



AN ERGONARMOR COMPANY

TECHNICAL INFORMATION

CES-286
05/10 Supersedes 12/09

SPECIFICATION FOR INSTALLATION

PENNTROWEL® UT500 SURFACER SYSTEMS

1. SCOPE

- 1.1 This procedure governs the installation of PENNTROWEL UT500 Polyurethane Mortar Flooring Systems CE-286, CE-287 and CE-288.

CE-286 - PENNTROWEL UT500 HD (Heavy Duty) Surfacer
CE-287 - PENNTROWEL UT500 SL (Self Leveling) Surfacer
CE-288 - PENNTROWEL UT500 TC (Top Coat)

- 1.2 PENNTROWEL UT500 systems are designed and utilized to protect floors and adjacent vertical (coving, curbing) surfaces exposed to demanding mechanical loads, thermal shock and exposure to solvents, acids, salts and alkalis.
- 1.3 PENNTROWEL UT500 systems are industrial linings and should only be installed by contractors familiar with accepted industrial lining practices.

2. MATERIALS / APPLICATION PARAMETERS

- 2.1 System Components: All PENNTROWEL UT500 systems include 3 primary components: a resin, a hardener and a powder, plus a color packet. Resin, hardener and color are standard across all systems except for size variation of package. The powders vary based on the system to be installed. Primer is required in specific circumstances.

PENNTROWEL UT500 Resin
PENNTROWEL UT500 Hardener
PENNTROWEL UT500 Color Pak (Gray and Red are standard)
PENNTROWEL UT500 HD Powder - Heavy Duty - CE-286
PENNTROWEL UT500 SL Powder - Self Leveling - CE-287
PENNTROWEL UT500 VS Powder - Vertical Surface - CE-286
PENNTROWEL UT500 TC POWDER - Top Coat - CE-288

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PENNTROWEL Epoxy Primer (where required)

- 2.2 PENNTROWEL UT500 Systems are cured by chemical reactions. Adherence to handling and application requirements outlined in the Product Data Sheets and in this Installation Specification will result in the best possible outcome, while neglecting to follow procedures properly can result in an inferior final result.
- 2.3 Curing optimally occurs for these materials at temperatures between 60 - 80°F. Lower temperatures increase cure time, while higher temperatures accelerate cure time.
- 2.4 Store PENNTROWEL UT500 System materials in such a way as the temperature of the materials is the same as the room/surface temperature where product is to be applied. This will improve the mixing, flow, penetration and hardening of the surface.
- 2.5 Light foot traffic to support a worker's weight can be allowed in accordance with the following schedule:
50°F - 16 hours
70°F - 12 hours
90°F - 8 hours
Flooring shall be allowed to cure for at least 48 hours @ 75 - 80°F prior to placing into full service. Ambient temperature during curing will affect required cure time for full service.
- 2.6 Complete hardening takes 5 - 7 days.

3. SURFACE PREPARATION

- 3.1 All Surface Preparation procedures shall be performed in accordance with ASTM standards listed below:
 - D4258 - Practice for Surface Cleaning Concrete for Coating
 - D4259 - Practice for Abrading Concrete
 - D4262 - Test Method for pH of Chemically-Cleaned or Etched Concrete Surfaces
 - D4263 - Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
 - D4541 - Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
- 3.2 UT500 should be applied at temperatures between 50 and 85°F. Do not apply below 50°F. When temperatures are likely to exceed 85°F, steps should be taken to store material in a cool area and apply during the cooler part of the day.

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- 3.3 Substrate shall have a minimum compressive strength of 3,500 psi. (Test with a concrete test hammer). Tests for pH shall show results in the range of 7-10.
- 3.4 Concrete shall be cured until a surface dry condition has been achieved with a compressive strength as noted in 3.3.
- 3.5 Anchor grooves, at least 1/4" wide and 1/4" deep must be cut at 6" perimeter along all walls, edges, pillars, doors, drainage channels, grid drains and penetrative joints. Consult Corrosion Engineering appropriate drawings for full details if in doubt.
- 3.6 Termination points, such as doorways should be cut and keyed into the concrete in order to prevent undercutting or lifting. Consult Corrosion Engineering appropriate drawings for full details if in doubt.
- 3.7 All surfaces should slope towards drains, trenches and sumps to prevent pooling of corrosive liquids on the floor surface.
- 3.8 Surface cracks shall be addressed as detailed below:
 - 3.8.1 Small surface cracks such as crazing or non-moving shrinkage cracks need not be addressed.
 - 3.8.2 Cracks due to movement, or cracks that penetrate into the concrete below shall be routed out forming a groove having a width and depth of twice (2x) the thickness of the PENNTROWEL UT500 System to be installed. Cracks that are considered to be "moving cracks shall be honed.
 - 3.8.3 After routing, the cracks shall be vacuum cleaned to remove all dust.
 - 3.8.4 The cracks shall then be filled with the PENNTROWEL UT500 System to be installed.
 - 3.8.5 The PENNTROWEL UT500 System used as crack filler shall be given a minimum of one (1) hour cure time before installation of the PENNTROWEL UT500 System.
- 3.9 Holes shall be addressed as detailed below:
 - 3.9.1 Holes shall be cleaned of all debris and dust prior to patching.
 - 3.9.2 Holes up to six (6) square feet, 1/2 inch deep may be patched with either PENNTROWEL UT 500 material or a concrete repair system that restores substrate to suitable condition. Holes patched with PENNTROWEL UT 500

