



MALP SERIES CONCRETE MIXING INSTRUCTIONS FOR MATERIALS LABS

The cementitious product you are about to mix is not a traditional Portland cement-based material and cannot be mixed exactly per ASTM protocols.

Phoscrete Corporation manufacturers **MALP Series** concretes (Magnesium Alumino Liquid Phosphate) that are provided in kits containing the dry and liquid component. The dry component (Dry Mix) is packaged in bags or pails and is composed of magnesium oxide, aluminosilicates, aggregates, and reinforcing fibers.

The liquid component (Liquid Activator) is packaged in jugs or jars and consists of an aluminum phosphate solution.

PHOSCRETE HC, PHOSCRETE VO, and PHOSCRETE SG are two [2] component mixes comprised of Dry Mix and Liquid Activator.

PHOSCRETE HC-ENDURE™ and PHOSCRETE SG- ENDURE™ are three [3] component mixes, comprised of Dry Mix, Liquid Activator, and PHOSCRETE ENDURE™ Admixture (ENDURE). The ENDURE third component is a bio-based Soy Methyl-Esther Polystyrene liquid (SME-PS) that improves freeze thaw durability and salt scaling resistance without sacrificing performance of hardened properties, including bond strength.

PHOSCRETE MALP Series products are pre-extended concrete mixes. Do not extend with aggregates or sand.

PHOSCRETE MALP Series concretes are very fast setting concrete materials.

PHOSCRETE MALP Series concretes gains strength suitable to vehicular traffic in less than one hour at moderate ambient temperatures. In just one hour, Phoscrete products typically achieve compressive, flexural and bonds strengths specified at 28 days by most US state DOT materials offices.

Due to its rapid setting nature, working time for PHOSCRETE MALP products is limited, especially in warmer temperatures. Working time at lab temperature (68°F, 20°C) is less than 10 minutes with initial set almost immediately thereafter.

Working time and set time can be easily extended in warmer temperatures with no modification of Phoscrete's hardened material properties by cooling or supercooling the Liquid Activator whose freezing point is -20°F (-28°C).



Supercooling PHOSCRETE Liquid Activator jugs in a freezer below 10°F (-12°C) and then transferring the jugs to a portable cooler on ice is a common field installation practice that delivers sufficient working time for material placement while still achieving one [1] hour traffic-ready strengths. Refer to [Phoscrete's All Temperature Guidelines](#)¹ for complete details on time-of-set research and best practices for use of Phoscrete MALP Series concretes in hot, warm, and cold climates.

The manufacturer advises Materials Labs supercool Phoscrete Activator below 10°F to ensure sufficient time to place mixed material in molds.

Mixing Procedure: Always mix at the specified Liquid Activator-to-Dry Mix ratio (18.75% for both PHOSCRETE HC and PHOSCRETE HC-ENDURE, and 17.33% for Phoscrete VO) per Phoscrete's [Technical Data Guides](#)²

When mixing full units in a bucket, use a dual or variable speed drill suitable for mixing (minimum 7-amp drill, ½" chuck) and Phoscrete's urethane mixing auger for best results.

When mixing partial units with lab equipment use the appropriate water-to-dry ratios and ensure no dry material remains in the bowl. Clean metal mixing tools immediately with water.

The manufacturer specifies that chilled Liquid Activator be placed in the mixing container first, with the ENDURE admixture added second. Begin mixing as you introduce the Dry Mix.

The product only requires the wetting of the powder/aggregates. Using a sufficiently powered mixer, this typically takes one minute or less. Do not overmix.

Sample immediately once product is fully wetted out and shows a uniform consistency.

PHOSCRETE MALP concretes are self-consolidating and thixotropic. For best performance, use vibration (vibrating table or pencil vibrator) to increase flow and reduce air bubbles when casting forms and bonding to substrates.

