Zinc – Hydrogel Anode

4727

Technical Data **March, 1998**

Product Objective

To help protect reinforced concrete structures from deterioration caused by corrosion of reinforcing steel. 4727 Zinc-Hydrogel Anode is a sacrificial anode designed to provide electrochemical protection, known as cathodic protection, to inhibit the corrosion of reinforcing steel. No external power supply is needed because the cathodic protection current is supplied by the galvanic coupling of the steel reinforcement and the zinc metal in 4727 Zinc-Hydrogel Anode.

Ingress of chlorides (deicing salt on highways, sea spary from oceans, etc.) and other impurites into reinforced concrete can destroy the passive, non-corroding layer of oxides on rebar. Due to variation in chloride concentration, some areas of rebar become active (corrosion prone) or anodic, other areas remain passive or cathodic. The corrosion cell that this creates can result in oxidation reactions (corrosion) at the anodic areas of rebar. The products of corrosion can occupy 5~10 times the volume of the origin steel. This can place high tensile stresses on the concrete, often resulting in cracking and spalling of the cncrete.

4727 Zinc-Hydrogel Anode is designed to function as a supplemental anode on the concrete structure. It is applied to the surface area of the concrete to be protected. The zinc is electrically connected to the rebar grid. The circuit is completed by current flowing through the adhesive and contrete by the ionic conductivity of these materials (electrolytes).

Because zinc has a more electronegative potential (is more corrosion-prone) than steel, when properly installed, the zinc becomes the anode of the corrosion cell, and the rebar is put into a cathodic state. Oxidation reactions (corrosion) occur at the zinc rather than the steel, helping protect the concrete from deterioration caused by corrosion of the rebar.

General Product Desciption

4727 anode is a sheet of zinc foil coated with an ionically conductive, hydrogel pressure sensitive adhesive (an electrolyte). The hydrogel is covered with a liner to help protect it from contamination. At time of installation, the protective liner is removed from the hydrogel by hand, and the zinc-hydrogel anode is adhered to the clean, bare concrete surface.

This zinc foil anode coated with hydrogel is provided in roll form for coverage of the concrtet surface to be protected. The ionically conductive hydrogel enables the anode to be securely adhered to the exterior surface of the concrete structure, as well as allowing the necessary electric current flow as an electrolyte.

Key Features

- Cathodic protection of reinforcing steel – helps inhibit corrosion of rebar
- Sacrificial zinc anode – no external power supply
- Easy adhesive attachment – following appropriate surface preparation
- 0.01 in. (0.25mm) thick zinc anode provides several years of service life.

Typical Physical Properties

Note : The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Materials:	
Zinc Anode:	0.010 in. (0.25mm) thick
Hydrogel:	Inonically conductive acrylic, 0.030 in. (0.75mm)
Liner:	0.003 in. (0.08mm) embossed polypropylene
Roll Width:	10 in. (25 cm)
Roll Length:	30 yards (27 m)
Color:	Gray
Shelf Life:	Six month from date of receipt by customer when stored in original packaging at 72ºF (22ºC) and 50% R.H.
Operating Temperature Range:	40ºF to 120ºF (4ºC to 49ºC) Continuous -40ºF to 158ºF (-40ºC to 70ºC) Intermittent

Typical Performance Characteristics

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Adhesion

Peel Adhesion to Concrete and Zinc:

ASTM D-3330, 90º angle peel, 12 nich/minute (305 mm/min) seperation speed:

	Adhesion to Concrete oz/inch (N/100mm)	Adhesion to Zinc oz/inch (N/100mm)
After 72 Hours at 68ºF (20ºC)	8 (9)	7 (8)
After 72 Hours at 158ºF (70ºC)	16 (18)	30 (33)

Static Tensile Holding Power*: Test Mass Supported During 6 Weeks Temperature Cycling

	Grams/square inch
-40ºF (-40ºC):	17**
86ºF (30ºC):	17
122ºF (50ºC):	17

*4727 Zinc-Hydrogel Anode test specimens, 1 in. x 1 in. were adhered to concrete test blocks. Specimens were placed in an environmental chamber in a horizontal position with the 4727 anode on the bottom side. A test mass equal to 12 times the weight of the zinc was suspended from the 4727 anode. The 4727 anode specimen supporting the test mass was subjected to the following repeating temperature cycle:

-40ºF (-40ºC):	4 hours	86ºF (30ºC):	7 hours
122ºF (50ºC):	6 hours	86ºF (30ºC):	7 hours

Note: This temperature cycle was repeated every 24 hours for 6 weeks (42 cycles).

**This test mass equals 12 times the weight of the zinc on the test specimen.

Typical Performance Characteristics

(continued)

Electrical Performance

Cathodic Protection:	**Depolarization of Reinforcing Steel**
RPO – 290 9:	100 millivolts, minimum depolarization
(NACE Standard	(Difference between Instant-off potential and
Recommended Practice)	fully depolarized potential, typically measured
	Four (4) hours or more after Instant-off)

Physical Appearance After Installation

The zinc anode will usually show deterioration in appearance during its service life, such as discoloration, pitting, rtc. This is because the zinc is sacrificially corroding as it is providing cathodic protection to the reinforcing steel below it.

Installation Instruction

Refer to Bulletin #96-22 Installation Instruction for details on installation methods.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-567-1639 extension 1417. Address correspondence to: 3M Industrial Tape and Specialties Division, 3M Center, Building 220-7W-03, St.Paul, MN 55144-1000. Our fax number is 612-733-9175.

Warranty and Limited Remedy

For information, contact 3M.

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ISO 9002

This Industrial Tape and Specialties Division product was manufactured under a 3M quality system registered to ISO 9002 standards.

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