PRODUCT DATA SHEET

Sika® Galvashield® CC

Alkali-Activated (Type 2A) Embedded Galvanic Anodes for Corrosion Control in Reinforced Concrete Structures

PRODUCT DESCRIPTION

Sika® Galvashield® CC embedded Type 2A (alkali-activated) galvanic anodes are used to mitigate ongoing corrosion and to prevent the initiation of new corrosion activity in sound reinforced concrete structures. The anodes consist of a high purity zinc anode core that is surrounded by a specially formulated precast cementitious mortar with an internal pH $\geq$14, keeping the zinc active over the life of the anode. Sika® Galvashield® CC anodes are available in three sizes to fit any structure and level of protection. The cylindical anodes are quickly and easily installed into drilled holes in concrete that is mechanically sound but has ongoing corrosion activity. Once installed, the zinc anode corrodes preferentially to protect the adjacent reinforcing steel.

USES

- Balconies.
- Reinforced concrete with high chloride content.
- Car park decks, columns and beams.
- Carbonated concrete.
- Post-tensioning anchors.
- Prestressed concrete.
- Piers, wharves, piles pile caps and beams in a marine environment.
- Bridge decks, piers, abutments, pier caps and girders.
- Swimming pools.
- Concrete tanks.
- Underpasses and other highway structures.

CHARACTERISTICS / ADVANTAGES

- Proven technology: extensive 20-year track record, supported by independent test program.
- Focused protection: provides localised corrosion protection in areas with high corrosion potential or active corrosion.
- Economical: low cost method by targeting only the remaining areas of high corrosive risk; protecting local areas that are chloride contaminated but sound, thereby reducing concrete breakout.
- 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 performance: anode performance can be easily monitored if required.
- Long lasting: minimum 20-year anode service life* when using standard design tables; reducing the need for future repairs.
- Full system: can be used in conjunction with Sika® MonoTop®, FerroGard®, Margel and / or Sikagard® technologies to offer a full corrosion management system.

* 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® CC2	30 anodes per box	5.4kg box
	Sika® Galvashield® CC4	30 anodes per box	9.1kg box
	Sika® Galvashield® CCX	20 anodes per box	10kg box
Shelf Life	24 months		

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

TECHNICAL INFORMATION

Design Considerations	**Design Table 1 - Design Criteria:**

Design Table 1 - Design Criteria:

Corrosion Risk Category	Chloride Content*	Minimum Current Density at 20 Years**
Low to Moderate	<0.8%	0.6mA/m²
High	0.8 to 1.5%	1.2mA/m²
Extremely High	>1.5%	2.4mA/m²

* Chloride content is calculated using percentage by weight of cement.
** Design current densities for Sika® Galvashield® CCX anodes are double the standard current densities at 20 years.

Design Table 2 - Unit Sizes and Minimum Hole Sizes:

Anode Type	Unit Size: diameter x length (mm)	Minimum Hole Size: diameter x depth (mm)
Sika® Galvashield® CC2	32 x 75	40 x 105
Sika® Galvashield® CC4	36 x 100	45 x 130
Sika® Galvashield® CCX	46 x 115	56 x 145

Anode Spacing
The following Tables provide guidelines for achieving the minimum current density for the appropriate corrosion risk category as stated, 20 years after installation.

NOTE: *In warmer or more demanding conditions (such as marine environments), Sika® Galvashield® CCX anodes are recommended to achieve the 20 year anode life.*

Design Table 3 - Low to Moderate Corrosion Risk (Chloride Content* <0.8% or Carbonated Concrete):

Steel Density Ratio	Sika® Galvashield® CC2	Sika® Galvashield® CC4 / CCX
(Steel Surface Area / Concrete Surface Area)	Maximum Grid Dimensions (mm)	Maximum Grid Dimensions (mm)
<0.30	650	700
0.31 - 0.60	475	675
0.61 - 0.90	375	550
0.91 - 1.20	325	475
1.21 - 1.50	300	425
1.51 - 1.80	250	375
1.81 - 2.10	225	350

* Chloride content is calculated using percentage by weight of cement.

