
MANUFACTURER QUALIFIED APPLICATION PROCEDURE FOR EXTERNAL PROTECTION OF STEEL PIPES

COATING SYSTEM INTENDED FOR CORROSION PROTECTION SERVICE UP TO 95 °C (204 °F) FC2

Product Qualified to Meet FC1/FC2 under CSA Z 245.30

Revision 1 – October 29, 2020

Product Description

POWERCRETE R-95 is a solvent free epoxy polymer concrete mainline pipeline coating operating at maximum temperatures up to 95°C(204 °F). Used for pipeline repairs and rehabilitation projects and other steel structures. POWERCRETE R-95 is used as the ultimate girth weld coating for FBE and liquid epoxy coated pipes.

Handling and Safety

Consult with the appropriate safety officer for the PPE requirements.

Eye protection - Some ingredients can be easily absorbed through the mucous membranes of the eyes, therefore indirect vented goggles, face shield or full face respirator is suggested.

Skin Protection – Ensure the product does not come in contact with bare skin. If there is a possibility of significant amounts of spray on the clothing then type 4 disposable protective clothing approved for low pressure liquid spray. If the clothing is exposed to minor amounts of coating then a type 5/6 disposable protective garment is suggested. Secure openings in arms & legs of disposable clothing to ensure no incidental contact with the skin.

Respiratory - Do not breathe vapors. A NIOSH approved half or full face respirator with multi-gas cartridges and P95 or higher efficiency filter is suggested. In order to determine the correct level of protection, air sampling must be conducted. A properly fitted and worn half face respirator is approved for up to 10X OEL (occupational exposure limit. All local applicable Occupational

Health and Safety Acts should be reviewed to ensure any legislation specific to the designated substance is followed. Additional information on exposure controls & personal protection is covered in the product's Safety Data Sheet.

Storage

Storage Temperature & Humidity
65°F - 85°F (18° - 30°C)

Flash Point
Mixed Material >446 °F (230 °C) mixed product
Part A > 199°F (93°C)
Part B > 199°F (93°C)

Storage Store Indoors

Disposal of Coating Containers

Dispose of waste product material in a facility permitted to accept chemical waste. Since regulations vary, consult applicable regulations or authorities before disposal. Allow mixed material to harden before disposal. Follow applicable regulations for disposal of spilled material. Refer to SDS in Further Accidental Release Measures section.

Tools, consumables, and equipment required to apply the coating system

Proper calibration and working condition of all tools and equipment is expected to be validated prior to use.

- 1) Heating Sources:
 - a) induction heating coils
 - b) infrared heaters
 - c) indirect heating
 - d) direct flame
 - i) Liquid or gas propane only
- 2) Compressed Air
 - a) Filter and oil separator capable of providing clean air as visually inspected using a blotter test (ASTM D 4285)
 - b) Desiccant air dryer capable of drying the compressed air supply.
- 3) Inspection:
 - a) Surface contact thermometer
 - b) Infrared (IR) thermometer; may on be used on coated surfaces only with the device emissivity set to 0.95

- c) High Voltage holiday detector with spring, conductive rubber, or wire brush attachment (NACE SP 0490)
 - d) Dry Film Thickness (DFT) gauge type II (SSPC PA2)
 - e) Wet Film Thickness (WFT) gauge
 - f) Shore D hardness tester (ASTM D 2240) – This test shall be performed as per the standard in 40 mils DFT of the coating in companion panels sprayed at the same time y exposed in the same conditions.
 - g) Thermometer used to measure ambient temperature
 - h) Application Documentation kit– items used to document inspection and measurements taken during the coating process
 - Sling or digital Hygrometer
 - j) Surface roughness test (ASTM D 4417)
 - Replicate tape
 - Profilometer
 - k) Soluble salts contamination test (Threshold at 5 µg/cm² of Chloride ion)
 - Potassium Ferrocyanide Paper
 - Sleeve test as per (ISO 8502-5 and SSPC Guide 15)
 - Brestle Patch Test conductimeter (ISO 8502-6)
 - l) Surface preparation written standards and supplemental visual standards or comparators.
- 4) Steel Surface Preparation
- a) Dry abrasive blasting equipment able to produce > 90 psi at the nozzle
 - b) Blast media capable of producing an angular anchor profile of 2.5 – 4.5 mils and surface cleanliness of at least near white metal finish per NACE No.2 /SSPC SP-10,
 - c) Surface cleanliness
- 5) Mixing
- a) Plural component applied product
 - b) For repairs variable speed power drill and mixing paddle.
 - i) Spiral mixer 75 mm (3” in diameter) is suggested
 - ii) Variable compressed air or electric drill is required
- 6) Cleaning
- a) Rags, brushes, short nap rollers and utility knife
 - i) Short nap (5mm) roller & short bristle brush
 - b) Non-Oily solvents; Methyl Ethyl Ketone, Xylene, Ethanol, Isopropyl Alcohol, and Acetone
 - c) Masking tape
- 7) Repair
- a) 60 or 80 grit sand paper
 - b) Clean lint free dry cloth

