

# **ELASTUFF 160**

## **STEEL PIPE SURFACES**

### **MASTER GUIDE SPECIFICATION**

#### **SECTION 09800**

## ***100% Solids Fluid-Applied Elastomeric Polyurethane Coating System***

### **PART 1 – GENERAL**

#### **1.01 SCOPE**

This Master Guide Specification has been established as an up-to-date inspection, preparation, repair and membrane coating system installation for interior and exterior steel pipe surfaces subject to below grade or immersion environments and/or abrasion conditions.

#### **1.02 QUALITY ASSURANCE**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

- A. ASTM D412 – Test Methods for Rubber Properties in Tension
- B. ASTM D570 – Test Method for Water Absorption of Plastics
- C. ASTM D624 – Test Method for Rubber Property Tear Resistance
- D. ASTM D2240 – Test Method for Rubber Property Durometer Hardness
- E. ASTM D4060 – Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- F. ASTM D4541 - Bond Strength as Measured by an Elcometer
- G. ASTM E96 – Test for Water Vapor Transmission of Materials
- H. Federal Standard 141a-6221/6223 – Low Temperature Flexibility
- I. Factory Mutual 4470 – Hailstone Impact Test
- J. National Sanitation Foundation ANS/NSF Standard 61 – Drinking Water System Components

#### **1.03 RELATED WORK SPECIFIED ELSEWHERE**

- A. Warranties: Section 01740
- B. Painting: Section 09900
- C. Metal: Section 05000

#### **1.04 SUBMITTALS**

- A. Submit Manufacturer's literature, certificates and samples in a single package to the Architect, Engineer or Owner in accordance with requirements specified in General Conditions and Division I, General Requirements.
- B. Manufacturer's Literature: Literature on the protective coating, as well as related repair materials, primers, sealers, sealant, reinforcement, etc. shall be submitted for review before work is started. Literature shall include material specification, physical properties (including ASTM and other test methods utilized), Manufacturer's estimated application rate for required dry film thickness, current application instructions, warnings or precautions, and Material Safety Data Sheets.
- C. Applicator's Qualifications: Submit a copy of Approved Applicator letter and/or certificate as issued and signed by an Officer of the Manufacturer of the 100% solids elastomeric polyurea coating system.

#### **1.05 PRODUCT DELIVERY, STORAGE & HANDLING**

- A. Delivery of Materials: Materials shall be delivered to the jobsite in original, sealed containers with labels legible and intact.
- B. Storage of Materials: Materials shall be stored in an area specifically designated for that purpose, where temperatures will not be less than 50°F (10°C) or higher than 100°F (38°C).
- C. Material Handling: Materials shall be handled and installed per Manufacturer's instructions and all applicable health and safety regulatory agencies.
- D. Damaged Materials: Contaminated, damaged or unsealed materials, or materials not conforming to the specified requirements, shall not be used in the installation. Rejected containers shall be immediately removed from the jobsite and replaced at no additional cost to the Owner.

### 1.06 ENVIRONMENTAL CONDITIONS

- A. Install all materials in strict accordance with Manufacturer's published safety and weather precautions.
- B. Do not apply elastomeric polyurethane coating system components when the ambient and/or surface temperature is below 40°F (5°C) or above 110°F (43°C), if any surface moisture is present or when the dew point is within 5°F (3°C) of the surface temperature. Do not apply if weather conditions will not permit complete cure before rain, dew, fog or freezing temperatures occur. Do not apply if wind velocity exceeds 15 MPH without taking appropriate precautions to eliminate overspray.
- C. Take all measures necessary to protect unrelated surfaces from coating overspray or spillage.

### 1.07 FIELD QUALITY CONTROL

- A. The overall weather conditions, including surface temperature, surface moisture, ambient temperature, relative humidity and wind velocity shall be recorded by the Contractor, at designated time intervals, on the Daily Quality Control Report Form if so requested by the Architect, Engineer or Owner.
- B. Verification of Protective Coating Thickness: The quantity of primer used, batch numbers and the area in square feet or meters shall be recorded daily, as shall the wet and dry film thickness, quantity, batch numbers and area in square feet or meters applied of the elastomeric coating, on the Daily Quality Control Form.

