

**OKLAHOMA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS
FOR
SURFACE APPLIED PENETRATING CORROSION INHIBITORS**

These special provisions amend, and where in conflict, supersede applicable sections of the 2009 Standard Specifications for Highway Construction, English and Metric.

(Add the following:)

535.01 DESCRIPTION

This work consists of treating concrete surfaces with a penetrating corrosion inhibitor. The corrosion inhibitor is intended to treat reinforcing steel 1 to 3 in [25 to 75 mm] beneath concrete surfaces which have been contaminated with chlorides and may not be exposed at the time of treating.

535.02 MATERIALS

Provide surface applied corrosion inhibitors that are *organofunctional silane* based. Use corrosion inhibitors that are designed to work on both anodic and cathodic areas. Use surface applied corrosion inhibitors on the Materials Engineer's list of approved products.

For a surface applied corrosion inhibitor to be considered for inclusion on the list of approved products, provide test data showing satisfactory test results from an approved independent testing laboratory as determined by the Materials Engineer. Include the manufacturer's name, test results and dates. Provide test results in accordance with FHWA RD-98-153 test protocol on crack slab black bars subjected to 48 weeks of cyclic salt water ponding. Demonstrate a 90% corrosion reduction using this test procedure.

535.03 EQUIPMENT

A. General

Furnish equipment meeting the requirements of Subsection 108.06, "Methods and Equipment," and the recommendations of the manufacturer of the corrosion inhibitor. Use spray equipment, brushes or rollers as recommended by the manufacturer.

B. Surface Preparation Equipment

With written approval from the manufacturer, any of the following may be used:

(1) Abrasive Blasting

Provide compressed air pressure type abrasive blasting equipment of proper size and capacity to clean concrete surfaces as specified.

(2) Shot Blasting

Provide portable type machine designed especially for cleaning horizontal concrete surfaces utilizing recyclable steel shot blast techniques.

(3) Hot Water Pressure Washers

Provide hot water pressure system for cleaning concrete surfaces as specified, utilizing 160°F [70°C] minimum water temperature at 3,500 psi [25 MPa] nozzle pressure.

(4) Hydroblast Washer

Provide high pressure cold water washer unit for cleaning concrete surfaces as specified, using 7,000 psi [50 MPa] nozzle pressure.

C. Application

Use low-pressure spray equipment as recommended by the manufacturer.

535.04 CONSTRUCTION METHODS

A. General

Follow the manufacturers recommendations for surface preparation and application. Keep traffic off treated surfaces until the treated surfaces have completely dried.

B. Work Plan

Before starting work, submit to the Engineer a work plan describing the treatment procedures to be used. Include the following in the work plan:

- The identification of the treatment system to be used by brand name, name of manufacturers and a copy of the manufacturer's unabridged application procedures
- A description of the surface preparation methods and equipment to be used
- A description of the application methods and equipment to be used
- Weather limitations

C. Surface Preparation

Clean all concrete surfaces as specified by the corrosion inhibitor manufacturer to be treated before applying the penetrating corrosion inhibitor treatment system. Clean all exposed reinforcing steel. Remove all traces of curing compound, existing coatings, laitance, dirt, dust, salt, oil, asphalt, algae, moss, or any other foreign materials. Use equipment as approved by the corrosion inhibitor manufacturer and in accordance with Subsection 535.03.B, "Surface Preparation Equipment." Provide a minimum profile in accordance with ICRI Guideline No. 03732 CSP-2. Obtain approval prior to use from the corrosion inhibitor manufacturer for any cleaning agents, solvents, hand tools, or detergents. If a water method is used for cleaning, remove any standing water or excess moisture, which may

delay surface drying or restrain surface penetration of the treatment system. Use brush, broom, sweeper or compressed air on surfaces as final cleaning before application.

D. Application

(1) General

Apply the corrosion inhibitor as shown in the Plans and as directed by the Engineer in accordance with the manufacturer's recommendations. Apply corrosion inhibitor to an area at least one foot beyond the perimeter of the areas to be treated in all directions. Unless otherwise recommended by the manufacturer, apply inhibitor directly to exposed reinforcement.

(a) Column and Pier Cap Encasements Including FRP Wraps (6" – 9" Encasements)

Apply corrosion inhibitors to *contaminated concrete* prior to encasing concrete sections or wrapping with FRP. Remove all traces of the inhibitor product remaining on the concrete surface prior to encasing, patching or applying FRP wraps.

(b) Concrete to Be Patched Without Encasement

Apply corrosion inhibitor after the patches have been placed and the fresh concrete has been cured for a minimum of 28 days.

(2) Weather limitations

Apply the penetrating corrosion inhibitor in accordance with the manufacturer's recommendations and as follows:

- When the air and concrete surface temperatures are above 40°F [4°C] and less than 100°F [38°C]
- When the wind speeds are 15 mph [24 km/hr] or less
- When there has not been any precipitation in the last 72 hours
- Do not apply if the ambient temperature is expected to be below freezing within 12 hours of application.
- Do not apply when precipitation will occur in less than 8 hours after application.
- Comply with any other manufacturer's recommendations for weather limitations or seasonal limitations.

(3) Fugitive Dye

Add a fugitive dye to the corrosion inhibitor for visual field inspection.

(4) Treatment Application

Notify the Engineer at least one week in advance of the application of treatment system so that the Engineer may inspect the work. Unless otherwise recommended by the manufacturer, apply two coats of corrosion inhibitor at a rate specified by the manufacturer. Apply inhibitor with a low-pressure spray equipment or as specified by the manufacturer. Apply additional coats as directed by the manufacturer's technical representative and in accordance with the manufacturer's

instructions. Confirm application of the corrosion inhibitor using a black light and reapply inhibitor as necessary. Carefully rinse concrete surface to remove any remaining residue from the surface.

E. Sampling and Testing of Bridge Decks and Approaches

Field test to verify penetration will be required for deck slabs and approach slabs. No field testing will be required for pier caps, columns, prestress beams, or reinforced concrete T-beams. For bridge decks only, test silane based inhibitors in accordance with Subsection 515.04.C, "Sampling and Testing of Bridge Decks and Approaches."

F. Acceptance

Silane based inhibitors for bridge decks will be accepted in accordance with subsection 515.04.D.(2), "Bridge Decks and Approach Slab Surfaces."

535.05 METHOD OF MEASUREMENT

Corrosion Inhibitor (Surface Applied) will be measured by the square yard [square meter] of treated concrete surface area.

535.06 BASIS OF PAYMENT

The Department will pay for accepted quantities, measured as provided above, at the contract unit price for:

Pay Item:	Pay Unit:
<i>CORROSION INHIBITOR (SURFACE APPLIED)</i>	Square Yard [Square Meter]

Payment will be considered full compensation for furnishing all materials, equipment, labor, testing, and incidentals necessary for mixing, delivery, storage, handling, surface preparation, and application.