SERIES 330,350,351,365,390 TANK ARMOR

SURFACE PREPARATION & APPLICATION GUIDE

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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 Tank Armor. Prior to starting work, please read this entire guide carefully. If you have questions, contact your Tnemec representative or call 1-800-TNEMEC1. It is important that you obtain answers to any questions before work begins.

Please review all pertinent Product Data Sheets as well as the Tank Armor 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 1-800-TNEMEC1 for assistance.

2.0 PRODUCTS AND PACKAGING

The products that form Tnemec's Tank Armor line are:

2.1 SERIES 330

A thick-film reinforced epoxy internal lining formulated for corrosion control and restoration of petroleum storage tanks. Spray applied at 20 to 40 mils depending on extent of bottom plate corrosion, and is flexibilized to reduce coating stress resulting from mechanical and physical forces exerted on the tank bottom. Lining may also be used for chemical storage tanks.

2.2 SERIES 330 PACKAGING

KIT SIZE	PART A	PART B	YIELD (MIXED)
Medium Kit	2 - 6 gallon cans	1 - 6 gallon can	15 gallons
Large Kit	2 - 55 gallon drums	1 - 55 gallon drum	150 gallons

2.3 SERIES 330 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Suggested	30.0 (762)	30.0 (762)	53 (5.0)
Minimum	20.0 (508)	20.0 (508)	80 (7.5)
Maximum	40.0 (1016)	40.0 (1016)	40 (3.7)

2.4 SERIES 350

A high-build tightly cross-linked high performance epoxy with excellent resistance to a broad range of chemicals, solvents and petroleum over a wide range of temperatures. Principally used as a lining in single coat applications ranging from 20 to 40 mils.

2.5 SERIES 350 PACKAGING

KIT SIZE	PART A	PART B	YIELD
Medium Kit	3 - 6 gallon can	1 - 6 gallon can	20 gallons
Large Kit	3 - 55 gallon drums	1 - 55 gallon drum	200 gallons

2.6 SERIES 350 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Suggested	30.0 (762)	30.0 (762)	53 (5.0)
Minimum	20.0 (508)	20.0 (508)	80 (7.5)
Maximum	40.0 (1016)	40.0 (1016)	40 (3.7)

2.7 SERIES 351

A 100% solids flexible polymer formulated for general use as a trowel grade filler/surfacer for steel and provides protection against chemical attack and environmental degradation. Resistant to a wide range of petroleum products, fuels, gasohol, waste, alkalis, and organic and inorganic acids. Compatible with a variety of topcoats.

2.8 SERIES 351 PACKAGING

KIT SIZE	PART A (PARTIALLY FILLED)	PART B (PARTIALLY FILLED)	YIELD (MIXED)
Small Kit	1- 5 gallon can	1 - 5 gallon can	4 gallons

2.9 SERIES 351 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Suggested	40.0 (1016)	40.0 (1016)	40 (3.7)

2.10 SERIES 365

Spray applied, 100% solids, high build, reinforced epoxy formulated for general use as an internal lining for tanks and other aggressive chemical immersion service. Exhibits excellent range of chemical and solvent resistance combined with physical properties for long term durability and service life. Principally used as a lining in single coat applications ranging from 20 to 60 mils.

2.11 SERIES 365 PACKAGING

KIT SIZE	PART A	PART B	YIELD
Medium Kit	2- 6 gallon can	1 - 6 gallon can	15 gallons
Large Kit	2 - 55 gallon drums	1 - 55 gallon drum	150 gallons

2.12 SERIES 365 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Suggested	30.0 (762)	30.0 (762)	53 (5.0)
Minimum	20.0 (508)	20.0 (508)	80 (7.5)
Maximum	60.0 (1525)	60.0 (1525)	27 (2.5)

2.13 SERIES 390

A thick-film, reinforced epoxy internal lining formulated for corrosion control of chemical tanks and aggressive chemical immersion. Spray applied at 20 to 50 mils. Series 390 exhibits superior resistance to a wide range of chemicals with excellent physical properties for long term durability and service life.

The Series 390 touch-up kit may be used to repair other Tank Armor linings. Contact Tnemec for more information.

2.14 SERIES 390 PACKAGING

KIT SIZE	PART A	PART B	YIELD
Medium Kit	2 - 6 gallon cans	1 - 6 gallon can	15 gallons
Large Kit	2 - 55 gallon drums	1 - 55 gallon drum	150 gallons

2.15 SERIES 390 PACKAGING - TOUCH-UP KIT

KIT SIZE	PART A	PART B	YIELD
One Tube*	2 ounces	4 ounces	6 ounces

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

2.16 SERIES 390 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Suggested	30.0 (762)	30.0 (762)	53 (5.0)
Minimum	20.0 (508)	20.0 (508)	80 (7.5)
Maximum	50.0 (1270)	50.0 (1270)	32 (3.0)

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

2.17 TANK ARMOR - 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

Prior to abrasive blasting, all oil, grease, tar and other residues must be removed from the surface. Solvent cleaning (per SSPC SP1) and high pressure water or steam cleaning are effective methods for removing hydrocarbon residues and other by-products. Fresh water rinse to ensure complete removal of soluble salts and cleaning chemicals.

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 recommended if humidity exceeds 80%.

If dehumidification equipment is not used, the surface to be coated should be abrasive blasted within twenty four (24) hours prior to the application of the lining material.

