



# SURFACE PREPARATION AND APPLICATION GUIDE

SERIES 1416 VINESTER  
150-MIL GLASS ROVING & ABRASION SYSTEM

**TNEMEC COMPANY INCORPORATED**

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## 1.0 INTRODUCTION

The purpose of this guide is to acquaint applicators with the basic information necessary for properly ordering, storing and installing Tnemec's Vinester 150 Mil Glass Roving Reinforced & Abrasion Resistant System. 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.

Also, reference the project specifications and compare them with this guide and the product data sheet. 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 sheet, please contact your Tnemec representative or call 1-816-483-3400 for assistance.

## 2.0 SYSTEM OVERVIEW

The following contains information on the core components of the products used in this system.

### 2.1 SERIES 1416 SYSTEM

The Vinester 150 Mil Glass Roving Reinforced and Abrasion Resistant System provides the ultimate in thermal shock and chemical resistance with the added feature of a specially formulated, robust abrasion and wear resistant mortar coat.

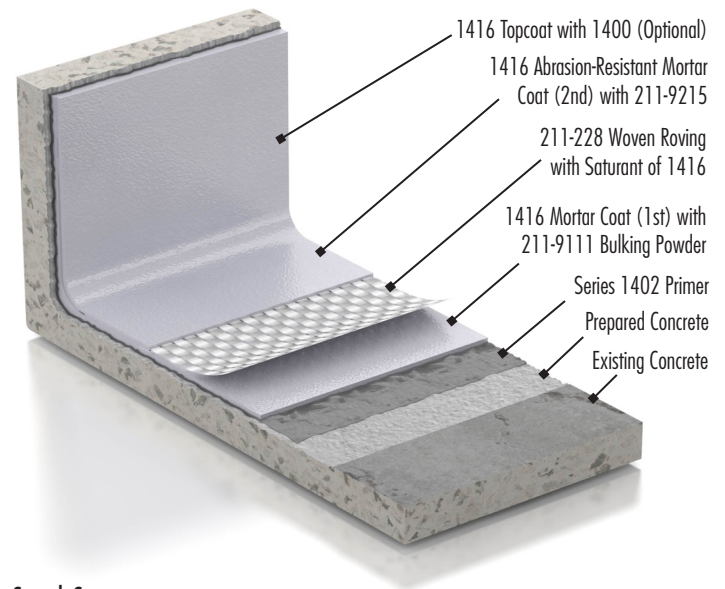
The application consists of appropriate surface preparation, primer, a trowel-applied standard mortar basecoat with an embed of reinforcing 18-ounce fiberglass roving, a resin saturant coat, and a final second mortar coat of abrasion resistant material.

### 2.2 MATERIAL OVERVIEW

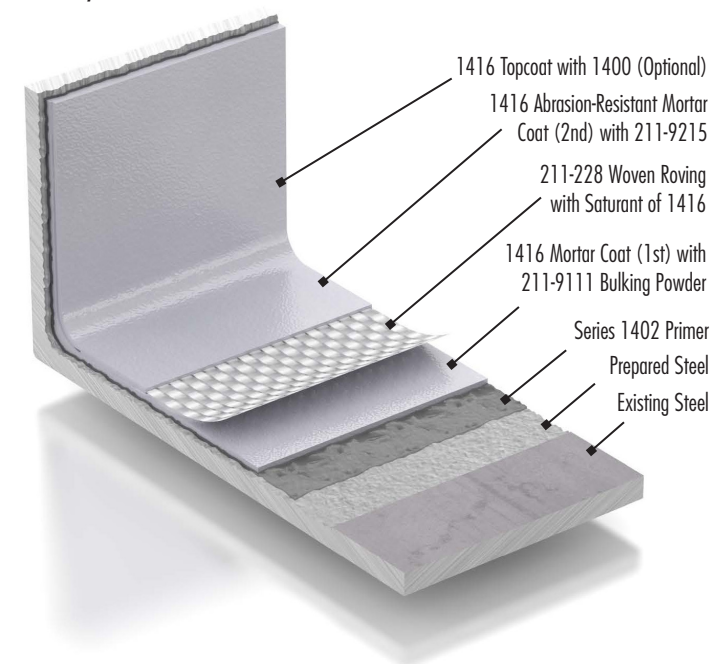
- Primer: Series 1402 ProPolymer
- 1st Mortar Coat: Series 1416-900 Vinester
- Bulking Additive (mortar): Series 211-9111 Bulking Powder
- Reinforcement: Series 211-228 Woven Roving
- Saturant Coat: Series 1416-900 Vinester
- 2nd Abrasion-Resistant Mortar Coat: Series 1416-900 Vinester
- Abrasion Additive: Series 211-9215 Abrasion Resistant Powder
- Topcoat: Series 1416-900 Vinester with Series 1400 Color Packs (Optional)

