INSTALLATION SPECIFICATION ARMOR VINYL ESTER LININGS

1. SCOPE

1.1 This specification governs the installation of Penncoat™ 310, 312FR, 331, 332, 340, and 350 Linings. If not noted otherwise the specification shall be applicable to all systems. Due to lining application thicknesses and installation techniques differences between the systems will be noted.

1.2 This specification shall also be used in conjunction with information presented on all applicable technical data sheets (TDS's) including CE-138 Penntrowel™ Vinyl Ester Primer, and any associated specifications referenced therein

1.3 For installation instructions for CE-307 Penntrowel™ VE Conductive Primer, and CE-322 Penncoat 310 ESD Lining, this document shall generally apply. However, contact Armor to discuss grounding grid patterns and other unique details related to these materials.

2. MATERIAL ENVIRONMENTAL AND SUBSTRATE CONDITIONS

2.1 Product and substrate temperatures are important. In cooler temperatures, product storage and construction areas shall be conditioned to achieve and maintain the temperatures outlined below.

2.2 At the time of mixing and application, the temperature of the components should ideally be between 70°F (21°C) and 90°F (32°C).

2.3 The temperature of the prepared surface shall be at least 5°F (3°C) above the moisture dew point and between 50°F (10°C) and 95°F (35°C) at the time materials are applied. If temperatures are below 50°F (10°C) consult Armor.

2.4 The work site must be protected from precipitation until the lining has achieved dry to touch stage.

3. STEEL SURFACE PREPARATION

3.1 For splash, spill and non-thermal-cycling conditions, a 2-3 mil anchor profile is acceptable with a SSPC-SP10 and NACE #2, near white surface cleanliness. In certain applications this can be relaxed to SSPC-SP6/NACE #3. Consult Armor for a project-specific review.

3.2 For tank immersion service conditions, highly corrosive environments and thermal cycling, the steel substrate should be clean, dry and have a minimum anchor profile of 3 mils. Steel surfaces should be abrasive blasted in accordance with Steel Structures Painting Council Specification SSPC-SP5 and/or NACE #1.

3.3 Penncoat Vinyl Ester Linings may be applied directly to blasted steel prepared to the above standards without use of Penntrowel™ Vinyl Ester Primer, provided the first coat is installed before the re-appearance of surface rust. A thin coat of Penntrowel Vinyl Ester Primer may need to be applied to blasted steel if lining work will not commence before the appearance of surface rust.

4. CONCRETE SURFACE PREPARATION

4.1 Concrete surfaces should exhibit a minimum surface tensile bond strength of 200 psi when tested in accordance with ACI 503R-89 Appendix A.1. Mechanical methods such as abrasive blasting or scarifying are the preferred methods. Chemical methods such as acid etching and detergents should be utilized to remove laitance, oil and grease or when mechanical methods cannot be utilized. Read and follow manufacturers' SDS and safety precautions when handling these chemicals.

4.2 Applicable ASTM Standards for surface preparation are as outlined in NACE No. 6/SSPC-SP 13. Criteria for acceptance shall be as noted in section 6.

4.3 When Armor Vinyl Ester Linings are to be applied onto concrete surfaces, the use of Penntrowel Vinyl Ester Primer is necessary to minimize out-gassing from the concrete substrate.

4.4 Do not apply Penntrowel Vinyl Ester Primer, or Penncoat Vinyl Ester Linings onto latex-based concrete patching compounds or underlayments. Vinyl ester coatings may dissolve or react with the latex which will result in little or no adhesion to the substrate. Penntrowel Epoxy Primer may have to be applied to latex-based patching compounds before vinyl ester linings are applied. Contact Armor.

4.5 Concrete expels air during the day and intakes air during the night. The best time to apply linings is late afternoon or early evening at which time concrete is least likely to expel air. Other precautions such as shading the work area from sunlight to minimize the heating of the substrate will also reduce expulsion of air.

5. MIXING OF COMPONENTS

5.1 Do not attempt coating application if substrate temperature is within 5°F (3°C) of dew point or if relative humidity is greater than 95%.

