

PRODUCT DATA SHEET

Sika® FerroGard®-650

DISCRETE EMBEDDED GALVANIC ANODE

DESCRIPTION

Sika® FerroGard®-650 is a zinc based discrete sacrificial anode placed inside a concrete repair area in reinforced concrete structures which are corroding as a result of chloride induced corrosion.

Sika® FerroGard®-650 anodes are placed along the perimeter of the repair area and fixed to the reinforcement prior to the application of a concrete repair system. The reinforcement outside the repaired area is at greatest corrosion risk owing to the passive condition of the reinforcement within the repaired area. Sika® FerroGard®-650 anodes corrode preferentially to the surrounding reinforcement offering protection against incipient corrosion damage.

Sika® FerroGard®-650 can also be placed at specific positions on steel reinforcement stirrups when used in new construction to prevent corrosion in marine environments.

Suitable to use in hot and tropical climatic conditions.

USES

Sika® FerroGard®-650 may only be used by experienced professionals.

- Controlling the incipient anode effect by electrically balancing the anodic and cathodic areas of reinforcement
- Targeted treatment applied to concrete repaired areas to prevent incipient corrosion damage

- For reinforced concrete structures such as bridges, car parks, coastal structures, industrial structures and residential high rise.
- Coastal reinforced concrete structures both in and above the tidal zone
- Corrosion prevention in new structure

CHARACTERISTICS / ADVANTAGES

- Sika® FerroGard®-650 anodes corrode preferentially to the surrounding reinforcement, offering protection from further corrosion damage
- Protects against incipient anode effect outside of repaired area
- Anode composition meets zinc anodes spec ASTM B418, Type II
- Auto-Corrosion <0,01mm / year
- Proven technology
- Specially configured galvanized tie wires
- High surface area for optimum performance
- Maintains anode activity and self regulates output with changes in environmental conditions
- Open Circuit Potential more negative than -1000 mV, CSE
- No long term maintenance costs
- Strengthens passive film on reinforcement
- Quick installation—no additional break out
- Performance can be monitored
- Cost effective corrosion control solution

PRODUCT INFORMATION

Packaging	30 anodes per box
Appearance and colour	Zinc anode core surrounded by a proprietary mortar casing with two integral conducting galvanised tie wires
Shelf life	5 years from date of production
Storage conditions	Product must be stored in original, unopened and undamaged packaging in dry conditions at temperatures between +5 °C and +35 °C. Always refer to packaging.

Length	114 mm
Width	70 mm
Thickness	20 mm
Zinc weight	65 g (Anode surface area: 13 540 mm ²)

TECHNICAL INFORMATION

Charge capacity	>800 Ah/kg	
Design considerations	Rest Potential	-850 to -1150 mV versus Calomel Standard Electrode (after 24 hours soaking)
	Auto-corrosion	<0,1 mm / year

SYSTEM INFORMATION

System structure	<ul style="list-style-type: none"> Sika® FerroGard®-650 Embedment and encapsulation mortar: Sika MonoTop®-412 N Other anode sizes are available with different zinc content:	
	Name	Zinc content
	Sika® FerroGard®-670	105 g
	Sika® FerroGard®-675	160 g

BASIS OF PRODUCT DATA

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

FURTHER INFORMATION

- Calculation sheet - Sika® FerroGard® anodes
- Sika Method Statement: Application of Discrete Galvanic Anode using Sika® FerroGard®-600 Anode

IMPORTANT CONSIDERATIONS

- Only repair mortar with a resistivity lower than 50 000 Ω·cm must be used to repair the concrete, embed and encapsulate the anodes.
- Mortar containing high polymer content and/or high silica fumes content must not be used as their resistivity will generally be too high. Use embedment mortar as required.
- Do not use any form of battery or impressed current in association with the Sika® FerroGard®-650 anode either to apply an electrical current to the steel reinforcement prior or after the repair.

- Do not install a preformed high resistivity or non-conductive barrier between Sika® FerroGard®-650 anodes and the steel reinforcement.
- Do not apply corrosion inhibitors directly on the Sika® FerroGard®-650 anode unit or connecting wires, especially on or near the steel reinforcement and wire connection point.
- Concrete repairs must be undertaken in accordance to an acknowledged national standard such as EN 1504.
- Any discontinuous reinforcement must be either electrically bonded to or electrically isolated from the system negative.
- Design of the galvanic protection system must be undertaken by an experienced qualified corrosion design engineer.
- Installation must be carried out in accordance with engineer's design and specification.
- When used in new construction the concrete cover must follow the project specification but must not be lower than 50 mm.

