



SENTINEL GALVANIC ANODES

SELF-GENERATING CATHODIC PROTECTION

EUCLID CHEMICAL

CATHODIC PROTECTION

SENTINEL GALVANIC ANODES

MASTER FORMAT #: 03 21 00

DESCRIPTION

SENTINEL GALVANIC ANODES ARE DESIGNED TO MITIGATE THE CORROSION OF REINFORCING STEEL IN CONCRETE. THEIR PRINCIPAL FUNCTION IS TO COUNTERACT THE “ANODE RING EFFECT” (SEE CORROSION PREVENTION BROCHURE) AND SIGNIFICANTLY EXTEND THE SERVICE LIFE OF CONCRETE REPAIRS. THEY ARE USED IN LOCATIONS WHERE NEW CONCRETE OR CONCRETE REPAIR MATERIALS ARE PLACED ADJACENT TO EXISTING CHLORIDE-CONTAMINATED CONCRETE. SENTINEL ANODES GENERATE AN EFFECTIVE CURRENT TO THE SURROUNDING REINFORCING STEEL, THUS PROTECTING THE STEEL FROM CORROSION. SENTINEL GL CONTAINS 38 GRAMS OF ZINC. FOR PROJECTS WHERE MORE ZINC IS REQUIRED, SENTINEL SILVER CONTAINS 100 GRAMS OF ZINC AND SENTINEL GOLD CONTAINS A MASSIVE 200 GRAMS OF ZINC.

PRIMARY APPLICATIONS

- Parking Structures
- Bridges
- Piers & dock supports
- Balconies

FEATURES/BENEFITS

- OFFERS THE HIGHEST SELF-GENERATING PROTECTIVE CURRENT OUTPUT OF ANY CATHODIC PROTECTION DEVICE ON THE MARKET ENSURING LONG SERVICE LIFE AND LARGE COVERAGE AREA
- ALLOWS THE USE OF REPAIR MATERIALS WITH RESISTIVITY VALUES UP TO 30,000 OHM-CM
- UNIQUE V-NOTCH DESIGN SNUGLY FITS AGAINST ANY SIZE REBAR AND MINIMIZES REMOVAL OF CONCRETE ASSURING EASY, EFFICIENT PLACEMENT USING STANDARD TOOLS, REDUCES LABOR REQUIREMENTS AND LOWERS INSTALLATION COSTS
- EXCLUSIVE INSULATING BARRIER DESIGN WILL NOT “DUMP” CURRENT INTO ATTACHMENT BAR EXTENDING THE COVERAGE AREA AND SERVICE LIFE OF THE CATHODIC PROTECTION DEVICE
- ENGINEERED TO PROVIDE LONG LASTING SERVICE THAT MAXIMIZES THE LIFE OF THE REPAIR AND DELIVERS AN EXCELLENT COST BENEFIT ADVANTAGE. SENTINEL ANODES ARE DESIGNED TO DELIVER BENEFICIAL PROTECTIVE CURRENT FOR 10 TO 20 YEARS*, THUS ALLOWING THE OWNER TO SKIP A REPAIR CYCLE OR TWO
- GALVANIZED TIE WIRE WILL NOT RUST AND MOUNTS TIGHTLY TO REBAR FORMING A SECURE CONNECTION
- MANY SUCCESSFUL PROJECT REFERENCES AVAILABLE

*CURRENT REQUIRED TO COMPLETELY PREVENT CORROSION OF STEEL IN CONCRETE WILL VARY WITH CONDITIONS, AS WILL EFFECTIVE SERVICE LIFE

TECHNICAL INFORMATION

SENTINEL anodes deliver a protective current equal to or greater than 1.0 milliamps after 90 days when tested at 21°C, and 50% relative humidity in a concrete test block containing not more than 0.065m² of reinforcing steel.

ANODE	DIMENSIONS	MASS OF ZINC
SENTINEL GL	76mm x 57mm x 28mm	38 grams
SENTINEL SILVER	108mm x 57mm x 32mm	100 grams
SENTINEL GOLD	117mm x 57mm x38mm	200 grams

PACKAGING

SENTINEL GL: 20 units per box; SENTINEL SILVER and SENTINEL GOLD: 10 units per box.

