

# Outline Specification

## Interconnected Galvanic Anode System



### 1. Description

Sacrificial anodes for preventing corrosion in sound but contaminated reinforced concrete (BS EN1504 – Part 9 Principle 10). Anodes to be embedded into drilled holes at defined centres and connected to the steel reinforcement via feeder wiring which is recessed into saw cuts.

### 2. Materials

#### 2.1 General

2.1.1 The contractor shall maintain a record of all materials installed and locations. A record of specified testing shall be maintained by the contractor.

2.1.2 The galvanic anode unit shall have been used on a minimum of five projects, similar to the current project, and be supplied by a manufacturing company certified to ISO 9001. The anode materials shall have been evaluated by an independent party with published test data.

2.1.3 The anodes shall be installed by a contractor approved by the Engineer and materials supplier.

#### 2.2 Anode

2.2.1 Anode size shall be determined by steel density and the local environment, with reference to the manufacturer's guidelines. Anode units shall be pre-manufactured and contain a cylindrical zinc alloy core coated with an activator and shall conform to the following criteria:

Diameter	Length	Zinc Weight	Minimum Charge Capacity
18mm ( $\frac{3}{4}$ "	42mm ( $1\frac{5}{8}$ "	65g	150kC
18mm ( $\frac{3}{4}$ "	77mm (3"	120g	300kC
18mm ( $\frac{3}{4}$ "	95mm ( $3\frac{3}{4}$ "	160g	400kC
18mm ( $\frac{3}{4}$ "	115mm ( $4\frac{1}{2}$ "	180g	450kC

2.2.2 Anode and anode systems shall be manufactured with an expected design life of 10-20 years subject to local environment.

2.2.3 The anode assembly shall incorporate an inert plastic spacer around the anode with flexible components so that the anode is located centrally and securely within the drilled hole, allowing for complete encapsulation with the manufacturer supplied embedment mortar.

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2.2.4 Anode units shall be supplied with integral un-spliced titanium conductor wire of length at least 45mm (1¾"). The conductor shall be formed of 1.2mm diameter titanium conforming to ASTM B 265 Grade 1

2.2.5 The anodes shall be supplied with chemically resistant polymeric screw connectors for securing the anode conductor to the feeder wire.

2.2.6 The anodes shall be supplied with 1.2mm diameter XLPE coated (zero halogen) titanium feeder wire to ASTM B265 grade 1, for connecting the anodes to each other via the screw connectors and directly to the steel reinforcement by stainless steel rivet.

2.2.7 Embedment material for anodes shall be pre-mixed, single component specially formulated mortar provided by the manufacturer in sealed 310ml (10.5oz) tubes which remains pliable when installed for greater than 48 hours. The mortar shall have sufficient ionic conductivity to enhance current delivery from the anode unit for the intended design service-life. The dispensing equipment shall have a nozzle of sufficient length to allow the application of mortar to the base of the hole and eliminate air voids.

### 2.3 Products

2.3.1 The following products shall be acceptable for this project.

CPT PatchGuard Connect anodes with DuoCrete PG mortar from:

Concrete Preservation Technologies  
Unit 1 Palmer Business Court  
Manor House Road  
Long Eaton  
Nottingham  
NG10 1LZ  
UK  
Tel: +44 115 972 4238  
Email: [general@cp-tech.co.uk](mailto:general@cp-tech.co.uk)

2.3.2 Deliver, store and handle all materials in accordance with manufacturer's instructions. Store all materials in sealed containers with manufacturer's supplied desiccants. Adhere to manufacturer's safety requirements. Discard any material that is not used within the manufacturer's permitted timeframe or has been stored outside the manufacturer's required environmental conditions. Only use newly opened tubes of embedment material for anode embedment. Do not install or store materials outside the recommended temperature range.

#### PatchGuard Connect Specification | 26/08/2020

Concrete Preservation Technologies Ltd | 1 Palmer Business Court, Manor House Road, Nottingham  
NG10 1LZ | Tel: 0115 972 4238 | Web: [www.cp-tech.co.uk](http://www.cp-tech.co.uk) | Email: [general@cp-tech.co.uk](mailto:general@cp-tech.co.uk) |

### **3. Installation of Anodes**

#### **3.1 Preliminaries**

##### **3.1.1 Reinforcement Continuity**

The reinforcement continuity 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 following the method and acceptance criteria as specified in EN ISO 12696:2016, clause 7.1. These measurements shall include the following:

- a) Continuity between elements of the structure
- b) Continuity of metallic items, other than reinforcement

Any electrically discontinuous steel shall be made continuous.