## 2.2 SYSTEM OVERVIEW

### Concrete System:



### Steel System:



## 3.0 JOB SET-UP

Prior to starting installation, please note the following:

- Itemize all materials ordered from Tnemec.
- Establish surface preparation requirements.
- Ensure all equipment is readily available and in working order.
- Set-up a mixing area clearly designated at least 50 feet away from heat, sparks, open flame, welding, or other sources of ignition.
- Communicate the installation, safety procedures, and requirements with all persons involved.

## 4.0 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.

### 4.2 PREPARATION OF STEEL

**Immersion Service/Severe Exposure/Elevated Temperatures:** SSPC SP5/ NACE No.1 White Metal Blast Cleaning or ISO Sa3 Blast Cleaning to Visually Clean with a minimum angular anchor profile of 3.0 mils (75 microns) is required.

**Non-Immersion Service:**

SSPC SP10/NACE No. 2 Near White Metal Blast Cleaning or ISO Sa 2 ½ Very Thorough Blast Cleaning with a minimum angular anchor profile of 3.0 mils (75 microns) is required.

### 4.3 TERMINATIONS

When the coating system is not scheduled to provide a monolithic surface, terminations must be built into the system. Examples include leading-edge sawcut terminations or overlapping onto pipes or other miscellaneous metals. Consult your Tnemec Representative for more information.

## 5.0 PRIMER INSTALLATION

### 5.1 SERIES 1402

The recommended primer for the Vinester Glass Roving Reinforced & Abrasion Resistant System is Series 1402 ProPolymer, an elevated temperature vinyl ester coating. Contact Tnemec Technical Services to discuss alternate primers.

### 5.2 SERIES 1402 CURING TIME

TEMPERATURE	IMMERSION SERVICE	MIN. RECOAT	MAX. RECOAT
90°F (32°C)	24 Hours	2 Hours	24 Hours
70°F (21°C)	24 Hours	2 Hours	24 Hours

**Note:** If more than 24 hours has elapsed between coats, the Series 1402 surface must be mechanically abraded before topcoating the first coat.

### 5.3 SERIES 1402 PACKAGING

KIT SIZE	PART A	PART B	YIELD (MIXED)
Medium	5 gallon pail	Pint bottle	5 gallons (18.9 L)
Small	1 gallon can	4 oz bottle	1 gallons (3.7 L)

### 5.4 SERIES 1402 COVERAGE RATES

DRY MILS (MICRONS)	SQ. FT./GAL (M <sup>2</sup> /GAL)
2.0 - 6.0 (50 - 152)	682 - 227 (63 - 21)

### 5.5 SERIES 1402 MIXING

Power mix contents of Part A (base) thoroughly, making sure no pigment remains on the bottom of the can. Add the Part B (catalyst) slowly to the Part A while under agitation. Ensure that all Part B is blended with Part A by scraping the pail walls with a flexible spatula. Continue to agitate until thoroughly mixed. Care should be exercised so as not to entrap air in the mixed material. Do not use mixed material beyond pot life limits.

