

RS-RRXL - Application Guidelines

1 Surface Preparation

1.1. In common with most protective coatings schemes, the performance level of RS-RRXL is ultimately determined by degree of surface preparation. The higher the degree of surface preparation achieved, the greater the long-term performance. For optimum performance, all surfaces to be coated should be clean, dry and free from contamination including dirt, salts, oil and grease.

Steel - Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:2000. Where necessary, remove weld spatter and smooth weld seams and sharp edges (see Appendix 1). In cases where the substrate is corroded or pitted, it may be necessary to fresh water wash the areas after abrasive blasting, then re-blast, in order to ensure complete removal of soluble corrosion products.

1.2. The allowable total soluble salt contamination on the steel before application of the RS-RRXL is as follows:

Chlorides	Less than 3µg/cm ²
Sulphates	Less than or equal to 5µg/cm ²
Nitrates	Less than or equal to 5µg/cm ²

1.3. The total of all 3 soluble salt types must not exceed 10µg/cm²

1.4. See section 3 for more details regarding measurement.

1.5. All steel surfaces to be coated should be correctly prepared prior to application of the coating system.

1.6. Abrasive grit blast the steel to be coated to a minimum of ISO Standard 8501-1 (2007) Sa2½ or NACE 2/SSPC SP10. A sharp and angular surface profile of between 75 and 125 microns (3-5mils) is required. In certain aggressive service conditions, it may be required to blast to Sa3 or NACE 1/SSPC SP5.

Concrete - New concrete shall be properly cured prior to the application of RS-RRXL. Laitance and efflorescence shall be removed. Moisture content must also be checked to make sure it is below 7% prior to coating application. The tensile strength of the concrete should be minimum 2MPa (300psi).

1.7. The presence of oil, grease and release agents in concrete may cause loss of coating adhesion. Although the surface may appear free of any oil, solvents in the coating material can draw the oil from within the concrete to the coating/concrete interface. Surface preparation of concrete should be done in accordance to NACE 6 / SSPC-SP13. All chemical contamination must be removed prior to the application of RS-RRXL coating systems. Contamination includes efflorescence, laitance, oils, chemicals, acids, salts, alkalis, curing compounds, form release agents, and microorganisms.

1.8. All existing coatings and sealers must be removed to insure proper bond between the concrete substrate and lining. Concrete structures that have mechanical or chemical damage, or rebar corrosion must be restored to provide a uniform substrate for the coating.

1.9. The presence of severe hydrostatic forces may disbond the coating. The concrete substrate should have a vapor barrier on the soil side to prevent hydrostatic forces. Consult a qualified engineer to determine if these forces are present. If so, it is recommended a test patch be applied to test the bond strength and evaluated over a reasonable period of time.

- 1.10. A good blast profile is required to ensure the adhesion of coatings. Depending on condition of the concrete, a combination of chemical cleaning and/or abrasive blasting may be required. Previously applied coating will require abrasive blasting for removal.
- 1.11. Dry blasting is recommended. Blasting will remove loose and powdery concrete and surface laitance. The resulting surface must be hard, with surface voids open and with a profile that is satisfactory for coating adhesion.
- 1.12. The blast nozzle must be kept at a distance that will provide good results without gouging the concrete. The resulting surface should be at least as rough as 50-100 grit sandpaper or refer to ICRI profile standards. All dust and debris must be removed after abrasive blasting.
- 1.13. Dry, oil-free air must be used for the blasting operation. Use ASTM Method D4285 for determination of oil and water in compressed air sources.
- 1.14. Final cleaning methods must ensure that the surface is free of any cleaning agents or other surface contaminants. This may be accomplished by a compressed air blow down, vacuuming, dry wipe down or other appropriate final cleaning methods. The surface must be allowed to dry adequately for compatibility with the coating material.
- 1.15. Impact tools (scabblers and scarifiers), vacuum grit blasting, and power grinding may also be used for roughening concrete, opening holes and voids, and to remove loose matter from the surface of poured concrete and precast slabs. These methods may be used instead of blasting but are slower.
- 1.16. When working outside or in direct sunlight, concrete 'gassing' or 'breathing' can occur, when the surface temperature rises due to exposure to sunlight or increasing ambient temperatures. This can cause bubbles or holes in the applied coating. When this problem occurs, it is necessary to shade the surface from the sun and/or apply the material in the evening or at night, so that initial cure can take place in cooler temperatures, without air escaping from the concrete.

Typical Specification

<u>Coat</u>	<u>Product</u>	<u>Dft (microns)</u>			<u>Dft (mils)</u>		
		Spec	Min	Max	Spec	Min	Max
Stripe	RS-RRXL	175	125	250	7	5	10
Full	Spray version	1125	(1000)	(2000)	45	(40)	(80)

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		Spec	Min	Max	Spec	Min	Max
Stripe	RS-RRXL	175	125	250	7	5	10
Full	Trowel version	6250	(3125)	(6500)	250	(125)	(260)

2 Environmental Conditions for Application

- 2.1. RS-RRXL will not cure at ambient temperatures below 13°C (55°F). For maximum performance, the temperature should be greater than 13°C (55°F). Humidity control is required during application. The climatic conditions should be controlled to maintain a maximum relative humidity of 80% and a minimum temperature of 16°C (60°F). Maximum steel temperature should be no more than 49°C (120°F).
- 2.2. Application should not take place when relative humidity is more than 80% or the surface temperature is less than 3°C (5°F) above the dew point.

