

CORROSION ENGINEERING SPECIFICATION FOR INSTALLATION

PENNTROWEL® SB / SBR FLOORING SYSTEMS

NOTE: PENNTROWEL SB / SBR Systems are sophisticated lining systems and should only be installed by industrial contractors familiar with industrial lining practices.

1. SURFACE PREPARATION

- 1.1 Concrete surfaces onto which these slurry-broadcast systems are to be installed shall be prepared in accordance with the latest edition of ASTM C811- "Standard Practice for Surface Preparation of Concrete for Application of Chemical-Resistant Resin Monolithic Surfacing". Also included are all ASTM standards referenced there in.

2. APPLICATION (ALL SYSTEMS)

- 2.1 In the event there is any confusion in understanding the steps outlined below, or confusion with respect to the total lining thickness various alternatives will achieve, contact Corrosion Engineering for clarification before proceeding. The experience of specific contractors in the slurry and slurry broadcast application techniques, as well as availability and size/shape of locally sourced aggregates, can vary the specific number of steps required, and the resulting build thickness achieved.
- 2.2 Mix PENNTROWEL Primer (either VE or Epoxy) as per labels on the containers and apply to the prepared concrete substrate with a stiff brush. If a roller is used, hard pressure must be exerted on the roller to ensure the surface is well wetted.
- 2.3 For optional SBR (reinforced) systems, roll precut 1 oz chopped strand mat into wet primer, and saturate cloth with catalyzed primer resin until fully wetted out. Be sure to work out all wrinkles in cloth carefully. Overlap cloth pieces 2".

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- 2.4 Broadcast #12 mesh sand into wet primer to excess and allow to dry to touch. For installation over SBR systems, re-prime saturated glass mat before broadcasting.
- 2.5 Sweep off excess sand after the primer becomes dry to touch.
- 2.6 Never add water, Portland cement, solvents, or any other adulterants to the mix.

3. EXPANSION JOINTS

- 3.1 Where expansion/contraction joints, control joints, construction joints, isolation joints or cracks exist in the concrete substrate, contact Corrosion Engineering for project specific details on how to best handle.

4. VERTICAL SURFACES

- 4.1 All vertical surfaces are to be prepared in accordance with the Surface Preparation Instructions outlined previously.
- 4.2 All bug-holes and honey combs shall be rubber float filled by using a mixture of Cab-O-Sil or approved equal brand of fumed silica, combined with the Primer Resin/Hardener (either Epoxy or VE) mixed to a paste or putty like consistency.
- 4.3 Prime all vertical areas in accordance with the details outlined in Section 2.1 of the Application Instructions in Section 2.
- 4.4 Knock or grind off any sharp edges or excess paste mixture.
- 4.5 Vertical surfaces cannot be protected by use of an SB or SBR system. Instead, coat all vertical surfaces by utilizing a mixture of Cab-O-Sil thickened Resin/Hardener (either Epoxy, 6710/6712, or VE, depending upon the floor lining system selected). Resin/Hardener should be thickened to achieve a consistency suitable for applying the Resin/Hardener mixture @ 40 mils WFT per coat. (This will require approximately 3 x 10 oz cups of Cab-O-Sil per gallon of Resin/Hardener.) As an alternate, PENNCOAT® 227 or PENNCOAT 331 Lining Systems can also be considered for vertical surfaces.
- 4.6 Repeat step 4.5 above to achieve a total build over the Primer system of 30-

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40 mils WFT - usually 2 coats with PENNCOAT 227 and 331.