### 5.6 SERIES 1402 THINNING

Do not thin.

### 5.7 SERIES 1402 SPRAY LIFE & POT LIFE

TEMPERATURE	SPRAY LIFE	POT LIFE
75°F (24°C)	25 Minutes	30 minutes

**Note:** At higher temperatures, pot life will decrease (use caution in spray equipment). In hot weather, material should be cooled to 65°F to 80°F (18°C to 27°C) prior to mixing and application to improve workability and avoid shortened pot life.

### 5.8 SERIES 1402 MATERIAL & STORAGE TEMPERATURE

**Minimum storage temperature is 40°F (4°C) and maximum is 80°F (26°C).** Prior to application, the material temperature should be between 60°F and 90°F (16°C and 32°C). It is suggested the material be stored at this temperature at least 48 hours prior to use.

Temperatures will affect workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten pot life.

### 5.9 SERIES 1402 EQUIPMENT

**Roller:** Use 1/4" or 3/8" (6.5 mm to 9.5 mm) synthetic woven nap roller cover.

**Brush:** Recommended for small areas only. Use high quality natural or synthetic bristle brushes.

### 5.10 SERIES 1402 SURFACE TEMPERATURE

Minimum surface temperature is 60°F (16°C) and maximum is 90°F (32°C). The surface should be dry and at least 5°F (3°C) above the dew point. Coating will not cure below the minimum surface temperature.

### 5.11 SERIES 1402 CLEANUP

Clean and purge lines immediately after use with MEK.

## 6.0 FIRST MORTAR COAT & REINFORCEMENT

### INSTALLATION

#### 6.1 SERIES 1416 VINESTER

The first mortar coat is made using Series 1416 clear with the addition of Series 211-9111 Bulking Additive adjusted in consistency for horizontal or vertical applications.

Reference the following charts for Series 1416 Vinester compositional specifics. Contact your Tnemec Representative with any additional questions.

#### 6.2 SERIES 1416 CURING TIME

TEMPERATURE	TO RECOAT	IMMERSION	MAXIMUM RECOAT‡
90°F (32°C)	3 Hours	20 Hours	3 Days
75°F (24°C)	4 Hours	24 Hours	4 Days
50°F (10°C)	12 Hours	4 Days	5 Days

‡ **Note:** Certain service applications may require elevated temperature and/or longer cure times for placing in service.

#### 6.3 SERIES 1416 PACKAGING

KIT SIZE	PART A (PARTIALLY FILLED)	PART B (PARTIALLY FILLED)	YIELD (MIXED)
Medium	5 gallon pail	Pint bottle	4.76 gallons (18 L)
Small	1 gallon can	4 oz bottle	0.95 gallons (3.6 L)

#### 6.4 SERIES 1416 COVERAGE RATES

##### Saturant

DRY MILS (MICRONS)	SQ. FT./GAL (M <sup>2</sup> /GAL)	SERIES 1400 COLORANTS	BULKING ADDITIVES*
20.0 (510)	68 - 340 (6.3 - 31.6)	N/A	N/A

##### Pigmented

DRY MILS (MICRONS)	SQ. FT./GAL (M <sup>2</sup> /GAL)	SERIES 1400 COLORANTS	BULKING ADDITIVES*
20.0 (510)	68 - 340 (6.3 - 31.6)	Half Pint - Quart	See 1416 Product Data Sheet for information

##### Mortar

DRY MILS (MICRONS)	SQ. FT./GAL (M <sup>2</sup> /GAL)	SERIES 1400 COLORANTS	BULKING ADDITIVES*
50.0 (1270)	49 - 250 (4.6 - 23.2)	Half Pint - Quart	1 bag - 2 bags

\*Bulking additives: Series 211-9106, 211-9111 or 211-9215.

