



SURFACE PREPARATION AND APPLICATION GUIDE

SERIES 217 MORTARCRETE

TABLE OF CONTENTS

Introduction.....	1
Products & Packaging.....	1-2
Concrete Surface Preparation.....	2-4
Mixing.....	4-6
Application Equipment.....	6-7
Application.....	7-9
Cure Schedule.....	9
Topcoating.....	9-10
Health & Safety.....	10

TNEMEC COMPANY INC

123 West 23rd Avenue North Kansas City, MO 64116
+1 816-483-3400 www.tnemec.com

Published technical data, instructions, and pricing are subject to change without notice. Contact your Tnemec technical representative for current technical data, instructions, and pricing. Warranty information: The service life of Tnemec's coatings will vary. For warranty, limitation of seller's liability, and product information, please refer to Tnemec's Product Data Sheets at www.tnemec.com or contact your Tnemec Technical Representative. 08/2022

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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 217 MortarCrete. Prior to starting work, please read this entire guide carefully. It is important to adhere to all procedures, limitations and cautions for the Series 217 MortarCrete in the current product data sheet and MSDS and that you obtain answers to any questions before work begins. This application guide cannot cover every issue that may be encountered in the field. If you have questions or if issues arise that are not addressed in this guide or on the Product Data Sheet, please contact your Tnemec representative or call +1 816-483-3400 for assistance.

Please review all pertinent Tnemec Product Data Sheets and other corresponding Application Guides. Reference the project specification and compare them with this guide and Product Data Sheet. Resolve any inconsistencies prior to starting work. For additional information consult the recommendations of the International Concrete Repair Institute (ICRI) Guidelines No. 310.1R (*formally No. 03730*), "Guide for Surface Preparation for Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion," or No. 310.2 (*formally No. 03732*), "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Overlays," and the American Concrete Institute (ACI) Repair Application Procedure (RAP) - 6 "Vertical and Overhead Spall Repair by Hand Application" and ACI RAP-12 "Concrete Repair by Shotcrete Application". Failure to follow good trade practices and recommendations herein may result in decreased material performance.

2.0 PRODUCTS & PACKAGING

2.1 SERIES 217 MORTARCRETE

Series 217 MortarCrete is single-component, ultra rapid setting, hydraulic cementitious resurfacer containing blended specialty cements, aggregates and admixtures used to restore deteriorated concrete surfaces or extended with aggregate to make high-strength concrete.

Series 217 is packaged in a bag inside a plastic bucket (LPK) or paper bag (LBG) containing 55 lbs (25 kg) or a 1,500 lb (680 kg) super sack (SS).

2.2 SERIES 217 PACKAGING

UNIT	SIZE (CEMENT BLEND)	YIELD
Bucket (LPK)	55 lbs. (25 kg)	3.4 gallons (0.45 CU FT) 12.9 L (0.017 CU YD) (mixed with 4 quarts water)
Bag (LBG)	55 lbs. (25 kg)	3.4 gallons (0.45 CU FT) 12.9 L (0.017 CU YD) (mixed with 4 quarts water)
Super Sack (SS)	1,500 lbs. (680 kg)	12.27 CU FT (0.46 CU YD) (mixed with 25-27 gallons water)

Series 217 LPK



Series 217 LBG



Series 217 Super Sack (SS)



2.3 COVERAGE RATES (THEORETICAL)

NOMINAL THICKNESS	COVERAGE SQUARE FEET (SQUARE METERS)	NOMINAL THICKNESS	COVERAGE SQUARE FEET (SQUARE METERS)
0.25 in. (0.635 cm)	21.6 (2.01)	2.25 in. (5.72 cm)	2.4 (0.22)
0.50 in. (1.27 cm)	10.8 (1.00)	2.50 in. (6.35 cm)	2.2 (0.20)
0.75 in. (1.91 cm)	7.2 (0.67)	2.75 in. (6.99 cm)	2.0 (0.19)
1.00 in. (2.54 cm)	5.4 (0.50)	3.00 in. (7.62 cm)	1.8 (0.17)
1.25 in. (3.18 cm)	4.32 (0.40)	3.25 in. (8.26 cm)	1.7 (0.16)
1.50 in. (3.81 cm)	3.6 (0.33)	3.50 in. (8.89 cm)	1.5 (0.14)
1.75 in. (4.45 cm)	3.0 (0.28)	3.75 in. (9.53 cm)	1.4 (0.13)
2.00 in. (5.08 cm)	2.7 (0.25)	4.00 in. (10.16 cm)	1.3 (0.12)

Approximate Unit Yield and Theoretical Spread Rate based upon 4 quarts (3.8 L) of mix water to yield 3.4 gal/0.45 cu ft (12.9 L) unit.

