



**ULTRA HIGH STRENGTH,  
Based on Silica Modified Portland Cement Designed for Renewal of Underground Concrete  
Sewer Structures. CORROSION RESISTANT MORTAR**

**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 shell.**

**\*PHYSICAL PROPERTIES**

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

**NOMINAL VALUES**

Set Time at 72°F ASTM C-403	
Initial Set	min 120 minutes
Final Set	min 240 minutes

Modulus of Elasticity ASTM C-469	
28 days	min 1,500,000 psi

Flexural Strength ASTM C-293	
24 hours	min 400 psi
28 days	>1,500 psi

Compressive Strength ASTM C-109	
24 hours	3,000 psi
28 days	10,000 psi

Slant Shear Bond ASTM C-882	
28 days	>2,000 psi

Split Tensile Strength ASTM C-496	>800 psi
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Shrinkage,ASTM C-1090	0
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Rapid Chloride Permeability ASTM C-1202 (AASHTO T-277)	< 550 Coulombs
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\*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**

The material, PERMACAST® MS-10,000, shall be an ultra high strength, high build, corrosion resistant mortar, based on silica modified Portland cement. 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 impermeable. The above 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.

**EQUIPMENT**

Mortar mixers, compressors and pumps are standard commercial models. Please contact AP/M for equipment specifications. The high speed, rotating applicator device is provided with the material to certified applicators.

## MIXING

Combine 50 pounds of the packaged dry mix with 128 to 145 ounces of clean (50°-70° F) water 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. Outside of manholes, protect against arid curing conditions; inside of manholes, curing compounds or membranes are usually not necessary.

## 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. 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 best 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.

## QUALITY ASSURANCE & ACCEPTANCE

All work shall be performed by factory certified applicators only. 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. This product is intended for use solely by our certified applicators.

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email: [info@permaform.net](mailto:info@permaform.net)  
[www.permaform.net](http://www.permaform.net)

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