#### 6.5 SERIES 1416 VINESTER MORTAR MIXING

The basecoat mortar requires Series 1416 clear. The Part A is mixed at a low speed, using a high-torque drill with a box style blade attached, blending until all solids are reincorporated and a uniform color is achieved. The Part A is then catalyzed using the 1402 Part B prior to the addition of the mortar powder. After catalyzing, immediately split the container into two buckets to allow for the incorporation and blending of the bulking powder.

Add Series 211-9111 to the catalyzed Series 1416 material at the rate of 20 to 25 pounds per gallon and mix until consistency is at the level required for vertical or horizontal application. Immediately proceed to installation of the mortar basecoat.

See the following chart for adjustments in viscosity and resulting coverage per target thicknesses.

COVERAGE CALCULATOR/USING TNEMEC BULKING POWDERS			
DESCRIPTION	POUNDS	DRY FILM THICKNESS (DFT)	COVERAGE
<b>VERY WET</b>	10	50	41
		60	34
		70	29
		80	25
		100	20
<b>WET/SLURRY</b>	15	50	48
		60	40
		70	34
		80	30
		100	24
<b>STANDARD -</b>	20	50	54
		60	45
		70	39
		80	34
		100	27
<b>STANDARD +</b>	25	50	61
		60	51
		70	44
		80	38
		100	31
<b>HEAVY</b>	30	50	68
		60	57
		70	49
		80	42
		100	34
<b>TNEMEC SERIES 211-9111/ 211-9215/211-9214</b>			
FOR USE WITH SERIES 1415/1416/1418 ONLY			
COVERAGE RATES ARE THEORETICAL AND SHOWN IN SQUARE FEET FOR THE NEW YIELD			

#### 6.6 SERIES 1416 VINESTER MORTAR APPLICATION

Apply the mortar basecoat using a high grade trowel at a nominal thickness of 60 mils dry film thickness (DFT), which results in a spread rate of 45 to 50 square feet per gallon. Heavy trowel marks may be addressed by lightly rolling over the fins using a 3/8-inch nap roller slightly dampened with Series 44-809 Smoothing Agent. Immediately proceed to reinforcement embed while still fluid.

#### 6.7 SERIES 211-228 WOVEN ROVING

Series 211-228 Woven Roving is a 38-inch-wide roll of fiberglass woven roving which is cut to size and is used as the reinforcement. Once installed, it will receive the second mortar coat application. Series 211-228 shall be placed into the wet mortar basecoat and impressed using a trowel, steel ribbed roller or other appropriate tools

to make full contact. Mix and catalyze Series 1416 clear and apply over Series 211-228 as a saturant coat to wet out and orient all dry fibers of the glass woven roving so there are no visible dry spots. Apply at no less than 20 mils DFT, or about 60-square feet per gallon.

The general method when installing or placing Series 211-228 Woven Roving is to place sheets with a minimum overlap of 2-inches onto the adjoining sheet. Use liberal amounts of Series 1416 saturant overlap to ensure a quality bond between sheets. Some projects may require smooth transitions and, in these cases, an edge-to-edge placement with as minimal of a gap as possible between sheets should be employed. Consult with specification or Tnemec Technical Services if questions arise.

Once firm and dry, scuff the surface to remove any stray wicked glass fibers, either mechanically or by hand, and to dull the gloss of the saturant coat. Vacuum the surface to remove debris and make a final wipe with a clean and lint-free rag dampened with Series 44-809 Smoothing Agent.

### 6.8 SERIES 1416 THINNING

Do not thin.

### 6.9 SERIES 1416 POT LIFE

TEMPERATURE	POT LIFE
75°F (24°C)	45 Minutes

### 6.10 SERIES 1416 MATERIAL & STORAGE TEMPERATURE

**Minimum storage temperature is 35°F (2°C) and maximum is 75°F (24°C).** Prior to application, the material temperature should be between 60°F and 90°F (16°C and 32°C). It is suggested the material be stored at this temperature at least 48 hours prior to use. Temperatures will affect workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten pot life.