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Design Table 4 - High Corrosion Risk (Chloride Content* 0.8 - 1.5%):

Steel Density Ratio	Sika® Galvashield® CC2	Sika® Galvashield® CC4 / CCX
(Steel Surface Area / Concrete Surface Area)	Maximum Grid Dimensions (mm)	Maximum Grid Dimensions (mm)
<0.30	475	600
0.31 - 0.60	325	475
0.61 - 0.90	275	375
0.91 - 1.20	250	325
1.21 - 1.50	225	300
1.51 - 1.80	200	275
1.81 - 2.10	175	250

* Chloride content is calculated using percentage by weight of cement.

Design Table 5 - Extremely High Corrosion Risk (Chloride Content* >1.5%):

Steel Density Ratio	Sika® Galvashield® CC2	Sika® Galvashield® CC4 / CCX
(Steel Surface Area / Concrete Surface Area)	Maximum Grid Dimensions (mm)	Maximum Grid Dimensions (mm)
<0.30	340	475
0.31 - 0.60	240	335
0.61 - 0.90	195	275
0.91 - 1.20	170	235
1.21 - 1.50	150	210
1.51 - 1.80	135	195
1.81 - 2.10	125	180

* Chloride Content is based on percentage by weight of cement.

NOTE: *For structures in high or extremely high corrosion risk environments that have high steel density ratios requiring close anode spacings, Sika® Galvashield® Fusion® anode systems are typically more economical.*

SYSTEM INFORMATION

System Structure

Sika® Galvashield® CC is part of a Concrete Repair System in accordance with the guidelines of BS EN 1504.
- **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.
  - 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.
  - Sika® MonoTop®-630 Rapid: Class R4 Hand applied fast setting repair mortar.
  - SikaCem®-133 Gunite Range: Class R4 Dry spray applied repair mortar.
- **Smoothing Coat**
  - Sika® MonoTop®-3020: Smoothing / levelling / fairing coat.
- **Corrosion Inhibitor**
  - Sika® FerroGard®-903+: Liquid active corrosion inhibitor.
- **Embedding Mortar**
  - Sika® Galvashield® Embedding Mortar: Controlled resistivity cementitous

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mortar for embedding Sika® Galvashield® CC anodes.

- ▪ **Ancillaries**
  - ▪ Sika® Galvashield® CC Anode Connection Kit: 4.3 m Interconnecting Wire, 23 x Green Connector Buttons, 5 x 3.2 mm Stainless Steel Rivets, 2 x 3.5 mm Drill Bits.

NOTE: In the event that Sika® Galvashield® CC Anodes are installed into break out patches, rather than into holes, Sika® Galvashield® Embedding Mortar, Sika® MonoTop®-4012, or Sika® MonoTop®-4052 can be used to embed the anodes. Sika® Galvashield® Embedding Mortar must be used to embed when Sika® Galvashield® CC Anodes are applied into holes.

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® CC anodes are intended to provide localised galvanic corrosion mitigation to significantly reduce or stop ongoing corrosion in areas of sound concrete and do not address or repair structural damage. Where structural damage exists, consult a Structural Engineer.
Concrete patch repairs should be completed using Sika® concrete repair products in accordance with BS EN 1504-3 and Sika® Galvashield® XP anodes installed around the boundary of the patch or Sika® FerroGard®-903+ prior to installing Sika® Galvashield® CC units in the remaining unrepaired areas.
Caution should be exercised when selecting corrosion mitigation systems for post-tensioned, prestressed, or otherwise highly stressed, steel. Furthermore, the system of corrosion protection, controls and monitoring should be designed and managed by specialists who can demonstrate expertise and successful project experience.

