



ULTRA HIGH STRENGTH, CORROSION RESISTANT MORTAR Based on Micro Silica and Portland Cement Designed for Renewal of Underground Concrete Sewer Structures in Severely Corrosive (MIC) Environments.

It is the intent of this specification to provide for the waterproofing, sealing, structural reinforcement and corrosion protection of existing manholes, pipe, wet wells and similar underground concrete structures by the safe, quick and economical application of a uniform cementitious layer of special mortar that cures in place to form an interior hardened liner.

Fortified with Con^{mic}Shield® for protection against Microbiologically Induced Corrosion (MIC).

PHYSICAL PROPERTIES

Applied Density	135 pcf ± 5 pcf
Color	Light Gray
Special Handling	None-keep dry
Shelf Life	One year
Water Demand	118-128 fl.oz/bag
Coverage	50# bag yields 0.40 cf
Working Time	40 minutes

NOMINAL VALUES

Set Time at 72°F ASTM C-403	
Initial Set	60 minutes
Final Set	240 minutes
Modulus of Elasticity ASTM C-469	
28 days 6-inch cylinders	5.26 X 10 ⁶ psi
Flexural Strength ASTM C-293	
24 hours	1,200 psi
28 days	1,500 psi
Compressive Strength ASTM C-109	
24 hours	4,000 psi
28 days	10,000 psi
Slant Shear Bond ASTM C-882	
28 days	2,900 psi
Split Tensile Strength ASTM C-496	835 psi
Shrinkage ASTM C-1090	0
Freeze Thaw ASTM C-666	300 Cycle Pass
Freeze Thaw Chloride Solution	300 Cycle <1%
Rapid Chloride Permeability ASTM C-1202 (AASHTO T-277)	< 50 Coulombs

*The Physical properties contained herein were obtained under laboratory conditions at 72° F. Physical properties obtained under field conditions may vary do to environmental variables. Data are subject to reasonable deviation.

GENERAL

This specification establishes the minimum standard for material and method of application for restoring and sealing leaking and deteriorated manholes by centrifugally casting a special mortar, PERMACAST® MS-10,000, onto its interior in one application at a specified thickness.

MATERIAL

PERMACAST® MS-10,000, shall be an ultra high strength, high build, corrosion resistant mortar, based on silica modified Portland cement and other special additives. The material is designed for use where bacterial corrosion can low concrete pH to < 3. When mixed with the appropriate amount of water, a paste-like material will develop which may be sprayed, cast, pumped or gravity-flowed into any area ¼ inch and larger. This mortar will harden quickly without any need for special curing.

The hardened binder is dense and highly resistant to water migration. This exceptional performance is achieved by a complex formulation of mineral, organic and densifying agents and sophisticated chemical admixtures. Graded quartz sands are used to enhance particle packing and further improve the fluidity and hardened density. The composition also possesses excellent thin-section toughness, high modulus of elasticity and self-bonding. Fibers are added as an aid to casting, for increased cohesion and to enhance flexural strength.

The water content may be adjusted to achieve consistencies ranging from thin motor oil to modeling clay. Despite its high fluidity, the mortar has good wet adhesion and does not sag or run after placement. The mortar may be cast against soil, metals (including aluminum and lead), wood, plastic, cardboard or other normal construction material.

Con^{mic}Shield® prevents MIC corrosion by creating an environment incompatible to the growth of Thiobacillus bacteria. Con^{mic}Shield® permeates the mortar during the mixing phase and molecularly bonds to the cement particles and becomes an integral component of the new liner. It cannot wash off, delaminate or lose its effectiveness from wear. Scraping or erosion of its surface only serves to expose additional treated material.

EQUIPMENT

Mortar mixers, compressors and pumps are standard commercial models. The high speed, rotating applicator device is provided with the material to certified applicators.

MIXING

Combine 50 pounds of the packaged dry mix with 118-128 fluid ounces of clean (50°-70° F) water and prescribed amount of ConShield® while mixing with a high speed shear mixer for four (4) minutes until proper consistency is obtained. Continue to agitate the mortar to prevent thickening beyond the desired fluidity. If it thickens, it may be retempered. The working time is approximately 40 minutes depending upon conditions.

PREPARATION

Cover the manhole base to prevent washed debris from entering the sewer line. Wash the interior surface with a high-pressure, water-blast sufficient to remove all laitance and loose material and flush debris downward to the covered base. Pressures sufficient to etch the existing surface will improve adhesion. Plug active leaks; fill voids.

APPLICATION

Position the rotating casting applicator within the center of the manhole at the lowest point desired for the new wall and commence pumping the mixed mortar. As the mortar begins to be centrifugally cast evenly around the interior, retrieve the applicator head at the prescribed speed for applying the thickness that has been selected. If flows are interrupted for any reason, simply arrest the retrieval of the applicator head until flows are restored. The retrieval speed can be easily varied to create different thickness as the condition or depth of the manhole may dictate to provide sufficient strengths. Because of the even application throughout the circumference, thickness may be verified at any point. If additional thickness is desired at any level, simply place the rotating applicator at that level and recommence pumping and retrieval until that area is thickened. Built-in bonding agents allow additional layers to be applied at any time. The pressure application from the centrifugal casting of the mortar produces a finely textured surface that requires no additional troweling or finishing. Upon completion, the base covering shall be removed and any debris disposed of properly. Additional material shall be hand applied to bench surfaces tapering from the wall to the edge of the channel. Flows at bottom channels may remain active during the procedure.

CURING

Avoid overly windy and arid curing conditions; use CS Identifier curing membrane per ASTM C-309 to create the most optimal curing conditions possible.

QUALITY ASSURANCE & ACCEPTANCE

All work shall be performed by factory certified applicators. Mortar cube test samples for material strengths may be taken randomly as directed by the inspector for testing at the owner's expense. Thickness can be verified with a wet gage at any random point of the new interior surface. Any areas found to be thinner than minimum tolerances shall immediately receive additional material. Visual inspection should verify a leak-free, uniform appearance.

SAFETY

Personnel entry is not required to rebuild the interior wall. If personnel entry is necessary for any reason, OSHA standards for confined space entry will be strictly observed.

WARRANTY and DISCLAIMER

The technical data herein provided is compiled from laboratory specimens in accordance with ASTM Standards. Test results from specimens made in the field may vary. Although this data is believed to be reliable, AP/M PERMAFORM makes no warranty express or implied, and further disclaims any liability as to the suitability of this information to a particular end use.

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