

STRUCTURAL POLYMER CONCRETE LINER BY AP/M PERMAFORM®

1 Intent: It is the intent of this specification to provide minimum standards for materials and methods for waterproofing, sealing, structural reinforcement and corrosion protection of existing manholes, wet wells and similar underground structures from the cover to the channel. This specification offers flexibility in design by offering technologies available for repairing the various defects found in sanitary sewer structures from minor leaks to complete structural failure.

2 Applicability: These repair means and methods may be engineered for the depth, diameter, shape, traffic loading, groundwater pressures and condition of each manhole.

3 Referenced Standards

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| 3.1 | ASTM D-570 | Standard Test Method for Water Absorption of Plastics |
| 3.2 | ASTM C-882 | Standard Test Method for Bond Strength of Epoxy Systems Used with Concrete by Slant Shear |
| 3.3 | ASTM D-1653 | Standard Test Methods for Water Vapor Transmission of Organic Coating Films (Method B) |
| 3.4 | ASTM D-4541 | Pull-off Strength of Coatings Using a Portable Adhesion Tester |
| 3.5 | ASTM D-4414 | Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages |
| 3.6 | NACE RP0274 | High Voltage Electrical Inspection of Pipeline Coating Prior to Installation |
| 3.7 | NACE 6/ SSPC-SP 13 | Surface Preparation of Concrete |

4 Infiltration Elimination (Preparation)

4.1 Plugging and Patching Material

4.1.1 Permacast-Plug™

4.1.1.1 A quick setting hydraulic cement compound used to quickly stop running water or seepage leaks in masonry and concrete. The Permacast-Plug™ formulation is nonshrinking, nonmetallic, and noncorrosive. Permacast-Plug™ requires only potable water for mixing and achieves initial set in 1 to 3 minutes, even when applied under water.

4.1.1.2 Permacast-Plug™ is used above or below grade, interior or exterior, to stop seepage and flowing water leaks in most concrete and masonry walls and floors. The fast initial set, high strength, and controlled expansion, make Permacast-Plug™ an effective patching material for use in manholes, wet wells, lift stations and other structures with leakage. Permacast-Plug™ will not permanently seal running water leaks that are caused by either thermal or structural movement.

4.1.2 Permacast-Patch™

4.1.2.1 A fast setting, ready-to-use, cement based concrete and masonry patching compound formulated specifically for underwater use. It requires only potable water for mixing. Permacast-Patch™ achieves initial set in 3 to 5 minutes and final set within 20 minutes even under

water. After initial set, Permacast-Patch™ may be shaved to conform to the contours of the surrounding surface. Properly mixed and applied, Permacast-Patch™ quickly develops a high strength and a tenacious bond.

4.1.2.2 Permacast-Patch™ is used underwater or below grade on vertical, overhead, and horizontal surfaces. It is used for the patching of manholes in preparation for the PERMACAST® liner application and is particularly well suited to fill offset bricks in the corbel area.

4.1.3 MS-10,000 UL™

4.1.3.1 PERMACAST® MS-10,000 UL is designed to provide a thick base layer that fills mortar joints, cracks and voids in brick and masonry manholes. The base layer provides a sound substrate onto which the structural liner is spun cast at the specified thickness of ½"-2" to reinforce and seal the existing structure.

4.2 Chemical Grout: All chemical sealing materials used when needed for severe leaks in the performance of work specified shall conform to ASTM F 2304 latest edition Standard Practice for Rehabilitation of Sewers Using Chemical Grouting.

5 Structural Polymer Concrete

5.1 COR+GARD® EPM is an aggregate filled, 100% solids epoxy especially formulated for use in sewer systems. Its no sag formulation allows it to be used on vertical and overhead surfaces. COR+GARD® EPM quickly forms a tenacious bond to freshly applied PERMACAST® mortars or properly prepared concrete surfaces. COR+GARD® EPM is self-priming and may be applied over damp concrete surfaces. COR+GARD® EPM application produces a homogenous protective layer that is impervious to water, oils and most chemicals.

5.2 COR+GARD® EPM Installation: Surfaces shall be free of oil, grease, laitance, surface water, form release agents and other contaminants that may affect bond. Concrete surfaces shall be pressure washed, abrasive blast or chemically cleaned to remove deteriorated concrete and other contaminants. All debris shall be kept from entering sewer flows and removed for disposal. Any active leaks shall be plugged with Permacast Plug or by an approved chemical injection grout. Permacast UL shall be used to fill voids and bring the cleaned concrete surface back to a uniform and sound substrate. If more than 24 hours has elapsed before the COR+GARD® EPM application can commence or chemical cleaning was used, the prepared substrate shall be neutralized with clean water.

5.2.1 The pre-measured Part A, Part B and Part C shall be remixed and then emptied into a clean, dry mixing pail. Mix with a jiffy-mixer until the components have reached a uniform color and texture. All parts shall be maintained at temperatures between 75 and 100 degrees F. Do not retemper or thin with solvents.

5.2.2 Apply COR+GARD® EPM by SpinCasting or trowel to achieve a minimum thickness of 1/8 ". A damp, short nap paint roller may be used to smooth out the surface after trowel application. Remove excess water prior to rolling.

- 5.2.3 Applied wet film thickness shall be verified per ASTM D-4414, Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.

6 Submittals

- 6.1 All submittals shall conform to the requirements of the Contract document.
- 6.2 In addition, the following items may be required of the installer to be submitted to the engineer at the sole discretion of the engineer. This Contract shall not be considered complete until receipt and acceptance of the following:
 - 6.2.1 Reference submittals
 - 6.2.1.1 Contractor certification
 - 6.2.1.2 Material certification
 - 6.2.2 Product data
 - 6.2.2.1 Polymer Concrete

7 Product Handling

- 7.1 Proper protective clothing and breathing apparatus shall be used to avoid direct contact with the liquid components of COR+GARD® EPM if hand spraying or brushing by man entry. When spraying COR+GARD® EPM with spinner head, breathing apparatus is not required. Manufacturer's material safety data sheets shall be kept on site and the applicator shall ensure familiarization with this information and emergency procedures.
- 7.2 Personnel entry is not required to rebuild the interior wall of most manholes when using the PERMACAST® spinner head. If personnel entry becomes necessary for any reason, OSHA standards for confined space entry shall be strictly observed.

8 Quality Assurance and Acceptance

- 8.1 Visual inspection should verify a leak-free, uniform appearance.
- 8.2 Applied wet film thickness of COR+GARD® EPM shall be verified per ASTM D-4414, Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages.
- 8.3 The protective coating shall be spark tested per NACE RP0274 at 100 volts per mil of dry film thickness. The dielectric strength of coatings will vary from manufacturer to manufacturer. If this value is unknown, it is recommended that a holiday be created in the coating and the tester be calibrated to the voltage that detects the flaw.

9 Measurement for Payment:

- 9.1 Payment shall be made at the unit price per vertical or square foot of finished wall for each prescribed thickness.