### 6.11 SERIES 1416 SURFACE TEMPERATURE

Minimum surface temperature is 60°F (16°C) and maximum is 90°F (32°C). The surface should be dry and at least 5°F (3°C) above the dew point. Coating won't cure below the minimum surface temperature. To minimize outgassing, concrete temperature should be stabilized or in a descending temperature mode and the concrete primed with a suitable epoxy primer.

### 6.12 SERIES 1416 CLEANUP

Clean all equipment and tools immediately after use with MEK.

## 7.0 SECOND MORTAR COAT ABRASION RESISTANT INSTALLATION

### 7.1 SERIES 1416 VINESTER

The second mortar coat is made using Series 1416 with the addition of Series 211-9215 Abrasion Resistant Powder adjusted in consistency for horizontal or vertical applications.

### 7.2 SERIES 1416 VINESTER MORTAR MIXING

The basecoat mortar requires Series 1416 clear. The Part A is mixed at a low speed, using a high-torque drill with a box style blade attached, blending until all solids are reincorporated and a uniform color is achieved. The Part A is then catalyzed using the 1402 Part B. After catalyzing, immediately split the container into two buckets to allow for the incorporation and blending of the bulking powder.

Add Series 211-9215 to the catalyzed Series 1416 material at the rate of 20 to 25 pounds per gallon and mix until consistency is at the level required for vertical or horizontal application. Immediately proceed to installation of the mortar basecoat.

See the following chart for adjustments in viscosity and resulting coverage per target thicknesses.

COVERAGE CALCULATOR/USING TNEMEC BULKING POWDERS			
DESCRIPTION	POUNDS	DRY FILM THICKNESS (DFT)	COVERAGE
<b>VERY WET</b>	10	50	41
		60	34
		70	29
		80	25
		100	20
<b>WET/SLURRY</b>	15	50	48
		60	40
		70	34
		80	30
		100	24
<b>STANDARD -</b>	20	50	54
		60	45
		70	39
		80	34
		100	27
<b>STANDARD +</b>	25	50	61
		60	51
		70	44
		80	38
		100	31
<b>HEAVY</b>	30	50	68
		60	57
		70	49
		80	42
		100	34
<b>TNEMEC SERIES 211-9111/ 211-9215/211-9214</b>			
FOR USE WITH SERIES 1415/1416/1418 ONLY			
COVERAGE RATES ARE THEORETICAL AND SHOWN IN SQUARE FEET FOR THE NEW YIELD			

### 7.3 SERIES 1416 VINESTER MORTAR APPLICATION

Apply the abrasion-resistant mortar coat using a high grade trowel at a nominal thickness of 60 mils DFT, which results in a spread rate of 45 to 50 square feet per gallon. Heavy trowel marks may be addressed by lightly rolling over the fins using a 3/8-inch nap roller slightly dampened with Series 44-809 Smoothing Agent. Immediately proceed to reinforcement embed while still fluid.

#### 7.4 SERIES 1416 THINNING

Do not thin.

#### 7.5 SERIES 1416 MATERIAL & STORAGE TEMPERATURE

**Minimum storage temperature is 35°F (2°C) and maximum is 75°F (24°C).** Prior to application, the material temperature should be between 60°F and 90°F (16°C and 32°C). It is suggested the material be stored at this temperature at least 48 hours prior to use. Temperatures will affect workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten pot life.

#### 7.6 SERIES 1416 SURFACE TEMPERATURE

Minimum surface temperature is 60°F (16°C) and maximum is 90°F (32°C). The surface should be dry and at least 5°F (3°C) above the dew point. Coating won't cure below the minimum surface temperature. To minimize outgassing, concrete temperature should be stabilized or in a descending temperature mode and the concrete primed with a suitable epoxy primer.

#### 7.7 SERIES 1416 CLEANUP

Clean all equipment and tools immediately after use with MEK.

