



SENTINEL GALVANIC ANODES

INSTALLATION INSTRUCTIONS

SENTINEL GALVANIC ANODES are designed to mitigate the corrosion of reinforced steel in concrete. Their principal function is to counteract the “anode ring effect” that commonly occurs once repair cycling begins in corrosive environments, thus significantly extending the life of concrete repairs (see CORROSION PREVENTION brochure). SENTINEL anodes generate an effective current to the surrounding reinforcing steel protecting it from corrosion.

Installation Preparation

1. Prepare concrete area in accordance with industry (ICRI & ACI) 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 $\frac{3}{4}$ in [19 mm] or $\frac{1}{4}$ in [6 mm] larger than the top-size aggregate in the repair material, whichever is greater).
2. Where anodes will be attached, clean the 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 multi-meter. Electrical discontinuity (a resistance reading greater than 3.0 Ohms) can be resolved by wiring discontinuous bars to adjacent bars using steel tie wire.

Placement of SENTINEL ANODES

1. Place SENTINEL anodes as close as practical to the edge of the repair area (within 6 in [15 cm]). Provide sufficient clearance for the anode to be completely surrounded by the repair material.
2. Anode spacing shall be as specified by the designer, but anode spacing must not exceed 30 in (75 cm) on center. Spacing is dependent on steel density, the corrosive nature of the environment, and electrical resistivity of the repair materials. For additional spacing information, refer to the SENTINEL technical data sheet or contact The Euclid Chemical Company.
3. SENTINEL anodes are normally installed with their top side parallel to the concrete surface, but they may be angled down in cases where the concrete cover is very shallow. According to ACI Guideline 318, Chapter 7, Section 7.7.1, the minimum coverage of cementitious materials over non-prestressed #5 reinforcing steel and smaller is $1\frac{1}{2}$ in (38 mm).

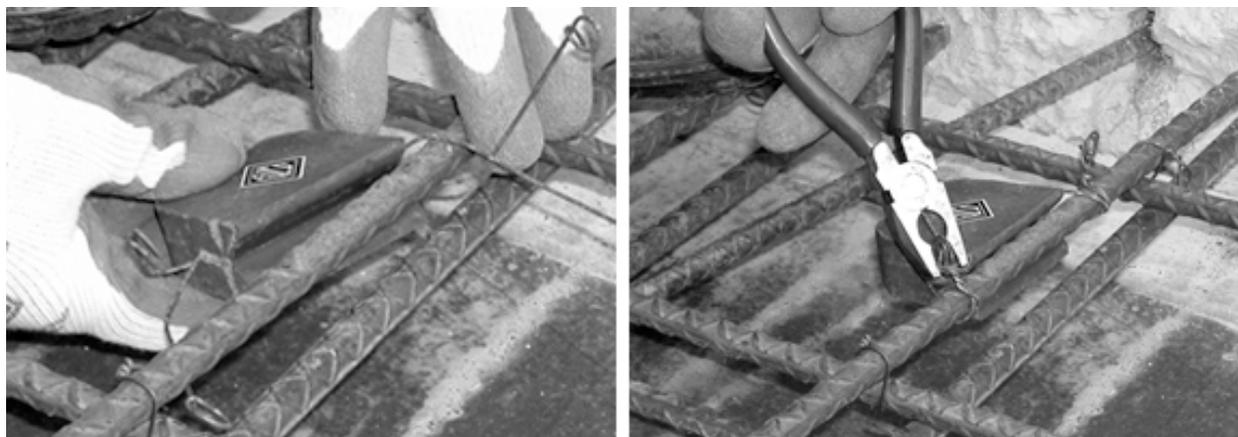
Installation Procedure

1. Position the SENTINEL anode's patented grooved insulator firmly against any size rebar and securely fasten the anode in place using the integrated tie wires. On each side, wrap each of the wires at least once around the rebar in opposite directions, then bring the ends of the wires together.
2. Grip the wires with pliers or other suitable tool and steadily twist the wires, firmly securing the anode to the rebar. **Caution:** Over-tightening may result in breakage of the wires.
3. Repeat steps 1 and 2 with the second set of tie wires.



Installation Procedures (continued)

4. After installation, check electrical continuity between the anode tie wires and the rebar, using a high impedance multi-meter. A resistance reading of 3.0 ohms or less indicates adequate continuity. If resistance is too high, remove the SENTINEL anode, clean the rebar thoroughly and repeat the installation procedure. Bend the excess twisted wires down onto the rebar.
5. Complete the repair following proper concrete repair procedures, taking care not to create any voids around the anodes.
6. If rebar 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.



Repair Material Selection

Repair materials must have a volumetric resistivity below 30,000 ohm-cm when tested at 28 days and maintained at 70 °F (21 °C) and 80% relative humidity. The Euclid Chemical technical data sheets for repair mortars list the volumetric resistivity. Sentinel Galvanic Anodes technical data sheet contains a list of Euclid Chemical repair products that are approved for use. Repair materials or ready-mix concrete with significant polymer or pozzolanic (such as silica fume or fly ash) modification may not be suitable.

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 resistivity 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 24 in (61 cm) due to the corrosive environment and the steel density within the concrete. However, the resistivity of the repair material is 25,000 ohm-cm. Therefore, the spacing would be $24 \times 0.7 = 17$ in (43 cm) anode spacing.

Health and Safety Information

Alkalis and other chemicals present in the anode mortar may be harmful to exposed skin. Wear proper safety gloves and other personal protective equipment in accordance with standard practices for handling cementitious products.