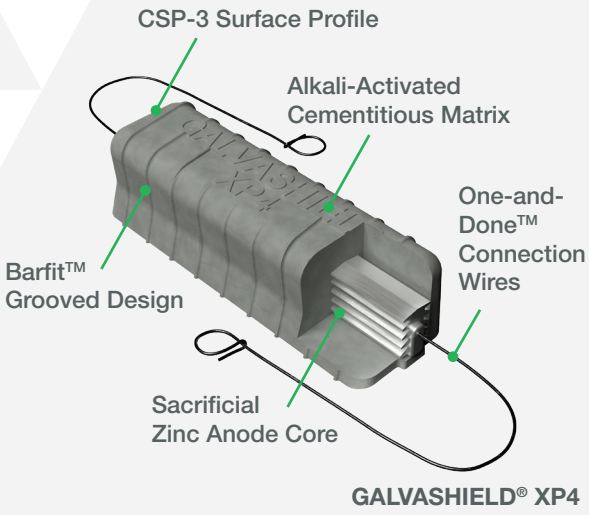
Galvashield® XP Product Line

Type 1A Embedded Galvanic Anodes for Concrete Repair

GALVANIC SYSTEMS



Galvashield® XP is the original embedded galvanic anode for concrete and has been used to mitigate ring anode corrosion when repairing reinforced concrete structures for over 25 years.

Designed for optimum performance and ease of installation, the alkali-activated (Type 1A) anodes are comprised of high purity zinc (ASTM B418) 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 25-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.
- **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** – ASTM B418 compliant zinc 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 chloride contaminated and carbonated 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.

** As with all galvanic protection systems, service life is dependent upon a number of factors including reinforcing steel density, concrete conductivity, chloride ion concentration, temperature, humidity and anode spacing. 10-year design tables are also available.*

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

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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 anodes are embedded in concrete repairs, or at other interfaced between new and existing concrete, to mitigate corrosion in the adjacent parent concrete.

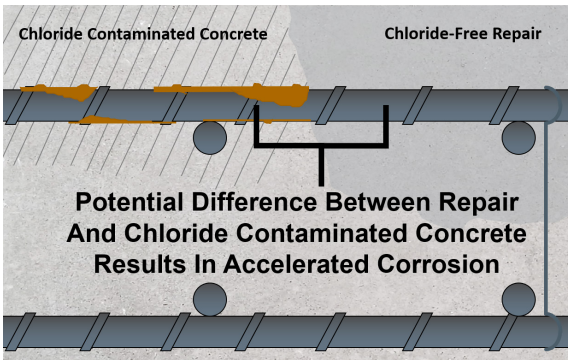
Anode Type Nomenclature

1 - Installed in Concrete Repairs

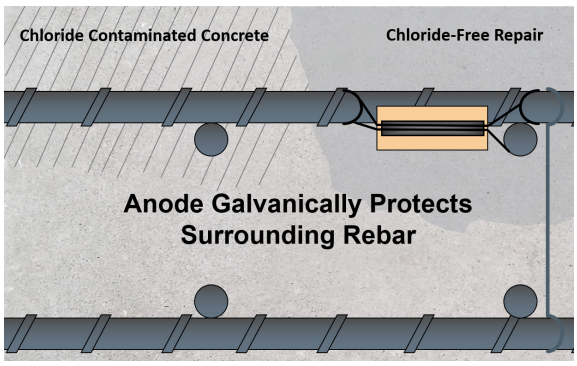
2 - Installed in Drilled Holes in Sound Concrete

A - Alkali-activated using High pH

H - Halide-activated using Corrosive Salts



Ring Anode Corrosion (without Galvashield® XP)



Galvashield® XP prevents Ring Anode Corrosion

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.