3.2 WELDS

Remove weld spatter, burrs, or protrusions; remove and/or round sharp edges; and smooth rough welds and gouges prior to abrasive blasting. Welds should be ground to remove any irregularities and are considered ready for painting when a minimum finishing level of a C designation, as defined by NACE RP0178 latest revision, has been achieved.

3.3 EXISTING/CONTAMINATED SURFACES

Unlined tanks or previously-lined tanks require checking for contaminant presence and complete removal prior to abrasive blasting. Water soluble contaminants such as chlorides, sulfates, acids, alkalies, etc. are not readily visible when present in small quantities on the surface of the metal. These surface contaminants can be embedded into blast profile if not removed and cause extensive, persistent corrosion and blistering under the protective coating system. For proper identification procedures and removal methods, contact Tnemec Company, Inc.

3.4 PREPARATION OF STEEL - ABRASIVE CLEANING

All steel surfaces to receive Tnemec's Tank Armor materials should be abrasive blasted to a white metal cleanliness in accordance with SSPC-SP5/NACE 1/ISO Sa 3 White Metal Blast Cleaning. A minimum 3.0 mil angular anchor pattern is required.

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).

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. In addition, application of a holding primert should be scheduled so as to immediately follow blasting and cleaning operations. 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 by vacuuming. Cloths should not be permitted for cleaning blasted surfaces because of possible lint contamination. Brushing or blowing the surface may dislodge all particles embedded in the surface profile.

3.5 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.

3.6 TANK BOTTOM PREPARATION

Buffer, striker, and datum plates should be prepared in accordence with SSPC-SP5/NACE 1/ISO Sa 3 (White Metal Blast Cleaning with a minimum angular anchor profile of 3.0 mils.)

4.0 MIXING

4.1 TANK ARMOR - PRE HEATING

Prior to application, heat each component to 110°-120°F (43°-49°C).

4.2 TANK ARMOR - MIXING

Place band heaters containers. Recirculate the material through the primary heaters back into the containers. Remove the center 2" bung or lid on the container and insert the mixing blade. The material should be 80°-90°F (27°-32°C) before the mixing blade is turned on. Mix the material until the material in the containers reaches 110°-120°F (43°-49°C).

Do not mix Part A with Part B. CAUTION: Do not reseal mixed material. Exothermic temperature can reach in excess of 250˚F. An explosion hazard may be created. Use a plural component heated airless spray unit. Note: Product must be heated to 110°-120°F (43°-49°C) prior to and during application.

4.3 SERIES 390 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.

5.0 APPLICATION & EQUIPMENT

5.1 SURFACE TEMPERATURE

Minimum surface temperature is 50°F (10°C) and maximum is 120°F (49°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%.

5.2 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.

5.3 TANK ARMOR - PLURAL COMPONENT EQUIPMENT RECOMMENDATION

Refer to the Tank Armor Plural Component Equipment Recommendations Guide. Contact Tnemec Technical Services for the most up to date version.

6.0 CURING TIME

PRODUCT	TEMP.	TOUCH/ HANDLE	IMMERSION	SHORE D/ BARCOL
330	75ºF (24ºC)	6/8 HRS	24-36 HRS	77/55
350	75ºF (24ºC)	3/4 HRS	24-36 HRS	77/55
351	75ºF (24ºC)	10/14 HRS	72-168 HRS	85/79
365	75ºF (24ºC)	2/3 HRS	24-48 HRS	81/65
390	75ºF (24ºC)	2/3 HRS	24-36 HRS	81/66

Cure time to achieve a minimum Shore D Hardness or Barcol GYZJ 935 hardness for immersion service is listed. In order to obtain an accurate durometer reading, the minimum DFT must be 30 mils. Higher film thicknesses, insufficient ventilation or cooler temperatures will require longer cure times. This coating commonly develops an amine-blush during cure. While this condition will not adversely affect performance of the coating, this blush must be removed by aggressive sweep blasting before applying additional coats. During high humidity conditions, it is recommended that the application be done while the temperatures are increasing and/or use of DH equipment.

7.0 INSPECTION

7.1 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.

7.2 FINAL INSPECTION - HIGH VOLTAGE DISCONTINUITY (SPARK) TESTING

If required by the contract specifications, high voltage discontinuity (spark) testing may be used to determine the presence and number of discontinuities in the nonconductive Tank Armor coating system applied to a conductive surface.

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

The Tank Armor coating system should be applied and allowed to cure within the parameters of the corresponding Product Data Sheets. Sufficient curing time of the coating system should be allowed prior to conducting a holiday test, as indicated by the, "To Place in 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.

The high voltage discontinuity (spark) testing voltage can be calculated using the tabulated total coating system thickness (in mils) multiplied by 100 volts DC. Never exceed the recommended 100 volts DC per mil, for excessive voltage may produce a holiday in the coating film. All high voltage discontinuity (spark) testing should be performed using a Tinker & Rasor model AP/W Holiday Detector.

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 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 should the voltage be increased above the recommended voltage potential.

7.3 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.

8.0 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. Application of an additional brush coat may be necessary.

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 1-800-TNEMEC1 for specific recommendations.

9.0 HEALTH & SAFETY

Tank Armor is for industrial use only and installed by qualified coating and lining application specialists. Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product. Keep out of the reach of children.