



SURFACE PREPARATION AND APPLICATION GUIDE

SERIES FC22 EPOXOLINE

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1.0 INTRODUCTION

The purpose of this guide is to acquaint contractors and applicators with the basic information necessary for properly ordering and installing Tnemec's Series FC22 Epoxoline. Prior to starting work, please read this entire guide carefully. If you have questions, contact your Tnemec representative or call 1-866-216-8677. It is important that you obtain answers to any questions before work begins.

Please review all pertinent Product Data Sheets as well as the Series FC22 Plural Component Equipment Recommendation Guide prior to starting. Also, reference the project specifications and compare them with this guide and the Product Data Sheets. Resolve any inconsistencies prior to starting work.

This application guide cannot cover every issue that may be encountered in the field. If issues arise that are not addressed in this guide or the Product Data Sheets, please contact your Tnemec representative or call 1-816-483-3400 for assistance.

2.0 PRODUCTS AND PACKAGING

2.1 SERIES FC22 EPOXOLINE

An advanced generation, 100% solids epoxy liner for the protection of steel and concrete. It provides excellent resistance to abrasion and is suitable for immersion and chemical contact. For use on the interior and exterior of steel or concrete tanks, reservoirs, and pipes in potable water service.

Certified by NSF International in accordance with NSF/ANSI/CAN Std. 61 and the extraction requirements of NSF/ANSI/CAN 600. Ambient air cured Series FC22 is qualified for use on tanks and reservoirs of 25 gallons (94.6 L) capacity or greater and pipes 6 inch (15.2 cm) in diameter or greater and valves 1 1/2 inch (3.8 cm) in diameter or greater. Reference Tnemec's certified product listing at www.nsf.org for details on the maximum allowable DFT. Conforms to AWWA D 102 and AWWA C 210. Contact your Tnemec representative for systems and additional information.

The Series FC22 touch-up kit may be used to repair other Tnemec epoxy linings. Contact Tnemec for more information.

2.2 SERIES FC22 PACKAGING

KIT SIZE	PART A	PART B	YIELD
Large Kit	1 - 5 gallon pail	2 - 6 gallon pails	15 gallons (56.78 L)

2.3 SERIES FC22 PACKAGING – TOUCH-UP KIT

KIT SIZE	PART A	PART B	YIELD
One Tube*	2 ounces	4 ounces	6 ounces (175 mL)

*One Touch-up Kit consists of 6 tubes and 12 disposable static mixer tips.

2.4 SERIES FC22 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M ² /GAL)
Minimum	16.0 (405)	16.0 (405)	100 (9.3)
Maximum	40.0 (1015)	40.0 (1015)	40 (3.7)

Allow for overspray and surface irregularities. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

2.5 SERIES FC22 – STORAGE

Minimum storage temperature is 20°F (-7°C) and maximum is 110°F (43°C). For optimal handling and application characteristics, both material components should be stored at a minimum of 70°F (21°C) or higher for 48 hours prior to use.

3.0 STEEL SURFACE PREPARATION

3.1 PRIOR TO BLASTING STEEL

The surface should be clean, dry, and contaminant free, and be at least 5°F (3°C) above the dew point. Do not apply when humidity exceeds 80%. For tanks, dehumidification equipment is required if humidity exceeds 80%.

3.2 PREPARATION OF STEEL – ABRASIVE CLEANING

Immersion Service: Steel surfaces to receive Tnemec's Series FC22 Epoxoline should be abrasive blasted to near white metal cleanliness in accordance with SPC-SP10/NACE 2 Near-White Blast Cleaning with a minimum angular anchor profile of 3.0 mils. **Note:** When self-priming on steel, a minimum angular anchor profile of 3.0 mils is required. For all other applications, refer to the primer data sheet for recommendations.

Non-Immersion Service: Steel surfaces to receive Tnemec's Series FC22 Epoxoline should be abrasive blasted to a commercial blast cleanliness in accordance with SSPC-SP6/NACE 3 Commercial Blast Cleaning with a minimum angular anchor profile of 3.0 mils.

Abrasive materials should be selected to produce the required 3.0 mils minimum angular anchor pattern and no evidence of a polished or peened surface will be accepted. Depth of anchor pattern is suggested to be measured by using Testex-Replica profile tape prior to the application of the prime coat. Profile readings should be recorded and retained by the applicator for verification as part of the Quality Assurance file (reference ASTM D4417 Method C).

The compressed air used for blasting should be free of water and oil. Adequate traps and separators should be used to ensure elimination of all contaminants. Cleanliness of the air supply may be checked by operating the line without abrasive media through a clean white cloth for 20 seconds. If oil or water appear on the cloth, the traps and separators should be cleaned until subsequent 20 second tests prove satisfactory (reference ASTM D4285).