Design Criteria

Corrosion Risk Category	Chloride Level*	Minimum Design Current Density**
Low to Moderate	<0.8%	0.4mA/m2 (0.04mA/ft2)
High	0.8%-1.5%	0.8mA/m2 (0.07mA/ft2)
Extremely High	1.5%	1.6mA/m2 (0.15mA/ft2)

** Chloride content is based on percent by weight of cement.*
*** Minimum design current densities at end of anode design life. Current densities for the XPX and/or environments with average annual temperatures above 20°C (68°F) are double the standard current densities.*

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
XPT Marine	1A	35 x 30 x 106 mm (1.37 x 1.1 x 4.17 in.)	60
XP2 Marine	1A	38 x 41 x 106 mm (1.49 x 1.61 x 4.17 in.)	100
XP4 Marine	1A	42 x 41 x 137 mm (1.65 x 1.61 x 5.39 in.)	160
XPX Marine	1A	42 x 41 x 176 mm (1.65 x 1.61 x 6.92 in.)	330

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Anode Spacing

The following anode spacing guidelines are based on achieving the minimum current density for the appropriate corrosion risk category at the end of the anode design life. In warmer or more corrosive conditions such as marine exposure, Galvashield® XPX is recommended to achieve the specified 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.

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.

If anode must be soaked for longer than 20 minutes, use XP-Marine equivalent.

Do not saturate for longer than 48 hours.

**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).*

20 Year Design Spacing

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

Steel Density	XPT/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	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/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	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/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	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/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	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

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Design Criteria

For assistance with system design, please contact Vector Corrosion Technologies.

Specification & Drawings

See sample specification and drawings provided on our website.

Installation Instructions

See installation instructions provided on our website.

Product Installation Videos

View installations demonstrations on our YouTube channel.

10 Year Design Spacing

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

Steel Density	XPT/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	inch	mm	inch	mm	inch	mm
<0.3	28	700	28	700	28	700
0.31-0.6	27	685	28	700	28	700
0.61-0.9	21	535	28	700	28	700
0.91-1.2	18	455	26	655	28	700
1.21-1.5	16	405	23	575	28	700
1.51-1.8	14	365	20	515	28	700
1.81-2.1	13	325	19	480	26	650

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

Steel Density	XPT/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	inch	mm	inch	mm	inch	mm
<0.3	27	455	28	640	28	700
0.31-0.6	18	310	26	430	28	700
0.61-0.9	15	250	21	345	28	700
0.91-1.2	12	215	18	295	24	600
1.21-1.5	11	185	16	260	21	535
1.51-1.8	10	170	14	235	19	485
1.81-2.1	9	155	13	220	18	450

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

Steel Density	XPT/XPT-Marine & XPC		XP2/XP2-Marine		XP4/XPX/ XP4-Marine/ XPX-Marine	
	inch	mm	inch	mm	inch	mm
<0.3	18	690	25	700	28	700
0.31-0.6	12	465	17	665	23	590
0.61-0.9	10	375	14	525	19	470
0.91-1.2	8	315	12	450	16	400
1.21-1.5	7	280	10	395	14	355
1.51-1.8	7	250	9	355	13	320
1.81-2.1	6	235	9	325	12	295

**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).*

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		55 lb. (25 kg) bag
Galvashield® XPT-Marine	24 units per box	15 lbs (6.8 kg)
Galvashield® XP2-Marine	24 units per box	22 lbs (10 kg)
Galvashield® XP4-Marine	24 units per box	32 lbs (14.5 kg)
Galvashield® XPX-Marine	15 units per box	30 lbs (13.6 kg)

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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

Portland cement concrete and mortar should be handled with suitable gloves and other personal protective equipment in accordance with standard procedures for handling cementitious materials.

Related Documents

A range of related documents are available including installation instructions, guideline specifications, project histories, applications and SDS. 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 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 Corrosion Technologies

Vector-Corrosion.com

Canada

Winnipeg, MB
(204) 489-9611
info@vector-corrosion.com

United States

Lexington, KY
(813) 830-7566
info@vector-corrosion.com

Houston, TX
info@vector-corrosion.com

Columbia, MD
info@vector-corrosion.com

United Arab Emirates

Dubai, UAE
+971 50 659 7322
infome@vector-corrosion.com

Australia

Redhead, NSW
+61 497 249 868
infoau@vector-corrosion.com

United Kingdom

Cradley Heath, UK
(44) 1384 671 400
infoeu@vector-corrosion.com

Indonesia

Nusa Tenggara Barat
+62 8213 7777798
info@vector-corrosion.com

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.

Patent Notice: www.vector-corrosion.com/patents

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