



## METHOD STATEMENT

# Corrosion Control using Discrete Galvanic Anodes Sika<sup>®</sup> FerroGard<sup>®</sup>-400s Patch CC

OCTOBER 2019 / VER.: 6 / SIKA SERVICES AG / M. DONADIO

**REFURBISHMENT**

## TABLE OF CONTENTS

|           |                               |          |
|-----------|-------------------------------|----------|
| <b>1</b>  | <b>Scope</b>                  | <b>3</b> |
| <b>2</b>  | <b>System Description</b>     | <b>3</b> |
| 2.1       | References                    | 3        |
| 2.2       | Limitations                   | 3        |
| <b>3</b>  | <b>Products (not limited)</b> | <b>3</b> |
| 3.1       | Material Storage              | 3        |
| <b>4</b>  | <b>Health and Safety</b>      | <b>4</b> |
| 4.1       | Risk Assessment               | 4        |
| 4.2       | Personal Protection           | 4        |
| 4.3       | First Aid                     | 4        |
| <b>5</b>  | <b>Environment</b>            | <b>4</b> |
| 5.1       | Cleaning Tools / Equipment    | 4        |
| 5.2       | Waste Disposal                | 5        |
| <b>6</b>  | <b>Preliminaries</b>          | <b>5</b> |
| <b>7</b>  | <b>Installation</b>           | <b>5</b> |
| <b>8</b>  | <b>Site QC Record</b>         | <b>7</b> |
| <b>9</b>  | <b>Typical Spacing</b>        | <b>7</b> |
| 9.1       | Comments                      | 7        |
| 9.2       | Table of Spacing              | 7        |
| <b>10</b> | <b>Typical Drawing</b>        | <b>7</b> |
| <b>11</b> | <b>Legal Note</b>             | <b>8</b> |

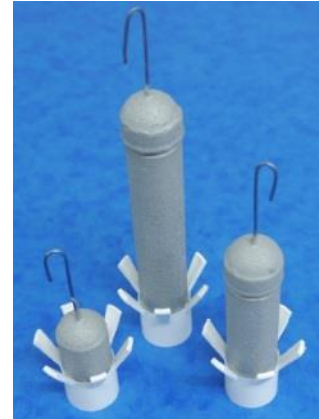
# 1 SCOPE

This method statement describes the step by step procedure for applying **Sika® FerroGard®-400s Patch CC** discrete galvanic anode.

# 2 SYSTEM DESCRIPTION

**Sika® FerroGard®-400s Patch CC** is a discrete sacrificial anode applied to contaminated but sound reinforced concrete structures which are corroding or at risk of corrosion as a result of chloride ingress or concrete carbonation.

**Sika® FerroGard Patch CC®** anodes corrode preferentially to the surrounding steel, protecting it from further corrosion damage.



## 2.1 REFERENCES

This method statement has been written in accordance with guidance contained in European Standards EN 12696:2016 and TR73.

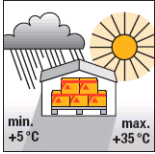
## 2.2 LIMITATIONS

- Products shall only be applied in accordance with their intended use.
- Local differences in product may result in performance variations. The most recent and relevant local Product Data Sheets (PDS) and Material Safety Data Sheets (MSDS) shall apply.
- For specific construction / build information refer to the Architect's, Engineer's or Specialist's details, drawings, specifications and risk assessments.
- Design of the **Sika® FerroGard®-400s Patch CC** system should be undertaken by a competent designer.
- All work shall be carried out as directed by a supervising officer or a qualified engineer.
- This method statement is only a guide and shall be adapted to suit local product and standards, legislation or other local requirements.

# 3 PRODUCTS (NOT LIMITED)

| Sika Product Names                   | Product dimensions           |                            | Hole dimensions     |
|--------------------------------------|------------------------------|----------------------------|---------------------|
|                                      | Diameter<br>(Excluding clip) | Length<br>(Inclusive clip) |                     |
| <b>Sika® FerroGard®-410 Patch CC</b> | ∅ 18 mm                      | ~50 mm                     | ~80 mm L x 30 mm ∅  |
| <b>Sika® FerroGard®-415 Patch CC</b> | ∅ 18 mm                      | ~80 mm                     | ~110 mm L x 30 mm ∅ |
| <b>Sika® FerroGard®-420 Patch CC</b> | ∅ 18 mm                      | ~115 mm                    | ~145 mm L x 30 mm ∅ |

### 3.1 MATERIAL STORAGE



Materials shall be stored properly in undamaged original sealed packaging, in dry cool conditions. Refer to specific information available on the product data sheet regarding minimum and maximum storage temperatures. Do not allow contact with oxidizing materials. Protect from moisture.

