



Pocono Fabricators

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GUIDE SPECIFICATION – #PKH - HAND APPLICATION TANK PREPARATION & APPLICATION INSTRUCTIONS

NOTE: This guide specification points out various installation procedures but cannot cover all variations in field conditions. Therefore experienced applicators may sometimes deviate from these procedures to suit specific field and service conditions.

1. **Services required** -- furnishing and installing a corrosion resistant mortar lining in accordance with the following specifications. This work is to be completed as close as possible to the anticipated start up date. All work is to be inspected at each stage by the party responsible for quality control.
2. **Scope**
 - a. The corrosion resistant mortar lining shall be applied to protect the substrate in accordance with these specifications. The application shall include preparation of the surface, mixing and applying the mortar lining using specified materials and application procedures.
 - b. The installation of the lining shall be accomplished by a representative of the manufacturer of the corrosion resistant mortar or by crews experienced in the field installation of mortar linings.
 - c. Installation is to be accomplished when the surface temperature is between 40°F and 90°F. Excursions for short intervals are permitted. If temperatures will be below or above this range for a majority of the time, the area should be heated or cooled to insure a sound lining application.
3. **Materials**
 - a. Lining -- The lining shall be a corrosion resistant cement, Pre-Krete, as manufactured by Pocono Fabricators, 160 Gamma Drive, Pittsburgh, PA. The mortar lining shall contain no free lime and not less than 25% silica. It shall be composed of a low water soluble hydraulic binder that is completely inorganic and non-toxic. The mortar lining material shall be pre-mixed in the plant of the manufacturer so that it is totally homogeneous and completely uniform.
 - b. The mortar lining material shall be delivered to the job site in 50 lb. paper bags. Only the addition of clean, cool water will be used, no other ingredients will be added. Use of portland cement will not be permitted.

- c. Prior to installation, certified laboratory data shall be submitted which verifies that the mortar lining meets the following minimum requirements:
1. The water absorption of the mortar lining (when tested in accordance with Military Specification MIL-T-12295) shall not be more than 10% of its dry weight.
 2. The compressive strength of the mortar lining (when tested in accordance with ASTM Method C109-86) shall be at least 5,000 psi after 3 days. The tensile strength (when tested in accordance with ASTM Method C190-77) shall be at least 600 psi after 3 days.
 3. The lining shall have approximately the same coefficient of expansion as medium steel. This shall be verified by tests where the mortar lining has been applied to medium steel rings, heated up to 350°F, then plunged into tap water at 40°F. Tests shall be repeated 100 times and shall indicate that the lining is unaffected by this temperature variation.
- d. Water -- Water for mixing the mortar lining shall be clean, cool potable water, free from objectionable quantities of silt, organic matter, alkali, salts and other impurities.

SURFACE PREPARATION

Units, which are already piped up, plug the openings with tapered wood plugs coated with grease. Various other types of plugs may also be used. On new units, which are not piped up, coat the threaded openings with a heavy coat of grease.

- a. The steel surface shall be cleaned to remove oil, dirt, grease and loose powdery contaminants or other coatings. Cleaning can be accomplished by:
1. Abrasive blasting equipment using dry, hard sharp sand or grit to remove contaminants.
 2. High-pressure water blaster is acceptable if it can clean the steel so it will exhibit a tight cohesive surface suitable for bonding of mortar lining. Rust bloom is perfectly acceptable and will aid in mechanical bond. A white metal surface is not recommended.
- b. On old steel, any holes shall be repaired prior to installing the lining.

MIXING

Pre-Krete is mixed at the rate of $\frac{3}{4}$ to 1 gallon of water per 50-lb. bag. The amount of water required is dependent on the weather conditions. On hot days, more water is needed than on damp days. Formula G-8 usually requires slightly less mixing water than C-17. Do not add all the water at one time. Start off with about $\frac{3}{4}$ gallon of water and add more as required. Mix the Pre-Krete to a normal, mortar-like consistency. Do not get the Pre-Krete too dry or too soupy. If necessary, add more Pre-Krete to a watery mixture. The consistency should be such that if you put a quantity of Pre-Krete (about the size of a golf ball) on your fingers press it down lightly, then turn your hand over -- the Pre-Krete should stay adhered to your fingers.

TOOLS REQUIRED

Mortar Box, Cement Brush - 1-1/2" thick, Hawk Board - 13" x 13", Square Mouth Spade, Pointing Trowel - 6", Mason Hoe, Plastering Trowel - 4" x 11"

APPLICATION

In a hot water generator, if possible, remove the heating coil. If it cannot be removed – protect/cover it. On horizontal vessels, do the heads first. On vertical units, start at the top head. Be careful not to trowel across the opening, this may cause the lining to drop. Work around the openings with a pointed trowel.

If the unit has an elliptical shaped manhole, taper the Pre-Krete away from the inner edge of the gasket surface. On small diameter vessels, it may be necessary to sacrifice thickness at this point to insure proper seating of the manhole.

After the first coat is on the heads; start on the cylinder and apply the first coat. Again, do not trowel over couplings. Do not be too concerned with the appearance of this coat -- put it on and leave it. Should small areas drop off, do not try to replace it, excessive troweling may cause more to drop.

The first coat should be approximately 1/4" thick. This is not a hold thickness, but is ideal for its purpose. It is thin enough to trowel on easily and thick enough to give a firm base for the second coat. Leave a pathway along the bottom to walk out of, and allow the first coat to set up. The set up time depends a great deal on the ambient conditions -- on hot days, it will set up faster than on damp days. Generally, allow 20 minutes to 1 hour for Formula C-17 to set up and slightly more time for Formula G-8. Do not allow the first coat to set up too hard since this will result in a laminated lining.

