BUILDING TRUST

PRODUCT DATA SHEET

Sika® Galvashield® XP

Type 1A Discrete Embedded Galvanic Anode Range for Corrosion Prevention

PRODUCT DESCRIPTION

Sika® Galvashield® XP Range is available in five sizes: Compact / XPT / XP2 / XP4 / XPX embedded galvanic anodes are used in concrete repair and rehabilitation to prevent the formation of new corrosion sites adjacent to completed patch repairs. Designed for optimum performance and ease of installation, the alkali-activated (Type 1A) anodes are comprised of high purity zinc core that is activated by the surrounding specially formulated cementitious mortar with an internal pH of ≥14 which keeps the zinc active over the life of the anode. The anode is quickly and easily fastened to the exposed reinforcing steel using the contractor-friendly One-and-Done™ single-wire connecton. Once installed, the zinc core corrodes preferentially to the surrounding reinforcement, thereby providing galvanic corrosion prevention to the adjacent reinforcing steel and mitigating ‘ring anode corrosion' or the 'halo effect'.

USES

Sika® Galvashield® XP anodes may only be used by experienced professionals.

- Patch repairs.
- Interfaces between new and existing concrete.
- Slab replacements.
- Expansion joint repairs.
- Repair of epoxy-coated rebar.
- Bridge widening and other structural modifications.
- Repair of pre-stressed and post-tensioned concrete.
- Mitigates ring anode formation (i.e. the 'halo effect') in concrete repairs.
- Extends the life of concrete and joint repairs.

CHARACTERISTICS / ADVANTAGES

- Proven technology - supported by independent test programme.
- Sika® Galvashield® XP is the original embedded galvanic anode with an extensive 20-year track record.
- Type 1A anode - alkali-activated to maintain activity of the zinc; meets building code requirements that prohibit intentionally added constituents that are corrosive to reinforcement with the repair area.
- Easy to install - innovative single wire One-and-Done™ connection can be installed twice as fast as traditional two wire connections, saving up to 50% on installation labour costs.
- Focused protection - provides localised corrosion protection where it is needed the most, at the interface of the repair and the remaining contaminated concrete.
- Cast zinc core - provides high anode utilisation and a secure long-term connection between the zinc and the integral lead wire.
- BarFit™ design - grooved edges on Sika® Galvashield® XP2, XP4 and XPX anodes assist with secure anode placement.
- Steel connection wires - provides dependable steel-to-steel contact with no intermediate materials (e.g. galvanising) that may impede the long-term electrical connection.
- Economical - provides localised protection where it is needed the most, at the interface between the repair and the remaining contaminated concrete.
- Versatile - effective in chloride-contaminated and carbonated concrete containing chlorides. Can be used for both conventionally reinforced and prestressed or post-tensioned concrete.
- User friendly - installation is quick and easy, requiring no special equipment or training.
- Low maintenance – requires no external power source or system monitoring.
- Measurable – anode performance can be easily monitored if required.

- Does not cause hydrogen embrittlement.
- ICRI CSP-3 (Concrete Surface Profile) - raised ridges provide increased surface profile to promote mechanical bond between repair mortars and concrete.
- Does not cause hydrogen embrittlement.
- Long lasting – minimum 20 year anode service life* when using standard design tables, reduces the need for future repairs.
- Full System – can be used in conjunction with Sika® FerroGard® and Sikagard® technologies to offer a total corrosion management system.
- Independent testing - indicates concrete repair service life can be extended by more than 400%.

* 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.

PRODUCT INFORMATION

Packaging

Sika® Galvashield® XP Compact	50 units per box	6.8 kg box
Sika® Galvashield® XPT	50 units per box	9.1 kg box
Sika® Galvashield® XP2	40 units per box	10.2 kg box
Sika® Galvashield® XP4	30 units per box	12.0 kg box
Sika® Galvashield® XPX	20 units per box	13.6 kg box

Shelf Life

24 months

Storage Conditions

Store in original unopened, sealed and undamaged packaging in dry and cool conditions. Avoid extremes of temperature and humidity.

