



Galvashield® XP

Product Line

Type 1A Embedded Galvanic Anodes
for Concrete Repair

DESCRIPTION

The Galvashield® XP range of embedded galvanic anodes are used to mitigate ring anode corrosion when repairing reinforced concrete structures. Designed for optimum performance and ease of installation, the alkali-activated (Type 1A) anodes are comprised of high purity zinc cast around a steel tie wire with an enhanced formulated cement-based mortar with an internal pH of 14 or greater that keeps the zinc active over the life of the anode. The Galvashield® XP range of anodes utilize the contractor-friendly One-and-Done™ single-wire connection. Once installed, the zinc anode corrodes to provide galvanic protection to adjacent reinforcing steel.

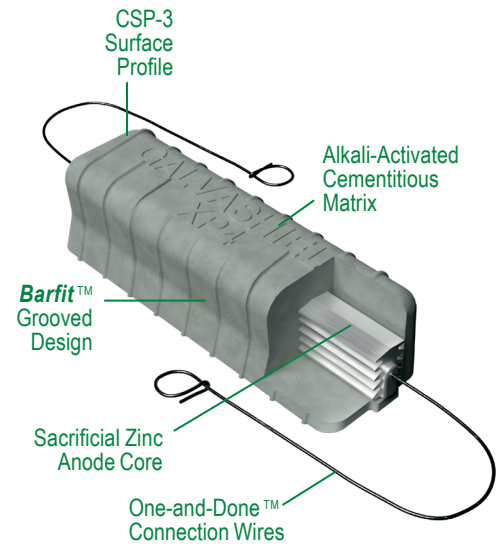
FEATURES AND BENEFITS

- **Proven technology** - Galvashield® XP 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.
- **Independent testing** - indicates concrete repair service life can be extended by more than 400%.
- **Type 1A anode** - alkali-activated to maintain activity of zinc; meets building code requirements that prohibit intentionally added constituents that are corrosive to reinforcement within repair area.

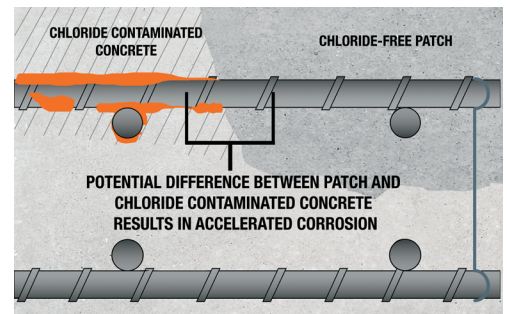
APPLICATIONS

- Mitigates ring anode formation (halo effect) in concrete repairs
- Bridge widening and other structure modifications
- Slab replacements, expansion joint repairs and other interfaces between new and existing concrete
- Repair of pre-stressed and post-tensioned concrete
- Chloride contaminated or carbonated concrete
- Repair of structures with epoxy-coated rebar
- Extends the life of concrete and joint repairs

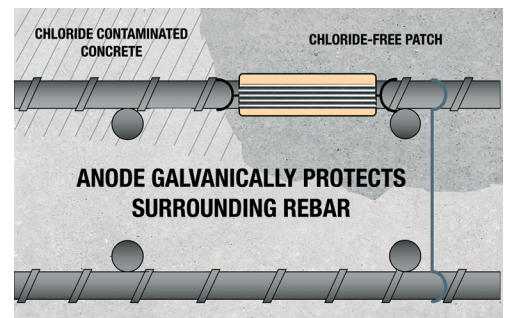
- **One-and-Done™** connection - innovative single wire connection can be installed up to 2x faster than the traditional two wire connection, saving 50% on installation labor cost.
- **Cast zinc core** - provides high anode utilization and a secure long-term connection between the zinc and the integral lead wire.
- **BarFit™** design - grooved edges on Galvashield® XP2, XP4 and XPX anodes assist with secure anode placement.
- **Steel connection wires** - provides dependable steel-to-steel contact with no intermediate materials such as galvanizing that may compromise the long-term electrical connection.
- **Economical** - provides localized protection where it is needed the most, at the interface between the repair and the remaining contaminated concrete.
- **Versatile** - can be used for both conventionally reinforced and pre-stressed or post-tensioned concrete.
- **Low maintenance** - requires no external power source or system monitoring.
- **ICRI CSP-3 (Concrete Surface Profile)** - raised ridges provide increased surface profile to promote mechanical bond with repair mortars and concrete.



Cut-away of Galvashield® XP4



"Ring Anode" Corrosion (without Galvashield® XP)



Galvashield® XP prevents "Ring Anode" Corrosion



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HOW IT WORKS

When two dissimilar metals are coupled together in concrete, the metal with the higher potential for corrosion (zinc) will corrode in preference to the more noble metal (reinforcing steel). Galvashield® XP-type anodes are embedded in concrete repairs to provide corrosion prevention or corrosion control to the adjacent reinforcing steel in the adjacent parent concrete.