SHELF LIFE

12 months in original, unopened package

SPECIFICATIONS/COMPLIANCES

- ASTM B418 Type II (Previously ASTM B418-95a), ASTM A82 (Previously ASTM A82-97a), and ASTM B6/ B69
- Listed under US Patents 6,217,742, 6,958,116 and 7,488,410
- SENTINEL GL passes the requirements of **M82 Protocol to Evaluate the Performance of Corrosion Mitigation Technologies in Concrete Repairs (USA Bureau of Reclamation)**

SPACING REQUIREMENTS

Place SENTINEL anodes as close as practical to the edge of the repair area (within 15cm). Provide sufficient clearance for the anode to be completely surrounded by the repair material.

Anode spacing shall be as specified by the designer, but anode spacing must not exceed 75cm on center. Spacing is dependent on steel density, the corrosive nature of the environment, and electrical resistivity of the repair materials.

The density of the reinforcing steel is the total surface area of the bar within a given area of concrete: m^2 of steel / m^2 of concrete (regardless of depth)

Corrosion levels in the concrete can be broken into three measurable categories based on ASTM C 1152 Acid-Soluble Chloride of Mortar and Concrete:

Low corrosion levels: $< 2.4 \text{ kg/m}^3$

Moderate corrosion levels: $2.4 - 4.7 \text{ kg/m}^3$

High corrosion levels: $> 4.7 \text{ kg/m}^3$

In the event the volumetric resistivity of the repair material is higher than 15,000 ohm-cm, a spacing correction factor must be used. If the resistivity is higher than 15,000 ohm-cm and equal to or less than 20,000 ohm-cm, a correction factor of 0.9 must be used. If the repair material is greater than 20,000 ohm-cm and equal to or less than 30,000 ohm-cm, a correction factor of 0.7 must be used. For example: the anode spacing has been determined to be 61 cm due to the corrosive environment the concrete is in and the steel density within the concrete. However, the resistivity of the repair material is 25,000 ohm-cm. Therefore, the spacing would be $24 \times 0.7 = \text{approx. } 43 \text{ cm spacing}$.

INSTALLATION PREPARATION

Prepare concrete repair area in accordance with industry guidelines. Remove concrete from around and behind the steel reinforcement inside the repair area. Provide sufficient clearance between the anode and the substrate concrete (minimum of 19 mm or 6 mm larger than the top size aggregate in the repair material, whichever is greater).

Where anodes will be attached, clean exposed rebar to bright metal to facilitate electrical connection. Confirm electrical continuity of the reinforcing steel within the repair area through the use of a high impedance multimeter. Electrical discontinuity (a resistance reading greater than 3.0 Ohms) can be resolved by wiring discontinuous bars to adjacent bars using steel tie wire.

INSTALLATION PROCEDURE

Complete the repair following proper concrete repair procedures, taking care not to create any voids around the anode. Repair material must have a volumetric resistivity below 30,000 ohm-cm when tested at 28 days and maintained at 21°C and 80% relative humidity. For optimal performance, The Euclid Chemical Company recommends that its specially formulated line of repair materials: EUCOREPAIR CP, EUCOCRETE, EUCOPATCH and NS GROUT be used with SENTINEL anodes as a complete corrosion prevention system.

Caution: Repair materials with significant polymer modification and/or silica fume content may not be suitable for use with Sentinel anodes. If you are unsure of the volumetric resistivity of the cover material, please contact Flowcrete Asia Technical Services.

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Note: See installation procedures included in each box of the SENTINEL anodes.

Although not required, the use of insulating rebar coatings (such as epoxy coatings) in the repair area will increase the effectiveness and service life of SENTINEL anodes by directing protective current to reinforcing steel outside the patch. If such coatings are used, coat reinforcing steel after installation of the anodes, taking care not to apply any coating to the anode itself. In this case, electrical continuity between the anode wires and the rebar must be checked thoroughly

PRECAUTIONS/LIMITATIONS

- SENTINEL anodes should be installed and covered as soon as possible after removal from their original sealed packaging. Any anodes removed from their original packaging must be protected from excessive moisture and/or contaminants until time of repair material placement.

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