The first coat should be sticky to the touch when applying the finish coat. While the first coat is setting up, Pre-Krete the manhole cover to which you previously have tack welded wire mesh or metal clips. This is essential in receiving a good bond to the cover that is generally subjected to rough treatment.

The finish coat is almost a repetition of the first (now is a good time to patch up the small areas, which may have dropped in the first application). Finish the heads first, then the cylinder. The final coat should be troweled smooth to a minimum 1/2" to 5/8" total finish thickness.

After the second coat has been allowed to partially set up, the entire surface should be brushed using a cement brush dipped in water. Lightly sweep the surface being careful not to pull the Pre-Krete. If the lining does start to pull let it set up tighter before brushing. Do not brush too much in one area since, this also, may cause the Pre-Krete to sag.

When the entire lining has been brushed, sweep out the excess Pre-Krete from the pathway left along the bottom. Starting at the front end, and working back to the exit, apply the finish coat to the floor. This can be done in one 1/2" to 5/8" thick application. Getting out of the tank and reaching in through the manhole may complete the final section of the floor.

When lining vertical tanks, it is best to do the top head first, then the sidewalls and work down to the bottom head. If the vertical tank exceeds 4 feet in height, strips of expanded metal 3/4"-13ga X 4" to 6" wide should be tack welded on 3 foot centers around the circumference of the tank to act as a slump support.

A good method for being certain that the lining is going on to its proper thickness is to use a paper clip. Straighten out one end. The applicator can then use this as an inexpensive thickness gage which he can stick into the Pre-Krete to continually determine if the lining is going on to its proper thickness.

PRE-KRETE MAY BE CURED TO ONE OF THE FOLLOWING METHODS:

NOTE: CONCRETE SEALER IS NOT BE USED IN POTABLE WATER SERVICE

1. CURING COMPOUND

Use of a resin-based membrane compound such as Concrete Sealer as supplied by Pocono Fabricators can be spray, brush, and/or roller applied to the fresh mortar lining. It should be applied as soon as possible after the surface moisture has disappeared. Coverage is approximately 150-200 sq. ft./gallon. Mortar lining should be allowed to set untouched for 24 hours.

2. MOISTURE CURE

Pre-Krete Systems can be moisture cured by creating a moist environment within the lined equipment. This is done by securely covering **ALL** manholes and nozzles with plastic and tape. It is imperative that **ALL** openings be tightly sealed. In large equipment, a punctured garden hose producing a fine mist or a simple garden sprinkler of the oscillating type can be placed in the upper elevations of the equipment. This will also create the moist environment required. In extreme conditions of very low humidity (less than 40%) and high temperatures (skin temperature above 90°F) humidifiers are required to prevent water loss during application. This equipment is also known as swamp coolers. If you have difficulty finding this type of equipment in your area, contact Pocono Fabricators.

3. IMMERSION CURE

After the tank is completely lined, let it set untouched for 4 to 8 hours. After the lining has gotten firm, SLOWLY fill the tank with water, making sure you are not "washing out" any of the lining. Allow the lining to set for 12 to 24 hours completely immersed in water. Drain and flush the tank. The tank is now ready to be placed into service.

4. HEAT-UP PROCEDURE

When a Pre-Krete lining is installed in a tank, boiler stack, breeching, etc. there is always some residual moisture remaining after a 24-hour curing period. When operating temperatures are above 250°F and a 5 to 7 day cure at 60°F is unattainable, it is important that the installed Pre-Krete lining be heated up gradually so that the residual moisture is not steamed. This could result in spalling and other damage. The following heat-up procedure is only required when a newly lined unit is first placed into service: After you apply the lining allow it to cure for 24 hours using Concrete Sealer or allowing it to set in a moisture laden atmosphere. After that time, bring the temperature up to 250°F and allow it to remain there for 1 hour, then increase the temperature by 50°F and again hold for 1 hour for each inch of thickness. Continue that procedure until you reach the operating temperature.

REPAIRING PRE-KRETE

NEW AND OLD SURFACE CRACKS

Wet the surface thoroughly with a cement brushes dipped in water. Pour a partial bag of Pre-Krete through a piece of window screen to sift out the coarse aggregate. Using a wet slurry mix of Pre-Krete, brush over the area until the crack is filled in flush with the old lining.

DEEP CRACKS

Clean the crack thoroughly using a wire brush. Wet the entire area with a cement brush dipped in water or Sonocrete Acrylic Additive bonding liquid. Trowel on a normal consistency of Pre-Krete. Build it up to about 1/8" x 1/4" higher than the original surface, then taper it off about 1" on either side. Blend in with a cement brush. Cure properly.

While in service, cracks may become filled with lime deposits after being in operation. If the lime appears white, do not disturb it. In most cases, this indicates a surface crack and the water have not penetrated to the steel. Should the lime appear discolored (black, dark red or rust colored) then clean out the crack and repair as above.

NOTES

1. Do not trowel Pre-Krete excessively. Use as few trowel passes as are necessary to move and level the material.
2. Pre-Krete has a tendency to set up quickly. Do not mix too much material in advance.
3. Pre-Krete contains hydraulic cements. They cannot be allowed to air dry. The lining must be properly cured in a moisture-laden atmosphere.