Note: Application below minimum or above maximum spreading rates may adversely affect product performance.

2.4 SERIES 211-217 SLOW SET (OPTIONAL)

Series 211-217 Slow Set is a retarding additive to slow the set time. Series 211-217 is packaged in 0.9 oz (25 grams) and 1.5 lbs (680 grams) packets. Depending on the ambient temperature and desired working time add up to three (3) MPK packets (or 75 grams) of Series 211-217 Slow Set additive into the mixing water or into the dry 55 lb Series 217 and agitate. For a 1500 lb Super Sack of Series 217 add up to three (3) LPK packets (or 2040 grams) of Series 211-217 Slow Set additive. Refer to the Series 211-217 Slow Set product data sheet for additional information.

2.5 SERIES 211-219 FLOW CONTROL (OPTIONAL)

Series 211-219 Plasticizer is a flow enhancing additive to increase fluidity and reduce the mix water requirement. Series 211-219 is packaged in 1.0 oz (30 gram) and 1.8 lbs (816 grams) packets.

Depending on the desired slump and flow add up to two (2) MPK packets (or 60 grams) of Series 211-219 Plasticizer additive into dry 55 lb Series 217 and agitate. Then add potable water to mix. For 1500 lb Super Sacks, add up to two (2) LPK packets (or 1632 grams). Refer to the Series 211-219 Plasticizer product data sheet for additional information.

2.6 STORAGE & CONDITIONING

Minimum 40°F (4°C), Maximum 95°F (35°C). For optimum handling and application characteristics, condition product between 65°F to 75°F (18°C to 24°C) prior to use. Protect from moisture; store in dry environment.

2.7 SHELF LIFE

Discard any material exhibiting clumping or balling.

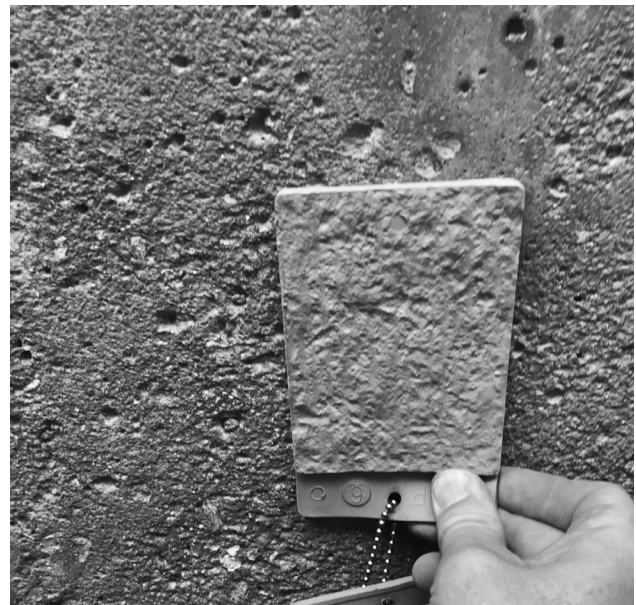
For 55 lbs: Six (6) months in original, unopened packing at recommended storage temperature.

For 1,500 lb super sack: three (3) months in original, unopened packaging at recommended storage conditions.

3.0 CONCRETE SURFACE PREPARATION

3.1 INITIAL CONCRETE REMOVAL

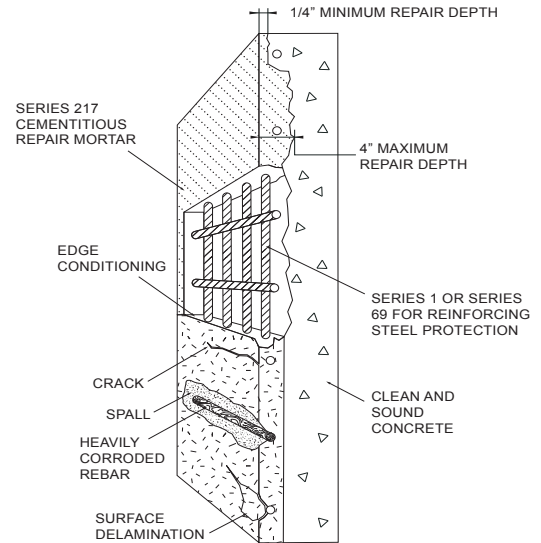
Substrate concrete must be structurally sound and cured a minimum of 28 days. Remove all loose materials, deteriorated concrete, laitance, existing coatings, and other bond-inhibiting materials from the substrate in accordance with SSPCSP13/NACE 6, minimum surface profile of ICRI-CSP6.



