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SPECIALTY POLYMER COATINGS, INC. (SPC)

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION

STEEL SUBSTRATE

I. GENERAL

- 1.1 SP-3888[®] Spray Grade is a 100% solids, epoxy manufactured and marketed by **Specialty Polymer Coatings, Inc.** (“SPC”), #101 - 20529 - 62nd Avenue, Langley, B.C., Canada, V3A 8R4, Telephone: (604) 514-9711, Fax: (604) 514-9722, and applied by approved applicators.
- 1.2 This specification covers only the spray application of the material. For brush or roller application, refer to SP-3888[®] Brush Grade Application Specification. Only application to steel surfaces is intended.
- 1.3 Mixing Ratio: 3 Parts Base to 1 Part Hardener (pre-measured) by volume.

II. SURFACE PREPARATION

- 2.1 All surfaces to be coated shall be abrasive blasted to SSPC SP-10 (Near White) cleanliness or equivalent. The resulting surface roughness profile shall be a minimum of 62.5 microns (2.5 mils) and a maximum of 127 microns (5.0 mils) peak to valley.
- 2.2 The underside and narrow edges of all angles, weld beads, pits and structural members must be blasted to the same surface condition as specified in Section 2.1. All surfaces must be cleaned of all blasting products, leaving no trapped particles or traces when blasting is completed.
- 2.3 All surfaces to be coated must be completely dry, free of moisture, soil, dust and abrasive material at the time the coating is applied. All weld spatters must be removed from the surface and rough welds must be ground smooth prior to coating.
- 2.4 Only that area that can be coated in a particular day shall be blast-cleaned and should extend for at least 50 mm (2”) past the end. Any area that is allowed to sit overnight must be returned to its original blast-cleaned condition. This requirement also applies to any blast-cleaned surface that has flash rusted as a result of exposure to rain or moisture.

SP-3888® SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

II. SURFACE PREPARATION (cont.)

- 2.5 If the coating operation is to continue to the following day, the edges of the area coated with SP-3888® Spray Grade are to be feathered down to the steel substrate after the coating has cured and before resumption of coating.
- 2.6 All blasting onto existing SP-3888® Spray Grade must be directed from the coated surface to the adjacent substrate rather than from the substrate onto the coating. The blasting should be initiated 300 mm (12") onto the coating.
- 2.7 Grit blasting must be directed from the parent coating to the adjacent substrate rather than from the substrate onto the coating when coating girth welds where the parent coating is Fusion Bond Epoxy (FBE) or Polyethylene (P/E). The blasting should be initiated 50 mm (2") onto the parent coating. In the case of P/E, ensure the surface is well roughened and not just sweep-blasted.
- 2.8 Prior to coating, all areas, including the floor, scaffolding, walkways and decks within 15 m (50') of the coating site, shall be swept or cleaned of abrasive products to prevent wind blown contamination of the coating surface.
- 2.9 Wetting of the ground in the vicinity of the coating operation may be necessary on new construction sites with bare ground and where high winds may occur.

III. APPLICATION

- 3.1 SP-3888® Spray Grade must be applied to clean, dry surfaces only. Condensation, precipitation, water vapour or any other forms of contamination will be **NOT** be acceptable on the blasted surface prior to coating. Surfaces subject to any of these conditions shall be cleaned with fresh water if necessary and re-blasted to return the surface to SSPC SP-10 cleanliness as per Section II.
- 3.2 The acceptable substrate temperature range for application of SP-3888® Spray Grade is 10°C (50°F) to 100°C (212°F). The substrate temperature must be a minimum of 3°C (5°F) above the dew point temperature before proceeding with the coating operation.
- 3.3 Coating application can be performed in cold temperature conditions if the substrate is preheated. For some applications, post-heating may be required to achieve an adequate cure depending upon ambient temperature, pipe wall thickness, and other variables. The coating must not be allowed to freeze before an adequate cure is reached. Preheating and post-heating may also be utilized if an accelerated cure time is required.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

