

	
	TECHNICAL INFORMATION

CES-150
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INSTALLATION SPECIFICATION PENNGUARD™ HP EPOXY PRIMER

1.0 SCOPE

- 1.1 This specification shall cover the following materials: Pennguard HP Epoxy Primer as outlined on the most current version of data sheet CE-314.
- 1.2 Pennguard HP Epoxy Primer is an industrial lining system most typically used as one of the components of the Pennguard Block Lining System. Consult Armor document CES-355 covering the installation of the Pennguard Block Lining System on steel for further details on the installation of the other components of the system.

2.0 SURFACE PREPARATION

- 2.1 All welds shall be continuous. Intermittent or spot welding shall not be permitted.
- 2.2 All weld spatter slag and old anchor welds shall be removed from the substrate and the area ground flush with the parent metal.
- 2.3 Gross pinholes, pits, blind holes, porosity, undercutting or similar depressions should not exist in the finished surface of the weld before or after blast cleaning.
- 2.4 All edges and fillets and similar abrupt contours shall be rounded off smoothly by grinding or machining. A 1/8" (3 mm) radius is preferable. Smooth ripple finished welds are acceptable.
- 2.5 Plates welded together shall be properly aligned; butt-welded joints are preferred.
- 2.6 Lap welded joints should be avoided wherever possible. If lap-welded joints are used, they must be fully welded on the inside.
- 2.7 All connections to the equipment to be lined shall be flanged.
- 2.8 Structural reinforcing members should be installed on the vessel exterior, if possible. However, if such members are installed internally, they should be fabricated of simple shapes such as smooth round bars or pipe for ease of applying the lining material. The use of angles, channels, I-beams, and other complex shapes should be avoided. If they must be installed internally, these members shall be fully seal welded and edges ground.
- 2.9 Unless otherwise specified in writing by Armor, a commercial blast finish (as specified by most

current revisions of SSPC-SP6, NACE #3, or SA 2.0) is required for preparing 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 0.0015-0.002" (38-50 microns), but this is not a hard and fast specification requirement. Variability with the size, shape, and composition of available local blast media may result in the achievement of the required cleanliness standard, while simultaneously producing a blast profile that may fall outside of this range.

- 2.10 For priming of stainless steel, titanium, and nickel alloys (metal surfaces) consult Armor.
- 2.11 All abrasives and dust must be removed from the substrate in accordance with the most recent revision of ISO 8502-3 prior to priming. The use of a power vacuum is recommended.

3.0 MIXING INSTRUCTIONS

- 3.1 Pennguard HP Epoxy Primer is supplied in premeasured containers consisting of a 1.0 US gallon (3.78 l) of HP Primer Resin Part A and a 1 US quart (0.94 l) can of Primer Part B. It can also be supplied in larger containers consisting of 1 x 4.0 US gallon (15.1 l) pail of Part A Resin and 1 x 1.0 US gallon (3.78 l) can of Part B Hardener.
- 3.2 Check the contents of Part "A" component for any solids that may have settled during shipping and storage. Reconstitute by stirring if needed. The Part "B" component should be uniform and clear and should not need reconstituting.
- 3.3 Pennguard HP Epoxy Primer is mixed in a ratio of 4.0 parts Part "A" Resin to 1.0 part of Part "B" Hardener by volume.

If using small units, both components should be fully emptied into a separate larger mixing vessel and proceed to section 3.4 below.

If using the larger units, carefully premeasure the desired amount to mix, paying close attention to maintaining the volumetric ratios noted above. The expected pot life is noted below in section 3.7. Use caution before mixing the entire volume of the large units. Once the desired volume to mix from the large containers is determined, add the measured amounts of Part A Resin and Part B Hardener into a separate mixing container and proceed to section 3.4 below.

- 3.4 Add Part A to mixing vessel. Slowly add Part B. Stir components thoroughly for 2 minutes until a uniform color is achieved.
- 3.5 Allow mixed material to stand for an induction period of 15 minutes.
- 3.6 Re-stir the mixture one final time after the induction period and before starting application.
- 3.7 The primer has a pot-life of 4-6 hours at 75°F (24°C). Mix only enough primer that can be used during this period.
- 3.8 Spray application is preferred, although brush or roller application is acceptable. When installing

by brush, use a nylon/polyester or natural bristle. When applying by roller, use a 3/8" (9.0 mm) woven roller with a phenolic core.

