

PREPARATION GUIDE

EXTERNAL PIPE SURFACES



SPECIFICATION FOR APPLYING SPI SPRAY POLYUREA COATING FOR EXTERNAL PIPE SURFACES

1. GENERAL

1.1 WORK SCOPE AND GENERAL REQUIREMENTS

- 1.1.1** This specification covers the surface preparation, coating application and inspection requirements for the external lining of piping and pipelines using SPI SPRAY POLYUREA.
- 1.1.2** The Contractor shall furnish all labor, materials and equipment necessary for cleaning, blasting, coating, curing and inspection of the surfaces to be coated. Only experienced coating applicators shall be used. The contractor shall provide resumes of each painter to ensure he has sufficient prior experience using this coating system on a similarly sized and type component. As a minimum the lead applicator shall have had three years of experience applying SPI SPRAY POLYUREA with a Gusmer gun. Each applicator shall have training by and certification from the manufacturer of the application equipment, i.e., Gusmer Corporation.
- 1.1.3** A pre-job meeting should be held before any coating is applied to resolve any questions the applicator may have regarding this specification. Present at the meeting should be the Owner and Coating Inspectors (including third-parties).
- 1.1.4** The Owner shall provide a qualified coating inspector that has been approved by the Technical Authority to monitor all phases of the coating job.

1.2 DEFINITION OF TERMS

- 1.2.1** The term Owner as used in this specification shall mean or their appointed representatives.
- 1.2.2** The term contractor as used in this specification shall include those who have contracted to provide the specified services.
- 1.2.3** The term "Holiday free" means that the coating film shall be absolutely continuous (free of any pinholes or other through-film discontinuities).

1.3 REFERENCE PUBLICATIONS

The following codes, standards, and specifications shall be considered as a part of this Specification. All documents shall be the latest editions in force.

NACE	National Association of Corrosion Engineers RP0287 Recommended Practice for field Measurement of Abrasive Blast Cleaned Steel Surfaces Using a Replica Tape
SSPC	Steel Structures Painting Council SP 5 Surface Preparation No. 5 White Metal Blast Cleaning IVS-1 Pictorial Preparation Standards

*Note: The preceding specification is to be used as a guideline to create a final specification.

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2. SURFACE PREPARATION

2.1 CLEANING OF SURFACES

All surfaces to be blasted shall be solvent cleaned or steam cleaned with detergent to remove all oil grease, soil, drawing and cutting compounds and other contaminants. If steam cleaning with detergent is used, all surfaces shall be steamed or washed with clean, hot water to remove all traces of detergent residue.

2.2 SURFACE PREPARATION

2.2.1 All surfaces to be coated shall receive full surface preparation.

2.2.2 The exposed surfaces not receiving SPI SPRAY POLYUREA shall be protected from the blast process using templates or other shielding devices.

2.2.3 Abrasive blast cleaning shall be used to prepare the surface for the application of the coating. The compressed air used for abrasive blasting shall be free of water and oil. The air pressure at the blasting nozzle shall be 85-100 psi. Carbide or carbide 2/8" or 7/16" long Venturi nozzles shall be used and other blasting equipment shall be sized to produce the required pressure. Smaller nozzles may be used on small items.

2.2.4 Abrasives shall be Idaho garnet or sharp steel grit. Alternative abrasives may be proposed by the Vendor for the Owner's consideration. The abrasive materials shall contain <100 ppm chlorides and <1% free silica. The abrasives shall be clean, dry and free of harmful quantities of toxic metals, clay, limestone, shells, and other foreign materials. Recycled abrasives may not be used without prior approval from the Owner.

2.3 TEMPERATURE AND HUMIDITY RESTRICTIONS FOR BLASTING

Abrasive blast cleaning shall not be conducted on surfaces that are wet or will be wet after blasting, when the relative humidity of the air is greater than 80%, or when the temperature of the surface to be blasted is less than 5°F above the dew point.

2.4 SURFACE PREPARATION REQUIREMENTS

Cleanliness shall meet the requirements of SSPC-SP5 White Metal Cleanliness. Anchor profile shall be 2+ mils. There shall be no oil, grease, dirt, or other contaminants on the surface after abrasive blasting. Profile shall be verified using Testex Press-O-Film replica tape. Cleanliness shall be verified using a visual comparator to standard SSPC VIS-1, Type A.

3. COATING MATERIALS AND GENERAL APPLICATION REQUIREMENTS

3.1 APPROVED COATING MATERIALS/REQUIREMENTS

All materials shall be in the Manufacturer's original containers, unopened, and with legible labels bearing the Manufacturer's name, product identification and storage requirements. All materials shall be stored in a safe manner and within the storage temperature range specified by the manufacturer. All materials shall be accompanied by the Manufacturer's Product Data Sheets (PDS). These sheets must contain the Manufacturer's recommended application and mixing instructions.

No thinners, catalyzing agents or other additives shall be added in the field without recommendations in writing from the manufacturer. Mixing techniques shall conform strictly with the Manufacturer's data sheet. No substitution of ANY materials shall be made without the written approval of the Owner.