III. APPLICATION (cont.)

- 3.4 Preheating may be accomplished by either flame heating the surface with a propane torch prior to blasting or by the use of an induction coil or catalytic infrared heater subsequent to blasting and prior to coating. In the case of some vessels, internal heating is required before the coating operation. Post-heating can only be done using an induction coil or catalytic infrared heater.
- 3.5 The appropriate preheat temperature and cure time can be determined from the attached SP-3888[®] Spray and Brush Grade Curing Table. The maximum preheat temperature shall not exceed 100°C (212°F).
- 3.6 SP-3888[®] Spray Grade shall be applied to the specified Dry Film Thickness (DFT) in a single application using Graco Hydra-Cat high pressure airless spray equipment or approved equal. Wet Film Thickness (WFT) measurements should be continuously taken to ensure the minimum film thickness specified. In general, a WFT of 0.50 mm (20.0 mils) can be applied in a single application. If additional coats are required, they shall be applied while the preceding coat is still tacky. The maximum over-coating interval **shall not** exceed two (2) hours at 25°C (77°F) without roughening the surface.
- 3.7 SP-3888[®] Spray Grade can be over-coated without the need for an additional tie coat. Should the over-coating interval exceed two (2) hours, the surface should be blast roughened prior to application of the topcoat.
- 3.8 Scaffolding and items such as hoses, cable braces, etc. shall be a minimum of 457 mm (18") from the surface to be coated or placed so as not to interfere with the space normally required for a spray gun operation.
- 3.9 A minimum of four (4) hours curing above 20°C (68°F) is required prior to handling. Handling time may be longer at lower temperatures.

IV. APPEARANCE OF FINISHED COATING

- 4.1 The finished coating shall be generally smooth and free of protuberances or holidays. All surfaces shall have the required minimum DFT. In general, the surface of the coating shall be no rougher than the base or substrate material. No drips, running, sagging or other discontinuities are acceptable.
- 4.2 The applicator shall exercise every reasonable precaution to assure proper application of the coating and satisfactory protection of the steel surface.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

V. INSPECTION

- 5.1 The owner's appointed representative must inspect the quality of all blasted surfaces, including cleaning of abrasive from these surfaces prior to the application of SP-3888[®] Spray Grade. Acceptance to be given by said representative to the owner and contractor's representative.
- 5.2 WFT measurements should be continuously taken to ensure the minimum film thickness specified. WFT measurements should be taken using SPC approved WFT gauges.
- 5.3 After the SP-3888[®] Spray Grade has cured to a tack-free condition, the owner's representative and / or contractor's inspector should measure the DFT with an SPC approved, calibrated, magnetic gauge and / or electronic DFT gauge. The appointed inspector shall notify the applicator of their acceptance. Notification to the applicator of all inadequately coated sections must be made immediately.
- 5.4 Spark testing of the finished coating film may be performed to ensure adequate corrosion protection. The maximum voltage used for this testing shall not exceed 100 volts per mil (25 microns). Reference is to be made to NACE RP0274-93.
- 5.5 Immediately upon completion of the work, the coating application shall be subject to final inspection by SPC and / or the owner's representative. Notification of all defects must be made within a reasonable time frame from completion of the work to allow for all repairs within the allowed time frame for the project.
- 5.6 For each spray application a minimum of one plate sample coated to the specified DFT and one free film sample sprayed to a minimum DFT of 4.0 mm (100 mils) shall be taken. The plate size should be approximately 100 mm x 150 mm x 9.5 mm (4.0" x 6.0" x 0.375"). The plate must be cleaned in accordance with Section II. Both samples should be cured for a minimum of four (4) days at 20°C (68°F) prior to testing.
- 1) **Adhesion Test:** Apply three (3) tensile adhesion dollies to the plate sample with epoxy adhesive and cure for 24 hours at 20°C (68°F). Pull the dollies at a controlled rate with an elcometer adhesion tester or equal [approximately 25 mm (1.0 inches) per minute]. The minimum average adhesion should be 2000 PSI.
 - 2) **Hardness Test:** Test the Shore D Hardness of the free film sample. Hardness should be Shore D 80-85.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

V. INSPECTION (cont.)

5.7 **Fast Cure Test:** In the case of pipeline valves, header assemblies, hot bends and other fabricated sections requiring immediate shipment to the field from the coating mill; the following procedure should be used to properly determine the quality:

- Force cure both plate and free film samples at 100°C (212°F) for one (1) hour.
- Cool samples to 20°C (68°F).
- Test the Shore D Hardness of the free film sample. Hardness should be Shore D 80-85.
- Apply thumb to the surface of the free film sample. No thumbprint should be left in the coating.
- Conduct a "cross hatch" adhesion test on the plate sample as follows:
 - i) Using a sharp pointed knife, make two 13 mm long scribes through to the metal surface to form a V with an angle of approximately 30° at the intersection point.
 - ii) Starting at the point of intersection, force the coating from the steel substrate using a sharp pointed knife. Care should be taken to protect the eyes and hands when carrying out this operation.
 - iii) **Rating:** Shear adhesion shall be rated from 1 - 4 as follows:
 1. The coating cannot be removed cleanly from the surface and exhibits substantial resistance to cohesive failure.
 2. The extent of adhesive failure between the coating and the substrate shall not exceed 4 mm from the center point of the cross. The coating exhibits substantial resistance to cohesive failure.
 3. The extent of adhesive failure between the coating and the substrate exceeds 4 mm from the center point of the cross and / or the coating exhibits poor cohesive strength and can easily be delaminated.
 4. The coating exhibits little or no adhesion and peels off in large pieces.

Note: A minimum rating of 2 is required to pass the shear adhesion test.

VI. REPAIRS

6.1 Repair of pinholes and holidays 300 mm (12") or less in diameter may be accomplished by using SP-3888[®] Cartridges. Refer to SPC's Application Specification for Use of SP-3888[®] Cartridge for Coating Repairs. The procedure is as follows:

- Repair areas should be roughened using carborundum cloth, sandpaper, file, or surface grinder.
- The adjacent coating should be abraded for a minimum distance of 25 mm (1") to ensure inter-coat adhesion.
- If necessary on larger repairs, feather the edges of the adjacent coating.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

VI. REPAIRS (cont.)

- Wipe with a clean cloth to remove dust. A dust respirator should be worn for all sanding or grinding activities.
- All surfaces to be coated shall be clean and completely dry prior to the application of the coating.
- The minimum surface temperature for coating is 10°C (50°F). The substrate temperature must be a minimum of 3°C (5°F) above the dew point temperature.
- The area to be coated should be preheated in cold temperature conditions. The appropriate preheat temperature and cure time can be determined from the attached SP-3888[®] Spray and Brush Grade Curing Table. The maximum preheat temperature shall not exceed 100°C (212°F). For some applications, post-heating may be required to achieve an adequate cure depending upon ambient temperature, pipe wall thickness, and other variables. The coating must not be allowed to freeze before an adequate cure is reached. Preheating and post-heating may also be utilized if an accelerated cure time is required.
- Preheating may be accomplished by either flame heating the surface with a propane torch prior to blasting or by the use of an induction coil or catalytic infrared heater subsequent to blasting and prior to coating. Post-heating can only be done using an induction coil or catalytic infrared heater.
- Eject the required amount of material from the cartridge onto a clean tray using the manual dispenser.
- Hand-mix the product with a stir stick until the coating colour becomes uniform with no streaks.
- Apply the coating to the required thickness on the area to be repaired using a spatula or paint-brush.
- Extend the coating to at least 25 mm (1”) over the surrounding pre-roughened coating.

6.2 Areas larger than 300 mm (12”) in diameter shall be repaired using SP-3888[®] Brush Grade kits. Refer to SPC’s SP-3888[®] Brush Grade Application Specification. The procedure is as follows:

- Areas requiring repair shall be prepared with a surface grinder or by abrasive blasting. All edges of the surrounding area shall be feathered. A dust respirator should be worn for all grinding activities.
- The surface to be coated shall be completely clean and dry prior to applying the coating.
- The minimum surface temperature for coating is 10°C (50°F). The substrate temperature must be a minimum of 3°C (5°F) above the dew point temperature.
- The area to be coated should be preheated in cold temperature conditions. The appropriate preheat temperature and cure time can be determined from the attached SP-3888[®] Spray and Brush Grade Curing Table. The maximum preheat temperature shall not exceed 100°C (212°F). For some applications, post-heating may be required to achieve an adequate cure depending upon ambient temperature, pipe wall thickness, and other variables. The coating must not be allowed to freeze before an adequate cure is reached. Preheating and post-heating may also be utilized if an accelerated cure time is required.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

VI. REPAIRS (cont.)

- Preheating may be accomplished by either flame heating the surface with a propane torch prior to blasting or by the use of an induction coil or catalytic infrared heater subsequent to blasting and prior to coating. Post-heating can only be done using an induction coil or catalytic infrared heater.
- Coat the repair area in accordance with Section VI of the SP-3888[®] Brush Grade Application Specification.

