

PERMACAST® CR-9,000QS Technical Data Sheet

CR-9,000QS, is a high strength, high build, corrosion resistant calcium aluminate cement mortar designed to be used to repair concrete sanitary sewer structures.

Physical Properties

Applied Density	135 pcf ± 5 pcf
Color	Brown
Special Handling	None-keep dry
Water Demand	110-125 fl.oz/bag
Coverage	50# bag yields .42 cf
Initial Set Time	50-60 minutes @ 72°F
Final Set Time	90-120 minutes @ 72°F

Compressive Strength ASTM C-109:

24 hours	>5,000 psi
28 days	>9,000 psi

Flexural Strength ASTM C-293	> 1,500 psi
Tensile Strength ASTM C-496	>800 psi
Thin Section Toughness	Excellent

Slant Shear/Bond Strength ASTM C-882	2000 psi
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Freeze/Thaw Resistance ASTM C-666	No visual damage 300 cycles
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Sulfate Resistance	No attack 90 days
Biogenic Sulfide Resistance	Excellent at pH 2 and higher

Shrinkage ASTM C-1090	<.05%
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Performance test data is based on laboratory test specimens prepared at 72° F. Reasonable variations from the data shown can be expected depending on the care taken in evaluating test specifications and jobsite conditions such as the quality of substrate preparation, level of expertise of personnel doing the application, curing procedures and weather conditions such as temperature and humidity. Proper surface preparation, application and curing are extremely important in ensuring good performance.

MATERIAL

The material, PERMACAST® CR-9,000 QS, shall be high strength, high build, corrosion resistant mortar based on calcium aluminate 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 1/4 inch and larger. This mortar will harden quickly without any need for special curing and can be considered

mature after 24 hours. The hardened mortar has been purposely developed to be resistant to very aggressive soil conditions, such as low pH and high sulfates, sea water and dilute sulfuric acid resulting from bacteriological oxidation of hydrogen sulfide common to sanitary sewers. The raw materials are carefully selected and contain no calcium sulfates, tri-calcium aluminates, or agents aggressive to reinforcing steel. The mortar is designed to resist biogenic corrosion in atmospheres in which Portland cements may reach levels as low as pH2.

The hardened binder is dense and relatively impermeable and does not contain any free lime hydrates. The above performance is achieved by a complex formulation of mineral, organic and densifying elements, and sophisticated chemical admixtures. Finely ground silica sands are used to enhance particle packing and further improve the fluidity and hardened density. The composition also possesses excellent thin-section toughness and bonding power. Non-metallic alkali resistant fibers control cracking and enhance its flexural resistance.

The mortar can be used as the sole protection against aggressive elements common to most sanitary sewer systems. The water content may be reduced to achieve any consistency ranging from thin motor oil to that of 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, wood, plastic, cardboard, or any other normal construction 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 96 ounces of water (a water/cement ratio of .32) while mixing with a high-speed shear mixer for four (4)

minutes. 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. Outside of manholes, avoid overly windy and arid curing conditions; otherwise, no moist curing or membranes are required.

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 any active leaks.

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. Cold joints are of no concern due to "built-in" bonding agents and additional layers may be applied at any time. The pressure application from the centrifugal casting of the mortar produces an orange peel 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 at a thickness of 3 inches tapering from the wall to the edge of the channel. Flows at bottom channels may remain active during the procedure.

DESIGN THICKNESS

Many factors impact optimum design thickness: condition of the existing manhole, material, depth, degree of ovality, ground water pressures and traffic loads. While theoretical load carrying thickness can be relatively thin, practical in-field application suggests a minimum 1/2-inch thickness applied monolithically for better long-term benefit. Thicker

layers should be considered for portions greater than 15 feet deep.

QUALITY ASSURANCE & ACCEPTANCE

All work shall be performed by factory certified applicators. Two cube tests for material strengths (ASTM C-109) may be taken randomly during the day's application as directed by the inspector. Thickness can be verified with a wet gauge at any random point of the new interior surface. Any areas found to be thinner than minimum tolerances will receive additional material. Visual inspection should verify a leak-free, uniform appearance.

SAFETY

OSHA standards for confined space entry will be strictly observed.

WARRANTY and DISCLAIMER

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