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material require a minimum of six (6) hours cure time. Holes patched with a concrete repair system require a minimum of twenty four (24) hours cure time.

- 3.10 Surfaces shall be profiled to promote bond.
- 3.11 Concrete shall be free of curing membranes, hardeners, paraffin type air entraining agents, parting compounds, laitance and form oils.
- 3.12 Areas exposed to acid spillage shall be neutralized.
- 3.13 Surfaces shall be cleaned of sand, dust, oil, grease and other bond-inhibiting materials.
- 3.14 Surfaces must be dry. Plastic Sheet test shall be performed in random areas on both horizontal and vertical surfaces.
- 3.15 All exterior below grade surfaces shall contain a moisture vapor barrier coating or sheet membrane.

4. SURFACE PRIMING CONSIDERATIONS

- 4.1 Primer use is suggested only in certain cases for horizontal surfaces:
 - Where concrete is very porous.
 - Where out gassing of concrete may cause surface defects in finished UT500 top coat.
 - In cases where UT500 SL Surfacers is to be used without broadcast and a top coat, the use of PENNTROWEL Epoxy Primer is MANDATORY to avoid out gassing and the appearance of pinholes.
- 4.2 All vertical surfaces shall be primed prior to application of UT500 material as detailed in application instructions in this document.
- 4.3 It is advisable to install a test patch in the area of concrete to be covered to determine if priming is necessary.
- 4.4 For all priming applications, utilize PENNTROWEL® Epoxy Primer (CE-139), a 2-component, liquid epoxy resinous primer. Refer to product data sheet for specific information related to this material.
- 4.5 Mixing of Primer:
 - Primer resins should be stirred thoroughly prior to adding primer hardeners.

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- Add hardener to resin portion and mix for a minimum of 5 minutes.
- Do not thin.

4.6 Application of Primer:

- PENNTROWEL Epoxy Primer should be applied with a stiff brush and worked into the surface with a strong scrubbing action so as to emulsify the wetness at the concrete surface and to penetrate into the concrete. Excess primer should be removed from the surface.
- Coat surface @ 8-10 mil WFT.
- For horizontal surfaces, allow to cure to tack-free hard finish (approx. 8 hrs. at 70°F) before application of PENNTROWEL UT500 Horizontal Surfacers (HD and SL).
- For vertical surfaces, apply on tacky Primer surface.

5. MIXING INSTRUCTIONS

CAUTION: Mechanical mixing is essential. Do not split components and mix part units.

5.1 Prior to mixing any materials, perform a pre application inspection of work site and make notes of specific conditions including:

- Date and time of day.
- Weather conditions including: air and surface temperatures, humidity and dew point.

5.2 Mixing procedures shall be performed in a well ventilated area, covered from exposure to direct sunlight, away from open flames. Set mixing station as near to the work area as possible.

5.3 Materials should be stored in their tightly sealed original containers in a dry, covered place at temperatures between 65 and 80°F. For proper mixing and trowelability, components must be maintained at temperatures noted.

5.4 Flooring materials should only be applied at temperatures between 45 and 85°F. Use a surface reading thermometer to measure floor temperature.

5.6 Utilize a 3/4 hp industrial grade variable speed drill with a helical mixing blade to mix all PENNTROWEL UT500 materials in this specification.

5.7 **Mixing Steps - CE-286 / CE-287:**

Consistency of mixing is important to minimize color variation. Always use same

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addition steps and same mixing time.

PENNTROWEL UT500 HD Horizontal Surfacers (HD Powder)

PENNTROWEL UT500 HD Vertical Surfacers (VS Powder)

PENNTROWEL® UT500 SL Horizontal Surfacers (SL Powder)

Addition order: Resin > Color > Hardener > Powder

5.7.1 Pour PENNTROWEL UT500 Resin into suitable mixing vessel (6 gallon pail recommended). Consult product data sheet for package size verification.

5.7.2 Add PENNTROWEL UT500 Color Pak and mix using a slow speed for 20 seconds.

5.7.3 Add PENNTROWEL UT500 Hardener and mix for an additional 30 seconds.

5.7.4 Add PENNTROWEL UT500 Powder (HD, SL or VS) gradually into the liquid mixture and blend thoroughly until a homogenous mixture is obtained (90 seconds). Ensure that all powders and resins are scraped into the mix from the sides of the mixing vessel otherwise bubbles/blisters can develop in the applied floor.