3.2 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 3/4 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 N69 can be applied to the reinforcement after surface preparation. Avoid spillage or application onto the parent concrete.



3.3 EDGE CONDITIONING

The edges of patch repairs or terminations should be saw cut perpendicular to the surface to a depth of at least 1/4 inch (6 mm) into the substrate concrete. Break out the complete repair area to a minimum depth of 1/4 inch (6 mm) up to the sawed edge to prevent feather edging. Avoid cutting the reinforcing steel. Contact Tnemec Technical Services with questions. The shape of the prepared cavity should be kept as simple as possible—generally square or rectangular in shape (Figure 1).

The edges of the patches should be saw cut perpendicular to the surface to a minimum depth of 1/4" (6 mm) to avoid feather edging and to provide a squared edge. Break out repair area to a minimum depth of 1/4 in (6 mm) (Figure 2).

Figure 2

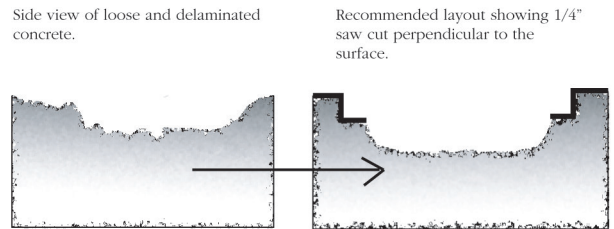
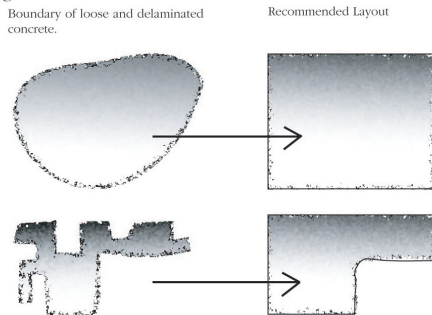


Figure 1



3.4 CRACKS

All active hydrostatic leaks in cracks must be stopped using Epoxytec Mortartec Hydrxx-1 or Hydrxx-3 or, if needed, a suitable urethane grout in accordance with ASTM F2414. Remove all excess grout outside of crack.

Static structural cracks may be routed to a depth of 1/4 inch (6 mm) and filled with properly mixed Series 217.

3.5 FINAL SURFACE CLEANING

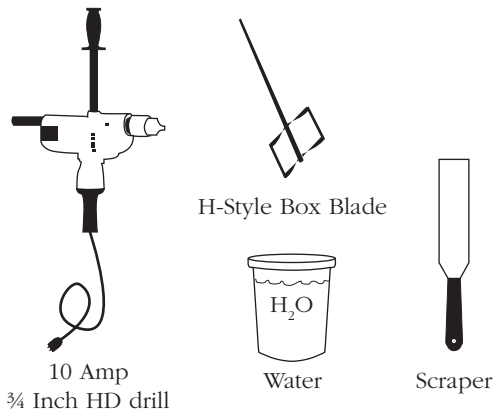
The concrete left in place shall be prepared by abrasive blasting or high-pressure water jetting to ensure the removal of any remaining damaged concrete, existing coatings, laitance, and other bond-inhibiting materials in accordance with SSPC-SP13/NACE No. 6 Surface Preparation of Concrete, and to produce a surface profile equivalent to the ICRI-CSP6 (or greater) amplitude. If the bond surface is produced by a vigorous mechanical method, such as pneumatic hammering, the surface will be very rough, but micro cracks may be induced just beneath the prepared surface. Tensile bond strength is sensitive to the existence of surface defects, such as micro cracks in substrate.

Check the concrete surface after cleaning to ensure the surface is free of additional loose aggregate or that additional delamination are not present. If high-pressure water jetting is used, cement and particulate slurry must be removed from the prepared surface before slurry hardens.

