

## PRODUCT DATA SHEET

# Sika® FerroGard®-903 Plus

Active corrosion inhibitor for reinforced concrete

### DESCRIPTION

Sika® FerroGard®-903 Plus is a surface applied active corrosion inhibitor, based on organic compounds, designed for use as an impregnation of steel reinforced concrete. It penetrates the concrete and forms a protective monomolecular layer on the surface of the reinforcing steel.

Sika® FerroGard®-903 Plus both delays the start of corrosion and reduces the corrosion rate. Corrosion protection with Sika® FerroGard®-903 Plus increases the service and maintenance life cycles by up to 15 years when used as a part of a complete Sika Concrete Repair and Protection System.

### USES

- For the corrosion protection of steel reinforced concrete structures above and below the ground.
- As a corrosion control treatment for undamaged reinforced concrete where reinforcing steel is corroding, or is at risk from corrosion due to the effects of carbonated or chloride contaminated concrete.
- Sika® FerroGard®-903 Plus is especially suitable for extending the service life of aesthetically valuable fair-faced concrete surfaces such as historic structures.

### CHARACTERISTICS / ADVANTAGES

- Suitable for method 11.3 (applying inhibitor to the concrete) defined by EN 1504-9 for Principle 11 (anodic control).
- Transparent - does not change the appearance of the concrete structure.
- Does not alter the water vapour diffusion properties of concrete.

- Long term protection and durability.
- Can be applied to the surface of existing repairs and to surrounding areas.
- Effective against carbonation.
- Protects both cathodic (principle 9) and anodic (principle 11) zones of reinforcing steel.
- Can be applied where other repair/prevention options are not viable.
- Economic extension of the service life of reinforced concrete structures.
- Easy, economical application, renewable.
- Complies with GHS/CLP regulation.
- Can be used as part of other Sikagard® or Sika Mono-Top® concrete repair and protection systems.
- Penetration depth can be tested on site using the Sika "Qualitative Analysis Test" - refer to your local Technical Service Department for details.

### APPROVALS / STANDARDS

- BRE, The use of surface applied Sika® FerroGard® 903 corrosion inhibitor to delay the onset of chloride induced corrosion in hardened concrete, BRE Client Report No. 224-346, 2005
- Mott MacDonald, Evaluation of Sika® FerroGard® 901 and 903 Corrosion Inhibitors, Ref. 26'063/001 Rev A, April 1996.
- SAMARIS (Sustainable and Advanced Materials for Road Infrastructure) - Final Report, Deliverables D17a, D17b, D21 & D25a, Copenhagen, 2006
- Mulheron, M., Nwaubani, S.O., Corrosion Inhibitors for High Performance Reinforced Concrete Structures, University of Surrey, 1999
- C-Probe Systems Ltd., Performance of Corrosion Inhibitors in Practice, 2000

### PRODUCT INFORMATION

Chemical Base

Aqueous solution of amino alcohols & salts of amino alcohols

<b>Packaging</b>	25 kg pail 220 kg drum
<b>Appearance / Colour</b>	Transparent liquid, colourless to slightly yellowish.
<b>Shelf Life</b>	24 months from date of production if stored properly in undamaged and unopened, original sealed packaging.
<b>Storage Conditions</b>	Store in a cool environment. In case of - frost ( $< -5\text{ }^{\circ}\text{C}$ ), - reversible crystallisation may occur. If this happens, let the product warm up at room temperature ( $+15$ to $+25\text{ }^{\circ}\text{C}$ ), then stir well to re-dissolve the crystals.
<b>Density</b>	$\sim 1.05$ (at $+20\text{ }^{\circ}\text{C}$ )
<b>pH-Value</b>	$\sim 10$
<b>Viscosity</b>	$\sim 20\text{ mPa}\cdot\text{s}$ (Brookfield RVT, spindle 2, 100 rpm, $23\text{ }^{\circ}\text{C}$ )

