



**TESORO LOGISTICS OPERATIONS, LLC.
HIGH PLAINS PIPELINE SYSTEM – ND**

**BEULAH BASIN
RAIL LOADING 10" PIPELINE
PROJECT**

**FUSION BOND EPOXY COATING
OF
GIRTH WELDS**

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TABLE OF CONTENTS

- 1.0 SCOPE**
 - 1.1 GENERAL
 - 1.2 CLARIFICATION OF REQUIREMENTS
- 2.0 GENERAL**
 - 2.1 MANUFACTURER'S PUBLISHED DATA
 - 2.2 STORAGE OF MATERIAL
- 3.0 THINFILM THERMOSET EPOXY PIPE COATING**
 - 3.1 GENERAL
 - 3.2 SURFACE PREPARATION
 - 3.3 COATING APPLICATION
 - 3.4 INSPECTION AND TESTING
 - 3.5 HOLIDAY TESTING
 - 3.6 COATING REPAIR
 - 3.7 REMOVAL OF COATING

1.0 SCOPE**1.1 GENERAL**

1.1.1 The minimum Dry Film Thickness (DFT) to the Fusion Bond Epoxy (FBE) coating shall be 20 mils to be applied to the girth welds.

1.1.2 These specifications are intended to cover the requirements for the field application of thin film thermosetting epoxy coating to pipeline circumferential (or girth) welds in pipe previously shop coated with epoxy, as well as the testing and repairing of the coating. Nothing contained herein shall be construed to relieve the Contractor of the obligation necessary for complete and satisfactorily coated pipe.

1.2 CLARIFICATION OF REQUIREMENTS

When coating or accessory material application or other requirements are omitted, uncertain, or in conflict with other project documents, the TESORO shall be notified for clarification of such requirements before quoting this Specification or the application of the material in question.

2.0 GENERAL**2.1 MANUFACTURER'S PUBLISHED DATA**

Manufacturer's published data regarding coating and accessory materials storage, mixing, application, curing, etc., shall be considered an integral part of this Specification.

2.2 STORAGE OF MATERIAL

All coating and accessory materials shall be stored at the temperature and under the conditions required by the material manufacturer to prevent damage to and deterioration of the materials. Materials that have been damaged or allowed to deteriorate shall not be used for any application under this Specification.

3.0 THIN FILM THERMOSET EPOXY PIPE COATING**3.1 GENERAL**

This segment of the specification is intended to cover the requirements of field application of thin film thermosetting epoxy coating to the girth welds of pipe previously shop coated with epoxy.

- 3.1.1 The Contractor supplied powdered resin used in the coating of the girth welds shall be one type - supplied by Nap-Gard.
- 3.1.2 Powdered epoxy shall be segregated and identified by batch number. Batches shall be used in rotational order starting with the oldest batch first.
- 3.1.3 Any deviations from this specification must be approved in writing by TESORO.

3.2 SURFACE PREPARATION

- 3.2.1 Contractor shall inspect and clean the bare steel pipe adjacent to and including the girth weld surface in accordance with Steel Structures Painting Council (SSPC), Surface Preparation Standards, SP-1 to remove oil, grease and loosely adhering deposits. Oil and grease shall be removed with a totally volatile, nonflammable solvent.
- 3.2.2 Following the initial cleaning described in Section 3.2.1 above, pipe shall be heated in a uniform manner to a minimum temperature of 5°F above the dew point temperature to assure that all moisture, grease and oil are removed. Contractor shall then blast clean the exterior bare pipe surface to near-white metal in accordance with SSPC SP-10 or National Association of Corrosion Engineers (NACE) Standard TM-01-75. The grit or shot utilized by Contractor shall produce a surface profile of not less than 1.5 MILS and not greater than 3.5 MILS.
- 3.2.3 Any slivers or bristles of steel remaining on the newly blasted surface shall be removed by the use of high speed wire brushes, sanders, files or other approved methods. Remaining surface imperfections such as scale, burrs, scabs, weld spatter, etc. may be removed by grinding, provided that the remaining wall thickness measured by an electronic thickness gauge is no less than 5% less than the nominal wall thickness.
- 3.2.4 After the cleaning and surface preparation, the exterior of the pipe shall be cleaned of residual grit/shot and other contaminants by air blast or vacuum cleaning.
- 3.2.5 Girth welds shall be available for inspection by the TESORO representative after the blast cleaning, but before the actual coating process begins.
- 3.2.6 A minimum of two inches of the shop applied FBE coating on each side of the girth weld shall be roughened and the edge feathered to allow for adhesion of the new coating to the shop coating.
- 3.2.7 The cleaning crew shall work three welds ahead of the coating crew so that the blasting function does not contaminate the applied coating or bulk

materials and to limit the time available for surface rust to form on the cleaned pipe.