4.0 MIXING

Obtain proper mixing equipment. Reference ICRI 320.5 Drill Mixing Paddle No. P3 or No. P6.

Mix only the appropriate number of units that can be placed in 10 to 15 minutes. Do not retemper (add additional water) Series 217 after initial mixing. Adjust the mix water and Series 211-219 Plasticizer amounts based on the desired workability and slump using ASTM D143 slump test.



4.1 SERIES 217 MORTARCRETE - WORKABILITY CHART WITH H₂O AND SERIES 211-219 PLASTICIZER*

DEGREE OF WORKABILITY	PRODUCT CONSISTENCY	SLUMP IN.	OPTION 1 WATER ONLY QT'S (OUNCES)	OPTION 2 WATER WITH S211-0219 PLASTICIZER		TYPICAL USES
				QT'S (OZ.)	MPK (G)	
VERY LOW	VERY DRY	0-1	3.25 (104)	NA	NA	very dry mixes, patching
LOW	HEAVY & THICK	1-2	3.5 (112)	NA	NA	high build spray and trowel applied, 1" to 4" vertical applications.
MEDIUM	FIRM	2-4	3.75 (120)	3.0 (96)	1 (30)	spray and trowel applied, 0.75" to 2" vertical applications, best for forms.
HIGH	FIRM & WET	4-6	4.0 (128)	3.25 (104)	1 (30)	general use, spray or trowel applied, 0.25" to 1" applications.
HIGH	LOOSE	6-8	4.25 (136)	3.5 (112)	1 (30)	spray transfer with trowel finish, thin applications (0.25-0.50")
VERY HIGH	THIN	8-10	4.5 (144)	4.0 (128)	1 (30)	pouring
	WET	10-12	4.75 (152)	3.75 (120)	2 (60)	not recommended

*All LPK pail mixes were mechanically drill mixed for 2 minutes. Water temperature 75°F (24°C), material temperature 82°F (28°C).



4.2 SERIES 217 PAIL MIX

Remove Series 217 bag from the 5-gallon plastic pail. Add half of the 3.5-4.5 quarts (3.3 to 4.2 L) of potable water to the supplied bucket. Slowly sift Series 217 powder into mixing bucket while under mechanical agitation with heavy duty 3/4" (10 amp) slow-speed corded drill (300-400 rpm) and H-Style (box) blade drill mixing paddle #P6 (ICRI 320.5). Add the remaining volume of water and mix for a minimum of two (2) minutes until a homogeneous mixture is achieved. Do not add additional water after initial batching. Water temperature that is above 80°F (27°C) can significantly reduce working time.



4.3 SERIES 217 MECHANICAL MIXER

For 3 bags (165 lb) mixes: Start mixer and add 1 gallon (3.79 L) of potable water. Add one bag (55 lbs) to mixer and allow to mix briefly. Add another 1 gallon (3.79 L) of potable water followed by the 2 remaining bags (110 lbs). Add additional potable water, up to 1.5 gallons (5.67 L), as needed for desired consistency. Allow to mix for a minimum of two (2) minutes until homogeneous mix is achieved. Continue mechanical mixing until ready to place. Maximum mixing time without admixtures is 15 minutes at 75°F (24°C).

