



Application Specification for Steel Pipe – *DuraShield 210 & DuraShield 210-61* *Polyurethane Coatings*

I. Scope

- A. This specification defines application requirements of *DuraShield 210 & DuraShield 210-61* plural-component 100% solids, 2:1 volumetric mix ratio polyurethane to steel substrates and over-coat areas.
- B. The coating material described in this specification can be applied in either a shop or field environment.
- C. The parts to be considered by this specification are as follows:
 - 1. Piping
 - 2. Piping components – elbows and tees
 - 3. Girth welds/field joints
 - 4. Valves
 - 5. Repair areas
 - 6. Other parts as directed by the end user.

II. Definitions

- A. PART - all service steel that is to be coated under the direction of this specification.
- B. APPLICATOR – the company selected by the END USER to apply plural-component coatings to the internal and external surfaces of PARTS.
- C. MANUFACTURER – the Company responsible for the chemical formulation and characteristics of the plural-component coatings applied to PARTS. (LifeLast Inc. is the Manufacturer that is composed within these specifications)
- D. INSPECTOR – The company or person selected by the END USER to ensure quality control of the work and adherence to this specification, where applicable.
- E. END USER – Pipeline or part owner
- F. RESIN – the two-part component of the urethane system to be referred to as part A.
- G. ACTIVATOR – the one-part component of the urethane system to be referred to as part B

III. Additional Requirements

- A. All specifications and standards mentioned in this document form part of this specification. The applicator shall ensure that a copy of this specification is kept at the coating site and shall ensure that their workers fully understand each specification and standard listed below.
- B. The following standards shall be a part of this specification.

Society of Protective Coatings (SSPC)

SSPC-SP10/ NACE No. 2 SSPC-SP11	Near-White Metal Blast Cleaning Power Tool Cleaning to Bare Metal
SSPC-VIS-1-89	Pictorial Surface Preparation Standard

NACE International

RP-0287-87	NACE Standard Recommended Practice for Field Measurement of Abrasive Blast Cleaned Surfaces Using Replica Tape
RP-0274-04	NACE Standard High-Voltage Electrical Inspection of Pipeline Coatings

IV. Surface Preparation

- A. Prior to commencement of work, all parts shall be visually inspected.
- B. Rough welds and other sharp projections shall be ground smooth by the end user or as designated by the inspector.
- C. All large surfaces to be coated will be prepared by abrasive blast cleaning. Smaller surfaces (less than 50 ft²) may be prepared by power tool cleaning using a hand-held angle grinder. All blast media will be clean and clear of any contaminants, have a maximum of one percent (1%) free silica, and will meet the specification of the coating manufacture. A 24-grit 3M grinding disk (recommended for coating), a metal grinding disk (required for steel) or equivalent should be used with the angle grinder.
- D. Prior to abrasive blast or power-tool cleaning the substrate, all contaminants such as dirt, dust, salt, oil and/or grease must be removed in accordance with SSPC-SP1.
- E. Prior to abrasive blasting or grinding, the metal surface shall be dry and warmed to a temperature at least 3°C (5°F) above the dew point to prevent oxidation of the part after cleaning. The applicator shall use a contact thermometer, psychrometer, and psychrometric charts, or equipment that provides equivalent accuracy, to monitor these environmental requirements.

