TECHNICAL INFORMATION

ERGONARMOR SPECIFICATION FOR INSTALLATION

TUFCHEM™ II MEMBRANE (ALL GRADES) AND PENNCHEM™ 97 MEMBRANE INSTALLATION ON STEEL

1. ***SCOPE***

1.1 This procedure governs the installation of urethane and urethane asphalt membranes Tufchem II Membrane (Trowel Grade), Tufchem II Membrane Spray Grade, Tufchem II SL Membrane (Self Leveling Grade), and Pennchem 97 Membrane manufactured by ErgonArmor on carbon steel, including Corten steel. Where applicable, the three grades of Tufchem II (Regular Grade, Spray Grade, Self Leveling Grade) in this specification shall hereafter be referred to collectively as "Tufchem II or Tufchem II Membranes." When differences apply, the specific grade of material shall be referenced.

2. MATERIALS

2.1 Primer:

2.1.1 Tufchem II Membranes and Pennchem 97 Membrane do not require a primer for adhesion on steel. However, the use of a primer is always good practice and is suggested to prevent re-rusting of a blasted and cleaned surface prior to installation of the membrane. This is especially important in areas of high humidity.

2.1.2 Recommended primer on steel substrates is Pennguard™ HP Epoxy Primer manufactured by ErgonArmor, applicable product data sheet is CE-314.

2.2 Membrane:

2.1.2 Membrane shall be one of the following: Tufchem II Membrane CE-196, Tufchem II Membrane - Spray Grade CE-228, Tufchem II

SL (Self Leveling) CE-197 or Pennchem 97 Membrane CE-293.

3. SURFACE PREPARATION - NEW CONSTRUCTION STEEL

3.1 Surfaces to be lined are detailed in other specifications and are beyond the scope of this document. ErgonArmor recommends steel vessels must conform with NACE Standard Recommended Practice for Fabrication Details, Surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to Be Lined for Immersion Service. Consult NACE Standard RP0178-2003 or most recent revision for full steel preparation details.

3.2 For new construction or where a primer is desired, a near white metal finish (as specified by most current revisions of SSPC-SP10, NACE #2, ISO 8501-1 or SA 2.5) is required for carbon steel surfaces to receive the lining. The resultant surface profile after grit blasting to achieve the near white finish typically falls in the range of 1.5-2.0 mils (38-50 microns).

4. MEMBRANE STORAGE AND MIXING

4.1 Individual product data sheets shall also be consulted on the mixing, storing, and application procedures for each product.

4.2 Remove the lid from the Part A can. Inspect for damage incurred during transit. Insure that there are no leaks in the Part B hardener container and that there is no water present on or in Part A.

4.3 Utilizing a heavy duty ¾ inch drill, delivering shaft rotation of 400 to 600 rpm, and the proper mixer blade, mix Part A by itself for a minimum of one minute. Suggested mix blade is a modified Jiffler Model DC312 with 2 x 6.5" (165 mm) propeller blades. These blades are available from ErgonArmor.

4.4 Open Part B. Continue to mix Part A at the recommended speed. Begin pouring the Part B into the Part A (there will be a vortex created by the mixer). Total elapsed time for the addition of the Part B should be 15 to 20 seconds while mixing.

4.5 When the material temperature is 70°F (21°C) or higher, mix for at least three (3) minutes using a good mixing technique to yield a uniform mix.

When the temperature of the Parts is 50°F (10°C), mix for at least five (5) minutes using a good mixing technique to yield a uniform mix.

4.6 A good mixing technique involves movement of the rotating blade within the pail. Move the blade around the base of the pail in a circular motion and lift the blade from the base of the pail without bringing the blade above the surface of the liquid and continue the circular motion around the side of the pail.

4.7 Never allow moisture or other contaminants to come in contact with either membrane component or the wet mix.

5. APPLICATION

5.1 Pennguard™ HP Epoxy Primer is applied in accordance with specification CES-150. Consult CES-150 for complete installation details.

Read and understand Safety Data Sheets and labels for any solvent to be used.

5.2 ErgonArmor's Tufchem II and Pennchem 97 Membranes are applied by trowel or spray. Pennchem 97 and Tufchem II Membrane Regular Grade and Tufchem II SL are recommended to be applied by trowel only. Tufchem II Membrane Spray Grade is designed to be applied by spray although it can be applied by trowel.

5.3 Recommended equipment for spray application of Tufchem II Spray Grade is as follows:

Mastic Pump	Graco Xtreme Airless Pump - X45DH4 (45:1 Fluid to Air Ratio) or X70DH4 (70:1 Fluid to Air Ratio). Pump has built in filter assy. w/60 mesh screen. All Pumps should have inlet siphon hose/tube removed. A piece of 1 ½" (38 mm) pipe should be cut and threaded the depth of 5 gallon pail. Inlet of pump pipe should be submerged in product.
Hydra-mastic Gun	Graco Mastic Gun XTR705.
Gun Tip	XHD001 Housing XHD543 Tip
Material Hose	50' (15 m) - ½" (13 mm) hose H75050 (2 sections) 50' (15 m) - 3/8" (9-10 mm) hose H73850 (up to 2 sections w/70:1 pump).

