**Galvashield® CC**

**Product Line**

Embedded Galvanic Anode Units for Corrosion Control

**DESCRIPTION**

Galvashield® CC embedded galvanic anode units are used to control on-going corrosion and to prevent the initiation of new corrosion activity in concrete structures. Galvashield® CC anodes are alkali-activated (Type 2A), and consist of a sacrificial zinc anode core that is activated by the surrounding specially formulated precast cementitious mortar. The cylindrical unit, available in a variety of standard sizes, is quickly and easily installed into concrete that is mechanically sound but has ongoing corrosion activity. Once installed, the zinc anode corrodes preferentially to the surrounding rebar, thereby providing galvanic corrosion control to the adjacent reinforcing steel. Custom size units are available for specific project needs.

**APPLICATIONS**

- Balconies
- Columns and beams
- Bridge decks
- Parking garages
- Piers and wharfs
- Prestressed concrete
- Post-tensioning anchors

**LEVELS OF PROTECTION**

- **Corrosion Prevention**: Mitigates initiation of new corrosion activity
- **Corrosion Control**: Reduces on-going corrosion activity
- **Cathodic Protection**: Reduces or eliminates on-going corrosion activity

**FEATURES AND BENEFITS**

- **Proven technology** - Galvashield® is the original embedded galvanic anode with an extensive 20-year track record.
- **Focused protection** - discrete anodes can be installed to provide corrosion protection in areas with high corrosion potentials or active corrosion.
- **Economical** - save money by only protecting the remaining chloride-contaminated (unrepaired) areas.
- **Versatile** - effective in chloride-contaminated and carbonated concrete. Can be used for both conventionally reinforced and prestressed or post-tensioned concrete.
- **User friendly** - installation is quick and easy.
- **Low maintenance** - requires no external power source or system monitoring.
- **Measurable** - anode performance can be easily monitored if required.
- **Long lasting** - 10 to 30 year service life* reduces the need for future repairs.

*As with all galvanic protection systems, service life is dependent upon a number of factors including reinforcing steel density, concrete conductivity, chloride concentration, humidity and anode spacing.

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**Cut-away of Galvashield® CC**

**Chloride Contaminated Concrete**

*Potential Difference Between Upper Steel in Chloride Contaminated Concrete and Lower Steel Results in Accelerated Corrosion*

**Corrosion Activity is Mitigated by Galvashield® CC**

*Galvashield® CC mitigates active corrosion*
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**SPECIFICATION CLAUSE**

Embedded galvanic anodes shall be Galvashield® CC (specify product number, ie. CC65), as supplied by Vector Corrosion Technologies. Galvashield® CC is a pre-manufactured unit consisting of zinc in compliance with ASTM B418-95a Type I cast around an integral bright steel tie wire for making connection to the reinforcing steel and encased in an activated cementitious mortar with pH of 14 or greater. The cementitious mortar around the zinc anode shall contain no chlorides or other corrosive constituents detrimental to the reinforcing steel as per ACI 222R.

**HOW IT WORKS**

When two dissimilar metals are coupled together in an electrolyte, the metal with the higher potential for corrosion (more electronegative) will corrode in preference to the more noble metal. In concrete repair applications, the anode with the higher potential for corrosion (more electronegative) will corrode in preference to the more noble metal. In concrete repair applications, the zinc core of the Galvashield® CC unit will corrode in favor of the reinforcing steel and encased in an activated cementitious mortar with pH of 14 or greater. The cementitious mortar around the zinc anode shall contain no chlorides or other corrosive constituents detrimental to the reinforcing steel, thus providing corrosion control to the adjacent reinforcing steel.

**DESIGN CRITERIA**

**Standard Units**

<table>
<thead>
<tr>
<th>Unit Type</th>
<th>Unit Size diameter x length</th>
<th>Galvashield® CC65</th>
<th>1 ¾ x 2 ½ in. (46 x 62 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Galvashield® CC100</td>
<td>1 ¾ x 4 in. (46 x 100 mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Galvashield® CC135</td>
<td>1 ¾ x 5 ¾ in. (29 x 135 mm)</td>
</tr>
</tbody>
</table>

**INSTALLATION INSTRUCTIONS**

The location and spacing of the Galvashield® CC units shall be as specified by the engineer. The anodes can be installed and connected to the steel individually or up to 10 anodes connected to a common header wire with two reinforcement connections. Using a rebar locator, locate all existing steel within the area designated for protection and mark areas to drill unit installation holes. When possible, units should be installed a minimum of 4 in. (100 mm) from the reinforcing grid.