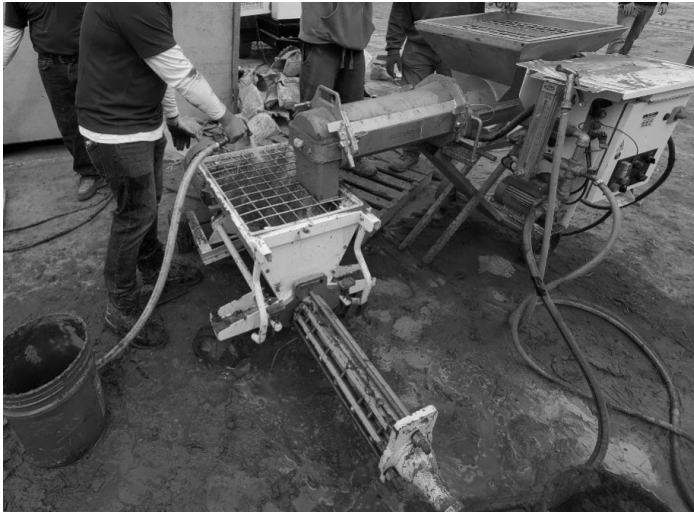
4.4 SERIES 217 CONTINUOUS MIXER

Add Series 217 directly to hopper of Graco ToughTek CM-40 electric continuous mixer. Set speed selector to No. 1. Turn water on and adjust water flow rate to 1.8 to 2.8 gallons (6.8 to 10.6 L) per minute (GPM). Add 211-217 Slow Set or 211-219 Plasticizer to grout pump hopper and drill mix with No. P3 or P6 mixing paddle to achieve homogeneous mix. Contact Tnemec Technical Service for the start-up/operate/shut down Equipment Guide using the ToughTek CM-40 or for additional information.

5.0 APPLICATION EQUIPMENT

5.1 GROUT PUMPS

Material may also be mixed and spray transferred to the substrate using low-pressure grout pumps, carousel pumps, or high-pressure wet-mix shotcrete equipment. Consult equipment manufacturer recommendations for specific details and instructions.



4.5 SERIES 217 CONCRETE

To create Series 217 high-strength concrete for casting or a “dry-pack” mortar for deep patch repairs of honeycomb or other cavities greater than the recommended maximum thickness, post-add 20 to 28 lbs of locally purchased coarse pea gravel per 55 lb Series 217 mix containing 3.5 to 4.0 quarts (3.3 to 3.8 L) of water. Note: Do not exceed 4.0 quarts (3.8 L) of potable water when making Series 217 concrete mix; use Series 211-219 Plasticizer to adjust the slump. Pea gravel aggregate must be non-reactive (ASTM C1260, C227, C289), clean and washed, well-graded, saturated surface dry (SSD), have low absorption and high density and conform to ASTM C33 size one half inch to No. 8 (12.5 mm to 2.36 mm). Contact your Tnemec representative or Tnemec Technical Services for additional information.



6.0 APPLICATION

6.1 TEMPERATURE REQUIREMENTS

Minimum 45°F (7°C) substrate and ambient application temperature maximum of 95°F (35°C). Do not apply Series 217 if expected to fall below this temperature within 24 hours of application. Follow ACI recommendations for Wet Weather Cold Weather or Hot Weather Concrete applications.



6.2 BOND (SCRUB) COAT

For hand placement or low pressure grout spray: Using a rubber sponge, work a thin bond coat (scrub coat) of Series 217 into the SSD substrate to ensure intimate contact and to help prevent sloughing or sagging of repair materials on vertical and overhead surfaces. Do not add additional water to scrub coat mix; it should be same water mix and slump as mortar.



PUMP	Graco M680 10:1 Ratio	QuikSpray Carousel (185 CFM required)	Graco Tough Tek S340e	WIWA 600 12:1	Graco Tough Tek P40 Rotor Stator
FLUID LINE	35'-70' of 1" ID	30-60' of 1 1/2" ID	25-50' of 1 1/2" ID	70' of 1" ID	50'-2" ID 150'-1.5" ID 200' total
SPRAY GUN	Flex Hose	Multi-air jet pole gun	Pole Spray Applicator	Straight Shot	1.2" Browning Nozzle
FLUID TIPS	No. 6 Nozzle	Rubber Cap with metal orifice 3/8" to 1/2" (9.5 mm to 12.7 mm)	No. 6 Nozzle	Nozzle 1/2"	Nozzle 1.25"
FLUID PRESSURE	300 psi (adjust as necessary)	60-80 psi (4.1-5.5 bar)	200-300 psi (adjust as necessary)	60-70 psi	600 psi (adjust as necessary)
ATOMIZING PRESSURE	Adjust at gun for proper atomization	70 psi (4.8 bar)	Adjust at gun for proper atomization	Adjust at gun for proper atomization	Adjust at gun for proper atomization
HOPPER	10 Gallons Stainless Steel	18 gallon	20 gallon	6.5 gallons stainless steel	19 gallon
YIELD PER HOUR †	20 bags (70 gallons)	30 bags (103 gallons)	25 bags (87 gallons)	20 bags (70 gallons)	100 bags (340 gallons)

† Estimates are based on industry feedback and experience; contact Temec Technical Service for additional details.

