

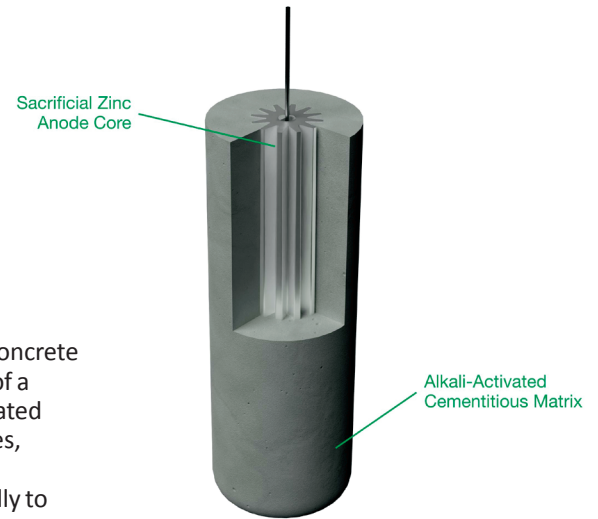
Galvashield® CC

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 reinforced 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 two 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.



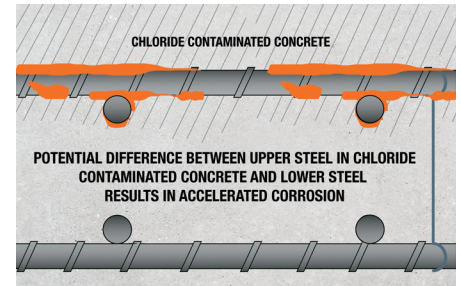
Cut-away of Galvashield CC

APPLICATIONS

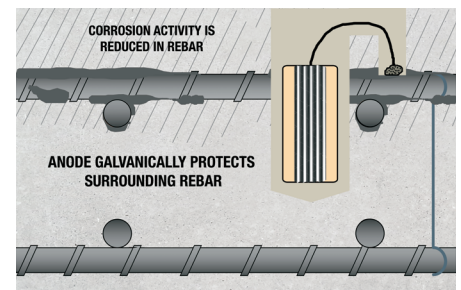
- Balconies
- Columns and beams
- Bridge decks
- Parking structures
- Piers and wharfs
- Prestressed concrete
- Post-tensioning anchors
- Swimming pools
- Concrete tanks

FEATURES AND BENEFITS

- **Proven technology** - Galvashield® is the original embedded galvanic anode with an extensive 20-year track record.
- **Long lasting** - minimum 20 year anode service life when using standard design tables; reduces the need for future repairs.
- **Targeted protection** - discrete anodes can be installed to provide corrosion protection in areas with high corrosion potentials or active corrosion.
- **Economical** - save money by targeting only the remaining areas of high corrosive risk.
- **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.



Chloride contamination causes corrosion in reinforced concrete



Galvashield® CC mitigates active corrosion



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HOW IT WORKS

When two dissimilar metals are coupled together in an electrolyte (concrete), the metal with the higher electronegative potential for corrosion (zinc) will corrode in preference to the more noble metal (reinforcing steel). Galvashield® CC anodes are embedded in holes in sound concrete to provide corrosion prevention or corrosion control to the adjacent reinforcing steel.

DESIGN CRITERIA

Corrosion Risk Category	Chloride Level*	Minimum Current Density at 20 Years
Low to Moderate	<0.8%	0.6mA/m ² (0.06mA/ft ²)
High	0.8%-1.5%	1.2mA/m ² (0.11mA/ft ²)
Extremely High	1.5%	2.4mA/m ² (0.22mA/ft ²)

* Chloride content is based on percent by weight of cement.

Standard Units

Anode Name	Anode Type	Nominal Dimensions (diameter x length)
Galvashield® CC2	2A	32 x 75 mm (1.3 x 3 in.)
Galvashield® CC4	2A	36 x 100 mm (1.4 x 4 in.)
Galvashield® CCX	2A	46 x 115 mm (1.8 x 4.5 in.)
Galvashield® Custom	2A	Custom Sizes Available

Please note:

- Minimum hole dimension is 30 mm (1 ¼ in.) deeper than the " anode length and 6 mm (¼ in.) wider than the anode diameter.