- 2.3. Dehumidification, air conditioning and/or heating equipment may be necessary to control environmental conditions but care should be taken when choosing heating methods, as some heaters can increase the local relative humidity.

3 Lining Application Procedure

- 3.1. Defective steelwork, prior to contract commencement, should be repaired in line with the guidance notes given in the Appendix of this document.
- 3.2. Microclimate should be monitored in between applications. Changes in microclimate may affect overcoating intervals.
- 3.3. For steel surfaces, grit blast the steel to be coated to a minimum of ISO Standard 8501-1 (2007) Sa2½ or NACE 2/SSPC SP10. A sharp and angular surface profile of between 75 and 125 microns (3-5mils) is required. In certain aggressive service conditions, it may be required to blast to Sa3 or NACE 1/SSPC SP5.
- 3.4. For concrete surfaces, carry out appropriate preparation as described in Section 1.
- 3.5. All marked areas shall be brought up to the required standard. The whole blasted area is to be blown down/vacuum cleaned to remove all dust and contamination.
- 3.6. Ensure, prior to application, that the minimum environmental conditions specified in Section 2 are achieved.
- 3.7. Provision should be made to ensure these conditions are maintained throughout the painting program.
- 3.8. All areas itemized in Section 6.11 are to receive a stripe coat. The stripe coat should be applied within the overcoating intervals specified in the RS-RRXL technical datasheet.
- 3.9. All the areas are to receive a full coat of RS-RRXL to the specified dry film thickness.
- 3.10. Any areas of under thickness are to be brought up to the minimum thickness specified. This must be carried out within the overcoating intervals specified for the product. If the overcoating interval has been exceeded then the area should be abraded and cleaned prior to application of touch up.
- 3.11. Unless otherwise advised, all damages are to be either vacublasted to Sa2½ (ISO 8501-1 (2007)) or NACE 2/SSPC SP10 or Power tool clean to SSPC SP11 with a profile of 75-100 microns (3 -4 mils). All damages are to be touched up with RS-RRXL to the specified minimum dry film thickness as per the project specification.
- 3.12. Upon completion of installation, the final coating should be inspected using a suitable non-destructive magnetic gauge to verify average lining thickness. Holiday testing and Shore D hardness testing should also be carried out.
- 3.13. Ensure that fresh containers are used after each unit is sprayed – do not refill the old containers.

4 Application Technics

- 4.1. Airless Spray. Stripe coats should be applied by brush or a combination of airless spray and brush. RS-RRXL trowel version can be applied by trowel.
- 4.2. Available air pressure and capacity for spray equipment should be at least 7kg/cm² and 7.0m³/min (100 psi and 250 cfm free air volume).
- 4.3. All spray equipment must be in good working order.
- 4.4. For both airless and heated plural component application, in cold and/or windy weather, insulate the expose pumping equipment using pipe insulation or similar insulating material to reduce unit heat loss.

Single Leg Airless Application

- 4.5. The single leg airless spray method requires constant attention to temperature and pot life as the material is mixed prior to passing through the pump. It is important to remember that the higher the mixing temperature the shorter the pot life.

- 4.6. It is recommended that airless spray pump ratios of 56:1 or greater should be used. Smaller pumps may not be able to physically push the material through the lines and spray gun at an adequate rate. Teflon packings are recommended.
- 4.7. Remove suction tube and all filters from the spray unit and airless spray guns Reversible tips should be the size range 31-36 thou (0.78 – 0.91mm). Tips must not be in a worn condition.
- 4.8. Paint line (hose) should be of 13mm, (½ inch), diameter, a maximum length of 45m (148ft), with a 10mm, (3/8 inch), diameter and 3m (10ft) whip-end. Both line and whip-end should be rated at 5000psi (351 kg/cm²).
- 4.9. The use of trace heated lines or an inline heater is recommended to maintain the temperature required for application (35-37°C, (95°F – 100°F).
- 4.10. Recommendations for the paint crew for single leg airless spray application are as follows: The application crew should consist of a minimum of four (4) trained crew members. The crew should thoroughly understand the basics of the equipment, the material and the application techniques. The contractor may require fewer personnel on smaller projects. Recommendations for distribution of personnel are two (2) inside of the tank and two (2) on the outside of the tank. The personnel inside of the tank being responsible for proper spraying, wet film thickness readings, and paint line (hose) movement. The outside personnel being responsible for the proper preheating, mixing of material, temperature monitoring once product is mixed, and dispensing of material to the pump.
- 4.11. It is recommended that periodic flushing of the pump, hose, and spray gun is carried out. If material reaches 54°C (130°F) during any part of the application process it is recommended that application be halted and the pump cleaned out immediately to reduce the risk of hardening in the pump, lines and gun.