ECOLOGY, HEALTH AND SAFETY

REGULATION (EC) NO 1907/2006 - REACH

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

APPLICATION INSTRUCTIONS

NOTES ON INSTALLATION

Design of the galvanic protection system must be undertaken by an experienced qualified corrosion design engineer.

Spacing

Multiple factors must be considered to determine the spacing of Sika® FerroGard®-650 anodes, including the structure's temperature, moisture content, chloride content, steel reinforcement surface area and placement. In most applications, the spacing must not exceed 760 mm. Refer to Sika® FerroGard® anodes calculation sheet for further design information.

APPLICATION

Strictly follow installation procedures as defined in method statements, application manuals and working instructions which must always be adjusted to the actual site conditions.

Reference must be made to the Sika Method Statement: Application of Discrete Galvanic Anode using Sika® FerroGard®-600's Anodes for further details.

Surface Preparation - Concrete

All loose and spalled concrete must be removed in accordance with national standards and guidelines such as EN 1504-10 or ICRI Guideline No. 310.1 R-2008 making sure that enough space is available to fully encapsulate the anode with a bridging mortar.

Surface Preparation – Steel reinforcement

The surface of the steel must be prepared in accordance with national standards and guidelines such as EN 1504-10 or ICRI Guideline No. 310.1 R-2008.

Extra preparation of the steel must be carried out in the area of the anode tie wire connections to provide a bright steel finish to ensure a good electrical connection.

Steel continuity

The steel reinforcement within the repair area must be tested for continuity. DC resistance between bars must be $\leq 1 \Omega$. If discontinuous steel is present, re-establish continuity with steel tie wires.

Anode positioning

In most applications, Sika® FerroGard®-650 anodes must be positioned along the perimeter edges of the repair and on the side or beneath the exposed reinforcement while ensuring the required level of repair mortar / concrete cover. Anodes must be positioned so the entire anode and steel reinforcement are totally covered by the repair mortar once the repair is complete.

Anode preparation

Pre-soaking the anodes in clean water for several minutes prior to installation is recommended to minimise the dehydration of the repair mortar.

Anode attachment

Securely fasten the two pairs of pre-twisted galvanised wires around the steel reinforcement in a double wrap pattern using a suitable wire twisting tool to eliminate free movement, and to ensure a good electrical connection.

Anode electrical verification

Verify electrical connection to the steel reinforcement. DC resistance must be $\leq 1 \Omega$.

Anode embedment and encapsulation

The Sika® FerroGard®-650 anodes must be embedded onto the substrate and then encapsulated with the suitable Sika® low resistivity mortar (Contact local Sika representative for recommendation) ensuring complete encapsulation of the anode and wire connections. Corrosion protection has been shown to be most enhanced when using mortars with a resistivity of $< 20\,000 \Omega\cdot\text{cm}$, however mortars with a resistivity up to $< 50\,000 \Omega\cdot\text{cm}$ may be used.

Concrete repair

Once the bridging mortar has stiffened sufficiently to prevent movement of the anode, the suitable Sika® low resistivity concrete repair mortar and associated system parts, such as reinforcement protection coating and bonding bridge, are then applied within the repair area. If the required grade of repair mortar has a higher resistivity, encase the anode and bridge the gap between the anode and the existing concrete with a low resistivity bridging mortar.

System monitoring

If required, the anode installation can be monitored using half-cell potential surveys, current outputs and reinforcement corrosion rate measurements.

Corrosion prevention in new construction

Sika® FerroGard®-650 anodes are attached to the reinforcement by the integral tie wires at regular spacing's (refer to the Method Statement). They must be properly fixed to the bar with additional plastic tie wires to prevent the anodes being displaced during concrete casting.

LOCAL RESTRICTIONS

Note that as a result of specific local regulations the declared data and recommended uses for this product may vary from country to country. Consult the local Product Data Sheet for exact product data and uses.

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.

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All products are supplied under
a management system certified
to conform to the requirements
of the quality, environmental
and occupational health &
safety standards ISO 9001,
ISO 14001 and ISO 45001.

SikaFerroGard-650-en-AE-(12-2022)-2-3.pdf

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December 2022, Version 02.03
020303090010000021