

Vector®

Galvashield® XP Product Line

Type 1A Embedded Galvanic Anodes with 2G Technology™

Description

The Galvashield® XP range of embedded galvanic anodes utilize an innovative zinc anode core design surrounded by an enhanced formulated cement-based mortar to provide corrosion mitigation to reinforced concrete structures. The anodes are alkali-activated (Type 1A) with an internal pH of 14 or greater to keep the zinc active over the life of the anode while being non-corrosive to reinforcing steel. The anodes utilize 2G Technology™ to provide higher current output. Once installed, the zinc anode corrodes preferentially to the adjacent reinforcing steel, thereby providing galvanic corrosion prevention or corrosion control.

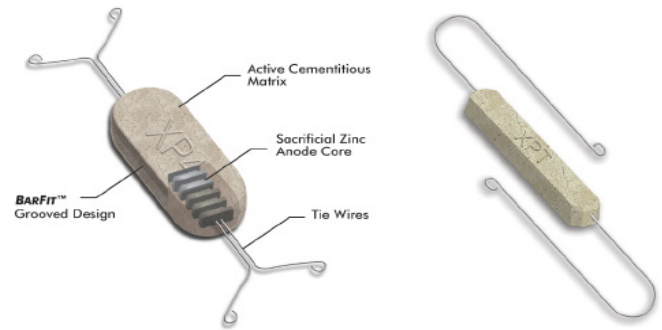
Applications

- Mitigates incipient anode formation (halo effect) in patch repair
- 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

Features and Benefits

- **Proven technology** - Galvashield® anodes have an extensive track record of delivering current in the field for over 15 years.
- **Independent testing** - indicates concrete repair service life can be extended by more than 400%
- **Type 1A anode** - alkali-activated to maintain activity of zinc while being non-corrosive to reinforcing steel.
- **2G Technology™** - provides enhanced current output and protection.
- **Cast zinc core** - provides high anode utilization in addition to a secure long-term connection between the zinc and the lead wires.
- **Integral steel lead wires** - allows for quick and convenient anode installation. Provides dependable steel-to-steel contact with no intermediate materials such as galvanizing (which can corrode over time) that may compromise the long-term electrical connection.
- **Single Wire Connection (XPT/XPC)** - saves 50% of installation labor cost.
- **BarFit™ design** - grooved edges on Galvashield® XP2 and XP4 anodes assist with secure anode placement.
- **Economical** - provides localized protection where it is needed the most, at the interface of 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.
- **Long lasting** - 10 to 20 year anode service life* reduces the need for future repairs.

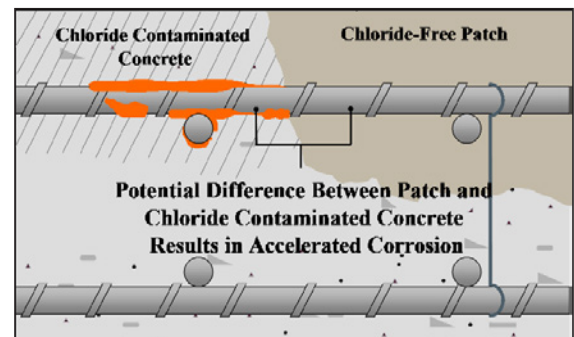
*As with all galvanic protection systems, service life and performance is dependent upon a number of factors including reinforcing steel density, concrete conductivity, chloride concentration, humidity and anode spacing.



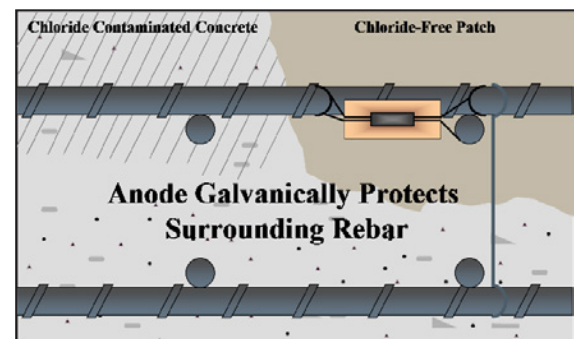
Cut-away of Galvashield® XP4

Galvashield® XPT

Level of Protection	Description	Galvashield® XPT/XPC	Galvashield® XP2/XP4
Corrosion Prevention	Mitigates initiation of new corrosion activity	•	•
Corrosion Control	Reduces on-going corrosion activity		•
Cathodic Protection	Reduce or eliminate on-going corrosion activity		



“Ring Anode” Corrosion (without Galvashield® XP Anodes)



Galvashield® XP products prevent “Ring Anode” Corrosion



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Specification Clause

Embedded galvanic anodes shall be pre-manufactured with nominal [add zinc mass] of zinc in compliance with ASTM B418 Type II cast around uncoated, non-galvanized steel tie wires 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). Anodes shall be supplied with integral unspliced wires with loop ties for tying to the reinforcing steel.