DESIGN CRITERIA

Corrosion Risk Category	Chloride Level*	Minimum Current Density at 20 Years**
Low to Moderate	<0.8%	0.4mA/m ² (0.04mA/ft ²)
High	0.8%-1.5%	0.8mA/m ² (0.07mA/ft ²)
Extremely High	1.5%	1.6mA/m ² (0.15mA/ft ²)

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

**Design current densities for the XPX are double the standard current densities at 20 years.

Standard Units

Anode Name	Anode Type	Nominal Dimensions	Zinc Mass (g)
XP Compact	1A	25 x 31 x 64 mm (1 x 1.25 x 2.5 in.)	40
XPT	1A	24 x 28 x 100 mm (1 x 1.13 x 4 in.)	60
XP2	1A	32 x 34 x 100 mm (1.25 x 1.34 x 4 in.)	100
XP4	1A	33 x 35 x 130 mm (1.3 x 1.38 x 5.12 in.)	160
XPX	1A	33 x 35 x 170 mm (1.3 x 1.38 x 6.69 in.)	330

SPECIFICATION CLAUSE

Embedded galvanic anodes shall be pre-manufactured with zinc in compliance with ASTM B418 Type II cast around an integral, unspliced, uncoated, non-galvanized double loop steel tie 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 an ionically conductive, cement-based repair mortar or concrete. Per ISO 12696, electrical resistivity and mechanical properties of the repair material shall be compatible with the original concrete. Repair materials typically should have an electrical resistivity of one-half to two times the resistivity of the parent concrete when measured under the same exposure conditions. If repair materials with a saturated bulk resistivity of 50,000 ohm-cm or greater are to be used, pack Galvashield® Embedding Mortar or another repair mortar with a resistivity of 15,000 ohm-cm or less between the anode and the substrate to provide an ionically conductive path to the substrate.



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

Steel Density	XPT/XPC**		XP2		XP4/XPX	
	inch	mm	inch	mm	inch	mm
<0.3	27	675	28	700	28	700
0.31-0.6	18	450	28	700	28	700
0.61-0.9	14	350	23	575	28	700
0.91-1.2	12	300	19	475	25	625
1.21-1.5	11	275	17	425	22	550
1.51-1.8	10	250	15	375	20	500
1.81-2.1	9	225	14	350	19	475

High Corrosion Risk (Chloride Content* 0.8% to 1.5%)

Steel Density	XPT/XPC**		XP2		XP4/XPX	
	inch	mm	inch	mm	inch	mm
<0.3	18	450	28	700	28	700
0.31-0.6	12	300	19	475	25	625
0.61-0.9	10	250	15	375	20	500
0.91-1.2	8	200	13	325	17	425
1.21-1.5	7	175	11	275	15	375
1.51-1.8	6	150	10	250	14	350
1.81-2.1	5	125	9	225	13	325

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

Steel Density	XPT/XPC**		XP2		XP4/XPX	
	inch	mm	inch	mm	inch	mm
<0.3	12	300	19	475	25	625
0.31-0.6	8	200	13	325	17	425
0.61-0.9	7	175	10	250	14	350
0.91-1.2	6	150	9	225	11	275
1.21-1.5	5	125	7	175	10	250
1.51-1.8	4	100	6	150	9	225
1.81-2.1	N/A	N/A	5	125	8	200

New Construction and Carbonated Concrete

Steel Density	XPT/XPC**		XP2		XP4/XPX	
	inch	mm	inch	mm	inch	mm
<0.3	28	700	28	700	28	700
0.31-0.6	28	700	28	700	28	700
0.61-0.9	23	580	28	700	28	700
0.91-1.2	20	500	28	700	28	700
1.21-1.5	17	440	27	680	28	700
1.51-1.8	16	400	24	600	28	700
1.81-2.1	15	370	22	560	28	700

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® XPX is recommended to achieve the 20 year anode life. For more information on the design methodology or to receive a custom design, contact Vector.

Spacing charts are based on an average annual temperature of 10°C (60°F).

PRECAUTIONS

Galvashield® XP-type anodes are intended to provide localized corrosion mitigation to concrete repair interfaces and joints and do not address or repair structural or concrete damage. Where structural damage exists, consult a structural engineer. To provide protection to broader areas, install Galvashield® CC anodes or Galvashield® Fusion® T2 anodes on a grid pattern or consult Vector for other product recommendations.