	Above hose sizes depend on length of run anticipated and pump size. 3/8" hose to gun is preferred due to more flexibility but gun must be close enough to pump. Temperature may impact hose selection as viscosity is increased in cooler weather. Contact ErgonArmor if in doubt.
Inline Filter	Spray Quip inline Filter with 0.020" mesh screen
Air Compressor	Air Compressor: 150 SCFM at 100 psi (6.9 bar).
Air Hose	3/4” or 1” (19-25 mm) to pump inlet Air Regulator (3/4” minimum size regulator).

NOTE: The above equipment list is a suggested starting point based on field experience. Site conditions can vary this selection. Contractor shall be experienced in spray equipment intricacies and compatibility to optimize the spray characteristics (spray ability) of material. Consult ErgonArmor if there are any questions on equipment specifics.

5.4 The membrane lining shall be applied in a minimum number of coats to achieve a dry film thickness of 3/32" (93 mils) to 1/8" (125 mils) minimum, or as otherwise specified. Thickness shall be dependent upon mechanical service requirements and whether the membrane will be subsequently protected by brick or shall serve as a standalone lining.

5.5 Apply subsequent coats as the preceding coat is approaching "dry to the touch". The membrane is ”tacky wet" if, when touched, a residue comes off on one’s fingers. It is better to apply a smaller area full thickness rather than a larger area half thickness with the intent of applying the subsequent layer the next day. See 5.6 below.

5.6 Wet Tufchem II Membrane does not bond well to cured Tufchem II Membrane and hence should Tufchem II Membrane cure for greater than 16 hours at 50°F (10°C), 4 hours at 70°F (21°C), and 2 hours at 90°F (32°C), it may be necessary to first clean the cured Tufchem II Membrane. The surface should be cleaned by solvent-wiping with isopropyl alcohol. Allow 5 minutes of solvent evaporation before reapplying fresh Tufchem II Membrane. For best adhesion, cured Membrane should be abraded to roughen the surface and remove surface gloss. When work stoppage is anticipated, remove as much of the Tufchem II Membrane as practical from the substrate and edges of the completed lining that will have additional lining when the stoppage ends.

Read and understand Safety Data Sheets and labels for any solvent to be used.

5.7 Membrane overspray, runs or sags shall not remain on primed steel. Membrane which has begun to set on primed steel to be coated later shall be removed with isopropyl alcohol. Mask primed areas to be lined later to avoid overspray contamination.

5.8 Unused membrane which has begun to set before application cannot be recovered and shall be discarded.

5.9 The membrane lining is sufficiently cured to accept the inorganic monolithic or brick lining after 48 hours at 60°F (16°C), 24 hours at 70°F (21°C), or 16 hours at 90°F (32°C).

5.10 For cleaning the surface of cured membrane, use isopropyl alcohol. As noted in section 4.6 Read and follow manufacturer's SDS's and handling precautions when using this chemical.

Mineral spirits can be used for cleaning and soaking trowels, and for loosening cured Membrane. It should not however be used to clean the surface on membrane that will recoated at a later date.

6. INSPECTION AND TESTS

6.1 Abrasively blasted surfaces shall be visually inspected to ensure it conforms to SSPC-SP10, NACE #2, or SA 2.5.

6.2 Air, surface and material temperature shall be measured and recorded during sandblasting, priming and membrane application in accordance with good industry practice. The moisture dewpoint shall also be measured and recorded during sandblasting, priming and membrane application every two hours.

6.3 Random dry film thickness measurements (4 per 100 sf) shall be taken of the membrane and recorded. Dry film thickness shall be as outlined in paragraph 5.4 or as otherwise specified.

6.4 After installation and cure of the membrane lining, it shall be spark-tested for pinholes, in accordance with the procedure in section 7 below.

6.5 Recorded measurements shall be documented on a suitable form. Forms shall include a sandblasting, primer and membrane lining record. The

priming and membrane lining record shall include air, surface, material and moisture dewpoint temperatures, visual inspection results, dry film thickness of urethane asphalt membranes, and spark test results for each time and location.

7. SPARK TESTING

7.1 Detection and correction of defects in protection linings are important factors in an effective corrosion control program. High voltage electrical inspection is one method in general use.

7.2 Refer to NACE SP0188 for additional information regarding the testing protocol, and the equipment Set testing voltage using 100 volts/mil of DFT.

8 REPAIR AND RELINE OF EXISTING STEEL STRUCTURES

8.1 All pinholes found by spark testing, damaged areas, thin spots or other imperfections shall be marked with a grease-free chalk, and the areas repaired as follows:

8.1.1 Damaged membrane consisting of cuts or tears must be removed back to sound lining. It may not be necessary to remove lining down to the primed steel. Abrade existing membrane to promote adhesion.

8.1.2 Solvent-wipe affected area with methyl ethyl ketone (MEK), or isopropyl alcohol (IPA). Allow for a 2" (50 mm) minimum overlap onto unaffected membrane. Read and understand Safety Data Sheets and labels for any solvent to be used.

8.1.3 Allow 5 to 10 minutes at 70°F (21°C), for solvent evaporation. Apply membrane lining in accordance with the product data sheet. Small areas may be easier to trowel or brush repair. Apply urethane or urethane asphalt membrane lining in accordance with Product Data Sheet.

9. SAFETY PRECAUTIONS / DISCLAIMER

9.1 Mixes and applications of this product present a number of hazards. Read and follow the hazard information, precautions and first aid directions on the individual product labels and 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. For all Terms and Conditions of Sale see ergonarmor.com.

9.2 Please contact ErgonArmor for specific recommendations at (877) 982-7667 or +1-601-933-3595.

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