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

The location and spacing of the Sika® 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 from the reinforcing grid.

INDIVIDUAL CONNECTION

- ▪ Drill a single 12 mm rebar connection hole per anode unit location.
- ▪ Sawcut a groove approximately 6 mm wide by 12 mm deep into the concrete to interconnect the rebar connection hole and anode connection hole.
- ▪ Reinforcing steel connections should be made using the Sika® Galvashield® CC Anode 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 and set into place by striking with a hammer. Verify continuity between unit locations and rebar connections with a multi-meter. A resistance of $\leq$1 ohm 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 reinforcing ensuring electrical conductivity.
- ▪ Sika® Galvashield® Embedding Mortar should be used to install the still wet anode units into pre-soaked (saturated-surface dry) holes.
- ▪ Mix one 20 kg bag of Sika® Galvashield® Embedding Mortar with 3.2 to 3.7 litres of potable water. Add the powder to the water and mix with a drum or paddle mixer for 3 minutes until a smooth consistency is achieved. Mix full bags or weigh partial bags and water to maintain correct mixing ratio. For more information, refer to the Sika® Galvashield® Embedding Mortar Product Data Sheet.
- ▪ Place the mixed Sika® Galvashield® 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.
- ▪ Place wires into grooves and top off holes and saw cuts flush to the concrete surface with Sika® Galvashield® Embedding Mortar, which should be wet cured or cured with a curing compound and protec-

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ted from traffic for at least 24 hours.

SERIES CONNECTION

- A single circuit shall contain no more than 20 Sika® Galvashield® CC units.
- Reinforcing steel connections shall be made using the Sika® Galvashield® CC Anode Connection Kit.
- Drill a minimum of two 12 mm rebar connection holes per string of anodes, and sawcut a groove 6 mm by 12 mm linking the rebar connection holes to the anode connection holes.
- Install the rebar connectors as detailed above. The wire and connectors supplied in the Sika® Galvashield® CC Anode Connection Kit will be used to link rebar connections to the anode units.
- If using rivets from the Sika® Galvashield® CC Anode Connection Kit, chip 50 mm holes to expose rebar in two locations. Electrical connection to the steel shall be established by drilling a 5-7 mm deep hole into the steel using the 3.5 mm drill bit provided. 3.2 mm stainless steel pop rivets are used to connect the connection wire to the steel. Stainless steel self-tapping screws may be used in place of rivets.
- The connection shall be insulated by Sikaflex®-11 FC Purform®.
- Saw cut a single continuous groove approximately 6 mm wide by 12 mm 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.
- Pre-wet anode units to achieve a saturated surface condition for no more than 20 minutes.
- Sika® Galvashield® Embedding Mortar should be used to install the still wet anode units into pre-soaked (saturated-surface dry) holes.
- Mix one 20 kg bag of Sika® Galvashield® Embedding Mortar with 3.2 to 3.7 litres of potable water. Add the powder to the water and mix with a drum or paddle mixer for 3 minutes until a smooth consistency is achieved. Mix full bags or weigh partial bags and water to maintain correct mixing ratio. For more information, refer to the Sika® Galvashield® Embedding Mortar Product Data Sheet.
- Place the mixed Sika® Galvashield® 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.
- Place wires into grooves and top off holes and saw cuts flush to the concrete surface with Sika® Galvashield® Embedding Mortar, which should be wet cured or cured with a curing compound and protected from traffic for at least 24 hours.

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

The information, and, in particular, the recommendations relating to the application and end-use of Sika products, are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. In practice, the differences in materials, substrates and actual site conditions are such that no warranty in respect of merchantability or of fitness for a particular purpose, nor any liability arising out of any legal relationship whatsoever, can be inferred either from this information, or from any written recommendations, or from any other advice offered. The user of the product must test the product's suitability for the intended application and purpose. Sika reserves the right to change the properties of its products. The proprietary rights of third parties must be observed. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.
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