Blasting should not be performed when the surface temperature is less than 5°F above the dew point to prevent the formation of rust bloom. Dew point and surface temperature readings should be taken prior to blasting to ensure this condition. Painting over flash rust or other contaminants is not acceptable. Care should be exercised by all personnel to avoid hand or clothing contamination of the freshly-blasted surface.

All dust and blasting debris must be removed prior to coating application, resulting in a clean, dry, contaminate free and angular profiled surface.

3.3 SURFACE IMPERFECTIONS

Abrasive blasting may expose surface imperfections in steel surfaces that may previously have gone unnoticed. If practical, these imperfections must be repaired immediately and blasted to duplicate the surrounding area.

4.0 CONCRETE SURFACE PREPARATION

4.1 PREPARATION OF CONCRETE

Allow new cast-in-place concrete to cure a minimum of 28 days at 75°F (24°C). Verify concrete dryness in accordance with ASTM F 1869 “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride” (moisture vapor transmission should not exceed three pounds per 1,000 square feet in a 24 hour period), F 2170 “Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes” (relative humidity should not exceed 80%), or D 4263 “Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method” (no moisture present). Prepare concrete surfaces in accordance with NACE No. 6/SSPC-SP13 Joint Surface Preparation Standards and ICRI Technical Guidelines. Abrasive blast, shot-blast, water jet or mechanically abrade concrete surfaces to remove laitance, curing compounds, hardeners, sealers and other contaminants and to provide a minimum ICRI-CSP 5 surface profile. Large cracks, voids and other surface imperfections should be filled with a recommended filler or surfacer.

All surfaces must be clean, dry and free of oil, grease, chalk and other contaminants.

4.2 PREPARATION OF EMBEDDED MISCELLANEOUS METAL

When encountering miscellaneous metals embedded into concrete, the surface must be prepared in accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning with a 3.0 mil minimum angular anchor profile.

4.3 EXPOSED REBAR

When rebar is exposed through the surface preparation or due to construction oversights, the rebar must be properly cleaned and primed. Exposed rebar must be cleaned as per SSPC-SP10/NACE 2 Near-White Metal Blast Cleaning and primed using a Tnemec recommended VOC compliant epoxy primer. (Refer to the Series FC22 product data sheet for a complete list of recommended primers.) The area around the rebar may then be rebuilt using Series 218 MortarClad.

4.4 OUTGASSING

Outgassing must always be considered a possibility with any concrete substrate. A number of means exist to either eliminate or reduce out-gassing. First, application should be accomplished in indirect sunlight and during times when the surface temperature of the concrete is stable or in a descending pattern. In addition, use of primers and resurfacing agents can help reduce outgassing. Series 218 MortarClad was specifically designed and is the preferred method to minimize this problem.

4.5 TERMINATIONS

When the coating system is not scheduled to provide a monolithic surface, terminations must be built into the system. For example, when the system is scheduled to terminate, sawcuts must be installed so the Series FC22 Epoxoline can be trowelled or brushed into these areas. Please refer to the Tnemec Standard Lining Details Guide.

5.0 RESURFACING & PATCHING

5.1 SERIES 218 MORTARCLAD

Series 218 MortarClad is a hybrid, cement-based, aggregate-reinforced waterborne epoxy for surfacing, patching and filling voids and bugholes up to 1/2” deep in concrete substrates. In addition, it also serves as a means to diminish out-gassing problems typically associated with coating concrete when used as a resurfacer at 1/16” thickness. If environmental conditions dictate, such as high air or substrate temperatures or dry winds, the surface should be “pre-wet” or dampened with potable water. This can be done using a Hudson pump-up sprayer or heavy nap roller cover dampened with potable water.

Note: Do not over-saturate the surface. Material can be transferred to the surface by utilizing hydraulic spray equipment (i.e. 11:1 Grover grout pump) followed by trowelling to close the material. For a smoother finished appearance, trowel licks may be reduced by using water to lightly dampen a 1/4” nap roller cover over the sealed Series 218 material. Refer to the Series 218 MortarClad Product Data Sheet for further information.

5.2 SERIES 218 PACKAGING

KIT SIZE	PART A (LIQUID)	PART B (LIQUID)	PART C (CEMENT SAND)	YIELD (MIXED)
Large (LPK)	1 gallon plastic jug	1 quart can	42.75 lb. bag with pre measured aggregate	2.8 gallons (10.6 L)

5.3 SERIES 218 COVERAGE RATES (THEORETICAL)

THICKNESS	LARGE KIT
1/16” (1.6 mm)	72 sq ft (6.7 m ²) theoretical
1/8” (3.1 mm)	36 sq ft (3.3 m ²) theoretical
1/4” (6.4 mm)	18 sq ft (1.7 m ²) theoretical

Allow for application losses due to surface irregularities and substrate porosity.