**Individual Connection** - drill one ⅜ in. (12 mm) rebar connection hole per unit location. Sawcut a groove approximately ¼ in. (6 mm) wide by ⅜ in. (12 mm) deep into the concrete to interconnect the rebar connection hole and anode connection hole. Reinforcing steel connections should be made using the Vector Rebar Connection Kit. Place the weighted end of the steel connector wire through the Vector Setting Tool and set into place by drilling the hole until the steel coil contacts the reinforcing steel. Feed the steel connector wire through the Vector Setting Tool and set into place by drilling the hole until the steel coil contacts the reinforcing steel. Verify continuity between unit locations and rebar connections with a multimeter. A resistance of 1 ohm or less is acceptable. Drill holes as per the dimensions listed above to accommodate the anodes. Presoak the units for a minimum of 10 to a maximum of 20 minutes in a shallow water bath. Remove the anodes from the bath and connect the steel lead wire from the anode to the tail of the Vector Rebar Connector using the supplied sealed connectors. Galvashield Embedding Mortar should be used to install the still wet units into presoaked (saturated-surface dry) mortar.

**Typical layout for series connection**

- Galvashield® CC Units
- Minimum number of rebar Connections
- Interconnecting cable
- Maximum spacing

**Anode Spacing* for Low to Moderate Risk**

<table>
<thead>
<tr>
<th>Steel Density Ratio</th>
<th>Galvashield® CC65</th>
<th>Galvashield® CC135</th>
<th>Galvashield® CC100</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.3</td>
<td>650</td>
<td>26</td>
<td>700</td>
</tr>
<tr>
<td>0.31 - 0.6</td>
<td>475</td>
<td>19</td>
<td>675</td>
</tr>
<tr>
<td>0.61 - 0.9</td>
<td>375</td>
<td>15</td>
<td>550</td>
</tr>
<tr>
<td>0.91 - 1.2</td>
<td>325</td>
<td>13</td>
<td>475</td>
</tr>
<tr>
<td>1.21 - 1.5</td>
<td>300</td>
<td>12</td>
<td>425</td>
</tr>
<tr>
<td>1.51 - 1.8</td>
<td>250</td>
<td>10</td>
<td>375</td>
</tr>
<tr>
<td>1.81 - 2.1</td>
<td>225</td>
<td>9</td>
<td>350</td>
</tr>
</tbody>
</table>

**Anode Spacing* for High Corrosion Risk**

<table>
<thead>
<tr>
<th>Steel Density Ratio</th>
<th>Galvashield® CC65</th>
<th>Galvashield® CC135</th>
<th>Galvashield® CC100</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.3</td>
<td>475</td>
<td>19</td>
<td>600</td>
</tr>
<tr>
<td>0.31 - 0.6</td>
<td>325</td>
<td>13</td>
<td>475</td>
</tr>
<tr>
<td>0.61 - 0.9</td>
<td>275</td>
<td>11</td>
<td>375</td>
</tr>
<tr>
<td>0.91 - 1.2</td>
<td>250</td>
<td>10</td>
<td>325</td>
</tr>
<tr>
<td>1.21 - 1.5</td>
<td>225</td>
<td>9</td>
<td>300</td>
</tr>
<tr>
<td>1.51 - 1.8</td>
<td>200</td>
<td>8</td>
<td>275</td>
</tr>
<tr>
<td>1.81 - 2.1</td>
<td>175</td>
<td>7</td>
<td>250</td>
</tr>
</tbody>
</table>

* Maximum grid dimensions are based on typical conditions. Spacing should be reduced as appropriate for severe environments or to extend the expected service life of the anode.