## TECHNICAL INFORMATION

<b>Penetration Depth</b>	<p>Site surveys and experimental tests have shown that Sika® FerroGard®-903 Plus can penetrate through concrete at a rate of a few millimetres per day and to a depth of approximately 25 to 40 mm in 1 to 2 months. This penetration rate can be faster or slower dependent on the porosity of the concrete. Sika® FerroGard®-903 Plus penetrates through both liquid and vapour phase diffusion mechanisms.</p> <p>Note: If, after application of Sika® FerroGard®-903 Plus, the concrete surface is coated with protective coatings (cement based, acrylic or impregnation) or hydrophobic impregnation, the rate of diffusion of the inhibitor is reduced but not stopped as the mechanism of diffusion is then only via the vapour phase.</p> <p>As concrete quality and permeability differ, it is recommended to perform some preliminary depth profile testing by the Sika "Qualitative Analysis" to assess the specific penetration rate.</p>
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## APPLICATION INFORMATION

<b>Consumption</b>	<p>Generally <math>\sim 0.50\text{ kg/m}^2</math> (<math>\sim 480\text{ ml/m}^2</math>).</p> <p>For very dense concrete with low permeability, the rate of application of Sika® FerroGard®-903 Plus can be reduced but must not be lower than <math>0.300\text{ kg/m}^2</math> (<math>290\text{ ml/m}^2</math>).</p> <p>To assess project requirements, consumption and depth of penetration shall be checked on site using the Sika "Qualitative Analysis" – refer to the relevant method statement.</p>
<b>Ambient Air Temperature</b>	$+5\text{ }^{\circ}\text{C}$ min. / $+40\text{ }^{\circ}\text{C}$ max.
<b>Substrate Temperature</b>	$+5\text{ }^{\circ}\text{C}$ min. / $+40\text{ }^{\circ}\text{C}$ max.

SYSTEM INFORMATION

System Structure	Sika® FerroGard®-903 Plus is part of the Sika® Concrete Repair & Protection Systems:	
	Repair system	Sika MonoTop®, Sika® Icoment® or SikaTop®
	Reinforcement corrosion control	Sika® FerroGard®-903 Plus
	Concrete protection	Sikagard® Coatings and or Sikagard® Hydrophobic Impregnations

BASIS OF PRODUCT DATA

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

LIMITATIONS

Do not apply when rain or frost is expected. The following construction materials have to be protected from splashes of Sika® FerroGard®-903 Plus during application:

- aluminium
- copper
- galvanised steel

If the product is applied next to natural stone, it may be necessary to protect them from splashes as some discoloration may occur. Visible concrete defects (spalling, cracks etc) must be repaired using conventional repair methods (removal of delaminating or loose concrete, treatment of reinforcement, re-profiling etc.). Alternatively to the method described above, Sika® FerroGard®-903 Plus can be applied after repair works (but not overlay) has been carried out (after hardening of the repair material) – freshly repaired areas might not need to be treated with the inhibitor. If this is, however, done, then lower diffusion would be expected at the zones that were repaired. Typical maximum chloride content at rebar level is 1 % by weight of cement of free chloride ions (corresponding to 1.7 % of sodium chloride). Above this limit, according to site conditions and level of corrosion activity, increased consumption of Sika® FerroGard®-903 Plus can be considered. Trials and corrosion rate monitoring to confirm consumption and effectiveness should be carried out. If chlorides are already present near the reinforcement bars, concentration of Sika® FerroGard®-903 Plus at rebar level should be minimum 100 ppm when measured by ionic chromatography to provide efficient protection. A detailed method is available upon request. Do not apply in tidal zones or to substrates saturated with water. Avoid application in direct sun and/or strong wind and/or rain. Do not apply to concrete in direct contact with drinking water. Depending on substrate conditions, the application of Sika® FerroGard®-903 Plus may lead to a slight darkening of the surface. Proceed with preliminary testing.

All surface treatments are to be carried out using cold potable water.