## **PART 2 – PRODUCTS**

### 2.01 DESCRIPTION

A seamless, fluid-applied 100% solids polyurethane elastomer membrane system designed for application over steel pipe surfaces. The coating system shall be a 1:1 ratio (1A:1B), fast set, 2-component hydrophobic polyurethane elastomer, containing no silica fillers or extenders. It shall have been tested and approved by an independent testing laboratory and shown to comply with Department of Health Services (DOHS) and Environmental Protection Agency (EPA) Standards for leachates – the Purgeable Priority Pollutant Analysis. Approved system shall be UNITED COATINGS' **ELASTUFF 160** 100% solids polyurethane elastomer coating system for use on steel pipe surfaces.

|                                    |   |                     |
|------------------------------------|---|---------------------|
| Tensile Strength                   | 4,010 psi ( ± 100) (27.7 MPa)                                       | ASTM D412           |
| Elongation                         | 20%   | ASTM D412           |
| Tear Strength                      | 125 lbs/in ( ± 30 (22 kN/m)   | ASTM D624           |
| Hardness                           | 70-75 Shore D @ 75°F (24°C)   | ASTM D2240          |
| Abrasion Resistance                | 6 to 8 mg loss H-10 wheels using 1,000 gm weight @ 1000 revolutions | ASTM D4060          |
| Water Absorption                   | <.5% wt. gain after 7 days  | ASTM D570           |
| Water Vapor Transmission           | .22 Perms @ 70 mils   | ASTM E96            |
| Impact Resistance                  | Pass 160 inch pounds direct @ -4°F (-20°C)                          | Factory Mutual 4470 |
| Adhesion To Concrete               | >1,000 psi  | ASTM D4541          |
| Adhesion To Steel                  | >2,350 psi  | ASTM D4541          |
| Resistance to Sulfuric Acid        | 30% Solution for 30 Days  | No Coating Failure  |
| Resistance to Sodium Hypo-Chlorite | 12.5% Solution for 30 days  | No Coating Failure  |
| Resistance to Sodium Hydroxide     | 50% Solution for 30 Days  | No Coating Failure  |

### 2.02 COLOR

The components of the 100% solids polyurethane elastomer shall be tinted to yield a Dark Gray color when they are properly proportioned and mixed. Color of the Part A component shall be Clear, while the Dark Gray colorant is incorporated in the Part B component. When properly proportioned and mixed, the resulting color shall be Dark Gray. A limited number of custom colors shall also be available to meet specific requirements.

## **PART 3 – EXECUTION**

### 3.01 SURFACE INSPECTION

All surfaces shall be clean and dry, free from any existing coatings, sealers, dirt, grease, oil, pollution fallout, smoke, wax, form release agents, chemical contamination, latence, etc.

### 3.02 SURFACE PREPARATION – STEEL SURFACES

- A. **MECHANICAL CLEANING:** Steel and fabrication defects, such as weld imperfections, delaminations, slivers, etc., shall be corrected prior to starting cleaning operations. All burrs, jagged edges, undercuts, recesses and surface defects shall be ground smooth. Porous welds shall be ground down to pinhole free metal. Excessive rust scale shall be removed by use of a wire brush or wheel, or other mechanical means prior to blast cleaning. All seams and joints must have a continuous, smooth interior weld.
- B. **SOLVENT WASH:** All steel surfaces shall be free of excessive rust scale, pollution fallout, dirt, grease, surface chemicals or other foreign contaminants prior to blast cleaning. Use a solvent wash as per SSPC-SP1 "Solvent Cleaning" to remove these contaminants along with any accumulated oil, smoke, wax, or other material that could interfere with maximum adhesion.
- C. **ABRASIVE BLAST CLEANING:** Steel surfaces subject immersion conditions must be blast cleaned to White Metal as per SSPC-SP5, with a minimum anchor profile of 2+ mils (51+ microns). Steel subject to below grade or non-immersion conditions shall be cleaned to Near-White as per SSPC-SP10, with a minimum anchor profile of 2.0 mils (51 microns). All previously applied paints or coatings on the substrate shall be completely removed, including paints or coatings that are tightly adhered to the surface. Abrasive blast cleaning shall not be performed when the surface temperature of the steel is less than 5°F (3°C) above the dew point of the ambient air, when relative humidity exceeds 90%, or when there is a possibility that the blasted surface will become wet before the coating can be applied. The blast-cleaned surface shall be coated by the end of the same work day, but in any event before any visible rusting occurs. If rusting occurs after blast cleaning, the surface shall be reblasted before coating.