Consistent mixing time and order of adding components is important to ensure color consistency.

5.7.5 Scrape out any residual material from the mixing vessel and dispose of before starting the next mix; otherwise the working time of the following mix could be reduced.

5.8 Mixing Steps - CE-288:

PENNTROWEL® UT500 TC COATING (TC Powder)

Addition order: Resin > Color > Powder > Hardener

5.8.1 Pour PENNTROWEL UT500 Resin into suitable mixing vessel. (6 gallon pail recommended).

5.8.2 Add PENNTROWEL UT500 Color Pak and mix at a slow speed for 20 seconds.

5.8.3 Gradually add PENNTROWEL UT500 TC Powder and continue mixing for 60 seconds.

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5.8.4 Add PENNTROWEL UT500 Hardener and continue mixing until homogeneous mixture is obtained (30 seconds). Ensure that all powders and resins are scraped into the mix from the sides of the mixing vessel otherwise bubbles/blisters can develop in the applied floor coating. Consistent mixing time of batches is important to ensure color consistency.

5.8.5 Scrape out any residual material from the mixing vessel and dispose of before starting the next mix; otherwise the working time of the following mix could be reduced.

6. APPLICATION PROCEDURES - PENNTROWEL UT500 HD SURFACER (CE-286)

6.1 PENNTROWEL UT500 HD Surfacer is meant for use on horizontal surfaces only.

6.2 Utilize PENNTROWEL UT500 HD Powder.

6.3 Mix according to instructions as detailed in section 5.7.

6.4 APPLICATION METHOD - Trowel Applied.

6.4.1 Dump out mixture onto surface to be applied. Spread out using a steel epoxy mortar finish trowel.

6.4.2 Trowel to required thickness of 1/4" - 3/8".

6.4.3 Theoretical coverage area is 24 sq ft at 1/4" thickness and 18 sq ft at 3/8" thickness.

6.5 ALTERNATE APPLICATION METHOD - SCREED BOX

6.5.1 Pour material into a screed box that is set to a depth which is 1/16" greater than the desired thickness.

6.5.2 Pull the box slowly across the width of the area to be applied allowing the material to flow from the bottom of the box and achieve consistent coverage.

6.5.3 The surface can then be compacted and finished with a trowel.

6.6 A "wet edge" installation is imperative during large placements. Allow a wet edge of between 8 and 10 linear feet per installer. Divide up work area accordingly. Work away from or alongside a wall using thickness gauges to form the outer edge. Lay a small amount and measure thickness. Use this area as a guide. Thickness should be checked periodically during application.

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- 6.7 Further finishing can be done by lightly rolling the surface with a 1/4" nap roller to even-out the surface and reduce trowel marks. Immediately after troweling, back roll lightly in one direction and in only one pass. Excessive rolling reduces texture and can lead to pin holes in the resin rich surface. The roller head must be replaced approx. every 500 sq ft to prevent resin curing on the roller.
- 6.8 Finishing should be completed quickly, within ten (10) minutes after the material has been applied. Work life under recommended application conditions is 15 - 20 minutes. Higher temperatures reduce work life.

7. APPLICATION PROCEDURES - PENNTROWEL UT500 VS VERTICAL SURFACER (CE-286)

- 7.1 Utilize PENNTROWEL UT500 VS Powder.
- 7.2 Intended for coving at walls and bases.
- 7.3 Mix according to instructions as detailed in section 5.7.
- 7.4 Application method - Trowel applied.
- 7.5 Prime the surface to be coated with PENNTROWEL Epoxy Primer. Allow primer surface to become tacky.
- 7.6 Apply wet on wet, while the primer's curing process is taking place and primer is tacky (starts about 30 minutes after application depending upon temperature - observe closely. Reapply primer if curing has progressed, resulting in a surface that has become tack free. Do not attempt to apply material to a cured vertical surface. It will not adhere properly.
- 7.7 Apply to a nominal thickness of 3/16".

8. APPLICATION PROCEDURES - PENNTROWEL UT500 SL (SELF LEVELING) SURFACER (CE-287)

- 8.1 APPLICATION METHOD - Trowel Applied.
- 8.2 Mix according to instructions as detailed in section 5.7.
- 8.3 Dump out mixture onto surface to be applied. Spread out using a steel epoxy mortar finish trowel. Using a wide, sweeping motion with a 3" x 12" trowel is recommended.
- 8.4 Alternatively, material can be spread out utilizing a gage rake.