6.3 Uncured areas requiring re-coating shall first have all uncured material removed and shall have the surface re-cleaned in accordance with Section II taking care to feather the edges of the surrounding coating. Re-application of the coating shall be in accordance with Sections III, IV and V.

VII. SAFETY PRECAUTIONS

- 7.1 The contractor will provide safe and secure scaffolding for ready access to work areas.
- 7.2 Other contract services will be halted as necessary so as not to interfere with the work flow of the SP-3888[®] Spray Grade application.
- 7.3 SP-3888[®] Spray Grade is **HARMFUL IF ABSORBED THROUGH SKIN, INHALED OR SWALLOWED**. It is a skin and eye irritant. Personal protective equipment is required. Refer to the **Material Safety Data Sheets**.
- 7.3.1 Chemical resistant gloves with a long cuff that will overlap the clothing sleeves should be worn when handling this product. The glove / clothing overlaps should be sealed by tape. Check with the glove manufacturer to determine the proper glove type.
- 7.3.2 Wear an appropriate, properly fitted vapour respirator (NIOSH / OSHA approved) during application where vapour / mist are likely to be encountered, e.g. confined spaces and during winter construction or when the substrate is preheated. For outdoor application and areas with adequate ventilation, the use of a respirator is normally not required. Follow the respirator manufacturer's recommendations. A dust respirator should be worn for any activity such as sanding or grinding of cured coating.
- 7.3.3 Wear splash proof chemical safety goggles and / or face shield.
- 7.3.4 Wear impervious boots.

SP-3888[®] SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

VII. **SAFETY PRECAUTIONS** (cont.)

- 7.3.5 Long-sleeved clothing is to be worn over regular clothing to cover all exposed areas of arms, legs or torso during mixing and application of the coating. Breathable clothing, such as cotton or disposable coveralls, is recommended.
- 7.3.6 Emergency eyewash and a shower should be in close proximity, where possible. A barrier cream may be used, in conjunction with the stated protective measures, as an additional safeguard against skin contact.
- 7.4 Keep the containers closed when not in use. In case of spillage, absorb with inert material and dispose of in accordance with Federal, Provincial, and Municipal regulations in Canada and Federal, State, and County regulations in the United States of America.
- 7.5 No open flames, smoking or welding will be allowed in the immediate vicinity during the coating application.
- 7.6 All personnel on the application crew shall be informed of regulations regarding smoking, auto traffic restrictions, the meaning of warning bells, horns and whistles, fire warnings and restricted areas. Members of the coating crew shall maintain good personal hygiene, wash thoroughly after exposure to the coating application, particularly before eating or going on breaks.

VIII. **EQUIPMENT**

- 8.1 Graco Hydra-Cat high pressure spray equipment or approved equal must be used to apply SP-3888[®] Spray Grade coating systems in accordance with SPC's recommendations and specifications.

IX. **MATERIALS**

- 9.1 SP-3888[®] Spray Grade containers must be sealed prior to use. Product exposed to the atmosphere must be protected with a blanket of nitrogen gas.
- 9.2 **NO** amount of SP-3888[®] Spray Grade shall be given, sold or exchanged without express written permission from SPC.
- 9.3 The acceptable shipping and storage temperature range for SP-3888[®] Spray Grade is between 5°C (41°F) to 40°C (104°F).
- 9.4 Store SP-3888[®] Spray Grade in a cool, dry, well-ventilated area. Keep the lids sealed. The Shelf Life is a maximum of 24 months in unopened containers.

SP-3888® SPRAY GRADE APPLICATION SPECIFICATION / STEEL SUBSTRATE

X. SUBSTRATE TYPES

- 10.1 This specification is applicable to standard steels.
- 10.2 Exotic metals, stainless steel or other special types of steel or alloys may require different consideration as to surface preparation and SPC formulations. Notification of the use of such metals must be made to SPC.

XI. INSURANCE

- 11.1 The contractor will provide all necessary insurance to protect itself and its employees during the application of SP-3888® Spray Grade.
- 11.2 SPC will provide all necessary coverage to protect SPC employees on site.

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