

# FUSION BONDED EPOXY

## CLASS A STEEL CONDUIT SYSTEM



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THERMACOR'S FUSION BONDED EPOXY (FBE) coated Class A Steel Conduit System is Federal Agency Committee Approved for steam, condensate, and high temperature hot water systems. The system is professionally engineered as a complete system that is drainable, dryable, and air testable with total manufactured components: pipes, loops, elbows, tees, end seals, gland seals, and anchors. The system is built to withstand heavy traffic/ earth loads, high water tables, and the most corrosive of soils.

## FUSION BONDED EPOXY PIPE AND STRUCTURES COATING SPECIFICATIONS

### DESCRIPTION

**FUSION BONDED EPOXY** is a primerless, one-part, heat curable, thermosetting powdered epoxy coating designed to provide maximum corrosion protection to pipeline systems.

A fusion bonded coating utilizes heat to melt and adhere the coating material to the metal substrate. It is a 100 percent solid, epoxy applied from the powdered state onto preheated pipe. The powder, when in contact with the hot pipe, melts, flows, and cures to a well-adhered, continuous, corrosion resistant coating.

### PRODUCT PROPERTIES

• Impact (ASTM G14)	160 in-lbs
• Abrasion Resistance (ASTM D1044)	0,1144 g loss
• Adhesion to Steel (ASTM D1002)	6150 psi
• Penetration (ASTM G17)	0
• Tensile Strength (ASTM D2370)	9300 psi
• Elongation Compressive (ASTM D2370)	6.9%
• Strength (D695)	11600 psi
• Thermal Shock	No visible effect
310° to -100°F 4x4 in coated panel	10 cycles
• Salt Fog (ASTM B117)	No blistering, no discoloration, no loss of adhesion
1000 hrs	
• Salt Crock	<u>Disbondment Dia.</u>
90 day, 5 volt, 5% NaCl	29 mm average
90 day, 1.5 volt, 3% ASTM G8 salt solution	24 mm average
90 day, 6 volt, 3% ASTM G8 salt solution	31 mm average
30 day, 5 volt, 5% NaCl sand crock 230°F	26 mm average
180 day, 1.5 volt, 3% ASTM G8 salt solution sand crock 230°F panel temperature, 26 mil coating thickness	39 mm average

- Hot Water Resistance (212°F immersion 1000 hrs)

-No blistering, good adhesion, slight discoloration, surface roughening and softening

- Color Blue Green

### APPLICATION

The exterior surface of the pipe or structure to be coated shall be abrasive blasted to near-white metal with a nominal 2 mil anchor pattern.

The next step in the process is to uniformly heat the pipe to a temperature in the range of 450°F using a noncontaminating heat source. Three heating methods are used - electrical induction, gas fired forced air, and a combination of high velocity direct flame impingement and infrared. All of these methods are suitable providing the pipe is heated uniformly.

After the pipe has been heated to the proper temperature, it passes through powder coating machines where the fusion bonded epoxy coating is uniformly applied to the specified film thickness, min. 20 mils, using electrostatic deposition on the exterior and air spray on the interior of pipe. After application, the coating is allowed to cure using the residual heat in the pipe. During the curing process, the coated pipe should be carefully handled to avoid damage to the coating. After the coating has cured, the pipe can be force-cooled with air or water to facilitate inspection and handling.

### INSPECTION

Coated pipe is electrically inspected using conventional search electrodes operating at 125 volts DC per mil of coating thickness. Small imperfections in the coating are repaired using hot melt patch sticks or two-part ambient curing liquid epoxy resins.

**CATHODIC PROTECTION:** **FUSION BONDED EPOXY** on steel is easily compatible with cathodic protection utilizing galvanic anodes or impressed current type systems.

**SPECIFICATION GUIDE \*****GENERAL**

All piping to be installed as shown on plans shall be **THERMACOR PROCESS INC. CLASS A STEEL** manufactured pre-insulated conduit with all necessary pipe, loops, elbows, tees, seals, anchors, and other appurtenances as specified hereinafter and as recommended by the manufacturer.

**CONDUIT**

Conduit for all components shall be either electric resistance welded or spiral welded steel pipe conforming to ASTM specification A-134, A-135, and A-139. Conduit thickness shall be 10 ga. up through 26" diameter pipe and 6 ga. for 28" diameter and above.

Conduit shall be factory coated with fusion bonded epoxy, minimum 20 mils thick. Conduit straight lengths shall be normally fabricated in 40 foot nominal lengths with five pipe supports per length. Shorter lengths will be fabricated as required and provided with pipe supports not more than nine feet apart and with a pipe support not more than two feet from each end. Tees, anchors, elbows, and other fittings will be coated and pre-fabricated to straight sections whenever shipping requirements permit.

**EXPANSION LOOPS, ELBOWS, AND ECCENTRIC FITTINGS**

Expansion loops and elbows shall be factory manufactured utilizing the same casing thickness, material, and coating as the straight conduit lengths. Loops and elbows shall be sized to allow carrier pipe expansion without damage to the insulation. Eccentric fittings shall be factory manufactured, coated, and utilized whenever changes in casing size are required as determined by the manufacturer.

**FIELD JOINTS**

Field joints shall be applied by the installation contractor utilizing the manufacturer's furnished kits and instructions. Field joints shall not be applied until after the carrier pipe has been hydrostatically tested and approved.

**CATHODIC PROTECTION**

Sacrificial galvanic anode cathodic protection systems are required in soils with resistivity readings less than 30,000 ohms/cm.

**TERMINAL SECTIONS AND ANCHORS**

Leak plates shall be 10 ga. steel plate conforming to ASTM A-36. End seals shall be of ½" steel plate conforming to ASTM A-36. Gland seals shall consist of a steel closure plate with stainless steel bolts and steel gland welded to a temperature resistant packing gland and a gland follower. Anchor sections shall be ½" steel plate conforming to ASTM A-36 steel with air passage holes and welded to carrier pipe and conduit.

**CARRIER PIPE**

Carrier pipe shall be as specified by the design engineer.

**INSULATION**

Insulation shall be mineral wool and shall be of a thickness as specified by the design engineer.

**INSTALLATION**

The installing contractor shall be responsible to excavate, string conduit, weld, test, place in trench, backfill, or otherwise treat and install the system as per directions furnished by the manufacturer and approved by the design engineer in accordance with the plans and specifications. The conduit shall be air tested at 15 psig for not less than two hours and the carrier pipe hydrostatically tested to 1½ times the working pressure for not less than four hours, or as specified by the engineer. Holiday testing of conduit coating shall be the responsibility of the contractor under the directions furnished by the manufacturer. All holidays shall be recoated and retested. A qualified representative of THERMACOR PROCESS INC. shall be present at the jobsite during critical periods of installation and testing. Backfill shall not commence until approval of tests by the THERMACOR PROCESS INC. representative. Field modifications must be approved by the manufacturer. The installing contractor shall certify that he has complied with the manufacturer's directions.

*\* For alternate specifications, please contact THERMACOR.*

**THERMACOR PROCESS INC.** Your Authorized THERMACOR Representative Is:

1670 Hicks Field Road East  
Fort Worth, Texas 76179-5248  
P.O. Box 79670

Phone (817) 847-7300  
Fax (817) 847-7222  
www.thermacor.com

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