The polyurea material shall be an SPI SPRAY POLYUREA PRODUCT.

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3.2 APPLICATION RESTRICTIONS (TIME, TEMPERATURE, HUMIDITY, ETC.)

3.2.1 SPI SPRAY POLYUREA shall be applied to properly prepared surfaces before any sign of oxidation is visible and within 8 hours of blasting. Coating materials shall not be applied; to surfaces that are wet or when the relative humidity exceeds 80% or when the temperature of the surface to be coated is less than 5°F above the dew point. Coated surfaces shall not be exposed to precipitation and condensation on the surface shall not be permitted at any time during the coating, drying, or curing process.

3.2.2 "A" ACTIVATOR SIDE:

- The "A" side shall be free of moisture. A nitrogen blanket or silica gel air dryer shall be used in small bung of drum to prevent moisture contamination.
- The material temperature in the container shall be between 70 and 120° F before spraying begins.
- Filter screens shall be checked before spraying.
- Primary heaters shall be set to 170° F. See material technical data sheet for further information.
- The hose temperature controller shall be set per instruction on the product data sheet. A hose thermometer inserted under the insulation near the gun should read as directed on the technical data sheet. Spraying shall not be started until the primary heater temperature reaches specified temperature.
- The material spray pressure shall be adjusted to a minimum of 1000 psi (dynamic). This will require increasing the static pressure at the proportioning pump. The minimum pressure is dependent upon which SPI POLYUREA formulation is used. consult an SPI technical rep regarding formulation best suited to your applicaiton.

3.2.3 "B" RESIN SIDE:

- The material temperature in the container shall be between 70 and 120° F before spraying begins.
- The "B" side shall be stirred to redistribute settled pigments or additives each time it is used.
- Filter screens shall be checked before spraying.
- Primary heaters shall be set to 170° F. See material technical data sheet for further information.
- The hose temperature controller shall be set per instruction on the product data sheet. A hose thermometer inserted under the insulation near the gun should read as directed on the technical data sheet. Spraying shall not be started until the primary heater temperature reaches specified temperature.
- The material spray pressure shall be adjusted per the product technical data sheet. This will require increasing the static pressure at the proportioning pump. Consult an SPI technician regarding proper pressure with the SPI POLYUREA formulation you are using if you have questions before you spray.

3.3 EXTENT OF COATING AND PROTECTION OF AREAS NOT COATED

3.3.1 The Coating shall be applied to all surfaces designated in the work order.

3.3.2 All areas not coated, shall be protected from blasing and buildup of coating or coating overspray.

3.3.3 The edge of the coating shall be applied at full thickness up to the adjacent noncoated surface.

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3.4 SPRAY EQUIPMENT

- 3.4.1** Consult the product technical data sheet for recommended spray equipment.

4. APPLICATION AND REPAIR PROCEDURES

- 4.1** Using multiple criss-cross passes, apply a coat of the SPI SPRAY POLYUREA material to all surfaces to be coated. The DFT to be applied per the job specification or product data sheet.
- 4.2** Check the dry film thickness throughout the coated area. Areas found to be in excess of the specified range shall be hand sanded with wet or dry abrasive paper to conform to the specified thickness.
- 4.3** The coating surface shall be smooth. No dimples or sags are acceptable.
- 4.4** Any coating containing dimples or sags shall be completely removed. Additional coating shall be applied within 8 hours. The repair coating shall be feathered into the existing coating. The edge of the existing coating shall be roughened up with a rough Scotch brite pad before the repair coating is applied.
- 4.5** Any area with coating less than the specified minimum thickness shall be corrected by applying additional material within 8 hours.
- 4.6** After all thickness corrections have been made, perform a complete holiday inspection of all coated surfaces in accordance with the latest edition of the following standards: NACE SP0188
- 4.7 HOLIDAY REPAIR**
- 4.7.1** Holiday's shall be repaired within 24 hours of applying the original coat.
- 4.7.2** Abrade a 6" diameter circle around each holiday using a rough Scotch brite pad.
- 4.7.3** Center a template with a 4" Diameter hole over each holiday and apply 20 to 40 mils of new coating. The template shall be held 1/4 to 1" away from the substrate to avoid damaging the freshly applied patch.
- 4.7.4** Perform another holiday inspection of the completed coating.

5. QUALITY ASSURANCE AND INSPECTION REQUIREMENTS

The Vendor shall be responsible for maintaining quality and ensuring that required inspections are performed in the prescribed manner. The Owner shall have the right to inspect the material, the coating equipment and the surfaces to be coated before, during and on completion of each phase of the coating work. The Vendor shall provide safe access and reasonable facilities for the Owner to inspect material, equipment and work in progress. Work not meeting the material or quality requirements of this Specification, as determined by the Owner, shall be repaired or redone at the Vendor's expense.

5.1 REQUIRED MEASURING AND TEST EQUIPMENT

The Vendor shall provide all equipment and calibration devices required for coating quality inspection. All such equipment shall be calibrated and adjusted when used. The following equipment and calibration devices are required. Most of this equipment is available from KTA-Tator, Inc. (412-799-1300, Pittsburgh, PA).