5. ALTERNATE A - EPOXY SYSTEMS

- 5.1 This part of the specification is suitable for the four following systems: PENNTROWEL Epoxy SB, Epoxy SBR, PENNTROWEL Novolac SB, and Novolac SBR Slurry/Broadcast Systems.
- 5.2 Note: PENNTROWEL Epoxy SB and PENNTROWEL Novolac SB are best installed using a "slurry" technique (as opposed to a straight "broadcast" method), whereby a filler is combined with the resin/hardener, and the mixed material is then spread by screed or pin rakes. Unlike straight broadcast systems, it is not necessary to build up the system in multiple seeding steps.
- 5.3 PENNTROWEL Resin/Hardener (for Epoxy SB) or 6710/6711 Resin/Hardener (for Epoxy Novolac SB) components shall be combined in their recommended ratios as outlined below in a clean, dry container and mixed thoroughly. A homogeneous and uniform colored mixture should be reached after 1 - 2 minutes of mixing using a mechanical mixer rotating at a constant slow speed of 30 - 60 rpm. A stationary mixing blade that provides both radial and axial action, scraping the sides and bottom of the pail, has been found very suitable for batch mixing of the slurry. Slowly add the recommended quantity of aggregate filler. See chart enclosed for aggregate sizing and loading recommendations. The mixed slurry should be a uniform consistency, free from lumps, with as little air entrained as possible.
- 5.4 Pour the mixed slurry onto the primed concrete and use a pin (gauge) rake, steel trowel or float, to spread the wet mixture to the specified thickness. See the estimating guide at the end of this specification for specific coverages.
- 5.5 Using a spiked (porcupine) roller or a loop roller, lightly roll the surface to remove any trowel marks, ripples, or other surface imperfections.
- 5.6 Within 10 - 15 minutes, uniformly broadcast to excess with Flint Silica No. 12 sand or approved equal onto the wet squeegeed epoxy surface.
- 5.7 Upon hardening, any unbonded aggregate is to be removed by sweeping. Lightly grind high points if and as required.
- 5.8 Repeat steps above, as required to obtain the required build thickness. See usage rate chart for specific details as to coverage.
- 5.9 Top coat with an application of either neat PENNTROWEL Resin/Hardener

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(which is grey tinted), PENNTROWEL 250 Grey Resin/Hardener, or 6710/6712 Resin/Hardener (for Novolac Epoxy SB System). Mix according to directions, and roll onto the surface at 16 mils WFT. PENNTROWEL Resin/Hardener topcoat will exhibit a slight surface blushing after drying, which can be easily removed with a warm water detergent wash. PENNTROWEL 250 or 6710/6711 Resin/Hardener does not require any further after treatment.

5.10 PENNTROWEL Epoxy SB/SBR System - MATERIAL COMPONENTS

STEP	PRODUCT	CODE	PACKAGING
Primer	PT Epoxy Primer unit	19676	4 x 1 gal units/case
Glass mat (for MR systems only)	Chopped strand glass mat	19639	50" x 125 yd - 1500 SF Roll (95 lb)
Saturant for Glass mat	PT Epoxy Primer unit	19676	4 x1 gal units/case
Basecoat/Saturant and Topcoat (all steps use same resin & hardener components)	PT Resin Grey PT Hardener	19679 19678	5 gal (50 lb) pail 5 gal (40 lb) pail
1 x 55 Gal (540 lb) Unit = 10 pails resin + 1 pail hardener			
Slurry/Broadcast sand	#12 sand (fine)	21932	100 lb bag

5.11 PENNTROWEL Novolac Epoxy SB/SBR System - MATERIAL COMPONENTS

STEP	PRODUCT	CODE	PACKAGING
Primer/Glass mat/Saturant	Same as outlined above for Epoxy SB above		
Basecoat/Saturant and Topcoat (all steps use same resin & hardener components)	6710 Resin 6711 Hardener	19592 19595	4 gal (40 lb) pail 2.5 gal (21 lb) can
6.5 Gal (61 lb) Unit: 1 pail resin + 1 can hardener			
Slurry/Broadcast sand	#12 sand	21932	100 lb bag

5.12 PENNTROWEL Epoxy & Novolac Epoxy SB/SBR - COVERAGES AND

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BUILD STEPS - THEORETICAL COVERAGES - NO OVERAGE

STEP	PENNTROWEL Epoxy SB/SBR (Nominal 125 mil (.125") thickness)	PENNTROWEL Novolac SB/SBR (Nominal 125 mil (.125") thickness)
1	PT Epoxy Primer 150 SF/Gal@11 mils WFT	
2	5 mixed gals of PT resin/hardener + 150 lbs #12 sand = 1 x 200 lb unit and will yield 230 sf @ 90 mils WFT	6.5 mixed gals of 6710/6711 resin/hardener + 200 lbs #12 sand = 1 x 261 lb (2.18 cu. ft) unit and will cover 307 sf @ 90 mils WFT
3	Broadcast #12 sand 0.5 lb/sf (to refusal)	Broadcast #12 sand 0.5 lb/sf (to refusal)
4	Topcoat with either PT Resin/hardener or PT 250 Resin/Hardener 100 SF/gal@ 16 mils WFT	Topcoat with 6710/6711 Resin/hardener 100 SF/gal@ 16 mils WFT