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- F. All parts that are not to be abraded shall be adequately protected.
- G. All compressors shall be in good working order and have adequate separators, filters, and drains to ensure contaminants such as oil and water are not deposited onto the steel surface. Accumulation of oil and moisture shall be removed by regular purging.
- H. For bare steel application an anchor pattern profile will be produced averaging 0.075 mm (3.0 mils) – 0.10 mm (4.0 mils). Individual measurements shall not be less than 0.065 mm (2.5 mils). Profile measurements shall be taken with replica tape and spring micrometer in accordance with NACE RP0287-87.
- I. For larger parts and/or structures (> 50 ft²), the substrate shall be abrasive blasted in accordance with the NACE No. 2/SSPC-SP10 specification to achieve an anchor pattern that is both sharp and angular. Smaller surface areas (< 50 ft²) may be power tool abraded using an angle grinder with either a metal grinding disk (for steel) or 24-grit 3M grinding disk (for coating and/or steel) or equivalent in accordance with SSPC-SP11 specification. Grinding should be done in such a way to achieve the roughest surface possible, and the direction of the final grind marks should run perpendicular to the flow of water in the pipe. The applicator shall ensure the proper surface finish is attained by regular checks with the SSPC-VIS-1-89 Standard. Profile depth shall be checked using replica tape and a spring micrometer (NACE RP0287-87). *Note: profile, particularly with power-tool preparation, should be deep enough such that it is very noticeable when scraping the end of a fingernail across the profile grooves.*
- J. When over-coating existing coating material the applicator will verify adhesion compatibility with the coating manufacturer before proceeding. Once compatibility is determined, the existing coating shall be swept, blasted or abraded with a grinder to remove the gloss and provide a roughened surface suitable for over-coating. This process should remove approximately 1-3 mils of coating.
- K. Existing coating shall be feathered 4 cm (1.5 in.) to 8 cm (3 in.) when coating adjacent bare steel, such as girth welds. Prior to coating, the applicator will tape off, using duct tape, a line between feathered coating and the remaining non-blasted coating prior to application of new coating material, making sure that edge of tape is on the roughened coating.
- L. Profile measurements will be taken, at a minimum, at the start of each shift, after a shut down to refill blasting pot, and after every hour of continuous blasting.
- M. Cleaned surfaces shall either be dry air blasted or brushed off, and vacuumed, in a manner to remove dust and debris prior to coating, and shall be coated before any rust blooming occurs. Any cleaned steel showing rust stains shall be re-prepared prior to coating.

V. Coating Application

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- A. The coating shall be applied according to the proceeding guidelines.
- B. Thinning is not allowed.
- C. The coating thickness shall be specified by the end user or the inspector. The minimum thickness for DuraShield 210 & DuraShield-61 is 20 mils. The applicator shall measure and record coating thickness using a thickness gauge that is acceptable to the end user/inspector.
- D. The steel surface shall be at least 3°C (5°F) higher than the dew point temperature and within the Surface Temperature requirements as listed on the DuraShield 210 and DuraShield 210-61 technical data sheet. The relative humidity and steel surface temperature shall not be higher than the recommended maximum according to the technical data sheet (see technical data sheet for DuraShield 210 and DuraShield 210-61). Ensure that the resin (Part A) and activator (Part B) components are within the recommended product Application Temperatures for the chosen application method as listed on the respective technical data sheet. The applicator shall use a contact thermometer, a psychrometer and psychrometric charts, or equipment that provides equivalent accuracy, to monitor these environmental requirements.
- E. A list of approved application equipment can be found in Appendix 1.
- F. Application shall be done in a professional manner, mitigating runs and sags and providing complete coverage on all surfaces, including difficult to spray areas like welds, seams and angles. Application shall be accomplished in a manner that achieves as smooth and uniform of a coat as possible.
- G. If recoating is required, it must be accomplished prior to the maximum recoat window as listed on the technical data sheet for the respective product. If the maximum recoat window is exceeded, then follow the instructions in Section 4.10 above.
- H. For Potable Water applications use only DuraShield 210-61 and allow a minimum of 72 hours of cure before placing system into service. For Non-potable Water applications use DuraShield 210; system may be placed back into service 24 hours after completion of coating application.

VI. Inspection and Testing

A. Visual

1. Coating shall be uniform in color. The coating shall be visually inspected and found to be free of blisters, cracks, pinholes, missed areas and excessive roughness.
2. Sags and runs shall be kept to a minimum. Excessive runs can be sanded smooth and overcoated with a layer of DuraShield 210 or DuraShield 310.