SPECIFICATION CLAUSE

Embedded galvanic anodes shall be premanufactured with zinc in compliance with ASTM B418 Type II cast around an integral, unspliced, uncoated, nongalvanized steel lead wire and encased in a highly alkaline cementitious shell with a pH of 14 or greater. The anode unit shall contain no intentionally added chloride, bromide or other constituents that are corrosive to reinforcing steel (refer to ACI 562-13, Section 8.4.1). The galvanic anode size and spacing shall be based on achieving the minimum current density for the appropriate corrosion risk category as referenced on the technical data sheet design criteria 20 years after installation.

ANODE TYPE

- 1 - Installed in Concrete Repairs
 - 2 - Installed in Drilled Holes in Sound Concrete
- A - Alkali-activated using High pH
H - Halide-activated using Corrosive Salts

REPAIR MATERIAL PROPERTIES

For optimum performance, use Galvashield® Embedding Mortar when grouting anodes in drilled holes to provide an ionically conductive path to the substrate.





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Low to Moderate Corrosion Risk (Chloride Content* <0.8% or Carbonated Concrete)

Galvashield®	CC2		CC4/CCX**	
	mm	in.	mm	in.
Steel Density Ratio < 0.3	650	26	700	28
0.31 - 0.6	475	19	675	27
0.61 - 0.9	375	15	550	22
0.91 - 1.2	325	13	475	19
1.21 - 1.5	300	12	425	17
1.51 - 1.8	250	10	375	15
1.81 - 2.1	225	9	350	14

High Corrosion Risk (Chloride Content 0.8% to 1.5% or Carbonated Concrete)

Galvashield®	CC2		CC4/CCX	
	mm	in.	mm	in.
Steel Density Ratio < 0.3	475	19	600	24
0.31 - 0.6	325	13	475	19
0.61 - 0.9	275	11	375	15
0.91 - 1.2	250	10	325	13
1.21 - 1.5	225	9	300	12
1.51 - 1.8	200	8	275	11
1.81 - 2.1	175	7	250	10

Extremely High Corrosion Risk (Chloride Content* > 1.5%)

Galvashield®	CC2		CC4/CCX	
	mm	in.	mm	in.
Steel Density Ratio < 0.3	340	13	475	19
0.31 - 0.6	240	9	335	13
0.61 - 0.9	195	8	275	11
0.91 - 1.2	170	7	235	9
1.21 - 1.5	150	6	210	8
1.51 - 1.8	135	5.3	195	7.7
1.81 - 2.1	125	4.9	180	7.1

Please note:

- For structures in high or extremely high corrosion risk environments that have high steel density ratios requiring close anode spacings Galvashield® Fusion anode systems are typically a more economical option.

ANODE SPACING

The following anode spacing guidelines are based on achieving the minimum current density for the appropriate corrosion risk category as referenced on the technical data sheet design criteria 20 years after installation. In warmer or more corrosive conditions such as marine exposure, Galvashield® CCX is recommended to achieve the 20 year anode life.

For more information on the design methodology or to receive a custom design, contact Vector.

PRECAUTIONS

Galvashield® CC anodes are intended to provide localized corrosion mitigation in areas of sound concrete and do not address or repair structural or concrete damage. Where structural damage exists, consult a structural engineer. To provide protection to concrete repair interfaces or joints install Galvashield® XP anodes or consult Vector for other product recommendations.

* Chloride content is based on percent by weight of cement

** Galvashield® CCX is recommended for structures in severe environments with high temperature and humidity to achieve expected service life.





