

# Typical Specification

## Reinforced concrete protection using a surface applied corrosion inhibitor

### Sika® FerroGard®-903+

## 1. Description

This specification describes the treatment of concrete surfaces and application of a penetrating corrosion inhibitor to delay the time-to-corrosion and to reduce the corrosion rates of steel reinforcement embedded in concrete structures, according to the following principle and method of European Standard EN 1504-9:

Control of Anodic Areas (Principle 11, Method 11.3 - Applying corrosion inhibitors in or to the concrete)

## 2. General Information

### 2.1 Quality Assurance

- 2.1.1 Manufacturing qualifications: The manufacturer of the specified product shall be ISO 9001 certified and have in existence a recognised ongoing quality assurance program independently audited on a regular basis.
- 2.1.2 Contractor qualifications: Contractor shall be qualified in the field of concrete repair and protection with a successful track record of 5 years or more. The contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
- 2.1.3 Store and apply materials in accordance with all safety requirements, taking into consideration weather conditions, as specified by manufacturer or as modified by applicable rules and regulations of authorities having jurisdiction. Consult Material Safety Data Sheets for complete handling recommendations.

### 2.2 Delivery, Storage, and Handling

- 2.2.1 All materials must be delivered in original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers. Damaged material or un-tight pails must be removed from the site immediately.
- 2.2.2 Store all materials off the ground and protect from rain, freezing or excessive heat until ready for use.
- 2.2.3 Store and handle the specified product as recommended by the manufacturer.



## 2.3 Job Conditions

- 2.3.1 Environmental conditions: Do not apply material if it is raining or snowing or if such conditions appear to be imminent. Minimum application temperature 5°C (41°F) and rising.
- 2.3.2 Protection: Precautions shall be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.
- 2.3.3 Chloride content at rebar level shall not exceed 1% by weight of cement.

## 2.4 Submittals

Submit two copies of manufacturer's actual literature including: Product Data Sheets and appropriate Material Safety Data Sheets (MSDS).

## 2.5 Warranty

Provide a written warranty from the manufacturer against defects of materials for a period of ten (10) years, beginning with date of substantial completion of the project.

# 3. Product

## 3.1 Manufacturer

Sika® FerroGard®-903+, as proposed by Sika<sup>1</sup> is considered to conform to the requirements of this specification.

## 3.2 Material

- 3.2.1 The material shall be based on amino alcohols and environmentally safe.
- 3.2.2 The material shall be water-based.
- 3.2.3 The material must not contain calcium nitrite.
- 3.2.4 The material shall not form a vapour barrier.
- 3.2.5 The material shall be a mixed inhibitor.

## 3.3 Performance Criteria

3.3.1 Typical properties of the surface applied corrosion inhibitor

- Viscosity (Brookfield Viscometer, Spindle #1, Speed 100): 24 mPas.
- Colour: Colourless
- Density: 1.04
- pH: 10 (+/-1)

3.3.2 Site testing of surface applied corrosion inhibitor

1. The material must be able to form a - mono-molecular layer (100 Å) on the reinforcing steel and be able to displace chlorides ions from the steel surface (X-ray Photon Spectroscopy (XPS) and Secondary Ion Mass Spectroscopy (SIMS)).
2. The material shall penetrate independently of orientation (horizontal, vertical, overhead) and it must be possible to determine penetration depth on-site.

<sup>1</sup> Insert the name and address of the relevant Sika Company

3. The material shall have demonstrated its ability to reach the reinforcement of a reinforced concrete structure and to reduce corrosion rates significantly.

