BUILDING TRUST

PRODUCT DATA SHEET

Sika® FerroGard®-675

Discrete embedded galvanic anode

PRODUCT DESCRIPTION

Sika® FerroGard®-675 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®-675 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®-675 anodes corrode preferentially to the surrounding reinforcement offering protection against incipient corrosion damage.

USES

Sika® FerroGard®-675 may only be used by experienced professionals.

Patch repairs within concrete or along joints between new and existing concrete. Effective in chloride contaminated and carbonated concrete. Used to prevent the “Halo” or “Ring” anode Corrosion effect.

CHARACTERISTICS / ADVANTAGES

- Anode Mortar Shell - uses proprietary technology that provides excellent transport of reactants to the surface of the zinc anode and corrosion products away from the surface of the zinc, using a chelation process. The encasing mortar will not cause corrosion of reinforcing steel.
- Proven technology – supported by 10+ years of development and testing.
- Cost Effective – lowers Life Cycle Cost of repairs.
- Auto-Corrosion – encasing mortar maintains performance but does not auto- or self-corrode the zinc anode.
- Ease of Installation – uses standard attachment methods known to industry.
- Self-Powered / Self Regulating – creates own protective current that adjusts to demand.
- Maintenance Free – requires no monitoring or maintenance.
- Safe to Use – protects conventional and pre-stressed / post-tension reinforcing steel; moderate pH safe to handle without PPE.
- Tie Wires – galvanized steel tie wires (annealed) are pre-twisted to form a cradle that accepts reinforcing steel, enables a better electrical contact and extends “throwing power”.
- Service Life – capable of 10+ years of protection depending on design and conditions.

PRODUCT INFORMATION

Packaging	24 anodes per box
Appearance / Color	Zinc anode core surrounded by a proprietary mortar casing with two integral conducting galvanised tie wires
Shelf Life	Nominal shelf life of 5 years.
Storage Conditions	Avoid temperatures >100°F
Zinc weight	160 g (Anode surface area: 27 090 mm^2)

TECHNICAL INFORMATION

Charge capacity	738 A-hr/kg	
Design Considerations	Electro-Potential	-850 to -1150 mV, CSE (water saturated)
	Auto-corrosion	<0.1 mm / year

SYSTEM INFORMATION

System Structure

- Sika® FerroGard®-675
- Bridging Mortar
- PH: ~11.5

Other anode sizes are available with different zinc content:

Name	Zinc content
Sika® FerroGard®-650	65 g
Sika® FerroGard®-670	105 g

Zinc Anode: Conforms to ASTM B418 Type II, Standard Specification for Cast and Wrought Galvanic
Zinc Anodes.

High Surface Area for Optimum performance: 42 in^2

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LIMITATIONS

- Only repair mortar with a resistivity lower than 50,000 Ω·cm must be used to repair the concrete and encase 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 bridging mortar as required.
- Do not use any form of battery or impressed current in association with the Sika® FerroGard®-675 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®-675 anodes and the steel reinforcement.
- Do not apply corrosion inhibitors directly on the Sika® FerroGard®-675 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 engineers design and specification.

APPLICATION INSTRUCTIONS

NOTES ON INSTALLATION

Spacing: Multiple factors must be considered to determine the spacing of the FerroGard® anode, including the structure's temperature, moisture content, chloride content, the steel surface area and placement. In most applications, the spacing should not exceed 30 inches. A design engineer should always be consulted to confirm final requirements. Consult FerroGard® Anode Calculation sheet for engineered designs or refer to the Maximum Anode Spacing Chart below.

APPLICATION

Surface Preparation

All loose and spalled concrete should be removed in accordance with ICRI Guideline No. 310.1R-2008 Guideline for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion. The Sika FerroGard® anode positioning should be considered when removing the existing concrete.

Preparation

For correct electrical connection and anode function, the surface of the reinforcing steel should be untreated and cleaned to a near white surface condition in areas designated for the connection of the FerroGard® anode. Refer to SSPC SP-10. Note, pre-soaking the SIKA FerroGard® anodes in clean water for several minutes prior to installation is recommended to minimize dehydration of the repair mortar.

Continuity

The reinforcing steel within the patch area should be tested for continuity: DC resistance between bars should be ≤ 1 Ω. Make continuity corrections, if needed, by welding steel bonding wire between bars to achieve a DC resistance ≤ 1 Ω.

Positioning

In most applications, the FerroGard® anode should be positioned at the perimeter of the repair and on plane with the reinforcing steel to provide a proper level of cover. Anodes must be positioned so that the entire anode and the wire connections to the reinforcing steel are totally covered by the repair material once the repair is complete. Note: Do not modify the shape of the anode to fit a hole.

Attaching

Tighten the two pairs of pre-twisted wires around the reinforcing steel in a double wrap pattern to achieve a sound electrical bond. The pre-twisted wire connectors provide a sound base, good electrical contact and proper spacing from the reinforcing steel to which the anode is attached. No additional form of attachment or electrical connection is necessary. Note: Use only the connector wires attached to the anode; do not use supplementary connection methods between the connector loops and the rebar nor use a twisting tool to tighten the wires.