For extremely high corrosion risk applications (> 1.5% Chloride), contact Vector for assistance. Note: Chloride content is based on percent by weight of cement.
Galvashield® CC
Product Line

holes. Mix one 20kg (44lb.) bag of Galvashield® Embedding Mortar with 3.2 to 3.7 liters (0.8 to 1.0 gallons) of potable water. Add the powder to the water and mix with a drum or paddle mixer until a smooth consistency is achieved. Mix full bags or weigh partial bags and wafer to ensure proper mix ratio is maintained.

Place the mixed embedding mortar into the bottom ¾ of each hole and slowly press in the unit allowing the mortar to fill the annular space ensuring there are no air voids between the unit and the parent concrete. The minimum unit cover depth shall be ¾ in. (20 mm).

Place wires into grooves and top off holes and saw cuts flush to the concrete surface with embedding mortar. Embedding mortar should be wet cured or cured with a curing compound and protected from traffic for 24 hours.

Series Connection - a single circuit shall contain no more than 10 Galvashield® CC units. Reinforcing steel connections should be made using the Vector Rebar Connection and Anode Connection Kits or the Galvashield® CC Rivet Connector Pack.

When using Vector Rebar Connectors, drill a minimum of two ½ in. (12 mm) rebar connection holes per string of anodes and install as detailed above. If installing in series, connect the units using the interconnection wire and connectors supplied in the Vector Anode Connection Kit.

If using Galvashield® CC Rivet Connectors chip 2 in. (50 mm) holes to expose rebar in two locations. If using the Galvashield® CC Rivet Connector Kits, electrical connection to the steel shall be established by drilling a 5-7mm deep hole into the steel using the 3.5mm drill bit provided. 3.2mm stainless steel pop rivets are used to connect the connecting wire to the steel. The connection shall be insulated by a neutral cure sealant or epoxy.

Saw cut a single continuous groove approximately ¼ in. (6 mm) wide by ½ in. (12 mm) deep into the concrete to interconnect rebar connection holes and anode connection holes. Connect the units directly to the rebar connection wire using the supplied wire connectors. Presoak anode units and install with Galvashield® Embedding Mortar as detailed above.

PACKAGING

<table>
<thead>
<tr>
<th>Product</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvashield® CC units</td>
<td>20 units per box</td>
</tr>
<tr>
<td>Galvashield® Embedding Mortar</td>
<td>44 lb. (20 kg) bags one bag per 40-80 units</td>
</tr>
<tr>
<td>Vector Rebar Connection Kit</td>
<td>20 rebar connectors per box</td>
</tr>
<tr>
<td>Vector Anode Connection Kit</td>
<td>250 ft. (15.2 m) insulated cable, 25 wire connectors</td>
</tr>
<tr>
<td>Vector Setting Tool</td>
<td>1 unit per box</td>
</tr>
<tr>
<td>Galvashield® CC Rivet Connector Pack</td>
<td>5 stainless steel rivets, 2 drill bits, 23 wire connectors, 14 m (46 ft.) insulated wire</td>
</tr>
</tbody>
</table>

STORAGE

Store in dry conditions in the original unopened boxes. Avoid extremes of temperature and humidity. Units should be installed within two years.
HEALTH AND SAFETY
As with all cement-based materials, contact with moisture can release alkalis which may be harmful to exposed skin. Galvashield® CC and Galvashield® Embedding Mortar should be handled with suitable gloves and other personal protective equipment in accordance with standard procedures for handling cementitious materials. Mix left over water from the unit bath with cementitious material and dispose by normal means after hardening. Additional safety information is included in the Safety Data Sheet.

RELATED DOCUMENTS
A range of related Galvashield® CC documents are available including independent product evaluations, installation instructions, specifications, project histories, applications, price list, MSDS etc. For more information, contact Vector Corrosion Technologies.

ABOUT VECTOR
Vector Corrosion Technologies takes pride in offering technically advanced, cost effective corrosion protection solutions to extend the service life and improve the durability of concrete and masonry structures around the world. Vector has earned numerous project awards and patents for product innovation and is committed to a safe, healthy and sustainable environment. For additional information or technical support, please contact any Vector office or our extensive network of international distributors.