### 8.0 TOPCOAT INSTALLATION (OPTIONAL)

#### 8.1 SERIES 1416 VINESTER

In general, topcoats are not applied over wearing surfaces, however some applications may require a finish coat. Consult Tnemec Technical Services for specifics. If the topcoat or finish option has been selected for the Vinester Glass Roving Reinforced & Abrasion Resistant System, the topcoat is Series 1416 Vinester with Series 1400 Color Pack to create a pigmented finish coat.

In lieu of Series 1416 with Series 1400 Color Pack, Series 1430 may be substituted with no change of film thickness. Follow mixing instructions and conditions specified on the product data sheet.

#### 8.2 SERIES 1416 VINESTER PIGMENTED TOPCOAT MIXING

The topcoat uses Series 1416 clear with the addition of a selected Series 1400 Color Pack. Series 1400 Color Pack is added and fully mixed into Series 1416 Part A until a uniform color is achieved. Series 1402 Part B is then blended into the now-pigmented material.

#### 8.3 SERIES 1416 VINESTER PIGMENTED TOPCOAT APPLICATION

Immediately begin applying Series 1416 topcoat over all horizontal and vertical surfaces using an appropriate squeegee or roller to seal the mortar coat on the walls and over the mortar coat at 15 to 20 mils DFT or a coverage rate of 55 to 90 square feet per gallon.

On vertical applications, 8 to 10 pounds per gallon of Series 211-9111 may be added to Series 1416 Vinester topcoat to assist in the film build without affecting the sheen or grit of the finish coat.

Actual topcoat application may be adjusted to achieve the desired level of finish, but it should be no less than 15 mils DFT.

#### 8.4 SERIES 1416 THINNING

Do not thin.

#### 8.5 SERIES 1416 POT LIFE

TEMPERATURE	POT LIFE
75°F (32°C)	25 minutes with 5% thinning

#### 8.6 SERIES 1416 MATERIAL & STORAGE TEMPERATURE

**Minimum storage temperature is 35°F (2°C) and maximum is 75°F (24°C).** Prior to application, the material temperature should be between 60°F and 90°F (16°C and 32°C). It is suggested the material be stored at this temperature at least 48 hours prior to use.

Temperatures will affect workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten pot life.

#### 8.7 SERIES 1416 SURFACE TEMPERATURE

Minimum surface temperature is 60°F (16°C) and maximum is 90°F (32°C). The surface should be dry and at least 5°F (3°C) above the dew point. Coating won't cure below the minimum surface temperature.

#### 8.8 SERIES 1416 CLEANUP

Clean all equipment and tools immediately after use with MEK.

### 9.0 INSPECTION

Examine the application for any air bubbles or blisters. If present, they must be cut out and repaired. Refer to Tnemec Technical Bulletin 98-11 for additional information.

Unless directed by the specification, NACE SP0188 is generally not required when this system is applied to concrete surfaces on process floors, intermittent immersion or secondary containment services. High voltage discontinuity (spark) testing may be used to determine the presence and number of discontinuities in the nonconductive Vinester Glass Roving Reinforced & Abrasion Resistant System applied to a conductive surface. All high voltage discontinuity (spark) testing shall be performed in accordance with NACE SP0188 and the procedure's outlines therein.

Coatings shall 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 "To Place in Service" or "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.

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 into 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 sand-filled paper 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.

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

TOTAL DRY FILM THICKNESS (MILS)	VOLTAGES (V)
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 shall be performed using the same testing procedures as outlined above. If utilizing alternate high voltage DC holiday detectors, never exceed 100 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 FINAL CURING TIME

Allow 7 days at 75°F (24°C) final cure before placing into service. Contact Tnemec Technical Service if deviations are required.

## 11.0 SAFETY

These products may contain solvents and/or other chemical ingredients. Adequate health and safety precautions should be observed during storage, handling, application and curing. For information regarding the potential hazards associated with these products, please refer to the container label or request a Material Safety Data Sheet from Tnemec Company, Inc. at +1-816-483-3400 or [www.tnemec.com](http://www.tnemec.com).