B. Coating Thickness

1. During continuous spray operations, the dry film coating thickness shall be tested using a properly calibrated magnetic pull off or eddy current equipment after completion of each pipe. If the thickness of the coating is below the minimum specified millage anywhere along the length of the pipe, then adjustments must be made to the spray system to account for this.
2. In hand application projects, the coating thickness shall be measured using a wet film thickness gage. At a minimum, the thickness shall be measured for every 50 ft² of sprayed area.

C. Holiday Testing

1. Holiday testing will be conducted on the completed coating after cure or 24 hours, whichever is less, using a high voltage spark test in accordance with NACE Standard RP-0274.
2. Coating shall be at 75% or greater of its fully cured hardness value prior to holiday testing.
3. Coating thickness used for holiday detection shall be the minimum specified coating thickness.
4. All holidays shall be plainly marked immediately after detection and shall be repaired according to Section 7 in this specification.
5. Holiday testing will be performed in such a way as to mitigate possible damage to the coating by performing as few of passes as required over the coating.

VII. Coating & Joint Repairs

- A. Coating and joint repairs may be made with DuraShield 210, DuraShield 310 or the DuraShield 310 JARS (Joint & Repair System) kit. All three systems are available in NSF certified versions.
- B. Please follow the Application Specifications for the particular product chosen for the repairs.

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Appendix 1: Approved Spray Application Equipment for DuraShield 210, DuraShield 210-61 and DuraShield 310 Polyurethanes

I. DuraShield 210/DuraShield 210-61

- A. Hydraulic Spray Machine – 2:1 (Resin:Activator) volumetric ratio
1. Graco/Gusmer H-35 or HXP3 Spray Machine or comparable
 - a) Setup #1: Resin #80 cylinder; Activator #40 cylinder
 - b) Setup #2: Resin #120 cylinder; Activator #60 cylinder
 2. Transfer Pumps
 - a) Resin: 5:1 Graco Monark or larger
 - b) Activator: 2:1 Graco FastFlo, 5:1 Graco Monark or larger
 3. Mixers/Spray Guns
 - a) Graco Restrictor Manifold (Restrictors – Resin 0.032", Activator 0.024") or similar; two 8" long by ¼" diameter spiral tube mixers or one 5" Simpson static mixer; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: ¼" high-pressure spray line no more than 15' in length.
 - Spray tips: 0.021" minimum.
 - b) Remote manifold with ⅜" x ¼" heated lines; two 8" long by ¼" diameter spiral tube mixers or one 5" Simpson static mixer; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: ¼" high-pressure spray line no more than 15' in length.
 - Spray tips: 0.021" minimum.
 - c) Impingement-mix setup using Graco Fusion Air or Mechanical Purge Gun with 2:1 module (i.e. AR2232 or AR2942 for Air Purge and XF2332 for Mechanical Purge). Fusion Air Purge Gun must have an extension adapter for a contractor flat tip. Acceptable tips for each module size are as follows:
 - AR2232: 0.035" to 0.040"
 - AR2942: 0.046" to 0.052"
 - XF2332: 0.038"
 4. Application Temperatures
 - a) Static Mix Setup
 - (1) Resin: 110°F to 160 °F
 - (2) Activator: 90°F to 160 °F
 - (3) Line Temperature: 110°F to 160 °F
 - b) Impingement-Mix Setup
 - (1) Resin: 130°F to 160 °F
 - (2) Activator: 130°F to 160 °F
 - (3) Line Temperature: 130°F to 160 °F
 5. Spray pressures: 2000 psi minimum at the gun.
- B. Pneumatic Spray Machine
1. Graco HydraCat with King Airhead – 2:1 ratio (Resin:Activator) or comparable
 2. Transfer Pumps
 - a) Resin: 5:1 Graco Monark or larger
 - b) Activator: 2:1 Graco FastFlo, 5:1 Graco Monark or larger