ECOLOGY HEALTH AND SAFETY

For information and advice on the safe handling, storage and disposal of chemical products, users shall refer to the most recent Safety Data Sheet (SDS) containing physical, ecological, toxicological and other safety-related data.



# APPLICATION INSTRUCTIONS

## SUBSTRATE QUALITY / PRE-TREATMENT

The concrete shall be free from dust, loose material, surface contamination, existing renders, laitance, coatings, oil and other materials which reduce or prevent penetration.

If the substrate is to be over-coated, the surface profile shall be sufficient to provide the required adhesion.

De-laminated, weak, damaged and deteriorated concrete shall be repaired using Sika MonoTop®, SikaTop® or Sika® Icoment® mortars.

For fair-faced concrete or concrete to be further over-coated by coatings or hydrophobic impregnation, water blast the concrete surface with pressure (up to 18 MPa – 180 bars).

For concrete surfaces to be further over-coated by cementitious material, roughen the surface using suitable abrasive blast cleaning techniques or high pressure water-blasting (up to 60 MPa – 600 bars).

For optimum penetration the substrate should be allowed to dry out prior to the application of Sika® FerroGard®-903 Plus.

## APPLICATION

Sika® FerroGard®-903 Plus is supplied ready for use and must not be diluted. Do not shake the material prior to use.

Sika® FerroGard®-903 Plus shall be applied, to saturation, by brush, roller, low-pressure or airless spray equipment.

After the application of the last coat, and as soon as the surface become matt, carry out low-pressure water cleaning (water hose).

The treated surfaces should be cleaned the day after application by pressure washing (~ 10 MPa – 100 bar) to remove any traces of soluble salts that may have deposited on the surface.

### Number of coats:

This is dependent on the porosity and moisture content of the substrate and the weather conditions.

**Vertical surfaces:** Normally, 2 to 3 coats are necessary to achieve the required consumption. For dense concrete, additional coats may be required.

**Horizontal Surfaces:** Saturate surface with 1-2 coats, whilst taking care to avoid ponding.

Waiting time between coats: This is dependent on the porosity of the concrete and the weather conditions, but normally 1-6 hours. Allow the surface to dry out between coats to a matt damp appearance.

## OVERCOATING:

If the application is carried out as described above, no further treatment is required before over-coating with Sikagard® hydrophobic impregnations, Sikagard® breathable coatings or Sikafloor® products (refer to appropriate Product Data Sheets for application details). If non-Sika coatings are to be applied, please contact the manufacturer's technical department for confirmation of compatibility with Sika® FerroGard®-903 Plus or undertake compatibility and adhesion site trials. When Sika® FerroGard®-903 Plus is used within a patch repair or before a cementitious overlay, Sika repair or overlay system can be used. Standard preparation (pre-wetting) shall be applied.

When using a smoothing coat/pore filler over surface4s treated with Sika® FerroGard®-903 Plus, products such as SikaTop®-121, Sikagard®-720 EpoCem®, Sika MonoTop®-107, SikaTop®-Seal 107, Sika MonoTop®-723 N, etc. can be used. Cementitious levelling mortars should only be used if there is a well prepared open textured surface that is completely cleaned of residue.

If other Sika cement-based products are to be used, site trials are recommended to confirm preparation and suitability.

If non-Sika cement-based products are to be used, please contact the manufacturer's technical department for confirmation of compatibility with Sika® FerroGard®-903 Plus or undertake compatibility and adhesion site trials.

## CLEANING OF TOOLS

Use water to clean application equipment.

## LOCAL RESTRICTIONS

Please note that as a result of specific local regulations the performance of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

## LEGAL NOTES

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, 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. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. 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. It may be necessary to adapt the above disclaimer to specific local laws and regulations. Any changes to this disclaimer may only be implemented with permission of Sika® Corporate Legal in Baar.

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### **Product Data Sheet**

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May 2025, Version 03.01

020303040010000016

SikaFerroGard-903Plus-en-PK-(05-2025)-3-1.pdf