Plural Component Airless Application

- 4.12. Heated plural component spray application is the most practical and preferred method when working with fast curing, short pot life materials, especially when lining large areas and applying at lower temperatures.
- 4.13. A pump capable of accurately delivering a 1:1 mix ratio is essential (Graco 56:1 or greater power ratio is recommended).
- 4.14. Remove all filters from the spray unit and airless spray guns
- 4.15. Two (2) ½" x 12 elemental in-line static mixers are required – these are located in line after the mixer manifold on the plural component equipment.
- 4.16. Heated tanks and heated lines up to 66°C (150°F) may be necessary.
- 4.17. The resin (Part A) fluid line should be 13mm (½") internal diameter minimum The hardener (Part B) fluid line should be 13mm, (½") internal diameter, although 10mm, (3/8") internal diameter minimum is also possible.
- 4.18. The high pressure solvent fluid line should be 6mm, (¼"), internal diameter minimum.
- 4.19. Tips should be the size range 31-36 thou (0.78 – 0.91mm) – reversible tips are suggested.
- 4.20. Paint line (hose) should be 13mm diameter (½ inch), maximum length 45m, with a 10mm (3/8 inch) diameter, 3m(10ft) whip-end. Both line and whip-end should be rated at 5000psi (351 kg/cm²).
- 4.21. Plural component application requires volumetric check of the mix ratio (utilizing a ratio monitoring system) before and during the application process, although any variation in product color during application will also indicate that the plural pump is off ratio.
- 4.22. The plural component unit should have facility for heating of the base and curing agent components.
- 4.23. The base component (part A) should be heated to a maximum of 60°C (140°F) and the hardener to a maximum of 40°C (105°F) under agitation in the plural component equipment.
- 4.24. The use of trace heated lines or an inline heater may be required to maintain the temperature required for application.

- 4.25. Recommendations for the paint crew for plural component airless spray application are as follows: The application crew should consist of a minimum of four (4) trained crew members. The crew must thoroughly understand the basics of the equipment, the material and the application techniques. The application crew should consist of an equipment operator, one person to load preheated material into pump, a mixing manifold operator (who can take wet film thickness readings and move the paint line), and a gun operator. Equipment operator should monitor operation of equipment at all times to ensure proper performance. The mixing manifold operator should monitor the manifold gauges to ensure proper mix ratio and continuous pressure delivery. The gun operator should continuously monitor spray fan and material colour for consistency. Arrange equipment and all possible work to allow the gun operator to spray continuously.
- 4.26. Important Note: A pressure drop is associated with paint lines. This pressure drop needs to be considered and depends upon the following factors.
- The viscosity of the paint. Higher viscosity paints produce greater pressure drops than low viscosity paints.
 - The length of the paint line. Longer lines produce greater pressure drops
 - The internal diameter of the paint line.
 - Flow rate of paint through the line.

Trowel Application

- 4.27. When using RS-RRXL for trowel applications preheating of the material is not required. RS-RRXL can be used in many different areas. It can be used as a flexible base coat or lining for concrete and steel surfaces that experience movement due to physical, mechanical or thermal forces. Some examples are:
- Steel Tanks
 - Chime Areas - Can be filled with RS-RRXL to create a 25-75mm (1" to 3") cove. The cove can then be coated easily and results in a smooth interface between wall and floor.
 - Bolted and/or Riveted Tanks – Can be used to build and cover around all bolts, rivets and lap seams to help create a smooth transition. It can then be top coated.

5 Inspection

- 5.1. When measuring the dry film thickness of coatings, the DTF gauge must be calibrated prior to use as follows:
1. Check that the probe is clean.
 2. Place the probe on a sample of millscale-free smooth steel of thickness greater than 1mm.
 3. Calibrate the instrument to zero.
 4. Select a certified shim of similar thickness to that expected for the coating under test.
 5. Calibrate the gauge to the shim thickness.
 6. Check that the gauge reads zero when replaced on the smooth steel sample.
- 5.2. Measurement of dry film thickness is described in ISO Standard 2808:1991 - Method 6A. or SSPC PA2
- 5.3. Holiday testing should be carried out to ensure the coating is free from voids according to NACE SP0188-2006 High Voltage Spark Testing at a test voltage of 100 volts per 25µm (1 mil)
- 5.4. Hardness – Conduct a Shore A Hardness test in accordance to ASTM D2240-05 to verify that RS-RRXL has cured to the appropriate hardness. Shore D Hardness readings should be a minimum of 50 to indicate full cure.
- 5.5. The fully cured lining system should be uniform in color and gloss and be relatively free of any runs, sags, porosity, pinholes, fisheyes, soft spots and debris