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3. Mixers/Spray Guns
 - a) Graco Restrictor Manifold (Restrictors – Resin 0.032", Activator 0.024") or similar; two 8" long by 1/4" diameter spiral tube mixers or one 5" Simpson static mixer; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: 1/4" high-pressure spray line no more than 15' in length.
 - Spray tips: 0.021" minimum.
 - b) Remote manifold with 3/8" x 1/4" heated lines; two 8" long by 1/4" diameter spiral tube mixers or one 5" Simpson static mixer; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: 1/4" high-pressure spray line no more than 15' in length.
 - Spray tips: 0.021" minimum.
 - c) Impingement-mix – NOT ACCEPTABLE
4. Application Temperatures
 - a) Static Mix Setup
 - (1) Resin: 110°F to 160 °F
 - (2) Activator: 90°F to 160 °F
 - (3) Line Temperature: 110°F to 160 °F
 - b) Impingement-Mix Setup – NOT APPLICABLE
5. Spray pressures: 2000 psi minimum at the gun.

II. DuraShield 310

- A. Hydraulic Spray Machine – 3:1 (Resin:Activator) volumetric ratio
 1. Graco/Gusmer H-35 or HXP3 Hydraulic Spray Machine with #120 (Resin) and #40 (Activator) cylinder setup or comparable.
 2. Transfer Pumps
 - a) Resin: 5:1 Graco Monark or larger
 - b) Activator: 2:1 Graco FastFlo, 5:1 Graco Monark or larger
 3. Mixers/Spray Guns
 - a) Graco Restrictor Manifold (Restrictors – Resin 0.040", Activator 0.024") or similar; two 8" long by 1/4" diameter spiral tube mixers; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: 1/4" high-pressure spray line no more than 75' in length.
 - Spray tips: 0.021" minimum.
 - b) Remote manifold with 3/8" x 1/4" heated lines; two 8" long by 1/4" diameter spiral tube mixers; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: 1/4" high-pressure spray line no more than 75' in length.
 - Spray tips: 0.021" minimum.
 - c) Impingement-mix – NOT ACCEPTABLE
 4. Application Temperatures
 - a) Static Mix Setup
 - (1) Resin: 120°F to 160°F
 - (2) Activator: 80°F to 160°F
 - (3) Line Temperature: 120°F to 160°F

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- b) Impingement-Mix Setup – NOT APPLICABLE
- 5. Spray pressures: 2000 psi minimum at the gun.
- B. Pneumatic Spray Machine
 - 1. Graco HydraCat with King Airhead – 3:1 ratio (Resin:Activator) or comparable
 - 2. Transfer Pumps
 - a) Resin: 5:1 Graco Monark or larger
 - b) Activator: 2:1 Graco FastFlo, 5:1 Graco Monark or larger
 - 3. Mixers/Spray Guns
 - a) Graco Restrictor Manifold (Restrictors – Resin 0.040”, Activator 0.024”) or similar; two 8” long by ¼” diameter spiral tube mixers; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: ¼” high-pressure spray line no more than 75’ in length.
 - Spray tips: 0.021” minimum.
 - b) Remote manifold with ¾” x ¼” heated lines; two 8” long by ¼” diameter spiral tube mixers; Graco Flex Gun or comparable. Acceptable tips and whip lines are as follows:
 - Whip lines: ¼” high-pressure spray line no more than 75’ in length.
 - Spray tips: 0.021” minimum.
 - c) Impingement-mix – NOT ACCEPTABLE
 - 4. Application Temperatures
 - a) Static Mix Setup
 - (1) Resin: 120°F to 160°F
 - (2) Activator: 80°F to 160°F
 - (3) Line Temperature: 120°F to 160°F
 - b) Impingement-Mix Setup – NOT APPLICABLE
 - 5. Spray pressures: 2000 psi minimum at the gun.