and provides organofunctional molecules to inhibit the electrochemical corrosion process between the rebar and the chloride ions, oxygen and moisture.

Uses

- Steel-reinforced cast-in-place, precast, post-tension, GFRC, prestressed or other steel
- Structures such as parking decks, facades, balconies, walkways, piers, bridge decks, beams, columns, and other steel-reinforced concrete structures
- Marine environments with high relative humidity and areas where de-icing salts are used

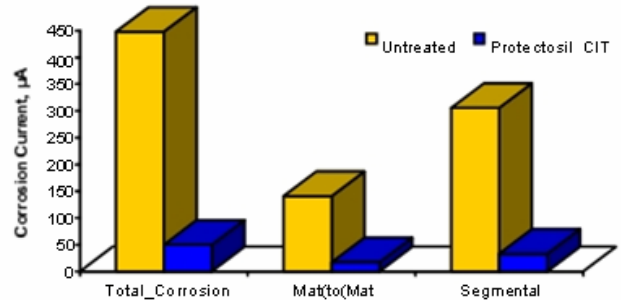
PROTECTOSIL CIT dramatically decreases both mat-to-mat and microcell (or segmental corrosion currents).

Advantages

- Dramatically reduces the chloride ion induced corrosion rate of steel concrete reinforcement via reaction of active material with the cement phase
- Mitigates corrosion of rebar even in structures subjected to a high relative humidity environment
- Effectively inhibits macrocell (mat-to mat) and microcell (along rebar) corrosion of steel reinforced concrete
- reduces corrosion in carbonated concrete steel-reinforced structures
- Is a liquid, low viscous silane system
- Is applied undiluted to a concrete surface and is absorbed quickly
- Is an easy-to-use treatment that penetrates the concrete and dries quickly
- chemically bonds with steel, cement phase and other siliceous material present in the concrete and the surface of the steel
- Will not discolour or change the substrate's surface appearance or surface friction
- Repels additional water and chloride ions
- Leaves the substrate water vapor permeable

Typical Properties

Appearance	: Clear to slightly amber
Density (DIN 51757)	: 0.882 gm/cm ³ at 20°C
Viscosity	: 0.95 mPa.s
pH	: 11
Flash point (DIN 51755)	: > 60°C



As the chart above shows, the proprietary organofunctional chemistry of PROTECTOSIL CIT can greatly reduce the corrosion current. This is done chemically by interrupting the electrolytic current and causing a decrease in the corrosion process.

Corrosion currents measured after application of PROTECTOSIL CIT are negligible while untreated concrete can show visible signs of corrosion (rust and cracks) within just a few years.

PROTECTOSIL CIT works on the molecular level to effectively inhibit the electrochemical interaction of the corrosion process. This advanced inhibiting action makes PROTECTOSIL CIT the best choice for difficult applications.

Applied to concrete structures repaired with polymer concrete, PROTECTOSIL CIT can equalize the differences in electrochemical potential between the polymer concrete and the existing concrete.

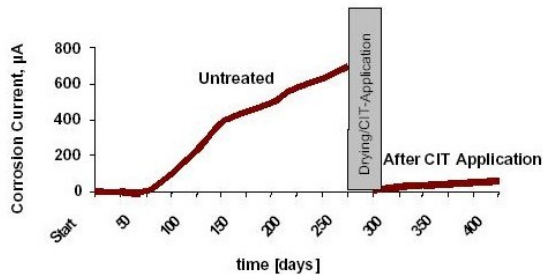
Specification Clause

The corrosion inhibition treatment for concrete shall be PROTECTOSIL CIT, an advanced organo functional silane formulation. The product shall have proven track record and shall be applied at an average rate of 600 ml/m² in two to three coats. The product shall exhibit excellent depth of penetration and shall react with the concrete substrate and form a permanent chemical bond. The product shall have measurable reduction in the corrosion current of concrete after 28 days of application at site.

Effectiveness of PROTECTOSIL CIT

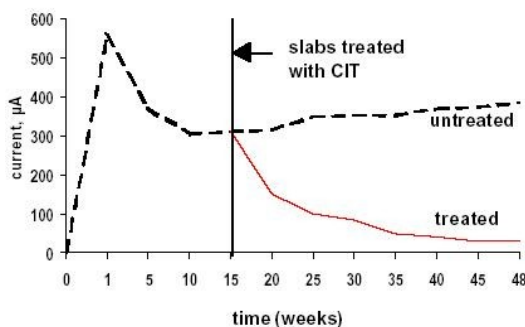
The steel reinforcement of concrete is very sensitive to chloride ions. After prolonged salt water ponding the corrosion current increases as shown below. The specimens were dried, treated with PROTECTOSIL

CIT and then submitted to ponding once again in salt water. The corrosion currents decreased drastically. Even after continued prolonged ponding corrosion currents increase only slightly.