- 5.1.1** SURFACE CLEANLINESS STANDARD: SSPC-Vis 1, "Visual Standard for Abrasive Blast Cleaned Steel."
- 5.1.2** SURFACE PROFILE: Testex Thickness Gauge, Testex Extra-Coarse Press-O-Film Tape and Clemtex or KTA Surface Profile Comparators
- 5.1.3** COATING THICKNESS: Magnetic type dry film thickness gauges for ferrous substrates such as Mikrotest, Positector 2000, Positector 6000, Elchometer 345, or other as approved by the Owner.
- 5.1.4** HOLIDAY INSPECTION: Tinker Razor Model APS

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- 5.1.5** HOLIDAY DETECTOR CALIBRATION: 80,000 ohms 1% and 90,000 ohms 1% resistors.
- 5.1.6** AIR TEMPERATURE, RELATIVE HUMIDITY AND DEW POINT: Any suitable sling psychrometer such as Taylor Model 1330 and suitable psychrometric tables such as KTA-Tator WB-235.
- 5.1.7** STEEL TEMPERATURE: Any suitable surface sensing thermometer such as Pacific Transducer Corporation (PTC) Model 312F for monitoring surface temperature during blasting and coating.

5.2 REQUIRED INSPECTIONS:

5.2.1 COATABILITY

All surfaces to be coated shall be inspected for coatability prior to blasting and coating. All defects shall be corrected before proceeding with the coating application.

5.2.2 TEMPERATURE AND DEW POINT

The surface temperature, ambient air temperature and dew point shall be checked and recorded at least every 3 hours during all blasting, coating, and drying procedures and must comply with the specifications at all times. Use the instruments specified in 6.1.

The metal temperature shall be monitored continuously during all application procedures and shall be recorded using an automatic temperature recording device.

5.2.3 COMPRESSED AIR SUPPLY

A daily blotter test shall be conducted to ensure the quality of the compressed air during all procedures requiring its uses.

5.2.4 SURFACE CLEANLINESS

All surfaces shall be inspected prior to blasting. Any oil, grease or other harmful contaminants shall be removed as per 2.1.1 prior to blasting. Any non-coatable metal defects shall be repaired as required in 2.5. The surface cleanliness shall be inspected after blasting and prior to the application of the coating using visual comparators. White Metal Cleanliness is required (refer to 2.4). The removal of all oil and grease shall be verified by inspection with a black light or other techniques suitable to owner.

5.2.5 SURFACE PROFILE

The surface profile of blasted surfaces shall be inspected prior to the application of the coating using Testex Extra-Coarse Press-O-Film. The profile depth shall be as specified in Section 2.4. The density of the blast peaks and valleys and the appearance of the blasted surface shall be comparable to that of the Clemtex or KTA Surface Profile Comparator.

5.2.6 DRY FILM THICKNESS GENERAL REQUIREMENTS

The dry film thickness of the coating shall be checked after the coat has set using a specified gauge that has been properly calibrated for the thickness range of the coating. Insure the DFT is applied per the job specification or product data sheet. The dry film thickness of all repaired areas shall also be checked and must be within the specified range.

5.2.7 COATING INTEGRITY

The coating shall be examined for blisters, runs, sags, dry spray and foreign material after the coating has dried. No coating containing blisters, runs, sags, dry spray or foreign material shall be accepted.

5.2.8 HOLIDAY INSPECTION GENERAL REQUIREMENTS

Holiday inspections shall be performed using a high voltage holiday tester in accordance with NACE SP0188. All coated surfaces shall be 100% holiday free. All repairs shall be inspected for holidays before acceptance.

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6. SAFETY AND WASTE DISPOSAL

6.1 SAFETY

It is the responsibility of the Contractor and any sub-contractors to know all of the regulatory and safety requirements to complete the work. It is also the full responsibility of the Contractor and any subcontractors to perform all work in a manner consistent with all applicable health and safety regulations. The Contractor and sub-tractors are responsible for assuring that all required protective equipment onsite, used and fully functional. The omission of any applicable safety regulation in this specification does not relieve the Contractor or any subcontractors of the responsibility of compliance. The Contractor must provide safe access to the surfaces to be cleaned, blasted, coated or inspected. All scaffolding, rigging, ladders, etc. must comply with local, state and federal regulations. The Contractor is responsible for controlling and maintaining a safe atmosphere in the vessel during all work operations.

6.2 WASTE DISPOSAL

It is the responsibility of the Contractor and any sub-contractors to know all of the regulatory requirements for handling and disposing of all materials, chemicals, etc. It is also the full responsibility (financially and physically) of the contractor and any sub-contractors to dispose of all waste materials. All unused mixed materials and all waste materials and spillage shall be immediately disposed of in a manner consistent with all applicable safety and waste disposal regulations. All cans that contained coating materials or thinners or that were used for mixing materials and all rags and other items contaminated with coating materials or thinners shall be disposed of in a manner consistent with all applicable safety and waste disposal regulations. The Contractor and sub-contractors are responsible for assuring that all permits and any other types of disposal documentation is fully complete and distributed as required by any regulations.

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