Best to use plastic molds (HDPE, Plexiglas, etc.) because MALP Series concretes bond and react to metals. If you are using metal molds, do not use galvanized metal because MALP Series concretes react with zinc, producing H₂ gas. Metal molds must be coated with an appropriate release agent. Improper coating may cause damage to the molds. Phoscrete recommends [Super Lube](#)³, a food grade multipurpose synthetic grease. *Do not use release agents for bond tests!* Contact Phoscrete to verify compatibility if you have a different release agent you wish to use.

¹ <https://www.phoscrete.com/phoscrete-all-temperature-concrete-repair-guidelines/>

² <https://www.phoscrete.com/data-guides/>

³ <https://www.super-lube.com/multi-purpose-synthetic-grease-with-synolon-ptfe>



Cube molds for compressive strength tests: The largest aggregate in PHOSCRETE HC is 2,4 mm, however the FRP macro-fibers are 20-30 mm. Due to length of the fibers, using 2" (50 mm) cube for compressive strength testing may result in anomaly readings. The recommended compressive strength test for PHOSCRETE HC is ASTM C-39. If 2" cubes are required for testing per ASTM C-109, it is recommended that a larger form is cast and then samples are saw-cut to the desired cube size. Otherwise prepare additional cubes and discard low (anomaly) readings.

Prism molds for free shrinkage tests: When testing ASTM C-157 (dry and wet shrinkage) 1" x 1" prisms are designed for mortar only. Per ASTM C-157 use 3x3 prisms for concretes containing aggregates (Phoscrete HC, HF, SG) for accurate results.

Cylinder molds for bond and compressive strength tests: Phoscrete MALP Series concretes bond best to a dry concrete substrate. **Do not apply to an SSD substrate surface.**

On set, Phoscrete may exhibit slight expansion. If the material mushrooms over a cylinder, it is important to grind or wet sawcut the top of the sample to level. Otherwise, the testing machine will not exert a uniform stress over the contact surface of the sample, resulting in potentially inaccurate readings. This is particularly true for slant shear bond (C882). Phoscrete can be sawcut or ground as soon as 15 minutes following final set.

Unless otherwise specified by the material testing office, produce substrates for bond tests such as ASTM C882 and ASTM C1583 with dry Ottawa sand mortars. Prepare the substrate to CSP-7 per ICRI specifications and vibrate Phoscrete into place.

For maximum bond strength, apply Phoscrete Primer prior to placing fresh Phoscrete. Phoscrete achieves high early bond strength without need for primer, however for challenging applications where maximum bond strength is required, such as greater than 2,000 psi at 1 day, Phoscrete Primer establishes a strong thin bond to the substrate surface. The subsequent Phoscrete-to-Phoscrete bond is practically monolithic.

When testing PHOSCRETE MALP concretes per ASTM C-882 Bond by Slant Shear using Phoscrete Primer:

1. Remove substrate from the cylinder mold before applying Phoscrete Primer (pre-drill a hole in the bottom of the cylinder mold to make it easy to remove and replace the substrate).
2. Mix a small amount PHOSCRETE Primer with chilled Liquid Activator.
3. *Aggressively scrub freshly mixed Phoscrete Primer on the prepared substrate surface with a gloved hand.*
4. *Apply a thin ¼" (5mm) layer of Phoscrete Primer over the scrub coat by hand. Do not smooth with a trowel.*
5. Wipe excess Primer from the perimeter of the substrate cylinder, then return to cylinder mold.
6. *Wait at least 15 minutes for the Primer layer to set, then mix, place, and finish the Phoscrete repair material.*



Never apply PHOSCRETE MALP Series concretes to an SSD surface.

Do not wet cure or moist cure PHOSCRETE MALP concretes before 3 days air cure.

The manufacturer recommends the Lab Manager call and speak with Phoscrete's General Manager or Phoscrete's Installation Support Manager (see below) prior to mixing to answer any questions and review the mixing/handling procedures the Lab plans to use.

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