Sika Galvashield® CC Embedded Galvanic Anodes
for Corrosion Control in Contaminated but Sound Concrete

Note To Specifier: This document is intended to provide assistance in developing a specification for the installation of embedded zinc anodes and should be modified as appropriate to accommodate project-specific conditions and applications. Refer to the Galvashield CC product data sheet for anode selection and spacing guidelines. For additional information, contact Sika Corporation.

PART 1   GENERAL

1.01 Related Documents
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 Summary
A. This Section includes furnishing all labor, tools, materials, equipment and services necessary to properly install embedded galvanic anodes.

B. Embedded galvanic anodes are designed to provide corrosion control in chloride-contaminated or carbonated concrete. When placed in drilled holes at the appropriate spacing, the anodes will extend the service life of the concrete structure.

1.03 References
A. ACI/ICRI 2003 Concrete Repair Manual
B. ACI 222R Corrosion of Metals in Concrete
C. ASTM C 309 Curing Compounds for Concrete
D. ASTM B418-95a Standard Specification for Cast and Wrought Galvanic Zinc Anodes
E. ASTM A82-97a Specification for Plain Steel Wire for Concrete Reinforcement

1.04 Installation Contractor
A. The embedded galvanic anodes shall be installed by an experienced concrete repair contractor as determined by the owner [owner's representative].
PART 2       PRODUCTS

2.01 Materials

A. Embedded galvanic anodes shall be cylindrical in shape, approximately 1 ¾ inches in diameter by 2 ½ inches high (44 mm x 64 mm), pre-manufactured, and consist of electrolytic high-grade zinc in compliance with ASTM B418-95a Type I cast around a steel electric lead wire in compliance with bright annealed ASTM A82-97a and encased in a highly alkaline cementitious shell with a pH of 14 or greater. The cementitious shell shall contain no chlorides or other corrosive constituents as per ACI 222R. Embedded galvanic anodes shall be Sika Galvashield CC [Specify type of anode i.e. CC65, see note below] from Sika Corporation, or approved equal.

B. Grouting material shall be Galvashield Embedding Mortar available from Sika Corporation or approved equal.

C. Rebar connections shall be made using Galvashield CC Rebar Connection Kit and Galvashield CC Setting Tool from Sika Corporation or approved equal.

D. Anode connections shall be made using Galvashield CC Anode Connection Kit from Sika Corporation or approved equal.

E. Application for approved equals shall be requested in writing two weeks before submission of project bids. Application for anode equals shall include:

1. A highly alkaline cementitious shell with a pH of 14 or greater.
2. Provide a minimum of 10 years service life in similar environment.
3. Contain no corrosive constituents detrimental to reinforcing steel, e.g. chloride, etc.
4. Proven track record showing a minimum of three years satisfactory field performance.
5. A minimum of three projects of similar size and application.
6. Anodes shall be supplied with integral steel lead wire for making connection with the reinforcing steel.

F. Deliver, store, and handle all materials in accordance with manufacturer’s instructions.

Note to Specifier: Galvashield CC’s are available in 3 standard configurations (CC65, CC100, and CC135). Custom sizes are also available for specific projects. Anode selection should be based on factors such as steel density and concrete thickness. Refer to Galvashield CC product data sheet for selection and spacing guidelines. Specify the required CC product in 2.01 A.
PART 3 EXECUTION

3.01 Anode Layout

A. Using a suitable rebar locator, the location of the reinforcing grid should be determined and marked out in areas where anodes are to be installed.

B. Mark out locations for anode installation. The anodes shall be installed in a grid pattern with a maximum spacing of [enter maximum grid dimension] on center, in each direction. When possible, anodes shall be installed a minimum 4 inches (100 mm) away from reinforcing grid.

C. Mark out location of rebar connections. If the anodes are to be individually connected, one rebar connection per anode is required. If the anodes are to be installed in series, two rebar connections per string of anodes are required with a maximum of 10 anodes per string.