ESTIMATED MIXING/PRODUCTION RATES PER HOUR	
PAIL MIX	20 buckets
MECHANICAL MIX	30 bags
CONTINUOUS MIX	100 bags

6.3 MORTAR

Apply the Series 217 with adequate pressure before the scrub coat dries. Thoroughly consolidate the repair material into the corners of patch and around any exposed reinforcement steel. Full encapsulation of the reinforcement and intimate contact with substrate is important for long-term durability.



6.4 FINISHING

Do not wait for bleed water. Finish Series 217 by striking off with a straight edge and close with the recommended concrete finishing tools, as conditions allow, to create a smooth, even surface. Finish Series 217 by striking off with a straight edge and close with a wooden float, plastic float, rubber float, or steel trowels. Avoid using a sponge and mason brush finishing as these introduce water into the surface during finishing. Do not overwork the Series 217.

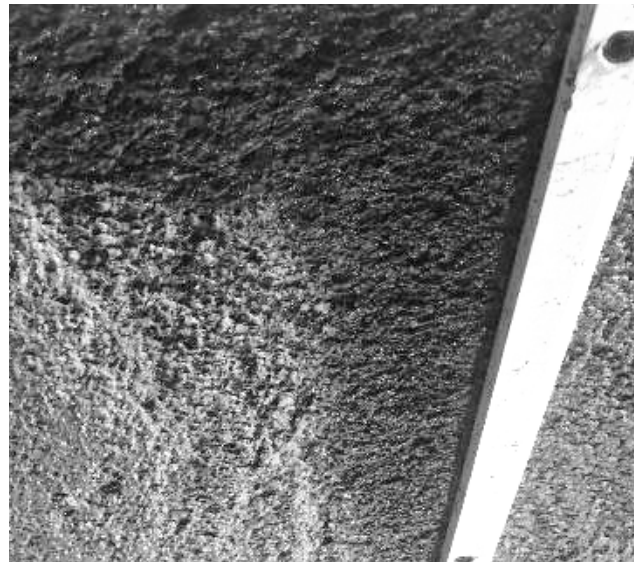


6.5 EDGE TERMINATION

Series 217 should not be feathered. The edges of repairs or termination points should be perpendicular to the concrete surface to a thickness of at least 1/4 inch (6 mm). Series 217 must be mechanically prepared in accordance with SSPC-SP13/NACE 6, ICRI-CSP 5 minimum surface profile prior to application of recommended topcoats.



The use of 3/8" plywood is used in the photo above



The use of 1/2" firing strip is used in the photo above.



Final edge condition is depicted in the photo above.

7.0 CURE SCHEDULE

Water quenching reduces cracking, which can be caused by the excess heat of hydration, which is a function of the thickness of Series 217. The greater the installed thickness of Series 217, the greater the excess heat of hydration.



Begin water quenching as soon as the surface has lost its moist sheen. Water quench Series 217 until product has achieved final set (can take up to 2-3 hours, dependent on thickness and temperature). Keep Series 217 concrete in forms for a minimum of 24 hours. Protect repairs from direct sunlight, wind and other conditions that could cause rapid drying of material. Longer water quench times may be required during colder temperatures or when using Series 211-217 Slow Set. Refer to ACI 305 or ACI 306 for hot or cold weather guidelines. Contact Tnemec Technical Services for additional information.

TEMPERATURE	INITIAL SET	FINAL SET	TO TOPCOAT
90°F (32°C)	30 Minutes	60 Minutes	12 Hours
70°F (21°C)	60 Minutes	90 Minutes	12 Hours
45°F (7°C)	90 Minutes	2 Hours	24 Hours

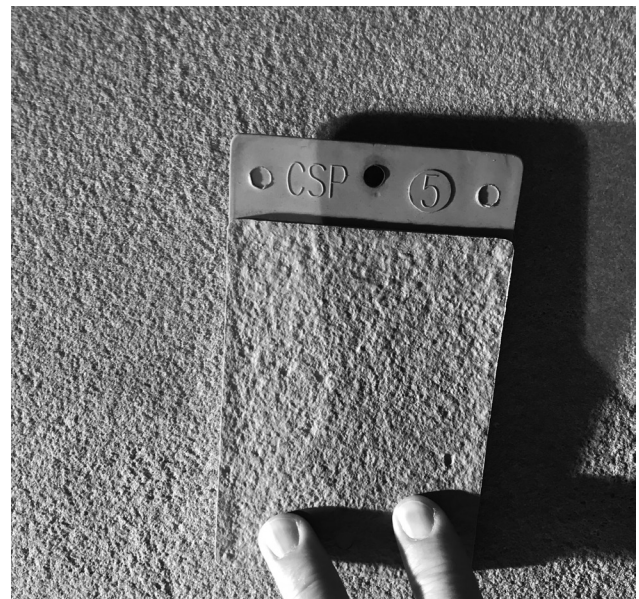
Minimum 45°F (7°C) substrate and ambient application temperature maximum of 95°F (35°C). Do not apply Series 217 if expected to fall below this temperature within 24 hours of application. Follow ACI recommendations for Wet Weather Cold Weather or Hot Weather Concrete applications.