Dimensions

Product Names	Anode Types	Anode Dimensions (nominal)	Zinc Masses (g)
Sika® Galvashield® XP Compact	Type 1A	25 mm x 31 mm x 64 mm	40
Sika® Galvashield® XPT	Type 1A	24 mm x 28 mm x 100 mm	60
Sika® Galvashield® XP2	Type 1A	32 mm x 34 mm x 100 mm	100
Sika® Galvashield® XP4	Type 1A	33 mm x 35 mm x 130 mm	160
Sika® Galvashield® XPX	Type 1A	33 mm x 35 mm x 170 mm	330

Anode Type:
First character indicates where the anode is installed: 1) Embedded in concrete repairs; or 2) Embedded into sound concrete.
Second character denotes the type of zinc activation utilised: A) Alkali-activated using high pH; or H) Halide-activated using corrosive salts.

TECHNICAL INFORMATION

Design Considerations

Table 1 - Design Criteria:

Corrosion Risk Category	Chloride Content***	Minimum Current Density at 20 Years
Low to Moderate	<0.8%	0.4mA/m²
High	0.8 to 1.5%	0.8mA/m²
Extremely High	>1.5%	1.6mA/m²

*** Chloride content is calculated as a percentage by weight of cement.

Anode Spacing
The following anode spacing guidelines are based on achieving the minimum current density for the appropriate corrosion risk category 20 years after installation.
NOTE: *In warmer or more demanding conditions (such as marine environments), Sika® Galvashield® XPX anodes are recommended to achieve the 20 year anode life.*

Table 2 - Maximum Anode Spacing for New Construction and Carbonated Concrete:

Steel Density Ratio*	Sika® Galvashield® XPT / Sika® Galvashield® XP Compact**	Sika® Galvashield® XP2	Sika® Galvashield® XP4 / XPX
<0.3	700 mm	700 mm	700 mm
0.31 to 0.60	700 mm	700 mm	700 mm
0.61 to 0.90	580 mm	700 mm	700 mm
0.91 to 1.20	500 mm	700 mm	700 mm
1.21 to 1.50	440 mm	680 mm	700 mm
1.51 to 1.80	400 mm	600 mm	700 mm
1.81 to 2.10	370 mm	560 mm	700 mm

* Steel surface area / concrete surface area.
** Sika® Galvashield® XP Compact may have reduced life due to reduced zinc mass (40g).

Table 3 - Maximum Anode Spacing for Low to Moderate Corrosion Risk (Chloride Content <0.8%*):**

Steel Density Ratio*	Sika® Galvashield® XPT / Sika® Galvashield® XP Compact**	Sika® Galvashield® XP2	Sika® Galvashield® XP4 / XPX
<0.3	675 mm	700 mm	700 mm
0.31 to 0.60	450 mm	700 mm	700 mm
0.61 to 0.90	350 mm	575 mm	700 mm
0.91 to 1.20	300 mm	475 mm	625 mm
1.21 to 1.50	275 mm	425 mm	550 mm
1.51 to 1.80	250 mm	375 mm	500 mm
1.81 to 2.10	225 mm	350 mm	475 mm

* Steel surface area / concrete surface area.
** Sika® Galvashield® XP Compact may have reduced life due to reduced zinc mass (40g).
*** Chloride content is calculated as a percentage by weight of cement.

Table 4 - Maximum Anode Spacing for High Corrosion Risk (Chloride Content 0.8% to 1.5%*):**

Steel Density Ratio*	Sika® Galvashield® XPT / Sika® Galvashield® XP Compact**	Sika® Galvashield® XP2	Sika® Galvashield® XP4 / XPX
<0.3	450 mm	700 mm	700 mm
0.31 to 0.60	300 mm	475 mm	625 mm
0.61 to 0.90	250 mm	375 mm	500 mm
0.91 to 1.20	200 mm	325 mm	425 mm
1.21 to 1.50	175 mm	275 mm	375 mm
1.51 to 1.80	150 mm	250 mm	350 mm
1.81 to 2.10	125 mm	225 mm	325 mm

* Steel surface area / concrete surface area.
** Sika® Galvashield® XP Compact may have reduced life due to reduced zinc mass (40g).
*** Chloride content is calculated as a percentage by weight of cement.