The plastic container should only be opened when product is required, and re-sealed when no tin use. The silica gel parcels should not be removed from the packaging container..

## 4 HEALTH AND SAFETY

### 4.1 RISK ASSESSMENT



The risk to health and safety from falling objects or defects in the structure shall be properly assessed.

Where structures are considered to be unsafe appropriate action shall be carried out to make the working area safe.

### 4.2 PERSONAL PROTECTION



#### Work safely!

Protective clothing must be worn. Wear gloves and eye protection at all times. Always wash hands with suitable soap after handling products and before food consumption.

FOR DETAILED INFORMATION REFER TO THE RELEVANT MATERIAL SAFETY DATA SHEET

### 4.3 FIRST AID



Sika® FerroGard®-400s Patch CC anodes are safe for use. However care shall be exercised when using accessory products such as repair material.

FOR DETAILED INFORMATION REFER TO THE RELEVANT MATERIAL SAFETY DATA SHEET.

## 5 ENVIRONMENT

### 5.1 CLEANING TOOLS / EQUIPMENT

Clean all tools and application equipment immediately after use, with water.

Hardened material can only be mechanically removed.

## 5.2 WASTE DISPOSAL



Do not empty surplus material into drains; dispose responsibly through licensed waste disposal contractor in accordance with legislation and local / regional authority requirements. Avoid run off onto soil or into waterways, drains or sewers.

FOR DETAILED INFORMATION REFER TO THE MATERIAL SAFETY DATA SHEET

## 6 PRELIMINARIES

The structure should be assessed prior to application of the Sika® FerroGard®-400s Patch CC anode range technology as follows;

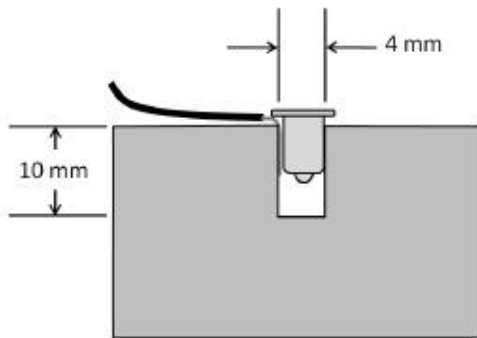
- i. Review of records: All available drawings and recorded information should be reviewed for information relating to the location, quantity, nature and continuity of reinforcement and to concrete quality.
- ii. Reinforcement continuity: This shall be proven on site by measuring the electrical resistance between reinforcing bars in mutually remote locations across the structure and between reinforcing bars exposed during concrete repairs or other works. This work should follow the method and acceptance criteria as specified in EN 12696:2012, clause 7.1. Any discontinuous components should either be treated as a separate zone or bonded to the main steel reinforcement.
- iii. Reinforcement location/concrete cover: Steel reinforcement size and location should be established to confirm details in the drawings.
- iv. Concrete cover: The cover of the area to be protected should be determined to ensure a minimum cover of at least 20 mm for the purposes of installation of the Sika® FerroGard®-400s Patch CC anode system.
- v. Concrete thickness: Confirm depth of surface to be treated is at least 20 mm greater than the anode size prior to installation.
- vi. Stray currents: The structure should be assessed for the presence of AC or DC stray currents. If stray currents are evident, remedial action must be undertaken under the auspices of a competent electrical/corrosion engineer.

## 7 INSTALLATION

1. Confirm steel continuity in areas to be treated. DC resistance between bars should be  $\leq 1$  mVolt as per EN 12696:2016 clause 7.1. Keep proper record – refer to clause 8. If steel is discontinuous, it should be dealt with as detailed in (ii) above.
2. Undertake a reinforcing steel survey as follows:
  - a) Locate steel using a cover meter and then mark steel locations on concrete surface
  - b) Mark locations for Sika® FerroGard®-400s Patch CC units on concrete surface in conjunction with drawings
  - c) Mark locations for saw cuts in conjunction with drawings
3. Drill 30 mm diameter holes at the locations identified in the drawings – depth shall be according to the table in **clause 3** above
4. Cut chases as identified in 2(c) above, 4 mm wide x 15 mm deep, between holes for location of titanium feeder wires.