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- 8.5 Trowel to required thickness (3/16-1/4").
- 8.6 Theoretical coverage is 24 sq ft at 3/16" thickness and is 18 sq ft per unit at 1/4" thickness.
- 8.7 A "wet edge" installation is imperative during large placements. Allow a wet edge of between 8 and 10 linear feet per installer. Divide up work area accordingly. Work away from or alongside a wall using thickness gauges to form the outer edge. Lay a small amount and measure thickness. Use this area as a guide. Thickness should be checked periodically during application.
- 8.8 Finishing should be completed quickly, within ten (10) minutes after the material has been applied. Self Leveling properties diminish rapidly as the material takes an initial set. Work life under recommended application conditions is 15 - 20 minutes. Higher temperatures reduce work life.
- 8.9 Broadcast inert selected aggregate into wet surface. Depending on temperature this is typically done 5-10 minutes after troweling to required thickness. Broadcast to excess. Color of broadcast aggregate can be neutral or colored quartz. Color can be selected to match standard colors (gray and red) or can be a pre-approved color blend/mixture to achieve varying architectural effects.

The surface texture of UT500 SL Surfacers can be varied by broadcasting suitable aggregate into the wet top surface. This will also increase the build thickness of the cured lining. However, it is necessary to topcoat the dried broadcast sand to seal the floor.
- 8.10 A reasonably sized standard test area shall be first installed and agreement shall be reached in writing by all parties that the desired texture and appearance has been achieved.
- 8.11 Sweep excess sand off floor after sufficient set has been achieved to support foot traffic (see 2.5 above).
- 8.12 In cases where UT500 SL Surfacers is to be used without broadcast and a top coat, the use of PENNTROWEL Epoxy Primer is MANDATORY to avoid out gassing and the appearance of pinholes.

9. APPLICATION PROCEDURES - PENNTROWEL UT500 TC (TOP COAT) COATING (CE-288)

- 9.1 The Topcoat is a critical step of the UT500 SL System. It locks aggregate in place and makes the floor significantly easier to clean.

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PENNTROWEL UT500 TC Coating is designed to enhance the appearance of the SL system. It can also be used as a stand alone coating system in areas such as vertical surfaces and curbing areas or as a sealer.

- 9.2 Mix according to instructions as detailed in section 5.8.

NOTE: TC Topcoat components are mixed in a **different** order than UT500 HD and UT500 SL Components. (HD and SL: refer to sec. 5.7, TC: refer to sec 5.8).

- 9.3 Apply using a rubber squeegee and back-roll with a 1/4" nap roller. The roller head must be replaced approx. every 500 sq ft to prevent resin curing on the roller. A paint brush can be utilized for edges.

- 9.4 For vertical surfaces, apply by heavy brush and back roll.

- 9.5 Theoretical coverage is 100-120 sf per unit @ 20 mils nominal thickness.

- 9.5 Application must begin immediately after mixing and be completed as quickly as possible because of a short working time. (15 min. @ 77°F)

10. CURING TIME

- 10.1 Flooring should be allowed to cure for at least 48 hours @ 75 - 80°F prior to placing into full service. Lower temperatures extend curing time.

- 10.2 Set times at temperatures of at least 70°F are as follows: foot traffic: 6 hrs., forklift traffic: 12 hrs., full set including full chemical resistance: 24 hrs.

- 10.2 Complete hardening takes 5 - 7 days.

11. LIMITATIONS

- 11.1 Do not apply at temperatures below 45°F or above 85°F or when humidity is > 85%.

- 11.2 Do not apply to wet concrete or to concrete or polymer modified concrete patches with a moisture content > 10%.

- 11.3 Do not apply to concrete if air temperature is within 5°F of moisture dew point.

- 11.4 Protect substrate during application from condensation or leaks.

- 11.5 Do not feather the edge.

- 11.6 Do not hand mix material.
- 11.7 PENNTROWELL UT500 Surfacer are industrial floor linings, and are not designed with aesthetics as a primary concern. It is strongly suggested a test panel is applied and approved by the owner before commencing large scale applications to verify acceptance of finish by the end user. UT500 Surfacer are not color stable and will discolor over time.

12. SAFETY PRECAUTIONS AND DISCLAIMER

- 12.1 Corrosion Engineering UT500 Surfacer components and mixes of them present a number of hazards. Read before using and follow the hazard information, precautions and first aid directions on the individual product labels and Material Safety Data Sheets.
- 12.2 The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. Since the conditions and methods of use of the product and of the information referred to herein are beyond our control, Corrosion Engineering expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information; NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE GOODS DESCRIBED OR THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable when such product is used in combination with other materials or in any process. The user should thoroughly test any application before installation. Nothing contained herein should be taken as an inducement to infringe any patent and the user is advised to take appropriate steps to be assured that any proposed use of the product will not result in patent infringement.
- 12.3 Please contact Corrosion Engineering for specific recommendations at +1-610-833-4000 or fax +1-610-833-3040.