Surface Preparation of Steel

- 1) Blasting media: dry grit abrasives, preferably glass beads, steel grit, sand or equivalent media that can produce an angular anchor profile of 2.5-4.5 mils and a surface cleanliness of at least near white metal finish per NACE No.2/SSPC SP-10.
 - 2) Visible oil and grease contamination to be removed by means of non-oily solvents or other agreed upon cleaning method.
 - 3) Soluble salts to be removed using agreed upon cleaning method (Threshold 3ug/cm2 [Cl-])
 - 4) No moisture on the surface coming from snow, ice, rain or condensation
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Surface Preparation of FBE

- 1) Blasting media: dry grit abrasives, preferably glass beads, steel grit, sand or equivalent media that can produce an angular anchor profile of 2.0 mils or higher and a surface preparation to NACE No.4/SSPC SP-7, with a dense and angular profile similar to sand paper (no glossy areas present)
 - 2) Visible oil and grease contamination to be removed by means of non-oily solvents or other agreed upon cleaning method.
 - 3) Soluble salts to be removed using agreed upon cleaning method (Threshold 3ug/cm2 [Cl-])
 - 4) Surface shall be free of contaminants meeting when applying test ISO 8502-3 with a level 3 or better.
 - 5) No moisture on the surface coming from snow, ice, rain or condensation
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Preheat Methods Prior to Coating Application

- 1) Induction heating (Preferred method).
 - 2) Infrared heaters
 - 3) Indirect heating
 - 4) Consult with SEAL FOR LIFE representative for direct flame heating
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Surface temperature range during surface preparation, application, and cure

- 1) Preheat temperature is; 45°-104°F/10°-40°C and always at least 5°F/3°C above the measured Dew point

- a) Preheating shall not damage the mainline coating, or the coating being repaired.
- b) or raise the temperature of the pipe above 160°F/71°C

2) Curing schedule for POWERCRETE R-95

Temperature	Gel Time	Min. Recoat Time	Max. Recoat Time	Dry to Touch	Time to 65 Shore D	Time to 75 Shore D
50 °F (10 °C)	Material is too viscous to handle					
60 °F (16 °C)	75 min	70 min	1.6 hrs	2.25 hrs	20 hrs	24 hrs
65 °F (18 °C)	44 min	40 min	1.3 hrs	2.15 hrs	5 hrs	9.2 hrs
70 °F (21 °C)	39 min	34 min	1 hr	1.6 hrs	4 hrs	8 hrs
80 °F (27 °C)	31 min	29 min	45 min	1.2 hrs	2.2 hrs	5 hrs
90 °F (32 °C)	21 min	17 min	35 min	56 min	1.5 hrs	2 hrs
100°F (38 °C)	19 min	16 min	28 min	40 min	1 hr	1.1 hrs
110°F (43 °C)	14 min	12 min	21 min	30 min	50 min	1 hr

This information refers to spray application, the cure rate accelerates as temperature and dry film thickness increase. Touch-up of holidays can occur then as well or any time the coating is firm enough to resist damage from the procedure. Full cure will take place according to the table above. Over-coating after the maximum recoat time requires that the surface be abraded prior to application. Use a medium grit, 60 to 80 grit paper or sweep blast to roughen the surface. Clean abraded area of dust before re-coat or repair. (For more information consult the Cure-Gel Time chart for Powercrete® R-95)

Note* because of variations of temperature the above table only provides a reference, therefore, the actual time to backfill shall be determined by a Shore D durometer test. Shore D value should be at least 75.

- 3) Post-curing might be acceptable in case of low temperatures and shorter project schedules.

Ambient conditions

- 1) POWERCRETE R-95 shall not be applied when the relative humidity exceeds 80% or when the steel surface to be coated is less than 5°F/3°C above the measured dew point.

Coating mixing and thinning procedures

- 1) Thinning of the coating product is not allowed
- 2) Premix individual components prior to mixing parts A and B
- 3) Power mix part A and part B separately until uniform for plural airless spray application. Do not over mix or incorporate air by mixing too fast.
- 5) Hand apply kits are hand mixed until color is consistent.

Application POWERCRETE R95

Plural Component Spray	OK
Brush / roller application	OK
Cartridge Application	OK

1) Plural Component Airless Spray

Use only heated plural component Airless equipment capable to maintain a 3.6 :1 ratio in volume and 1.25 Gallon/4,73 Liter per minute output, with heated drums, insulated (heated) hoses and minimum 193 bar (2800 psi.) fluid pressure for Part A and 207 bar (3000 psi) for Part B. Use Binks 1M Airless spray-gun or equal with preferably changeable spray tips. Consult SEAL FOR LIFE for specific information.

- Transfer pumps (Graco 5:1 or 10:1)
- Agitation (expandable blade mixer)
- Heated drums for A and B
- High pressure filter (60 mesh)
- Hose bundle (A hose =3/4", B hose = 3/8") I.D.
- Static mixers set of 2 – 12" static mixer 3/8" separated by whip hose.
- Whip hose and mixer assembly max length at 20 ft
- High pressure fluid heater and temperature control (5400 watts)
- Spray Temperature (Part A 130 – 180 F and Part B 68 - 86 F)
- Pump Ratio: 56:1 (min.)
- Mix ratio at 3.6:1 by volume
- Volume Output: 4.73 l or 1.25 Gallons per minute as minimum
- Tip Size: (0.021-0.031")
- Pressure: Part A 2500 - 2800 psi (170 Bar); Part B 1800 - 2500 Psi (124 Bar)
- Airless Spray Gun: Graco XRT, Binks or similar.