5.4 SERIES 218 – MIXING

Mix entire kits as supplied. For smaller applications, smaller kits are available. **Note:** Mixing less than a full kit can result in miscatalization, improper film build and variant cure times.

IMPORTANT: Do not split kits.

Pour Part A liquid into clean empty pail. Under agitation slowly add Part B liquid. When blended, slowly sift Part C powder while continuing agitation. Do not dump all of the Part C into the liquids at one time. Mix for 2 minutes or until the cement-sand is thoroughly wetted and a smooth consistency is obtained.

5.5 SERIES 218 – APPLICATION EQUIPMENT

Mortar Hawk, steel, stiff concrete finishing trowels, broad knives and rubber floats are recommended. For troweling inside and outside corners, the use of a radius or margin trowel is recommended.

Material can be transferred to the surface by utilizing hydraulic spray equipment (i.e. WTWA 410 9:1 or 600 12:1 pump) followed by troweling to seal the material. No special ACI 308 curing requirements - ambient cure only.

For a smoother finished appearance, trowel licks may be reduced by using a 1/4" nap roller cover lightly dampened with water over the sealed Series 218 material. **Note:** If white liquid is brought to the surface during this process, the Series 218 material is being overworked and/or oversaturated. Overworking or oversaturating the surface may have an adverse effect on the adhesion of subsequent coatings applied. Let Series 218 cure and remove surface deposit using concrete rub brick.

5.6 SERIES 218 – CURING

Ambient cure only. No special ACI 308 curing requirements. Refer to the Series 218 product data sheets for additional information.

6.0 MIXING

6.1 SERIES FC22 EPOXOLINE – PRE-CONDITIONING

For optimal handling and application characteristics, both material components should be stored between 80°F to 90°F (27°C to 32°C) for 48 hours prior to use.

6.2 SERIES FC22 – MIXING

Agitate Parts A & B making sure no pigment remains on the bottom of the can. **DO NOT MIX PART A WITH PART B.** Use a 1 (Part A amine/catalyst) to 2 (Part B epoxy/resin) mix ratio heated plural component airless spray unit.

CAUTION: Do not reseal mixed material. Exothermic temperature can reach in excess of 250°F. An explosion hazard may be created.

6.3 SERIES FC22 TOUCH-UP KIT – MIXING

Equipment: A dispensing applicator with a thrust ratio of 26:1 is required (F100-TKAP). Material tube must be used in conjunction with provided disposable static mixer in order to ensure proper mixing.

Usage: Unscrew retaining ring and remove plug. Save plug in case entire tube is not used. Install static mixing element, replace retaining screw ring, and install tube in applicator. Point assembly up and slowly pull the trigger to de-air the mixer. Dispense approximately 1 fluid ounce of material to waste and continue to pump until material is of uniform color with the Part A completely blended with the Part B. Use a putty knife or spatula to ensure adequate coverage and mixing.

7.0 APPLICATION & EQUIPMENT

7.1 SURFACE TEMPERATURE

Minimum surface temperature is 35°F (2°C) and maximum is 130°F (54°C). The surface should be dry and at least 5°F above the dew point. Do not apply when humidity exceeds 80%. For tanks, dehumidification equipment is recommended if humidity exceeds 80%.

7.2 STRIPE COATING (WET ON WET)

Welds, seams and repaired areas should be given an initial brush coat prior to a full spray application of the first coat to work the material into the surface. This should also apply to all areas inaccessible by spray gun and as necessary to achieve the specified dry film thickness and a surface free of imperfections.

7.3 SERIES FC22 EPOXOLINE – APPLICATION HEAT REQUIREMENT

Both components must be heated prior to and during application. Heat product component A (amine) to 110°F to 120°F and component B (epoxy) to 120°F to 130°F. Do not heat component A (amine) above 120°F or component B (epoxy) above 130°F. Consult Tnemec Technical Services for specifics. Prior to use: Keep containers tightly sealed.

7.4 SERIES FC22 EPOXOLINE – PLURAL COMPONENT EQUIPMENT RECOMMENDATION

Contact Tnemec Technical Service for the most up to date equipment recommendations.

8.0 CURING TIME

TEMPERATURE	35°F (2°C)	75°F (24°C)	110°F (43°C)
TO HANDLE	12 Hours	6 Hours	1 Hour
TO RECOAT	7 Days	7 Days	7 Days
RETURN TO SERV.	48 Hours	24 Hours	16 Hours

Note: These times are based on a 20.0 mil (500 micron) dry film thickness. Curing time varies with surface temperature, air movement, humidity and film thickness. **Ventilation:** When used as a tank lining or in enclosed areas, provide adequate ventilation during application and cure.