The United States Federal Highway Administration has developed a testing protocol for the evaluation of corrosion inhibitors and coated rebar under aggressive corrosion conditions. The testing is carried out under 48 weeks of cyclic salt water ponding (15% salt), high relative humidity (70-80%) and elevated temperature (38°C). To make a more reliable test, the test specimens were cracked along the length of the reinforcement.

This was done to stimulate transverse bridge deck cracking. The results of PROTECTOSIL CIT are shown in the graph below. PROTECTOSIL CIT inhibits corrosion in pre-cracked concrete up to 99% if the concrete has had no contact with chlorides (i.e. corrosion was not present) prior to application. Reduction of corrosion is 92% if the concrete was in contact with chlorides (i.e. corrosion was present) before application of PROTECTOSIL CIT.



Directions for Use

Concrete Repairs

All delaminated, loose or spalled concrete must be removed and repaired. Shrinkage cracks that are dormant, shallow in depth and with no structural significance can be treated with a multiple coat application of PROTECTOSIL CIT. Other cracks should

be routed, treated with PROTECTOSIL CIT and then sealed with a suitable sealant. PROTECTOSIL CIT does not affect the adhesion of most sealants to concrete or that of concrete to rebar. PROTECTOSIL CIT may be applied directly to the cleaned rebar prior to placing repair material. PROTECTOSIL CIT does not negatively influence the ability of concrete to adhere to the steel rebar.

Surface Preparation

The concrete surface must be clean. All traces of dirt, dust, efflorescence, mold, grease, oil, asphalt, laitance, paint, coatings, curing compounds and other foreign materials that would inhibit penetration have to be removed. Acceptable cleaning methods include shotblasting, sandblasting, waterblasting, grinding and chemical cleaning.

Application

Apply PROTECTOSIL CIT to the entire concrete surface, including repaired areas, in a multiple coat application. Allow a minimum of 15 minutes (or until visibly dry) between coats. Most applications require two or three coats at 180 to 230 ml/m² for each coat.

The exact amount of PROTECTOSIL CIT will depend on the present extent of corrosion, chloride, chloride ion level and the service environment of the structure.

- PROTECTOSIL CIT should be applied to concrete using low-pressure pumping equipment with a wet fan-type spray nozzle. Alternate methods include roller, brush or pouring (into a crack, for example).
- Do not alter or dilute the product with water or solvents. Do not apply PROTECTOSIL CIT to a wet or damp substrate.

Exceptions are substrates placed in the tidal zone: These substrates should dry as long as possible before PROTECTOSIL CIT is applied. As the substrate will be still wet, the ability to absorb is decreased. Therefore PROTECTOSIL CIT has to be applied several times (up to 6 times or more) in order to achieve the necessary consumption rate of 600 ml/m².

PROTECTOSIL CIT can, as an additional protective measure, be applied directly to exposed rebar before repair work commences.

Application Conditions

Proper application conditions are between 5 and 40°C (40-100 °F). Do not apply if rain is expected within four hours following application, or if high winds or other conditions prevent proper application. The substrate should be as dry as possible prior to application. Depending on weather conditions allow 24 to 72 hours for the substrate to dry after rain or cleaning with water.



The Chemical Company

Packaging

PROTECTOSIL CIT is supplied in 28L, 205L drums and 1000L bulk containers.

Storage and Shelf life

Store under cover, out of direct sunlight and protect from extremes of temperature. In tropical climates the product must be stored in an air-conditioned environment.

Shelf life is 12 months when stored as above.

Failure to comply with the recommended storage conditions may result in premature deterioration of the product or packaging. For specific storage advice please consult BASF's Technical Services Department.

Safety precautions

As with all chemical products, care should be taken during use and storage to avoid contact with eyes, mouth, skin and foodstuffs (which can also be tainted with vapour until product fully cured or dried). Treat splashes to eyes and skin immediately. If accidentally ingested, seek immediate medical attention. Keep away from children and animals. Reseal containers after use. Do not reuse containers for storage of consumable item. For further information refer to the material safety data sheet. MSDS available on demand or on BASF construction chemicals web site.

Note

All BASF Technical Data Sheets are updated on regular basis; it is the user's responsibility, to obtain the most recent issue.

Field services where provided, does not constitute supervisory responsibility, for additional information contact your local BASF representative.

Disclaimer

Whilst any information contained herein is true, accurate and represents our best knowledge and experience, no warranty is given or implied with any recommendations made by us, our representatives or distributors, as the conditions of use and the competence of any labour involved in the application are beyond our control.

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Page 3 of 3