5.2 Vinyl ester components should be mixed thoroughly prior to adding CHP Hardener. Add Hardener to Resin in accordance with dosage rates specified on tds and mix for a minimum of 2 minutes. Do not thin.

5.3 When a primer is used, allow it to cure until dry to touch before proceeding with topcoat application.

5.4 Vinyl ester components should be mixed thoroughly prior to adding CHP Hardener. Add CHP Hardener to Resin portion and mix for a minimum of 3 minutes or until uniform color and consistency is obtained. Use 2 fl. oz. of CHP Hardener per gallon of Resin. Do not thin without specific written authorization from Armor. Be certain to check the sides of the mixing container for uncatalyzed resin. If temperatures are low or elevated, the CHP dosage rate can be adjusted. Contact Armor for guidance.

5.5 An appropriate paint mixing blade should be used, along with a variable speed drill to ensure proper mixing.

6. APPLICATION

6.1 Penncoat 310, 312FR, 331, 332, 340, 350 Linings may be applied by brush, roller or spray.

6.2 The pot life or working time of the material is mass sensitive: the larger the volume the shorter the pot life. Do not catalyze more material than can be used within the pot life. Above 90°F (32°C), best results are obtained when the catalyzed material is poured into smaller containers reducing the mass. When ambient temperature exceeds 80°F (27°C) the pot life can be extended by cooling the materials. The materials should be stored between 65°F and 75°F for 24 hours prior to use for optimum handling properties. If plural component application equipment is used, materials are not premixed, and pot life is not a factor. Mixing chamber and spray tip must be kept clean and flushed with solvent.

Substrate temperature	Pot life	Initial set	Minimum recoat	Maximum recoat	Full cure
50˚F (10˚C)	100 mins	5 hours	12 hours	7 days	48 hours
75˚F (24˚C)	45 mins	2 hours	4.5 hours	7 days	24 hours
90˚F (32˚C)	25 mins	1.5 hours	3 hours	2 days	8 hours

6.3 For the optional MR (mat reinforced) variants of linings where offered, embed mat reinforcement into wet primer layer after application onto the substrate. Flood the mat, working the resin into the mat, smoothing with a serrated roller to eliminate wrinkles. Once the primer layer with mat has hardened proceed with base and topcoat layers.

7. RECOAT COMMENTS

7.1 Applicator should always plan the work so that the primer and lining are applied within the shortest time possible.

7.2 Penncoat Linings can be top coated according to the temperature information above; however, if applicator must walk on the basecoat to apply the topcoat this time should be extended.

7.4 If the Penncoat Vinyl Ester Lining first coat is left uncoated beyond the time to complete cure, or if there is a need to recoat a cured Penncoat Lining, the surface must be cleaned, and abrasive blasted to promote bonding of the next coat.

8. CURE TIME AND TEMPERATURES

8.1 The cure time is dependent on temperature of the substrate as well as the material temperature. Ambient air temperature may not be the temperature of the substrate; i.e. direct sunlight will heat steel to a higher temperature than ambient air. In winter, steel may be colder than ambient air. The substrate temperature should be measured, and the dew point calculated prior to coating. Substrate temperatures below 50°F (10°C) will retard the curing of vinyl ester linings.

9. CLEAN-UP

9.1 All mixing equipment, spray equipment, rollers and brushes should be cleaned immediately after use. Solvents recommended for clean-up are methyl ethyl ketone or lacquer thinner. When using these materials read and follow the supplier's safety data sheets.

9.2 The use of acetone for cleaning vinyl ester-based materials is not recommended.

10. STORAGE AND SHELF LIFE

10.1 Consult individual product data sheets for specific shelf-life information.

10.2 Refer to applicable SDS's for storage compatibility with other chemicals.

11. SAFETY PRECAUTIONS DISCLAIMER CONTACT INFORMATION

11.1 Consult current Safety Data Sheets (SDS's) before commencement of work.

11.2 While 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. For all Terms and Conditions of Sale see armor-inc.com.

11.3 Please contact Armor for further information at +1-877-98ARMOR (982-7667) or customerservice@armor-inc.com.

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