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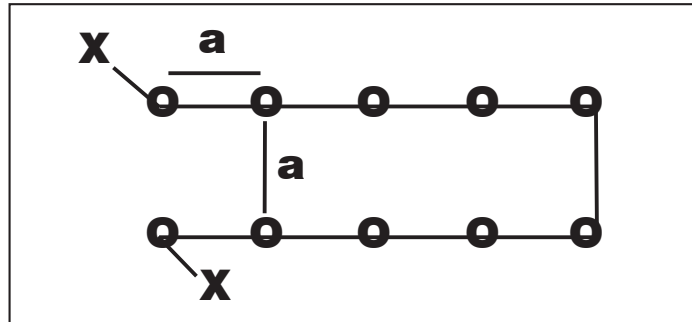
INSTALLATION INSTRUCTIONS

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 20 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 100 mm (4 in.) from the reinforcing grid.

Individual Connection - drill a single 12 mm (½ in.) rebar connection hole per anode unit location. Sawcut a groove approximately 6 mm (¼ in.) wide by 12 mm (½ in.) 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. After cleaning out the hole, place the weighted end of the steel connector into the drilled hole until the steel coil contacts the reinforcing steel. Feed the steel connector wire through the Vector Setting Tool and set into place by striking with a hammer. 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.

Pre-wet anode units to achieve a saturated surface condition for no more than 20 minutes. 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) 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.

Typical layout for series connection



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

Place the mixed embedding mortar into the bottom ⅔ 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 20 mm (¾ in.).

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 20 Galvashield® CC units. Reinforcing steel connections should be made using the Vector Rebar Connection and Anode Connection Kit or the Galvashield® CC Rivet Connector Pack.

When using Vector Anode Connection Kit, drill a minimum of two 12 mm (½ in.) rebar connection holes per string of anodes and sawcut a groove 6mm (¼ in.) by 12 mm (½ in.) linking the rebar connection holes to the anode connection holes. Install the rebar connectors as detailed above. The wire and connectors supplied in the Vector

Anode Connection Kit will be used to link rebar connections to the anode units.

If using Galvashield® CC Rivet Connectors chip 50 mm (2 in.) 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 5-7 mm (0.2 to 0.28 in.) deep hole into the steel using the 3.5 mm (0.14 in.) drill bit provided. 3.2 mm (¼ in.) stainless steel pop rivets are used to connect the connection wire to the steel. The connection shall be insulated by a neutral cure sealant or epoxy.

Saw cut a single continuous groove approximately 6 mm (¼ in.) wide by 12 mm (½ in.) 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.



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PACKAGING

Galvashield® CC2 Units	30 units per box	12 lbs. (5.4 kg)
Galvashield® CC4 Units	30 units per box	20 lbs. (9.1 kg)
Galvashield® CCX Units	20 units per box	22 lbs. (10 kg)
Galvashield® Embedding Mortar		44.1 lbs. (20 kg) bag
Vector Rebar Connection Kit		
Vector Rebar Connectors	20 rebar connectors per box	
Vector Anode Connection Kit	15.2 m (50 ft.) insulated cable, 25 wire connectors	
Vector Setting Tool	1 unit per box	
Galvashield® CC Rivet Connector Pack	5 stainless steel rivets, 2 drill bits 23 wire connectors, 14 m (46 ft.) insulated wire	

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® anodes and Galvashield® Embedding Mortar should be handled with suitable gloves and other personal protective equipment in accordance with standard procedures for handling cementitious materials. Additional safety information is included in the Safety Data Sheet.

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 on concrete preservation and sustainability, visit **WeSaveStructures.Info**. For additional information or technical support, please contact any Vector office or our extensive network of international distributors.

Vector products are provided with a standard limited warranty against defects for a period of 12 months from the date of sale. To obtain a complete copy of Vector's limited warranty, contact Vector or visit www.vector-corrosion.com/warranty.pdf. Contact Vector for information on extended warranties. User shall determine the suitability of the products for the intended use and assumes all risks and liability in connection therewith. For professional use only; not for sale to or use by the general public.

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Rev. January, 2022

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