Brush and Roller Application

POWERCRETE R95 can be applied with brush or roller. For small repairs and field hand application, follow hand application instructions guide from Powercrete R95. Warm parts A & B to 25°C (77°F) and mix by pouring all of part B into part A. Thoroughly scrape container and lid of B.

Power mix the material at a speed that uniformly blends the 2 parts but does not add air to the mixture or spillage. Use trowels, brush, applicator pad or roller to apply required minimum thickness of coating to the surface. Use a Wet Film gauge to measure that the desired minimum thickness has been achieved. Double check around the weld to insure minimum desired thickness.

Cartridge Application

POWERCRETE R-95 can be applied with cartridge system following the application guide instructions as follows:

- Verify that the cartridge temperature meets recommended application conditions.
- Verify that the air supply source meets the required operation pressure (100 psi) and it is clean and dry (ASTM D 4414).
- Install the static mixer and flow control orifice in the cartridge.
- Install the cartridge in the pneumatic dispenser, make sure the plates and cartridges section coincide.
- Connect the air supplier to the atomizer and adjust the pressure.
- With the atomizer in off-position, purge the static mixer pointing straight up to displace any air bubble in the cartridges.
- Immediately after continue to purge pointing down to make sure the color of the mixed material is even.
- Open the air for the atomizer and proceed to spray.
- The coating flow through the static mixer should be not less of 10 cc per second. A 940 cc cartridge shall be used in about 1 minute with 30 seconds.
- Spray the cartridge continuously without interruption or changing delivery speed.
- Always start and finish off-target
- Never finish the cartridge while spraying since the mixing ratio could vary at the end of the spray sequence.

To obtain a homogeneous mixture of A and B component, it is critical that POWERCRETE R95 is heated to the recommended temperatures:

	Part A	Part B
Optimum	140 °F (60 °C)	140 °F (60 °C)
Minimum	130 °F (54 °C)	130 °F (54 °C)
Maximum	160 °F (71 °C)	160 °F (71 °C)

For more information consult “POWERCRETE R95 Cartridge Spray Guide”.

Coating Thickness

Corrosion control (FC1) coating optimum thickness is 20-40 mils/(500 - 1000 µm)

Coating Application

- 1) Validate surface is meeting the requirements of surface preparation for FBE or bare metal. and the surface profile requirements.
- 2) Spray or apply mixed material onto the surface to receive coating and spread down and around the surface under the pipe.
- 3) Where practical determine wet film thickness
- 4) Use a brush to smooth out obvious curtains, runs, sags, drips, and protuberances
 - a) Special attention is required to the bottom and weld surfaces
 - b) An additional application of coating increasing the film thickness on the bottom of the pipe or weld area may be required
- 5) Protect coating until moisture and other contaminants such as dust, insects and airborne particulates do not contaminate the finished coating.

Repair Methods

- 1) Repair Method A (holidays or damaged areas less than 2 mm in diameter) Repair Area minimum of 3 x 3 inches.
 - a) Remove oil, grease, and loosely adhering deposits

- b) Abrade the coating surface with coarse sandpaper (60-80 grit).
- c) Ensure that the surrounding coating is abraded (remove gloss) one inch beyond the defect on all sides
- d) Ensure abraded surface is cleaned of any sanding debris with compress air or a lint free cloth.
- e) Apply POWERCRETE R95 at minimum thickness of 20mils.
- f) Applications for holiday repair or damage with total repair surface area less than 300 cm² (48 in² or 1/3sqft) can be applied by brush.

2. Repair Method B (Damaged areas revealing bare metal up to 25 cm² /4 in² in size).

- a) Remove oil, grease, and loosely adhering deposits
- b) Abrasive blast as outlined in this application guide, or by power tool cleaning in accordance with SSPCSP 11 to remove dirt, scale, rust, damaged coating and any other foreign material to a bare metal condition and retain or produce the surface profile required.
- c) Continue with the same steps “c”, “d” and “e” as in Method A

3. Repair Method C (Damaged areas revealing bare metal larger than 25 cm² in size)

- a) Remove oil, grease, and loosely adhering deposits
- b) Abrasive blast as outlined in this application guide
- c) Continue with the same steps “c”, “d” and “e” as in Method A

Holiday Detection

Test coating using high voltage holiday detector per CSA Z245.20 (125 volt/mil or 5 volts/micron)

Documents Reference:

- 1) POWERCRETE R-95 Product Data Sheet
- 2) POWERCRETE R-95 Spray Application Procedures
- 3) POWERCRETE R-95 Hand Application Procedures
- 4) POWERCRETE R-95 Performance Summary
- 5) Inspection testing plan guideline for POWERCRETE R-95
- 6) POWERCRETE R-95 Cartridge Spray Procedures

DISCLAIMER

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