SURFACE PREPARATION AND APPLICATION GUIDE

SERIES 406 ELASTO-SHIELD

TABLE OF CONTENTS

TNEMEC COMPANY INC.
123 West 23rd Avenue North Kansas City, MO 64116
1-800-TNEMEC1 www.tnemec.com

INNOVATION IN EVERY COAT.™

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 406 Elasto-Shield. Prior to starting work, please read this entire guide carefully. If you have questions, contact your Tnemec representative or call 1-816-483-3400. It is important that you obtain answers to any questions before work begins.

Please review all pertinent Product Data Sheets as well as the project specifications and compare them with this guide and the Product Data Sheets. Resolve any inconsistencies prior to starting work. Contact Tnemec Technical Service for the most up to date equipment recommendations.

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 & PACKAGING

2.1 SERIES 406 ELASTO-SHIELD

Series 406 Elasto-Shield is a two-component, fast setting, monolithic, aromatic polyurethane hybrid coating, designed to provide a durable polyurethane lining in a single-coat multi-pass spray application with plural component equipment. This high-performance coating has excellent chemical, thermal shock and abrasion resistance. It is ideal for application to steel or concrete in water and wastewater treatment, secondary containment and for tank linings and bottoms. It is recommended for immersion service

Note: Material is to be applied by qualified applicators. Series 406 WH06 Off-White is certified by NSF International, in accordance with ANSI/NSF/CAN Std. 61 and the extraction requirements of NSF/ANSI/CAN 600. Series 406-WH06 is qualified for use on the interior of potable water storage tanks and reservoirs. WH06 Off-White is the only color that is NSF certified in Series 406 Elasto-Shield. Refer to the NSF website at www.nsf.org for current listings and application specifications.

2.2 SERIES 406 PACKAGING

KIT SIZE	PART A	PART B	YIELD
X-Large Kit	1 - 55 gallon drum (50 gallon fill)	2 - 55 gallon drums (50 gallon fill)	150 gallons (568 L)
Large Kit	1 - 5 gallon pail	2 - 5 gallon pails	15 gallons (57 L)

2.3 SERIES 406 COVERAGE RATES (THEORETICAL)

	DRY MILS (MICRONS)	WET MILS (MICRONS)	SQ.FT./GAL (M^2/GAL)
Minimum	25.0 (635)	25.0 (635)	64 (6.0)
Maximum NSF	75.0 (1905)	75.0 (1905)	21 (2.0)
Maximum	125.0 (3175)	125.0 (3175)	13 (1.2)

2.4 SERIES 406 STORAGE & MATERIAL TEMPERATURE

Minimum storage temperature is 50°F (10°C) and maximum is 90°F (32°C). For optimal handling and application characteristics, both material components should be stored between 80°F and 90°F (27°C and 32°C) for 48 hours prior to use.

3.0 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 406 Elasto-Shield should be abrasive blasted to near white metal cleanliness in accordance with SSPC-SP10/NACE 2 Near White Metal Blast Cleaning or ISO Sa 2.5 Very Thorough Blast Cleaning and achieve a minimum 3.0 mil angular anchor profile.

Non-Immersion Service: Steel surfaces to receive Tnemec's Series 406 Elasto-Shield should be abrasive blasted to a commercial blast cleanliness in accordance with SSPC-SP6/NACE 3 Commercial Blast Cleaning or ISO Sa 2 Thorough Blast Cleaning and achieve a minimum 3.0 mil angular anchor profile.

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.

3.4 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 and other contaminants.

3.5 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 or ISO Sa 2.5 Very Thorough Blast Cleaning with a 3.0 mil minimum angular anchor profile.

3.6 REINFORCING STEEL REPAIR

Where corrosion of the reinforcement steel (rebar) exists, continue concrete removal along the corroded steel and any adjacent areas which show evidence of corrosion-induced damage that would inhibit bonding of repair material. When the exposed reinforcing steel has loose rust, corrosion products, or is not well bonded to the surrounding concrete, removal should include undercutting the corroded reinforcing steel by approximately ¾ in (19 mm) in accordance with ICRI Guideline No. 310.1R. Every precaution should be made to avoid cutting underlying reinforcement. All exposed reinforcement surfaces shall be thoroughly cleaned of all loose concrete, rust, and other contaminants. A protective coating such as Series 1 or N140 can be applied to the reinforcement after surface preparation. Avoid spillage or application onto the parent concrete. The area around the rebar may then be rebuilt using Series 218 MortarClad, or in more extreme cases, Series 217 MortarCrete.

3.7 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. Outgassing can also be minimized when using Series 406 Elasto-Shield direct to concrete by spray applying a "mist coat" and allowing the concrete to outgas for several minutes. This should be followed by another light tack coat.

3.8 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. Apply Series 218 up to sawcuts, then the Series 406 Elasto-Shield can be trowelled or brushed into the saw cut areas. Please refer to the Elasto-Shield Detail Guides which can be found online at www.tnemec.com.

4.0 SURFACER/FILLER/PATCHER

4.1 SURFACER/FILLER/PATCHER

Reference the Series 215 or 218 product data sheet or application guide if available for more information.

5.0 PRIMERS

5.1 PRIMERS FOR CONCRETE

Concrete: Series 20HS, FC20HS, N140, N140F, V140, V140F, 201.