Table 5 - Maximum Anode Spacing for Extremely High Corrosion Risk (Chloride Content >1.5%*):**

Steel Density Ratio*	Sika® Galvashield® XPT / Sika® Galvashield® XP Compact**	Sika® Galvashield® XP2	Sika® Galvashield® XP4 / XPX
<0.3	300 mm	475 mm	625 mm
0.31 to 0.60	200 mm	325 mm	425 mm
0.61 to 0.90	175 mm	250 mm	350 mm
0.91 to 1.20	150 mm	225 mm	275 mm
1.21 to 1.50	125 mm	175 mm	250 mm
1.51 to 1.80	100 mm	150 mm	225 mm
1.81 to 2.10	N/A	125 mm	200 mm

* Steel surface area / concrete surface area.
** Sika® Galvashield® XP Compact may have reduced life due to reduced zinc mass (40g).
*** Chloride content is calculated as a percentage by weight of cement.

NOTE: Spacing should be reduced for continuously wet substrates to extend the expected service life of the anode. Where stirrups in beams or columns are exposed, place a Sika® Galvashield® XPT / XP2 / XP4 / XPX anode at each stirrup location. Spacings are based on an average annual temperature of 10°C.

SYSTEM INFORMATION

System Structure

Sika® Galvashield® XP anodes are part of a Concrete Repair System in accordance with the guidelines of BS EN 1504-9.

Bonding Primer

- Sika® MonoTop®-1010: Bonding primer and reinforcement coating (normal applications).
- SikaTop® Armatec®-110 EpoCem®: Bonding primer and reinforcement coating (demanding requirements).

Repair Mortar

- Sika® MonoTop®-4012: Class R4 Hand and wet spray applied repair mortar (low resistivity - can be used for anode embedment).
- Sika® MonoTop®-615: Class R3 Hand and wet spray applied high build repair mortar.
- Sika® MonoTop®-614 F: Class R4 Pourable repair mortar.
- Sika® MonoTop®-4052: Class R4 Pourable concrete repair mortar for horizontal applications (low resistivity - can be used for anode embedment).
- Sika® MonoTop®-630 Rapid: Class R4 Hand applied fast setting repair mortar.
- SikaCem®-133 Gunite Range: Class R4 Dry spray applied repair mortars.

Smoothing Coat

- Sika® MonoTop®-3020: Smoothing / levelling / fairing coat.

Corrosion Inhibitor

- Sika® FerroGard®-903+: Active corrosion inhibitor.

Embedding Mortar

- Sika® Galvashield® Embedding Mortar: Mortar for embedding Sika® Galvashield® XP Compact / XPT / XP2 / XP4 / XPX.

NOTE: *For optimum performance, use an ionically conductive, cement-based repair mortar or concrete. In accordance with 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 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 Ω·cm or greater are to*

be used, pack Sika® Galvashield® Embedding Mortar, Sika® MonoTop®-4012 or Sika® MonoTop®-4052 (or another repair mortar with a resistivity of 15,000 Ω·cm or less) between the anode and the substrate to provide an ionically conductive path to the substrate. Sika® MonoTop®-4012 and Sika® MonoTop®-4052 can be used to embed anodes and complete the concrete repair.

VALUE BASE

All technical data stated in this Product Data Sheet are based on laboratory tests. Actual measured data may vary due to circumstances beyond our control.

USES

- Sika® Galvashield® XP anodes are intended to provide corrosion mitigation to concrete repair interfaces and joints, and do not address or repair structural or concrete damage. Where structural damage exists, consult a suitably qualified Structural Engineer.
- Sika® Galvashield® XP Compact / XPT / XP2 / XP4 / XPX anodes are designed to provide localised galvanic corrosion prevention. To provide protection to broader areas, install Sika® Galvashield® CC anodes or Sika® Galvashield® Fusion® T2 anodes on a grid pattern in the remaining sound but contaminated concrete, or consult Sika® Technical Services for other product recommendations.
- Sika® Galvashield® XP type anodes are not suitable for use with epoxy and polyester repair mortars or bonding primers, as these are non-conductive.
- Caution should be exercised when selecting corrosion mitigation systems for post-tensioned, prestressed or otherwise highly stressed steel.

ECOLOGY, HEALTH AND SAFETY

This product is an article as defined in article 3 of regulation (EC) No 1907/2006 (REACH). It contains no substances which are intended to be released from the article under normal or reasonably foreseeable conditions of use. A safety data sheet following article 31 of the same regulation is not needed to bring the product to the market, to transport or to use it. For safe use follow the instructions given in the product data sheet. Based on our current knowledge, this product does not contain SVHC (substances of very high concern) as listed in Annex XIV of the REACH regulation or on the candidate list published by the European Chemicals Agency in concentrations above 0,1 % (w/w).