All holes and saw cuts shall be clear of rubble and excessive dust prior to application of the Sika® FerroGard®-500 Crete mortar and concrete repair mortar.

- Make electrical connections to the reinforcing steel by first removing a small area of cover concrete before drilling a 4 mm hole and using a stainless steel rivet to connect the titanium feeder wire to the steel (rivet grip range 3.2 - 4.8 mm). At least two steel connections shall be made per zone of anodes.



- Using a spray bottle or other suitable method, wet out the holes ensuring that any excess water is removed prior to application of the **Sika® FerroGard®-500 Crete** mortar.
- Electrically pre-connect the individual **Sika® FerroGard®-400s Patch CC** units to the titanium feeder wire using the plastic screw connectors. Twist the excess wire from the **Sika® FerroGard®-400s Patch CC** units around the titanium feeder wire to ensure electrical continuity. The screw connectors should be hand tight – electrical resistance between the primary titanium anode wire and the individual **Sika® FerroGard®-400s Patch CC** units should be checked to ensure electrical continuity (<0.5 ohm or <1 mVolt). Keep proper record – refer to clause 8



- Using a sealant gun and a rubber hose extension (e.g. 15 mm (5/8 inch) Ø automotive hose) to allow access to the base of the hole, apply **Sika® FerroGard®-500 Crete** mortar into the pre-drilled holes to an initial depth of ~50 mm from the concrete surface by slowly retracting the hose from the base of the hole.



- Insert the individual **Sika® FerroGard®-400s Patch CC** units into the mortar – the mortar should flow to ~20 mm from the concrete surface. Ensure that any trapped air is removed and that the plastic screw connector is below the concrete surface. The **Sika® FerroGard®-400s Patch CC** units should be applied immediately after injection of the **Sika® FerroGard®-500 Crete** mortar.

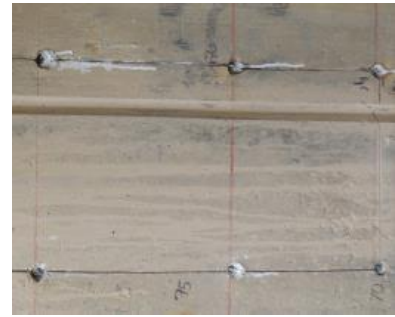


- To connect secondary steel connections to the feeder wire, use a plastic screw connector and wrap any excess wire from the steel connection around the feeder wire.

- The remaining void at the top of the anode hole should be filled with a low shrink repair mortar such as **Sika MonoTop®-412 N** within 2 hours of installation. The chases within which the titanium wire is situated, and excavations where steel connections have been made, can also be filled with the low shrink concrete repair mortar at this stage.



12. The Sika® FerroGard®-400s Patch CC units are now operating in galvanic mode.
13. The feeder wires are buried in the chases using repair mortar or pourable compound as specified which is allowed to cure according to the manufacturer's instructions.
14. Clean the treatment area.
15. The installation phase is now complete.



## 8 SITE QC RECORD

Contractor shall fill and retain a suitable QC record for the installation of anodes and the monitoring system. Example of suitable QC record is embedded in the document.



## 9 TYPICAL SPACING

### 9.1 COMMENTS

The spacing provided in the table below are given for guidance only. Spacing will depend on site conditions, steel density, reinforcement bar sizes & geometries, chloride content, humidity, temperature, etc. Specialist design engineer shall confirm the spacing based on the site conditions.

