

## PERMACAST® MS-10,000 Technical Data Sheet

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

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	118-128 fl.oz/bag
Coverage	50# bag yields 0.42 cf
Working Time	40 minutes

#### NOMINAL VALUES

Set Time at 72°F ASTM C-266	
Initial Set	min 160 minutes
Final Set	min 295 minutes
Modulus of Elasticity ASTM C-469	
28 days	5.26 X 10 <sup>6</sup> psi
Flexural Strength ASTM C-293	
24 hours	1,200 psi
28 days	1,530 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	
28 days	835 psi
Shrinkage ASTM C-1090	<.05%
Freeze Thaw ASTM C-666	300 Cycle Pass
Freeze Thaw Chloride Solution	300 Cycle <1%
Rapid Chloride Permeability ASTM C-1202 (AASHTO T-277)	< 100 Coulombs

\*The Physical properties contained herein were obtained under laboratory conditions at 72° F. Physical properties obtained under field conditions may vary due 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 118 to 128 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. Remove ladder rungs flush with concrete surface of manhole structure. Existing baffles are to be removed for specified manholes. The Contractor is to clean the surface of the manhole to sound surface using high pressure water washing or wet abrasive sand blasting. Where high pressure water blasting is used, a minimum of 24.13 MPa (3500 psi) is required to clean free all foreign material within the structure. A minimum of 9.5 liters (2.5 gallons) per minute should be delivered through the spray tip. The spray tip should be kept between 15 and 30 cm (6 and 12 in.) from the surface and be held at an angle between 45° and 90° to the surface being cleaned. When grease and oil are present within the structure, an approved detergent or muriatic acid shall be used integrally with the high-pressure cleaning water.

Remove loose and protruding brick, mortar and concrete using a masons hammer and chisel and/or scraper to provide an even surface prior to liner installation. Care should be taken to avoid further structural damage to the existing surface. Perform structural crack repair, patching of damaged areas or large voids in concrete, joint treatment, stopping of water leaks and all other needed localized repairs using approved materials. Cement patching material shall be set as per the manufacturer's recommendation

## 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.

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