3.1.2 Reinforcement detail – Steel reinforcement in the areas to be protected shall be identified to confirm detail in the original drawings and that the design is appropriate.

3.1.3 Concrete cover over the area to be protected shall be determined to ensure a minimum cover of 20mm ( $\frac{7}{8}$ " ) for the purposes of installing the PatchGuard Connect anode system. The depth of element to be treated shall be determined to be at least 50mm (2") greater than the anode length prior to installation.

#### **3.2 Installation**

3.2.1 The location of steel reinforcement shall be determined using a cover meter and marked out on the concrete surface. Locations for the anode unit holes and saw cuts shall be marked with reference to steel configuration and structural geometry. Spacing between the anode units shall be determined by steel density and the local environment, with reference to the Manufacturer's guidelines and shall in no case exceed 650mm (25").

3.2.2 A 25mm (1") diameter hole, 30mm deeper than the anode length, shall be drilled to accommodate each anode unit.

3.2.3 4mm ( $\frac{3}{16}$ " ) wide x 15mm ( $\frac{5}{8}$ " ) deep saw cuts shall be prepared between holes for housing and embedment of feeder wires.

3.2.4 All holes and saw cuts shall be free of excessive dust and rubble prior to installation of anode and embedment materials.

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3.2.5 Electrical connections to the reinforcement steel shall be established by removing a small area of concrete cover to expose a section of steel, drilling a 4mm diameter hole and riveting the titanium feeder wire with a 3.2mm stainless steel pop rivet (grip range 3.2 to 4.8mm). Steel connections shall be made at both ends of every anode string or group of maximum 40 anodes. Continuity between the feeder wire and steel reinforcement shall be confirmed by use of a multimeter. Electrical continuity shall be confirmed if a resistance of less than 1 ohm is obtained.

3.2.6 The anode units shall be pre-connected to the XLPE coated titanium feeder wire using the polymeric screw connectors and temporarily positioned in the drilled holes to facilitate installation. At each anode location a 30mm (1¼") section of the XLPE coating shall be stripped away and the excess anode conductor wire shall be twisted around the exposed titanium feeder wire. The screw connectors shall be carefully tightened using a 12mm (½") multi-tooth ring spanner and continuity checked between the anode conductor and feeder wire using a multimeter to ensure electrical resistance of less than 1 ohm.

3.2.7 With the anode tail wires now securely fixed to the titanium feeder wire, the anodes shall be removed from the holes prior to application of the embedment mortar.

3.2.8 Using a spray bottle, or other suitable method, the drilled anode holes shall be pre-soaked with water for a minimum of 15 minutes, removing excess water from the bottom of the holes prior to application of the embedment mortar.

3.2.9 The embedment mortar shall be applied into the pre-drilled holes using a sealant gun and a rubber hose extension, e.g. 15mm (5⁄8") automotive hose, to allow access to the base of the holes. The mortar shall be applied to an initial depth of 50mm (2") from the concrete surface by slowly retracting the hose from the base of the hole, taking care to avoid air holes.

Note: Ensure any water which has settled on the surface of the embedment mortar within the cartridge, is poured into a suitable container prior to expressing the paste.

3.2.10 Immediately after injection of the embedment mortar at each anode site, the anode unit shall be placed into the hole and inserted such that the embedment mortar encapsulates the whole unit, ensuring that the mortar flows to 20mm from the concrete surface. Ensure that any trapped air is removed and that the plastic screw connector is below the concrete surface.

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3.2.11 Fill the remaining 20mm ( $\frac{7}{8}$ " ) at the top of each hole, plus steel exposures and all chases, with an appropriate low shrink BS EN 1504 compliant repair mortar applied and cured as per manufacturer's instructions.

3.2.12 Within 24 hours of anode installation, a copper sulphate reference electrode and multimeter shall be used to measure potential above and immediately adjacent to each anode. The potential above the anodes should be more negative than areas immediately adjacent.

Note -This sample specification should be modified as appropriate to reflect project specific conditions before being incorporated into contract documents. Users shall satisfy themselves that the specification details apply to their particular works and that there is compliance with all relevant regulations and standards.