

Vector™

Ebonex®

Discrete anodes for impressed current cathodic protection

Description

Ebonex is a discrete impressed current cathodic protection (ICCP) anode that utilizes an innovative ceramic/titanium composite with an integral gas venting system. The anode system includes Ebofix grout, a high density, acid absorbent grout for long term stability.

Ebonex discrete anodes are available in a range of sizes and diameters to provide excellent design flexibility. Ebonex discrete anodes satisfy the 100mV potential shift requirement for effective cathodic protection as specified under National Association of Corrosion Engineers Standard RP 0290.

Applications

- Bridges
- Parking garages
- Marine structures
- Steel framed buildings

Features and Benefits

- **Gas venting** - no buildup of anodic gases. Can be installed under fiber-reinforced polymer (FRP) strengthening systems, membranes, and coatings.
- **Embedded installation** - no added dead weight or increase to physical dimensions of structure from thick overlays.
- **Long lasting** - 25+ year service life, the longest of any discrete CP anode system.
- **Highest level of protection** - satisfies the 100mV depolarization criteria for effective cathodic protection.
- **Proven technology** - field verified performance.
- **Cost competitive** - compared to other types of ICCP anodes.
- **Deep installation** - addresses multi-levels of steel and difficult access.
- **High operating current** - suitable for use in areas of high steel density.
- **Versatile** - can be used in new construction as a preventative measure.

Specification

Where indicated, cathodic protection to reinforced concrete elements shall be provided by Ebonex discrete composite anodes as supplied by Vector Corrosion Technologies. Ebonex anodes shall be capable of maintaining long term stability at current densities of up to 900mA/m² (of anode surface). The Ebonex discrete anodes shall be gas vented and shall be grouted in place using Ebofix grout, a thixotropic high density, electrochemically compatible grout.

How It Works

ICCP mitigates corrosion activity by supplying sufficient electrical current from an external source to overcome the on-going corrosion current in the structure. Ebonex anodes are permanently installed into the structure. An external DC power source provides the source of electrical current that overpowers corrosion activity. The anodes are connected to the positive (+) terminal. According to industry standards, an ICCP system is considered to be effective when the system polarizes the reinforcing steel sufficiently to result in a 100mV depolarization after the system is turned off.



Ebonex anodes are available in a range of sizes to suit project requirements

Level of Protection	Description	Ebonex
Corrosion Prevention	Preventing new corrosion activity from initiating	
Corrosion Control	Significantly reducing on-going corrosion activity	
Cathodic Protection	Highest level of protection intended to stop on-going corrosion activity	•

Design Criteria

Ebonex is a discrete cathodic protection system providing long term durability to both new and existing structures under highly aggressive conditions. In line with other cathodic protection systems, Ebonex discrete anode systems should be designed by corrosion specialists and installed by knowledgeable and experienced contractors.

Ebonex Type	Diameter x length (mm)	Current rating (mA)
CP07/100	7 x 100	2.0
CP10/100	10 x 100	2.8
CP10/150	10 x 150	4.2
CP18/100	18 x 100	5.1
CP18/200	18 x 200	10.2
CP18/300	18 x 300	15.2
CP28/100	28 x 100	7.9
CP28/300	28 x 300	23.7
CP28/600	28 x 600	47.5

Installation Instructions

Preparation

Ebonex discrete anodes are installed in pre-drilled holes 4 to 8 mm larger than the nominal anode diameter and typically no further than 600 mm apart. The holes and Ebonex discrete anodes should be located to minimize their proximity to the steel



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reinforcement in order to provide an even current distribution to the steel within the local vicinity.

Cut a saw cut of minimum 10 mm depth and 8 mm width into the concrete or mortar joint between the holes. This saw cut will accommodate the titanium feeder wire interconnecting the Ebonex anodes, and the gas-ventilation tubing. A 3 mm saw cut can be used if the venting pipes are not interconnected. Prior to application the holes and saw cuts should be blown or vacuum cleaned of all debris and pre-soaked with water.

Mixing

Ebofix grout should be mixed with a slow speed drill (400-500 rpm) and paddle mixer. Place 3.0 litres of potable water into a suitable mixing container, add one full 10 kg bag of Ebofix grout and mix for three minutes until fully homogeneous.

Installation

Standing water should be removed from the drilled anode hole and the Ebofix grout placed to the rear of the hole to avoid air entrapment, ensuring sufficient grout is placed to cover the entire length of the active Ebonex discrete anode once installed. The thixotropic nature of Ebofix grout will prevent significant flow from vertical and overhead holes. Wet each Ebonex anode with clean water, but do not immerse for more than 10 seconds, before gently inserting into the hole. Ensure the vent pipe is unobstructed and that sufficient tail wire remains exposed to enable connection with the feeder wire.

Place the Ebofix grout within 30 minutes of mixing to gain benefit of the expansion system and allow to cure for a minimum of 24 hours, without physical disturbance. When cured, the open end of the gas vent network can be directed to a well-ventilated location.

Connect strings of Ebonex discrete anodes together as recommended by the CP design engineer using non-coated titanium feeder wire. All wire jointing requires the use of titanium metal crimps, secured using an appropriate crimping tool.

After connections have been made continuity should be tested with a resistance meter. Any reading found to have a resistance greater than 1 ohm require recrimping the connection. When the integrity of the connection is established the tail of each Ebonex discrete anode can be gently bent, thus settling the wire into the saw cut groove.

The saw cut is filled with Ebofix grout or a cementitious mortar, and left undisturbed for a minimum of 4 days before connecting to the power system.

Precautions

In chloride contaminated structures, particular attention should

be paid to the control of applied voltage. Potentials greater than 7 volts should not be applied to the titanium connecting wires. Performance of the Ebonex discrete anode is dependent upon the correct design, installation and maintenance of the cathodic protection system. For further information consult the local Vector office.

Packaging

Ebonex discrete anode	Anode with 500 mm tail wire (packaging varies depending upon the anode dimensions)
Ebofix grout	10 kg bags
Wire pack	Titanium feeder wire 40 m x 1.5 mm diameter
Crimping pack	80 titanium crimps
Venting pack	20 m PVC tube plus 40 connecting T-pieces
Crimping tool	Crimping tool plus plattens

Storage

Store both the Ebonex discrete anodes and Ebofix grout in dry conditions in their original unopened packaging. Ebofix grout has a shelf life of 12 months.

Health and Safety

There are no known health hazards associated with Ebonex discrete anodes.

Ebofix grout is alkaline and should not come into contact with the skin and eyes. Avoid inhalation of dust during mixing. Gloves, goggles and dust mask should be worn. If contact with skin occurs, wash with water. Splashes to eyes should be washed immediately with plenty of clean water and medical advice sought.

Ebonex discrete anodes and Ebofix grout are non-flammable.

Related Documents

A range of related Ebonex documents are available. For more information, contact Vector Corrosion Technologies.

About Vector

Vector Corrosion Technologies is a member of the Vector Construction Group, a privately owned corporation with 11 offices throughout Canada and the United States. Vector takes pride in offering technically advanced yet cost effective solutions for concrete structures subject to corrosion damage and has earned numerous awards and patents for product innovation. As evidenced by the Corporate Safety and Environmental Policies, Vector is committed to a safe, healthy and sustainable environment.