5.13 For optional Epoxy SBR Systems add the following components

STEP	PENNTROWEL Epoxy SB/SBR (Nominal 125 mil (.125") thickness)	PENNTROWEL Novolac SB/SBR (Nominal 125 mil (.125") thickness)
1A	1 oz. glass mat 1500 sf roll (for optional SBR system)	
1B	PT Epoxy Primer (saturant for SBR) 50 SF/Gal @ 32 mils WFT	

5.13 Note: The above steps (without mat reinforcement in primer layer) will produce a nominal lining thickness of 125 mils with a fine to medium surface texture. For heavier lining thicknesses, either utilize coarser aggregate fractions (such as Corrosion Engineering 3Q sand), or utilize more build/broadcast steps (steps 2 and 3 above). For thicknesses less than 125 mils, spread rates can be adjusted to pull the lining thinner, but care must be taken to insure areas to be protected have complete sealing. Contact Corrosion Engineering for complete details.

5.14 When using the optional SBR system, the components in steps 1A and 1B will add approximately 50 - 60 mils thickness to the lining.

6. VINYL ESTER SYSTEMS

6.1 This part of the specification is suitable for the two following systems: PENNTROWEL VE SB, and PENNTROWEL VE SBR Broadcast Systems.

6.2 Note: Due to inherent resin shrinkage, PENNTROWEL VE systems are best

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installed using a broadcasting technique whereby the filler is shaken into the resin/hardener mixture after it has been spread out onto the floor. The lining thickness is built up in steps by repeating this procedure. Aggregate sizes can be varied to adjust the amount of build per layer, and the surface texture. See the estimating guide at the end of this specification for specific coverages.

- 6.3 For PENNTROWEL VE Broadcast systems, roll the first coat of mixed VE Resin/Hardener onto the suitably primed concrete (as outlined in section 2.1 and 2.3 earlier) at a rate indicated in section 6.10 below (varies with aggregate size). Proceed by broadcasting either 3Q (coarse) or #12 (regular) sand into the wet surface at a rate of approx 0.5 lb/sf, and allow to set hard.
- 6.4 Sweep off excess unbonded sand and install next coat of PENNTROWEL Vinyl Ester Resin/Hardener.
- 6.5 Repeat steps 6.3 and 6.4 as required to achieve required build as specified. By changing the aggregate sizing and angularity, varying build thicknesses and textures are achieved. See section 6.10 below.
- 6.6 Top coat with either 1 or 2 applications of PENNTROWEL VE Grey Resin/Hardener or PENNCOAT 331 Resin/Hardener (color per specification). Mix according to information on the containers, and roll onto the surface at 15 -20 mils WFT. Better sealing is achieved with two top coats, as well as a smoother surface finish.
- 6.7 The applied PENNTROWEL VE SB/SBR Flooring System shall be protected for a minimum of 24 hours at 70°F.
- 6.8 PENNTROWEL VE SB System - Material Components

PENNTROWEL VE (Vinyl Ester) SB/SBR Systems			
STEP	PRODUCT	CODE	PACKAGING
Primer	PT VE Primer	19514	4 x 0.75gal (6.4 lb) cans/case
	PT VE Primer	19515	5 gal (43 lb) pail
	CHP Hardener	19552	0.7 pint (0.75 lb) bottle
Note: 1 x 0.7 pint bottle of CHP will harden either 1 x 5 gal pail or 4 x 0.75 gal cans of VE Primer resin. When using with the 4 x 0.75 gal cans, split catalyst into 4 equal parts, and add equally to each can.			