## 4. Execution

### 4.1 Surface Preparation

- 4.1.1 Concrete surfaces must be prepared by suitable mechanical means, by abrasive blast cleaning or high pressure water jetting at sufficient volume and pressure (20 MPa - 200 bars) to remove all surface contaminants such as oil, grease, curing membranes, efflorescence, algae, moss, dirt, etc. Prior to the application of the corrosion inhibitor all loose materials and any existing coatings must be removed to provide a clean, sound, dry and absorbent surface.
- 4.1.2 Visible concrete defects such as spalling and cracks must be repaired by conventional repair methods (removal of contaminated concrete, treatment of reinforcement, re-profiling, etc) prior to the application of corrosion inhibitor.
- 4.1.3 For more specific information, refer to the manufacturer's method statement

### 4.2 Application

- 4.2.1 The corrosion inhibitor is delivered ready to be used and shall hence not be diluted on site
- 4.2.2 Generally, **Sika® FerroGard®-903+** is to be applied at a rate of approximately 500 g/m<sup>2</sup>. For very dense, low absorbing concrete, the rate of application can be reduced but must be greater than 300 g/m<sup>2</sup>.
- 4.2.3 Best results are usually obtained by low pressure spray application. However in windy conditions, application by roller is preferred.
- 4.2.4 Between applications of subsequent coats of **Sika® FerroGard®-903+** allow previous coats to be absorbed into the concrete surface until the surface has a dry matt appearance (waiting time between subsequent coats 1 to 6 hours, dependent on ambient temperature and relative humidity).
- 4.2.5 The number of coats required to achieve the targeted consumption is dependent on the porosity and moisture content of the substrate and the weather conditions.
- 4.2.6 Normally on vertical or overhead surfaces 2 to 3 coats are necessary to achieve the required consumption. In case of dense concrete, additional coats may be required.
- 4.2.7 On horizontal surfaces, saturate the surface with 1-2 coats, taking care to avoid ponding.
- 4.2.8 Clean with water (water hose 0.6 – 0.8 MPa, 6 – 8 bars) after application of the last coat, but not before the surface is matt in appearance.
- 4.2.9 The day after application clean the treated surfaces using low pressure water jetting (~ 8 to 10 MPa – 80 to 100 bars)

### 4.3 Overcoating (when required)

- 4.3.1 If the application is carried out as described 4.1 and 4.2, no further treatment is required when over-coating with **Sikagard®** hydrophobic impregnations, **Sikagard®** breathable coatings or **Sikafloor®** products (Refer to appropriate Method Statement for application details)
- 4.3.2 When **Sika® FerroGard®-903+** is used within a patch repair or before a cementitious overlay, a Sika® repair or overlay system can be used. Standard preparation (pre-wetting) shall then be applied.



## 4.4 Cleaning

- 4.4.1 Use water to clean tools.
- 4.4.2 Leave finished work and work area in a neat, clean condition without evidence of spillages onto adjacent areas.

## 4.5 On-site quality control

- 4.5.1 Tests performed to ascertain the application depth of Sika® FerroGard®-903+ shall be carried out at random locations on the structure determined by the Supervising Officer.
- 4.5.2 A test specimen of Sika® FerroGard®-903+ shall be taken from a treated area of concrete by core drill – minimum 45mm (2 in) diameter, or best 75 mm (3 in) – by a depth greater than that of the reinforcement steel. Samples extracted by hammer and chisel for analysis shall be taken before application of any overlays, levelling mortars, coatings, impregnations etc
- 4.5.3 The concrete samples shall be tested for the presence of Sika® FerroGard®-903+ in accordance with the test requirements of the Sika “Qualitative Analysis” – refer to Sika® Method Statement
- 4.5.4 All testing will be carried out in the presence of the Supervising Officer.
- 4.5.5 If Sika® FerroGard®-903+ is not identified from the test sample, additional tests shall be carried out at a frequency determined by the Supervising Officer.
- 4.5.6. Where testing confirms that a satisfactory application depth of Sika® FerroGard®-903+ has not been achieved, re-application of the corrosion inhibitor shall be carried out to affected areas as determined by the Supervising Officer, as per the above procedure.
- 4.5.7 Test areas shall be reinstated to its original profile using an appropriate concrete repair product from the Sika® Repair System range as specified by the Supervising Officer.

The information contained herein and any other advice are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. The information only applies to the application(s) and product(s) expressly referred to herein. In case of changes in the parameters of the application, such as changes in substrates etc., or in case of a different application, consult Sika's Technical Service prior to using Sika products. The information contained herein does not relieve the user of the products from testing them for the intended application and purpose. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.



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