**ELASTUFF 160** is a primerless system over clean, properly prepared steel surfaces. All prepared metal should be top-coated on the same day. If topcoating cannot be achieved within 24 hours, consult UNITED'S Technical Service Department for recommendations.

### 3.03 ELASTOMERIC COATING APPLICATION

- A. **ELASTUFF 160** is applied using 1:1 ratio plural component airless spray equipment. Refer to separate literature entitled Plural Component Spray Equipment for information on design and operation.
- B. All preparation work, including treatment of seams, surface repairs, etc. must have been completed in accordance with UNITED'S published recommendations. Do not apply **ELASTUFF 160** when the ambient temperature is below 40°F (4°C) or above 100°F (38°C), if rain is anticipated within 2 hours of application or if the relative humidity is over 90%.
- C. Flush Methylene Chloride or M.E.K. solvent through the pumps, hoses and spray gun prior to introducing the material components. One of these solvents should also be used to fill the solvent flush system, if such a system is utilized, which must be set so as to achieve a minimum of 800 psi (5,512 kPa) fluid pressure. Set transfer pumps at the minimum pressure required to completely fill the proportioning cylinders as they cycle so that no cavitation occurs. This will typically require 200 to 300 psi (1,378 to 2,067 kPa) fluid pressure for 5:1 ratio transfer pumps. Set main proportioning pump to produce an output fluid pressure of 2,100 to 2,800 psi (14,469 to 19,292 kPa) to achieve an acceptable spray pattern, depending upon tip size, material temperature and ambient conditions.
- D. Plural component equipment must be equipped with in-line, high-pressure heaters as well as heated, insulated high pressure hose capable of developing and maintaining a minimum of 120°F (49°C) material temperature at the spray gun. In cooler ambient conditions where the material in the drum cannot be maintained at 60°F (16°C) or higher, it is recommended that drum heaters be utilized to facilitate easier pumping of the liquid components by the transfer pumps.
- E. Utilize an approved plural component gun equipped with a static mixer, or a single component gun with a static mixer in conjunction with a manifold and up to a 12' (4 m) whip to assure proper mixing and cure of the liquid components. A spray tip between .025" and .041" (.64 and 1.0 mm) with a 40° to 50° fan pattern is recommended. Certain mechanical and air purge guns can also be used to apply **ELASTUFF 160**. Consult UNITED'S Technical Service Department for additional information on equipment options.
- F. Prior to spray application, mix the Part A and B components separately with a clean power-mixer of sufficient size to thoroughly mix the contents of the container.
- G. Coverage rates and dry mils are determined by specific project requirements. Soil makeup, type of backfill to be used and pipe diameter will affect exterior coating thickness requirements. Type of solution, size of any particulates, etc. will affect interior coating thickness requirements. The versatility of **ELASTUFF 160** allows the specifying engineer to solve a multitude of protection problems utilizing one coating system at a wide range of dry film thickness'. **ELASTUFF 160** applied at the rate of one (1) gallon per 100 sq. ft. (.4 l/m<sup>2</sup>) of the combined Part A and Part B will theoretically yield 16.0 dry mils (406 dry microns). The following dry film thickness' are provided for guideline use only:
  - 1. Light Abrasion – Interior or Exterior: 32 to 40 mils (813 to 1,016 microns)
  - 2. Medium Abrasion – Interior or Exterior: 45 to 60 mils (1,143 to 1,524 microns)
  - 3. Heavy Abrasion – Interior or Exterior: 80 to 120+ mils (2,032 to 3,048+ microns)
- H. The applicator must periodically check the film thickness applied to the pipe surface. If adequate film thickness has not been achieved according to UNITED'S published recommendations or project specifications, adjust accordingly and apply additional material to previously coated areas.
- I. **ELASTUFF 160** is capable of rapid, high film build utilizing multiple-pass application technique. Most required film builds can be achieved in a single, multi-pass application using this method. Optimum results will always be achieved by applying overlapping coats, which helps to eliminate pinholes and thin spots. Ultra-high film builds may require two (2) or more separate coats. Number of coats required to achieve the specified film thickness will vary depending on application method, jobsite and ambient conditions. Allow each coat of **ELASTUFF 160** to dry tack-free prior to applying an additional coat. This will require a minimum of 20 minutes at 75°F (24°C).