7.1 SERIES 217 WORKING TIME

Approximately 15-20 minutes at 75°F (24°C), & 50% R.H. Placement time is dependent on environmental conditions, mixing water and material temperatures. It is recommended to use chilled water 50°F-60°F (10°C-16°C) when temperatures exceed 85°F (29°C).

8.0 TOPCOATING

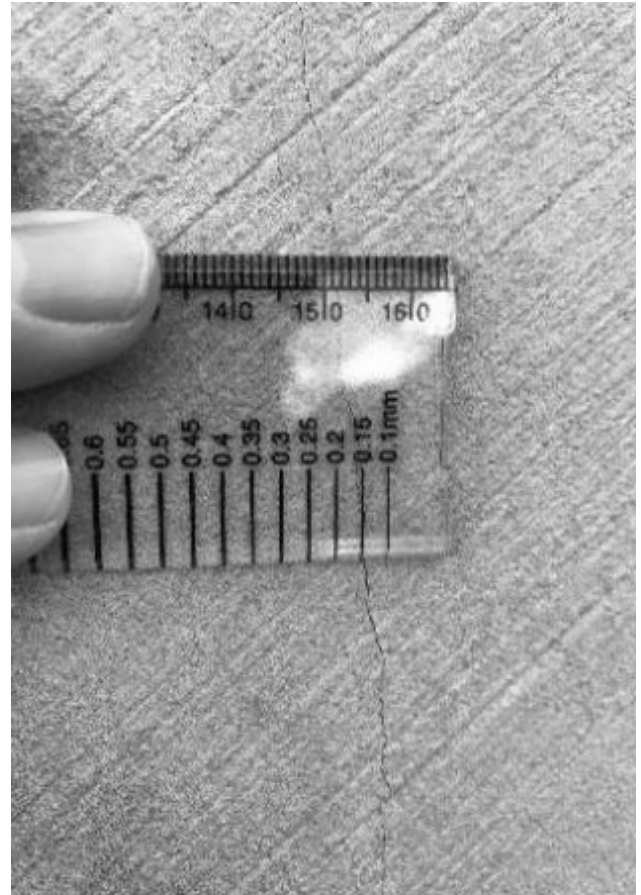
When topcoating with other Tnemec products, Series 217 MortarCrete must be mechanically prepared in accordance with SSPC-SP13/NACE No. 6, ICRI-CSP 5 or greater surface profile. This ensures complete removal of the weak upper laitance layer and creates the necessary surface amplitude for topcoating.



8.1 SURFACE CRACKING

Surface cracking is not anticipated with proper water curing. However, should hairline cracking occur, these cracks should be sounded on both sides to confirm material has not disbonded from the wall at the crack location. Any cracks larger than hairline or those that have become disbonded from the host substrate must be remediated/routed out to a v-shaped groove and re-sounded on both sides of the crack.

Surface cracks may be properly filled/patched with Series 215 Surfacing Epoxy or Series 218 MortarClad prior to topcoating to prevent crack transfer or telegraphing through the topcoat.



8.2 OUTGASSING

Outgassing must always be considered a possibility with any concrete substrate, including Series 217 MortarCrete. Several means exist to either reduce or eliminate outgassing. First, application of topcoats should be accomplished in indirect sunlight and during times when the surface temperature of the concrete is in a descending pattern. Secondly, the use of primers can help reduce outgassing over Series 217. Series 218 may be used to further reduce outgassing if specified as a resurfacer over Series 217.

9.0 HEALTH & SAFETY

Series 217 is for industrial use only and shall be installed by a qualified installer. Cementitious 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.