5.2 PRIMERS FOR STEEL

Steel: Self-priming or Series 1, 20HS, FC20HS, 90-97, 91-H_2O, 94 H_2O, N140, N140F, V140, V140F.

5.3 RECOAT TIMES

When topcoating with Series 406, the following recoat times apply:

	90˚F (32˚C) (Min/Max)	75˚F (24˚C) (Min/Max)	55˚F (13˚C) (Min/Max)	35˚F (2˚C) (Min/Max)
Series 90-97/ 91-H_2O/94-H_2O	4 hrs/ 14 days	4 hrs/ 30 days	4 hrs/ 30 days	4 hrs/ 30 days
Series 201	4 hrs/ 3 days	6 hrs/ 5 days	8 hrs/ 7 days	N/A
Series 140	7 hrs/ 7 days	10 hrs/ 14 days	24 hrs/ 30 days	N/A
Series 140F	4 hrs/ 7 days	6 hrs/ 14 days	24 hrs/ 30 days	24 hrs/ 30 days
Series 1	4 hrs/ 30 days	4 hrs/ 30 days	4 hrs/ 30 days	4 hrs/ 30 days

Reference Tnemec's certified product listing at www.nsf.org for details on the maximum allowable DFT, tank capacity and pipe diameter.

DO NOT AGITATE PART A. Agitate Part B making sure no pigment remains on the bottom of the container. **Do not mix Part A with Part B.** Use a 1 (Iso): 2 (Resin) ratio plural component heated airless spray unit. **Note:** Part A must be heated to 90°F to 100°F (32°C to 38°C) and Part B must be heated to 110°F to 120°F (43 °C to 49 °C) prior to and during application.

Prior to use: Keep containers tightly sealed. Components will react with moisture. For the Parts A and B, attach desiccant filter through bunghole to prevent moisture from air entering the drum.

CAUTION: Cap partial drums with nitrogen gas to prevent moisture contamination.

6.0 MIXING

6.1 SERIES 406 ELASTO-SHIELD - THINNING

DO NOT THIN. Thinning will adversely affect the performance properties and negate NSF/ANSI/CAN Std. 61 Certification for potable water contact applications.

7.0 CURING TIME

	To Recoat (Maximum)	Return to Service WH06 (NSF/ANSI/CAN Std. 61)	Return to Service Non-Potable
95°F(30°C)	24 hours	72 hours	36 hours
75°F (24°C)	24 hours	72 hours	36 hours
35°F (2°C)	24 hours	7 days	7 days

Note: There is a seven day return to service time for potable water immersion if N140, N140F, V140, or V140F is used as a primer. This does not apply if Series 406 is applied direct or another approved primer is used. **Note:** If the maximum recoat window has been exceeded, the Series 406 coated surface must be mechanically abraded and wiped with MEK prior to topcoating. Curing time varies with surface temperature, air movement, humidity and film thickness. **Ventilation:** When used in enclosed areas, provide adequate ventilation during application and cure.

8.0 APPLICATION & EQUIPMENT

8.1 SURFACE TEMPERATURE

Minimum surface temperature is 20°F (-7°C) and maximum is 120°F (49°C). The surface should be dry and at least 5°F above the dew point. **Note:** Dehumidification is required if humidity is above 85%. **Note:** To reduce the effects of outgassing when applied to concrete/CMU, the surface temperature should be stable or descending and out of direct sunlight.

8.2 SERIES 406 ELASTO-SHIELD - APPLICATION HEAT REQUIREMENT

Both components must be heated prior to and during application. Heat product component A (iso/catalyst) to 90°F to 100°F and component B (resin/base) to 110°F to 120°F. Do not heat component A (iso/catalyst) above 100°F or component B (resin/base) above 120°F. Consult Tnemec Technical Service for specifics. **Prior to use**: Keep containers tightly sealed.

8.3 SERIES 406 ELASTO-SHIELD - PLURAL COMPONENT EQUIPMENT RECOMMENDATION

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

9.0 TOUCH-UP & REPAIR

- If removing blisters, cut back to sound coatings or substrate.
- If the blister has uncured material, remove all resins by scraping then wipe with solvent such as MEK or xylene to remove all uncured resin.
- If the steel substrate is exposed, prepare the steel in accordance with SSPC-SP11. If the substrate is concrete, prepare in accordance with SSPC-SP13 with a surface profile of ICRI CSP 5.
- Scarify and feather the edges 2-4 inches around the area to be repaired with wire cup brushes attached to right angle drills.
- Wipe the area to be coated with MEK and allow to dry.
- Series 406 should be applied at the specified thickness to the properly prepared, clean, dry and comtaminant free surface Spot touch-up using other materials: For potable water, use Series 22 Epoxoline applied at 30.0 - 40.0 mils in one coat. All other applications, use Series 435 Perma-Glaze. **Note**: Series 22 and Series 435 have a different finish color than Series 406 Elasto-Shield.
- Refer to the product data sheet for proper mixing, application and cure instructions.

10.0 INSPECTION

10.1 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 film coverage.

10.2 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 406 Elasto-Shield 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 406 Elasto-Shield 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.

10.3 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 alternative 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.

11.0 HEALTH & SAFETY

Series 406 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 Safety Data Sheet for important health and safety information prior to the use of this product. Keep out of the reach of children.