*Chloride content is based on percent by weight of cement

**Galvashield® XP Compact (XPC) may have reduced life due to reduced zinc mass (40 g).



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INSTALLATION INSTRUCTIONS

Concrete shall be removed from around and behind all corroding rebar in accordance with good concrete repair practice such as ICRI Guideline R310.1R. Exposed reinforcing steel should be cleaned to remove all residual rust and concrete residue.

The anodes and repair material should be installed immediately following preparation and cleaning of the steel reinforcement. The location and spacing of the anodes shall be as specified by the designer (refer to design criteria). Anodes can be placed around the perimeter of the repair or on a grid pattern to protect a second mat of steel if desired.

Step 1

Securely fasten the anodes on the side r beneath the exposed rebar as close as practical to the surrounding concrete [preferably within 4 in. (100 mm)] while ensuring that enough space remains to fully encapsulate the anode in the repair. The minimum cover of the repair material over the anodes should be $\frac{3}{4}$ in. (20 mm).

Step 2

Wrap the tie wires around the clean reinforcing steel at least one full turn in opposite directions.

Step 3

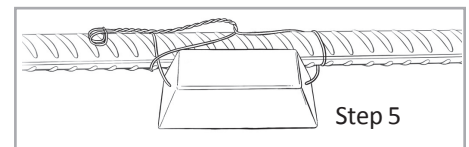
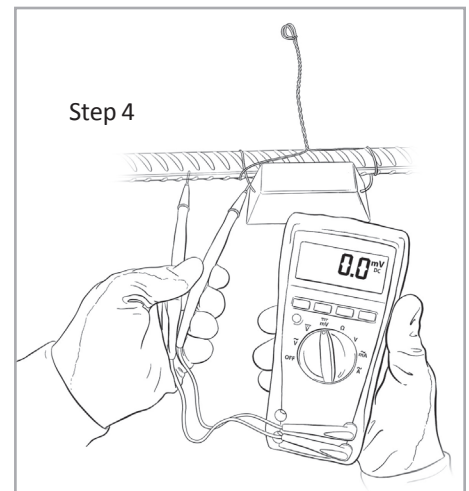
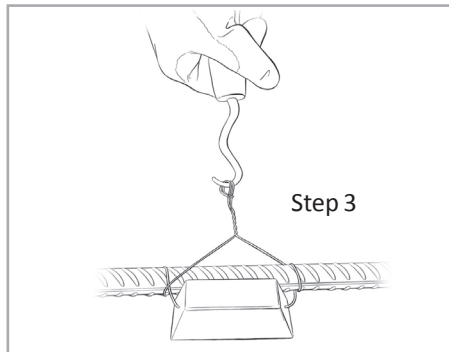
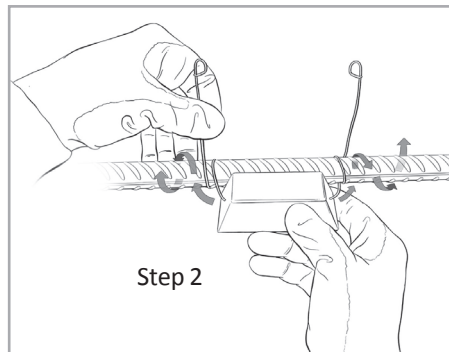
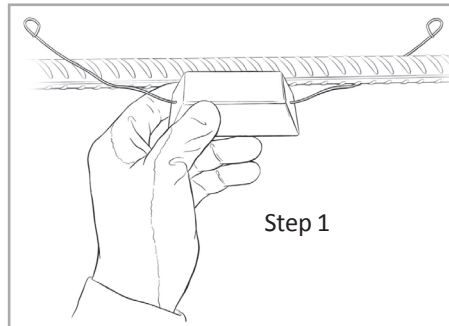
Bring the two free ends together and twist tight.

Step 4

Anode-to-steel continuity and steel-to-steel continuity within the repair cavity should be verified with an appropriate meter; discontinuous steel should be tied to continuous bars using steel tie wire and re-tested. A value between 0 and 1 ohm should be achieved.

Step 5

If the repair procedures require the concrete surface to be saturated with water, do not damage the anode nor allow the anode units to be soaked for greater than 20 minutes.





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PACKAGING

Galvashield® XP Compact	50 units per box	15 lbs. (6.8 kg)
Galvashield® XPT	50 units per box	20 lbs (9.1 kg)
Galvashield® XP2	40 units per box	22.5 lbs (10.2 kg)
Galvashield® XP4	30 units per box	26.5 lbs (12.0 kg)
Galvashield® XPX	20 units per box	30 lbs (13.6 kg)
Galvashield® Embedding Mortar		44.1 lb. (20 kg) bag

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.

STORAGE

Store in dry conditions in the original unopened box. Avoid extremes of temperature and humidity. Anodes should be installed within 2 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.

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