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1. Coating (Inner & Outer Wrap) Application

1.1 General. Coating application must be a continuous process, beginning with a properly prepared pipe surface. This process involves three consecutive steps: (1) applying liquid adhesive; (2) applying the inner-layer tape directly to the prepared pipe surface; and (3) applying the outer-layer tape directly over the inner-layer tape. Coating materials must be stored in a clean, dry area. During steps 2 and 3, one or more layers of inner-layer and outer-layer tape may be applied if specified by the purchaser.

2. Pipe Preparation

2.1 Metal Surface Condition. Bare pipe must be free of mud, mill scale, mill lacquer, wax, coal tar, asphalt, oil, grease, and any other foreign material. Before blast cleaning, surfaces must be inspected and, if necessary, pre-cleaned according to SSPC-SP 1 to remove oil, grease, and loosely adhering deposits. Visible oil and grease spots must be removed with a non-residue solvent. Preheating to remove oil, grease, and mill scale is permissible, provided all pipe is preheated uniformly to prevent distortion.

2.2 Blast Cleaning. After drying and removing all loose foreign material, the pipe surface must be blast cleaned using sand, grit, or shot to achieve a surface preparation at least equal to SSPC-SP6/NACE No. 3. The blast anchor pattern or profile depth must be 1 mil to 3 mil (25 µm to 75 µm), measured per ASTM D4417.

2.3 Surface Inspection. The cleaned exterior pipe surface must be inspected for proper surface preparation. Surface imperfections, such as slivers, scabs, burrs, weld spatter, and gouges, must be removed by hand filing or grinding, as needed, to prevent holidays (pinhole defects in the coating).

2.4 Protection from Moisture. Blast-cleaned pipe surfaces must be protected from high humidity, rainfall, and surface moisture. No pipe may flash rust before coating. To ensure a dry pipe surface when applying the liquid adhesive, the minimum steel substrate temperature must be 15°C and at least 3°C above the dew point.

3. Coating Application

3.1 Liquid Adhesive Application. The liquid adhesive must be applied as a uniform, thin film at the manufacturer's recommended coverage rate. It must be thoroughly and continuously mixed and agitated during application to prevent settling. The liquid adhesive may be applied to the entire exterior pipe surface by spray, rug, or other suitable methods. The liquid adhesive coat must be uniform and free of floods, runs, sags, drips, or bare spots. The liquid-adhesive-coated pipe surface must be free of foreign substances such as sand, grease, oil, grit, rust particles, or dirt. The liquid adhesive layer must be allowed to dry per the manufacturer's recommendations before applying the inner-layer tape.

3.2 Inner-Layer Tape Application. The inner-layer tape must be applied directly to the prepared pipe surface using mechanical, constant-tension coating equipment. The inner-layer tape must be applied at a minimum roll temperature of 21°C. It must be spirally applied with

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an overlap width (at least 12 mm) and application tension as recommended by the manufacturer. When applied to spirally welded pipe, the tape spiral direction should generally parallel the weld spiral. The minimum overlap must be no less than 12 mm (0.5 in.). When starting a new roll of tape, the ends must overlap at least 150 mm (6 in.) circumferentially. The overlap must be smooth and positioned to ensure inner-layer coating continuity. A hard-rubber roller, wider than the tape, may be required by the purchaser to ensure maximum tape-to-pipe contact. Consult the tape manufacturer for recommended temperatures above 21°C to improve inner-wrap conformability to the pipe surface.

3.3 Outer-Layer Tape Application. The outer-layer tape must be applied over the inner-layer tape using the same mechanical equipment used for the inner-layer tape. The outer-layer tape overlap must not coincide with the inner-layer tape overlap. The minimum tape overlap and minimum end lap of two rolls must be the same as in Section 3.2. The outer-layer tape must be applied at a minimum roll temperature of 21°C. Consult the tape manufacturer for recommended temperatures above 21°C to improve outer-wrap conformability to the pipe surface.

3.4 Cutbacks. Cutback dimensions depend on the pipe joint type and must be as specified by the manufacturer and approved by the purchaser. Cutbacks may be a straight edge for the total coating thickness or tapered, as specified by the purchaser.

3.5 Coating Repair (Plant and Field). All holidays (pinhole defects) detected visually or electrically at the coating plant or in the field must be repaired by peeling back and removing the outer and inner layers from the damaged area. The exposed area must then be coated with liquid adhesive, and either (1) a length of inner-layer tape wrapped around the pipe to cover the defective area, or (2) a patch of inner-layer tape applied directly to the defective area, as specified by the purchaser. The minimum lap at the damaged area must be 12 mm (0.5 in.) all around. The repaired area must be tested with a holiday detector after repair. If no holidays are found, the repaired area must be covered with the outer-layer tape with a minimum 12 mm (0.5 in.) lap beyond the inner-tape patch. Tape conforming to AWWA C209 may replace the inner-layer tape for repairs.

4. Joint Wrap Coating Application (Field and Shop)

4.1 Equipment. Blasting and coating equipment must be of a design, manufacture, and condition that ensures the described procedures can be followed to achieve the required results.

4.2 Metal Surface Condition. Bare pipe must be free of mud, mill scale and mill lacquer, wax, coal tar, asphalt, oil, grease, and any other foreign material. Before blast cleaning, surfaces must be inspected and, if necessary, pre-cleaned per SSPC-SP 1 to remove oil, grease, and loosely adhering deposits. Visible oil and grease spots must be removed with a non-residue solvent. Preheating to remove oil, grease, and mill scale is permissible, provided all pipes are preheated uniformly to prevent distortion.

4.3 Blast Cleaning. Metal surfaces must be blast cleaned to achieve a surface preparation at least equivalent to SSPC-SP10/NACE No. 2/Sa2-1/2, unless otherwise specified by the

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purchaser. Surfaces blast cleaned in a mill or shop and shipped to a field location must be cleaned by wire brushing or other approved means immediately before applying the liquid adhesive and tape. If oil or grease is present, a solvent wash conforming to SSPC-SP-1 must be used before wire brushing.

4.4 Protection from Moisture. Blast-cleaned surfaces must be protected from high humidity, rainfall, and surface moisture and must not be allowed to flash rust before applying the liquid adhesive.