### 9.2 TABLE OF SPACING

Table 1

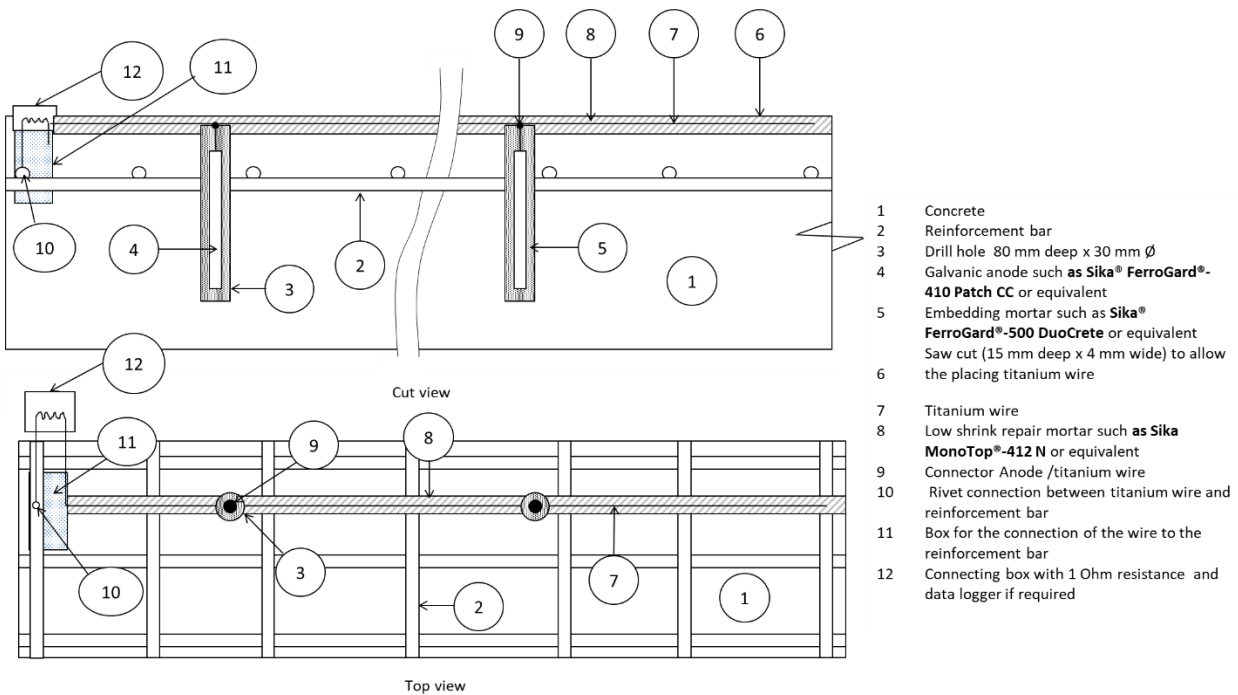
| MAXIMUM ANODE SPACING |                               |     |                               |     |                               |     |
|-----------------------|-------------------------------|-----|-------------------------------|-----|-------------------------------|-----|
| Steel Density Ratio   | Sika® FerroGard®-410 Patch CC |     | Sika® FerroGard®-415 Patch CC |     | Sika® FerroGard®-420 Patch CC |     |
|                       | Inches                        | mm  | Inches                        | mm  | Inches                        | mm  |
| <0.3                  | 24                            | 600 | 24                            | 600 | 26                            | 650 |
| 0.31-0.60             | 20                            | 500 | 22                            | 550 | 22                            | 550 |
| 0.61-0.90             | 18                            | 450 | 19                            | 475 | 20                            | 500 |
| 0.91-1.20             | 16                            | 400 | 17                            | 425 | 18                            | 450 |
| 1.21-1.50             | 14                            | 350 | 16                            | 400 | 17                            | 425 |
| 1.51-1.80             | 12                            | 300 | 13                            | 350 | 16                            | 400 |
| >1.81                 | 11                            | 280 | 12                            | 320 | 13                            | 350 |

Note 1: Typical data – in more aggressive or benign conditions these may be adjusted – consult a suitably qualified engineer. Steel geometry and lifetime requirements will affect the layout and design.

Note 2: Using the enclosed excel sheet, a suitable qualified engineer with appropriate certification can estimate the number of anodes required based on steel density, life expectation and environmental conditions.



## 10 TYPICAL DRAWING



## 11 LEGAL NOTE

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 products 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.

**Sika Services AG**  
Tüffenwies 16  
8048 Zürich  
Switzerland  
www.sika.com

**Version given by**  
M. Donadio  
Phone: +33 6 700 300 59  
Mail: donadio.michel@fr.sika.com

**Method Statement** Corporate – for template  
Corrosion Control using Discrete Galvanic Anodes Sika® REFURBISHMENT  
FerroGard®-400s Patch CC  
October 19, Ver.:6  
850 33 11-V1