How It Works

When two dissimilar metals are coupled together in an electrolyte (in this case 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 reinforcing steel in the adjacent area.

Product Anode Details

Anode Name	Anode Type	Nominal Dimension (mm)	Zinc Mass (g)
XPC	1A-P	31 mm x 25 mm x 64 mm	40
XPT	1A-P	125 mm x 25 mm x 25 mm	60
XP2	1A-C	70 mm x 65 mm x 30 mm	100
XP4	1A-C	110 mm x 55 mm x 30 mm	160

Anode Type and Class

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

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 required.

Securely fasten the anodes from the side or 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.

Wrap the tie wires around the clean reinforcing steel at least one full turn in opposite directions and twist tight for secure connection. For single wire anodes (XPT and XPC), after wrapping the wires around the steel, bring the two ends together and twist tight. The minimum cover of the repair material over the anodes should be ¾ in. (20 mm).

Anode-to-steel continuity and steel-to-steel continuity within the patch 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.

Repair Materials

For optimum performance, use a repair material with resistivity less than 15,000 ohm-cm. If a higher resistivity repair material is to be used or if the resistivity of the material is unknown, pack Galvashield® Embedding Mortar between the anode and the substrate to provide an ionically conductive path to the substrate. Prior to placing the repair material, pre-wet the concrete substrate and the anodes to achieve a saturated surface dry condition, then complete the repair. Do not soak anodes for greater than 20 minutes.

Precautions

Galvashield® XP-type anodes are intended to provide localized corrosion prevention or corrosion control and do not address or repair structural or concrete damage. Where structural damage exists, consult a structural engineer. To provide protection to a broader area, install Galvashield® CC anodes on a grid pattern or consult Vector for further product recommendations.

Packaging

Galvashield® XPC	50 units per box	15 lbs. (6.8 kg)
Galvashield® XP	20 units per box	11.5 lbs (5.2 kg)
Galvashield® XPT	50 units per box	20 lbs (9.1 kg)
Galvashield® XP2	20 units per box	14.0 lbs (6.3 kg)
Galvashield® XP4	20 units per box	19.0 lbs (8.6 kg)
Galvashield® Embedding Mortar		44.1 lb. (20 kg) bag

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 Material 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 or technical support, please contact any Vector office or our extensive network of international distributors.



Vector® Galvashield® XP Product Line

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

Protection Level	Corrosion Prevention						Corrosion Control			
	XPT/XPC**		XP2		XP4		XP2		XP4	
Galvashield® Anode	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.
Steel Density Ratio <0.3	750	30	750	30	750	30	600	24	750	30
0.31 - 0.6	600	24	700	28	750	30	500	20	700	28
0.61 - 0.9	500	20	650	26	750	30	400	16	550	22
0.91 - 1.2	450	18	550	22	750	30	350	14	450	18
1.21 - 1.5	400	16	500	20	675	27	250	10	425	17
1.51 - 1.8	350	14	450	18	600	24	200	8	375	15
1.81 - 2.1	300	12	425	17	550	22	175	7	350	14

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

Protection Level	Corrosion Prevention						Corrosion Control	
	XPT/XPC**		XP2		XP4		XP4	
Galvashield® Anode	mm	in.	mm	in.	mm	in.	mm	in.
Steel Density Ratio <0.3	600	24	750	30	750	30	600	24
0.31 - 0.6	500	20	600	24	700	28	500	20
0.61 - 0.9	400	16	500	20	650	26	400	16
0.91 - 1.2	350	14	450	18	550	22	350	14
1.21 - 1.5	250	10	400	16	500	20	250	10
1.51 - 1.8	200	8	350	14	450	18	200	8
1.81 - 2.1	175	7	300	12	425	17	150	6

For extremely high corrosion risk applications (> 1.5% Chloride), contact Vector for assistance.

Note: Chloride content is based on percent by weight of cement.

*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.

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



We Save Structures™

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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. 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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Patents: US 9909220, 6022469, 6303017, 6193857.