Verification

Verify sound electrical connection of the FerroGard® system to the reinforcing steel by checking for a DC resistance ≤ 1 Ω.

Note: Conventional, commercially available repair mortars with a resistivity ≤50,000 Ω-cm should be used to repair the concrete and encase the FerroGard® anodes. Corrosion protection has been shown to be most enhanced when using mortars with a resistivity of ≤20,000 Ω-cm, however mortars with a resistivity up to 50,000 Ω-cm may be used. High polymer content and silica fume, which are known to have a resistivity

>50,000 Ω-cm, should not be used in the mix. If the repair design requires a mix with resistivity >50,000 Ω-cm, then use an encasement mortar to encase the anode and bridge the area between the anode and the existing concrete. SikaRepair® 222 (with water) or SikaRepair® 223 (with water) are acceptable encasement mortars. Place encasement materials in accordance with conventional techniques to assure good consolidation. Rebar coatings such as Sika Armatec 110 EpoCem and Sikadur 32 can and should be used along with Sika FerroGard anodes as full
system repair approach. The sketches below depict the proper way to install the rebar coating (and bonding agent). All the usual preparation techniques are employed (geometry of the repair area, cleaning the steel, surface preparation). The anodes are tied to the steel, continuity is verified and the rebar coating is applied as per the PDS. Please note, avoid coating the anode itself. The tie wires may be coated too as long as continuity to the steel is ensured.
Do not use any form of battery or impressed current in association with the FerroGard® anode or apply an electrical current to the reinforcing steel prior to or after the repair. Do not install a preformed high resistivity or non-conductive barrier between the FerroGard® anode and the reinforcing steel. Do not apply corrosion inhibitors directly on the FerroGard® anode body or connecting wires, especially on or near the wire connection point with the reinforcing steel.

Maximum Anode Spacing for Moderate-Low Corrosion Risk Environment

Cl content <1% by weight of cement, or Steel Potential more positive than -350 mV, CSE

Steel Density Ratio	Inches
<0.2	31
0.21-0.46	28
0.47-0.70	27
0.71-0.93	25
0.94-1.15	24
1.16-1.36	22
1.37-1.56	21
1.57-1.75	21
1.75-1.93	20
1.94-2.1	19

Maximum Anode Spacing for High Corrosion Risk Environment

Cl content >1% by weight of cement, or Steel Potential more negative than -350 mV, CSE

Steel Density Ratio	Inches
<0.2	28
0.21-0.46	25
0.47-0.70	24
0.71-0.93	22
0.94-1.15	21
1.16-1.36	19
1.37-1.56	18
1.57-1.75	18
1.75-1.93	17
1.94-2.1	16

Common Steel Density Ratio Examples

Bar Size	One Mat/One Way	Two Mat/Two Way
#4	0.13	0.52
#5	0.16	0.65
#6	0.20	0.79
#7	0.23	0.92
#8	0.26	1.05

Assumption: Bars are 12" On Center

Calculating Steel Density Ratio (Surface Area of Steel ÷ Surface Area of Concrete):

Surface Area of Steel ÷ Surface Area of Concrete

Surface area of steel = π x D x L x n
Surface area of concrete = 12” x 12” = 144 in2
π = 3.14
D = bar diameter
L = length of bars in calculated area (always 12” in this calculation)
n = number of bars in calculated area (12”÷ spacing)

Sample Calculation #1

Heavily Reinforced: #8 bars, 2 mats, 2 ways, 8” oc
Top mat, transverse: 3.14 x 8/8” x 12” x 12”/8" oc ÷ 144 in2 = 0.39

Top mat, longitudinal = 0.39
Bottom mat, transverse = 0.39
Bottom mat, longitudinal = 0.39
Total = 1.57

Sample Calculation #2

Moderately Reinforced #5 bars, 2 mats, 2 ways, 12” oc
Top mat, transverse: 3.14 x 5/8” x 12” x 12”/12" oc ÷ 144 in2 = 0.16

Top mat, longitudinal = 0.16
Bottom mat, transverse = 0.16
Bottom mat, longitudinal = 0.16
Total = 0.65

Sample Calculation #3

Lightly Reinforced: #4 Bars, 1 mat, 2 ways, 16” oc
Transverse = 3.14 x 4/8” x 12” x 12”/16" oc ÷ 144 in2 = 0.1

Longitudinal: 0.1
Total: 0.2

OTHER RESTRICTIONS

See Legal Disclaimer.

LEGAL DISCLAIMER

- **KEEP CONTAINER TIGHTLY CLOSED**
- **KEEP OUT OF REACH OF CHILDREN**
- **NOT FOR INTERNAL CONSUMPTION**
- **FOR INDUSTRIAL USE ONLY**
- **FOR PROFESSIONAL USE ONLY**

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