APPLICATION INSTRUCTIONS

APPLICATION

Substrate Quality and Preparation

Concrete

Break out the concrete from around and behind the reinforcement steel in accordance with the requirements of the Product Data Sheet for the appropriate BS EN 1504-3 Classification concrete repair mortar.

Steel Reinforcement

Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed to a minimum standard of SA 2½. The whole circumference of the exposed reinforcement shall be uniformly cleaned except where structural considerations prevent it. Reference should also be made to BS EN 1504-10 for specific requirements.
Steel preparation may be carried out by removing loose rust by very thorough scraping, hand or machine wire brushing, abrasive paper / cloth, grinding or other appropriate techniques to achieve the required final surface condition.
Method and choice of cleaning shall take into account bar congestion, contact between bars, proximity to concrete substrate, etc.
Extra preparation of the steel should be carried out in the area of the anode tie wire connection to provide a bright steel finish to ensure a good electrical connection. Alternatively drill a small hole in the reinforcement at both ends of the anode position to accept a mild steel self tapping screw and wrap the anode tie wires around the screws.
After removal of the rust to the required standard. Clean the steel reinforcement with a dry clean brush. The anodes and repair materials should be installed immediately following preparation and cleaning of the steel reinforcement.

Bonding Primer / Reinforcement Coating

Bonding Primer:
When a bonding primer is required, apply Sika® MonoTop®-1010 (normal applications) or SikaTop® Armatec®-110 EpoCem® (demanding applications, such as high chloride locations).
Reinforcement Coating:
Where a reinforcement coating is required apply Sika® MonoTop®-1010 (normal applications) or SikaTop® Armatec®-110 EpoCem® (demanding applications, such as high chloride locations).
IMPORTANT
When Sika® MonoTop®-1010 or SikaTop® Armatec®-110 EpoCem® is used as a reinforcement coating or bonding primer, it is important not to allow the coating to get inbetween the connection wire and steel, as this will act as an insulator from the zinc core.

Application Method

- The location and spacing of the anodes shall be as specified by the designer (for more information refer to **Design considerations** above).
- Anodes are typically tied on the side or beneath the exposed reinforcement as close as practical to the edge of the surrounding concrete, making sure that enough space is left to fully encapsulate the anode with the Sika® Galvashield® Embedding Mortar, Sika®

MonoTop®-4012 or Sika® MonoTop®-4052 (or another suitable mortar).

- Minimum cover over the anodes / embedment mortar must be 20 mm, or the minimum thickness of the concrete repair material for trafficked areas; 10 mm, or minimum thickness of the concrete repair material, for non-trafficked areas.
- A 20 mm minimum clearance on sides adjacent to repair edge should be maintained. Where chloride contaminated concrete remains in contact with reinforcement, place Sika® Galvashield® XPT / XP2 / XP4 / XPX anodes along the length of reinforcement, or in grid pattern at spacings recommended in the appropriate Tables above.
- Securely fasten the anodes on the side beneath the exposed rebar, as close as practical to the surrounding concrete (preferably within 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 20 mm.
- Wrap the tie wires around the clean reinforcing steel at least one full turn in opposite directions.
- Bring the two free ends together and twist tight.
- 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 1Ω should be achieved.
- 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.
- With the anodes securely in position, begin the repair process by packing the embedment mortar between the anode and the substrate to provide a conductive path to the substrate.
- Allow the embedment mortar to sufficiently harden around Sika® Galvashield® XP Compact / XPT / XP2 / XP4 / XPX anode before applying concrete repair mortar.
- Complete repair with the appropriate BS EN 1504-3 Classification concrete repair mortar and, where applicable, a cementitious bonding primer.

LOCAL RESTRICTIONS

Please note that as a result of specific local regulations the performance of this product may vary from country to country. Please consult the local Product Data Sheet for the exact description of the application fields.

LEGAL NOTES

SIKA LIMITED
Watchmead
Welwyn Garden City
Hertfordshire, AL7 1BQ
Tel: 01707 394444
Web: www.sika.co.uk
Twitter: @SikaLimited