3.02 Drill Holes

A. Rebar Connection – Electrical connection shall be established using a Galvashield CC Rebar Connection Kit. At the location of the rebar connections, drill ½ inch (12 mm) diameter holes from the concrete surface until contact is established with the top surface of the rebar.

B. Anode Location - Drill a hole 2 inches (50 mm) in diameter by a minimum of 3 ¾ inches (95 mm) deep in close proximity to marked out location to accommodate the anode. Do not damage rebar when drilling holes.

Note to Specifier: Maximum anode spacing guidelines can be found on the Sika Galvashield CC data sheet. Anode spacing should be adjusted for aggressive source conditions or for an extended anode service life.

If Galvashield CC100 or Galvashield CC135 anodes are to be installed, modify hole dimensions in 3.02B appropriate for the selected anode. For additional information, refer to the Galvashield CC data sheet.

C. Saw cuts – All saw cuts into the concrete surface between the anode installation holes and the rebar connection holes shall be approximately ¼ inch (6 mm) wide by ½ inch deep.

1. If anodes are to be individually connected, saw cut grooves between the anode installation hole and the rebar connection hole for each anode location.

2. If anodes are to be installed in series, saw cut a single continuous groove between the anode installation holes and the rebar connection holes.

D. All holes and saw cuts shall be cleaned of debris and concrete dust.
3.03 Rebar Connections

A. Using one Galvashield CC Rebar Connector per rebar connection hole, place the weighted end of the connector into the drilled hole until the steel coil contacts the top of the rebar.

B. Feed the steel connector wire through the Galvashield CC Setting Tool and set into place by striking with a hammer.

C. Proper connection and rebar continuity shall be verified between two rebar connections using a multi-meter. Maximum resistance between the two locations shall be less than 1 ohm.

3.04 Anode Installation

A. Holes shall be in a saturated-surface dry condition prior to anode placement. 

B. Presoak anodes in a small volume of water for 10 to 30 minutes. Remove from water bath immediately prior to installation.

C. Complete wiring between the anodes and the rebar connections.

1. If anodes are to be installed in series:
   a. Trim the cable supplied in the Anode Connection Kit leaving enough length to interconnect the anodes and rebar locations along a single string. Trim the steel anode connection wire on each anode to a length of approximately ½ in. (12 mm)
   b. Insert the interconnecting cable through the open side of the button-type wire connectors supplied in the Galvashield CC Anode Connection Kit and the steel anode wire into the terminated side. With the anode along side of the installation hole, crimp the button connector until it is flush with its casing.
   c. Connect the bare ends of the interconnecting cable and reinforcing steel connector wires using the same procedures as outlined above in 3.04.C.1.b.
   d. After all anodes along the string are connected to the interconnecting cable, verify continuity between anodes and rebar connections with a multi-meter. Resistivity of 1 ohm or less is acceptable.

2. If anodes are to be connected individually:
   a. Trim the steel anode connection wire on each anode to a length of approximately ½ in. (12 mm).
   b. Insert the end of the rebar connection wire though the open side of the button-type wire connectors supplied in the Galvashield CC Anode Connection Kit and the steel anode wire into the
terminated side. Crimp the button connector until it is flush with its casing.

c. Verify continuity between steel anode wire and rebar connection wire with a multi-meter. Resistivity of 1 ohm or less is acceptable.

D. Mix the embedding mortar per the manufacturer’s instructions. After removing excess water from the presoaked holes, fill each anode installation hole approximately 2/3 full with mixed embedding mortar.

E. Insert an anode into each hole, forcing the embedding mortar to fill the annular space from the bottom up. Top off the hole with embedding mortar and strike off excess flush with the concrete surface. Minimum cover over the top of the anode shall be 1 in. (25 mm).

F. After burying all wiring into the saw cut and drilled holes, backfill saw cut and rebar connection holes with embedding mortar or other material approved by the owner [owner's representative] and strike off flush with the concrete surface.

G. Wet cure cement-based mortar(s) or cure with two coats of a membrane-forming concrete curing compound meeting the requirements of ASTM C309.

H. Protect area from traffic for 24 hours.

END OF SECTION

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