9.0 INSPECTION

9.1 WET FILM THICKNESS MEASUREMENT

Wet film thickness readings for successive coats should be taken as soon as possible at a frequency of at least one per 100 sq. ft. and should be taken so as to avoid surface irregularities that could distort the readings. Readings on corners and in areas of intricate geometry should be taken every 10 sq. ft. to ensure proper wet coverage.

9.2 FINAL INSPECTION – HIGH VOLTAGE DISCONTINUITY (SPARK) TESTING

High voltage discontinuity (spark) testing is recommended to determine the presence and number of discontinuities in the nonconductive Series FC22 Epoxoline applied to a conductive surface.

All high voltage discontinuity (spark) testing shall be performed in accordance with NACE SP0188 and the procedures outlined herein.

Series FC22 Epoxoline should be applied and allowed to cure within the parameters of the corresponding Product Data Sheets. Sufficient curing time of the coating system shall be allowed prior to conducting a holiday test, as indicated by the "Return to Service" duration on the Product Data Sheets. Curing time will vary with surface temperature, air movement, humidity, and film thickness. If the substrate is incompatible or if thickness constraints are not applicable for a non-destructive dry film thickness gauge, measurements of the coating system thickness are to be performed during application of each system component using a wet film gauge, feeler gauge, or other measurement device that can accurately measure the coating wet film thickness. These coating measurements are to be tabulated to determine the total system thickness.

All high voltage discontinuity (spark) testing shall be performed using a Tinker & Rasor model AP/W Holiday Detector. Refer to the following chart for appropriate voltage based on coating system thickness.

To perform holiday testing attach a ground wire from the instrument ground output terminal to the conductive substrate and ensure proper electrical contact. Test conductivity by attaching the instrument ground wire to rebar or other metallic ground permanently installed in the concrete and touch the electrode to the bare concrete. If metallic ground is not visible, the ground wire can be placed directly against a bare concrete surface and weighted with a damp cloth and paper sand-filled bag. Make contact with the exploring electrode on the conductive substrate to verify the instrument is properly grounded. If the test proves negative, determining discontinuities with a high voltage spark test will be ineffective. Under no circumstances shall the voltage be increased above the recommended voltage potential.

9.3 RECOMMENDED VOLTAGES FOR HIGH VOLTAGE SPARK TESTING WITH TINKER & RASOR MODEL AP/W

TOTAL DRY FILM THICKNESS (MILS)	VOLTAGE (V)
20-24	2,500
25-29	3,000
30-39	3,500
40-47	5,000
48-59	6,000
60-69	7,500
70-79	8,500
80-99	10,000
100-124	12,500
125-134	15,000
135-159	16,000
160-174	17,500
175-214	20,000
215-269	27,000
270-299	31,000
300-350	35,000

Holiday testing of repaired areas should be performed using the same testing procedures as outlined above.

If utilizing alternate high voltage DC holiday detectors, never exceed the recommended 100-125 volts DC per mil or contact Tnemec Technical Services for recommended voltage settings. Excessive voltage may produce a holiday in the coating film.

10.0 REPAIR

Where imperfections, discontinuities or surface defects are present, or if a coating is damaged during inspection, the area in question should be masked and mechanically abraded to provide a consistent finish.

If immediate repair is not feasible (due to loss of blast), the affected area is to be masked off and repaired following application of the first coat. If welding is involved in the repair procedure, the masked area must measure 6" in any direction from the weld. The edges of all masked repair areas should be feathered using an abrasive cloth or wheel. Prepare the repaired area for coating using the surface preparation procedures for steel outlined previously in Sections 3 and 4. Any contamination resulting from the repair must be removed by solvent wiping prior to abrasive blasting.

A record should be kept of all repaired areas using a coordinate system. The repaired area must be spot-blasted and remain free of voids, undercutting and weld spatter and exhibit a minimum 3.0 mil angular anchor pattern.

If film defects are suspected to involve a significant void or holiday, or if the film has been damaged to the substrate, contact your Tnemec representative or call Tnemec Technical Service at 1-866-216-8677 for specific recommendations.

11.0 HEALTH & SAFETY

Series FC22 is for industrial use only and installed by qualified coating and lining application specialists. Paint products contain chemical ingredients which are considered hazardous. Consult the latest version of Tnemec Technical Bulletin 19-110 for One-Hundred-Percent-Solids Epoxy Coating Safety. Read container label warning and Safety Data Sheet for important health and safety information prior to the use of this product. Keep out of the reach of children.