4.0 APPLICATION

- 4.1 Application shall be performed within a temperature range of 50°F to 95°F (10°C-35°C). Temperatures must be maintained at least 5°F (3°C) above the moisture dew point, and relative humidity must be maintained below 85%. The work environment of the job site shall be controlled within this range.
- 4.2 Application should be accomplished in a single wet pass with a 50% overlap.
- 4.3 Hold the spray gun at right angles to the surface.
- 4.4 HP Primer can be applied at varying coverage rates, varying from a rate of 230 sf/gal (0.007"/175 µm) WFT (Wet Film Thickness) to 530 sf/gal (0.003"75 µm) WFT. For most applications where a 38-50 µm (0.0015-0.002") blast profile has been achieved, it is suggested primer be installed at a nominal thickness of 0.003-0.006" (75-150 µm) WFT.
- 4.5 The WFT/DFT (Dry Film Thickness) thickness of the applied primer has a relationship to its performance and cost. Variables such as the profile of the prepared steel can be impacted by the media used, regardless of the cleanliness standard specified. All these factors must be considered in advance of the commencement of work to establish agreed QA standards and methodologies.
- 4.6 WFT testing should be performed to monitor specified thicknesses as the job progresses. Film reduction during curing will reduce the DFT thickness of the cured lining when applied at the thicknesses above by a factor of approximately 50%.
- 4.7 Suggested spray equipment (or equivalent) as follows:
 - Gun: DeVilbiss MBC-510
 - Fluid tip: E
 - Pressure: 2800-3000 psi (19-20 MPa)
 - Hose: 1/4" (6.0 mm) ID
 - Tip: 0.017"- 0.023" (430-580 µm)
 - Filter: 60 mesh
- 4.8 The above equipment specification is a suggested starting point only. Changes in pressure and tip sizes may be needed for proper atomization.
- 4.9 Pennguard HP Epoxy Primer is pre-thinned and further thinning is typically not required. If circumstances and the expertise of the painter deem that thinning may aid in the spraying of the material, Pennguard HP Epoxy Primer can be thinned up to 10 % by volume with MEK to assist in spraying if needed. Do not thin more than 10 %.

5.0 CURING AND RECOAT

- 5.1 Pennguard HP Epoxy Primer typically cures dry to touch in about 2.0 hours at temperatures of 75°F (24°C). High velocity air and good ventilation help to remove solvents and accelerate drying. High humidity slows curing. Primer will dry hard to allow handling in 2 to 4 hours depending on humidity and substrate temperature. Use a fingernail scratch test to insure Primer is cured hard before proceeding.
- 5.2 Recoat: Pennguard HP Epoxy Primer is designed to be installed in a single step to the desired thickness. In the event it becomes necessary to perform re-coating or touch-ups, Pennguard HP Epoxy Primer may require surface preparation before these operations can be completed. Material will reach approximately 80% of its full cure within 72 hours of application, with the remaining 20% attained over a period of 7-14 days. Recoating within the initial 72-hour period does not require any surface preparation other than dry rag wipe cleaning. Once the initial 72-hour period has passed, the coated surface shall be sanded with a 150-200 grit sandpaper to roughen the coating surface thus providing a “tooth” that will aid the adhesion of subsequent topcoats.
- 5.3 The Primer must dry hard to touch before commencing application of the Pennguard Adhesive/Membrane. Do not apply the Pennguard Block Lining System on wet or tacky Primer.
- 5.4 Primed components that remain exposed to the elements for excessive lengths of time require the resultant surface chalk to be removed before commencement of repriming or subsequent lining work. Wash affected components with clean water and allow to dry to touch before proceeding with installation of other components of the Pennguard Block System. Pressure washing may be more efficient to achieve this for larger areas and is acceptable.

6.0 SAGS AND RUNS

- 6.1 Sags and runs can occasionally be encountered during the installation of Pennguard HP Epoxy Primer. While sags and runs are aesthetically displeasing, they are not necessarily detrimental to the purpose of the Primer, which is to protect the steel from re-rusting before subsequent block lining work. A sag/run however with a thickness >200 µm (0.008”) could develop curing shrinkage stresses that minimizes bond in that area and shall be dealt with.
- 6.2 To assist in defining a standard for pass/fail for sags and runs the following is noted:
- 6.3 A sag is defined as having a width greater than its height and a height not exceeding 200 µm (0.008”). A run is defined as singular bubble-shaped slumps of nominal 3 mm width or less and height of 200 µm (0.008”) or greater.
- 6.4 Sags and run shall be permitted, provided the DFT thickness is less than 200 µm (.008”). Runs should ideally be “worked out” during installation while the primer is still wet by using a paint brush or roller to knock down the peaks.
- 6.5 In the event sags or runs in excess of 200 µm (.008”) are discovered after the primer has dried, they shall be sanded so they are below 200 µm (.008”).

7.0 CLEAN UP AND SHELF LIFE

- 7.1 Equipment should be thoroughly cleaned with MEK. Read and follow manufacturer's SDS's and safety precautions when handling this chemical.
- 7.2 Maintain products in original packaging and sealed until ready for use. Estimated shelf life of both Part A and Part B components is 24 months when stored in a dry area at 70°F (21°C). Actual shelf life may vary with storage conditions. If there is any question with respect to the quality of the components, check reactivity prior to use. For assistance consult with Armor.

8.0 DISCLAIMER SAFETY CONTACT INFORMATION

- 8.1 Read and follow the hazard information, precautions and first aid directions on the individual product labels and material safety data sheets before using.
- 8.2 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 armor-inc.com.
- 8.2 Please contact Armor for further information at +1-877-98ARMOR (982-7667) or customerservice@armor-inc.com.

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