3.3 COATING APPLICATION

- 3.3.1 The application of the selected epoxy coating system shall be in accordance with the manufacturer's recommendations, including any primer or acid wash recommended by the manufacturer to enhance the bond of the epoxy to the pipe surface.
- 3.3.2 Pipe shall be uniformly preheated (after abrasive blast cleaning) to a temperature range of 462°F to 500°F or as otherwise specified by the epoxy manufacturer and approved by the TESORO. In no case shall the pipe temperature be raised above 500°F. Preheat temperatures shall be continuously monitored with Tempilstik.
- 3.3.3 Oxidation and/or bluing of the steel pipe in any apparent form shall be cause for rejection and recycling of the pipe through the cleaning process at no cost to the TESORO.
- 3.3.4 Girth weld heating shall be accomplished using induction heating and only with 100% duty-cycle machine. Flame heating is not permitted.
- 3.3.5 The induction heating machine shall be of such size that the weld joint will be uniformly heated to the 462°F specified temperature. The heat source shall not leave residue or contaminate the weld joint surface.
- 3.3.6 The heating zone shall extend around the circumference of the pipe, and over the roughened area of the previously applied shop coating.
- 3.3.7 The coating shall be applied using automatic spray techniques to a uniform minimum cured film thickness - as specified in Section 1.1.2. At no point shall coating thickness be less than the specified thickness.

3.4 INSPECTION AND TESTING

The Contractor is responsible for meeting the following requirements for inspection and testing of the coating.

- 3.4.1 Inspection records shall be maintained on each pipe joint and copies shall be made available to the TESORO.
- 3.4.2 Cured coating shall be of uniform color, thickness, and gloss, and shall be free of blisters, pinholes, sags or other irregularities judged detrimental by the TESORO.
- 3.4.3 The finished coating shall be inspected for thickness prior to lowering in or backfill. Each coated joint shall be checked at a minimum of four

random locations around pipe using a magnetic dry film thickness gauge. The Contractor provided gauge shall be calibrated at least once per eight-hour shift to U.S. Department of Commerce certified coating thickness standards.

3.4.4 Where the minimum thickness is less than that specified, the coating thickness of the affected joint shall be measured at four different locations. The average of each set of measured values shall exceed the thickness specified in this specification.

3.4.5 Any pipe joint with coating thickness not in compliance with section 3.3.7 or 3.4.4 of the specification shall be recoated at no cost to the TESORO.

3.5 HOLIDAY TESTING

3.5.1 The detector shall be a pulsed DC voltage type set within the range of 125 to 150 volts per mil thickness of coating. The test wand shall not be moved over the surface faster than 1 ft/sec.

3.5.2 The holiday detector shall be calibrated at least once per eight-hour shift with a high impedance peak reading kilovolt meter.

3.5.3 All holidays found shall be repaired.

3.5.4 Where excessive holidays are encountered, Contractor shall cease coating operations and ascertain the cause of the defects. After corrective action is taken, trial coating runs shall be made to prove that the holiday problem has been corrected.

3.5.5 Adequate lighting shall be available to facilitate a proper visual inspection of the girth weld coating system.

3.6 COATING REPAIR

3.6.1 The area to be repaired shall be cleaned of all rust, damaged coating and foreign material. All repaired areas shall maintain the proper anchor pattern required by the original shot blasting criteria.

3.6.2 Repair material shall be compatible with the manufacturer's recommendations and shall be 100% solids liquid epoxy compounds.

3.6.3 The repair compound shall be applied in accordance with the manufacturer's recommendations to a thickness no less than the specified coating and, except for pinholes, shall overlap the adjacent undamaged coating by a minimum of one inch.

3.7 REMOVAL OF COATING

- 3.7.1** The following procedure shall be used to remove existing coating when necessary to make cuts, install taps or cathodic protection test stations.
 - 3.7.1.1** Coating may be burned off using a rosebud tip on an acetylene torch. Note: At no time shall the pipe be heated to above 400°F. Pipe temperature shall be monitored with a Tempilstik crayon.
 - 3.7.1.2** When existing coating turns black, it can then be removed with a power brush. Heat may be applied a second time if necessary recoating shall conform to Section 3.0 of this Specification