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Floodcoat/Saturant and Topcoat (all steps use the same resin and hardener components)	PT VE Resin Grey	19637	5 gal (43 lb) pail
	PT VE Resin Grey	19638	55 gal (475) drum
	* or * PENNCOAT 331 Resin (Grey or White per spec)	19578 gr 19577 wh	5 gal (43 lb) pail 5 gal (43 lb) pail
	CHP Hardener	19552	0.7 pint (0.75 lb) bottle
	CHP Hardener	21922	1 gal (8.3 lb) bottle
5 gal unit: 1 x 0.7 (0.75 lb) pint bottle of CHP Hardener + 1 x 5 gal pail of Resin 55 gal unit: 1 x 1 gal (8.3 lb) can of CHP Hardener + 1 x 55 gal drum of VE Resin			
Broadcast sand (base)	#2040 sand (medium)	27468	50 lb bag
Broadcast sand (build)	# 2040 sand (medium)	27468	50 lb bag

* PENNCOAT 331 incorporates flake fillers in the resin component for optimal chemical resistance and better permeation performance for environments where low molecular structure fluids such as paint stripping chemistries and solvents may be present.

6.9 PENNTROWEL® VE SB/SBR Coverage and Build Steps - Theoretical Coverages - No Overage

PENNTROWEL VE Broadcast .080" Thickness		
	Step	Coverage
1	Primer	45 SF/gal @ 36 mills WFT
2	Light Broadcast Sand	0.25 lb per SF
3	Flood coat	45 SF/gal @ 36 mills WFT
4	Broadcast Sand to Build Thickness	1.0 lb per SF
5	Top Coat	100 SF/gal @ 16 mils WFT

PENNTROWEL VE Broadcast .125" (1/8") Thickness		
	Step	Coverage
1	Primer	45 SF/gal @ 36 mills WFT
2	Light Broadcast Sand	0.25 lb per SF
3	Flood coat	90 SF/gal @ 18 mils WFT
4	Broadcast Sand to Build Thickness	0.5 lb per SF
5	Flood Coat #2	90 SF/gal @ 18 mils WFT

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6	Broadcast Sand to Build Thickness	0.5 lb per SF
7	Top Coat	100 SF/gal @ 16 mils WFT

PENNTROWEL VE Broadcast .250" (1/4") Thickness		
	Step	Coverage
1	Primer	45 SF/gal @ 36 mils WFT
2	Light Broadcast Sand	0.25 lb per SF
3	Flood coat	45 SF/gal @ 36 mils WFT
4	Broadcast Sand to Build Thickness	1.0 lb per SF
5	Flood Coat #2	45 SF/gal @ 36 mils WFT
6	Broadcast Sand to Build Thickness	1.0 lb per SF
7	Top Coat	100 SF/gal @ 16 mils WFT

6.10 PENNTROWEL SBR (Slurry Broadcast Reinforced) - System Components

STEP	FOR ALL PENNTROWEL VE SBR SYSTEMS		
Glass mat	1 oz. glass mat	19639	1500 sf roll
Saturant	PT VE Primer	Use components as under PT VE Primer above	50 SF/Gal @ 32

6.11 Optional PENNTROWEL® VE SBR - Coverage and Build Steps

#	ALL PENNTROWEL VE FLOORS
1A	1 oz. glass mat 1500 sf roll
1B	PT VE Primer R&H(saturant for SBR system) 50 SF/Gal@ 32 mils WFT

6.12 NOTE: All coverage information is based on theoretical volumes and yields. Thicknesses are based on suggested WFT spread rates. Actual field usage rates will vary according to substrate roughness profile, and normal wastage.

7 SAFETY PRECAUTIONS / DISCLAIMER

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- 7.1 Read and follow the hazard information, precautions and first aid directions on the individual product labels and material safety data sheets before using. While all statements, technical information, and recommendations contained herein are based on information our company believes to be reliable, nothing contained herein shall constitute any warranty, express or implied, with respect to the products and/or services described herein and any such warranties are expressly disclaimed. We recommend that the prospective purchaser or user independently determine the suitability of our product(s) for their intended use. No statement, information or recommendation with respect to our products, whether contained herein or otherwise communicated, shall be legally binding upon us unless expressly set forth in a written agreement between us and the purchaser/user.
- 7.2 Please contact Corrosion Engineering for specific recommendations at +1-610-239-1500 or fax +1-610-239-1526.

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