- J. Additional coats of **ELASTUFF 160** should be applied within 48 hours of the previous coat, however, as long as the surface remains clean, additional coats can be applied as long as there is chemical cure occurring within the urethane film. This is normally 3 to 5 days.
- K. All surfaces must be uniformly coated and free of voids, pinholes or blisters.
- L. **ELASTUFF 160** is a self-flashing material. Use plastic or paper skirting over the pipe ends prior to commencing coating application to protect weld areas from overspray.
- M. The **ELASTUFF 160** coating installation must be inspected using a spark tester as soon as practical to ensure that all surfaces have been uniformly coated and are free of holidays. Any holidays shall be marked and repaired.
- N. Place coated pipe sections on a dry rack and allow the coating membrane to cure a minimum of 24 hours at 75°F (24°C), (48 hours if ambient temperatures are below 60°F) before the pipes are handled. Elevated temperatures will decrease handling time.

### 3.04 REPAIR PROCEDURE

- A. Weld joints shall be abraded to achieve a minimum surface profile of 2+ mils (51+ microns). A minimum 4" (10 cm) tie-in area of the existing coating shall be scuff-sanded or abraded to roughen the membrane surface. The abraded area shall then be solvent-wiped using MEK (Methyl Ethyl Ketone) using a clean, dry rag. An in-field plural component application unit shall be utilized to spray-apply **ELASTUFF 160** to the specified thickness. Use overlapping, multiple-pass application technique to achieve an even, pinhole free finish. Spark test all field-applied weld joints to ensure a monolithic membrane.
- B. Repairs to the coating membrane shall be made with **ELASTUFF 160 Mastic Patch Kit** where small spot repairs require a hand-applied material. Surfaces shall first be roughened using an abrasive brush-blast or by mechanically abrading with a wire wheel, wire brush, coarse sandpaper, or other similar means. Coating surface must be roughened so that the repair material is able to achieve a mechanical bond. Solvent wipe the surface with M.E.K to remove all dust and other contaminants and to soften the existing coating surface. After thoroughly blending the Part A and B components, apply repair material to the designated area, using a brush, trowel or mitt, taking care to maintain a flow edge at least 20 mils thick. Do not feather edges of the repair material.

### 3.05 CLEANUP

- A. Maintain work and work areas in a clean, safe condition at all times during coating installation. Remove excess materials, trash and debris from the jobsite daily.
- B. At the completion of the project, clean area of any spills and containers, and clean up all debris, leaving jobsite in a clean and orderly condition.

### 3.06 INSPECTION

Periodically during the coating system application, the Coating Manufacturer's Representative, Owner's Representative, Consultant and/or Engineer shall make inspections to determine the dry film thickness of the fluid-applied, 100% solids polyurethane membrane and to verify that the system is free from voids and/or pinholes. Any defects shall be noted, duly marked and immediately repaired prior to acceptance.