



PHOSCRETE® MALP Series Installation Guide

Installation Overview

Using Phoscrete concrete repair materials is easy, but for best results, it is important to follow the directions provided in this installation guide.

Quick Start Guides are included with all Phoscrete products and are published at phoscrete.com.ⁱ

Visit our website for the latest versions of all our documentation.

Contact our installation support team for help anytime.

What is MALP?

[Magnesium Alumino Liquid Phosphate] are concretes based on magnesium-phosphate cement. Unlike conventional concrete, MALP is not produced with Portland cement. Phoscrete's MALP concrete materials mix with a Liquid Phosphate Activator, not water. Phoscrete's family of MALP concretes include

- HC (Horizontal/Castable)
- HF (Hot Floor)
- VO (Vertical/Overhead)
- SG (Shotcrete/Gunite)

What is PHOSCRETE® ENDURE™?

PHOSCRETE MALP concretes are also packaged with PHOSCRETE ENDURE™ admixture, a bio-based, liquid soy-methyl-ester polystyrene (SME-PS) concrete durability enhancer. When mixed with ENDURE, PHOSCRETE MALP concretes become hydrophobic, with exceptional freeze-thaw and salt scaling resistance properties that lasts 10+ years.

Properties of PHOSCRETE MALP Series

PHOSCRETE MALP concrete materials are very rapid hardening, with high early strength gain. Phoscrete bonds strong – both chemically and mechanically - to conventional concrete substrates with no cold joints. Phoscrete also bonds super strong to itself, wet or cured, so repairs can be completed in segments with no cold joints. Phoscrete stops rust on contact, prevents chloride penetration, does not shrink, and resists cracking even under severe stress and/or environmental conditions.

At temperatures above 68°F (20°C), PHOSCRETE MALP is traffic-ready in less than one [1] hour. It achieves a compressive strength of 5,000 psi (35 MPa) and a bond strength of 1,500 psi (10 MPa) at one [1] hour. Phoscrete's ultimate strength is 10,000 psi (70 MPa) compressive, 700 psi (5 MPa) flexural, and 3,000 psi (20 MPa) bond (by slant shear).

For detailed technical data and performance characteristics, visit phoscrete.com.ⁱⁱ

Important things to know when working with PHOSCRETE MALP:

- › **Never add water** when mixing or placing MALP, mix only with PHOSCRETE Liquid Activator.
- › **Always add liquid first into an empty pail** when mixing. Next add admixtures. Then blend in the Dry Mix powder.
- › **Do NOT extend Phoscrete with aggregates or sand.** Phoscrete is pre-extended.
- › **Mix one full bag of PHOSCRETE HC or HF Dry Mix** into **one full jug of PHOSCRETE Liquid Activator.** Wet to Dry (WTD) mix ratio is 18.75% for HC and HF.
- › **Mix one full jug of Liquid Activator** into **two full bags of PHOSCRETE VO Dry Mix.** WTD mix ratio is 17.33% for VO. On-site measurement for partial unit mixing is NOT recommended, however Phoscrete provides a measuring beaker for mixing with one bag of VO with ½ jug of Liquid Activator (**54 ounces = ½ jug Liquid Activator**).
- › Liquid Activator is the same formula and volume packaging for HC, HF and VO.
- › Phoscrete products are usually mixed one kit at a time in standard 5-gallon (or larger) buckets on installations requiring 2 pallets of material or less (96 kits). On larger volume repairs, multiple kits of PHOSCRETE HC/HF can be mixed at once using a rubber tipped, paddle-type mortar mixer. The Whiteman WM7OPH8 with a HDPE plastic drum is recommended. On smaller repairs, it is recommended to use Phoscrete Small Pails that have 1.25-gallon capacity and are available for PHOSCRETE HC, HF and VO. Small Pail coverage is [1] board foot (.0833 cf or 12" x 12" x 1").
- › Use a heavy-duty drill designed for mixing concrete materials. Phoscrete recommends the Bosch GBM-9-16 mixing drill or the Collomix Paddle Mixer XO. Ensure your generator and extension cords can supply sufficient power to the mixing drills.
- › PHOSCRETE Urethane Mixing Augers (Small and Large) are excellent tools for fast and easy mixing of Phoscrete in a bucket. A special version of the auger is available for Collomix.
- › Do not over-mix Phoscrete. Mix approximately one minute, until material is fully wetted out (no dry material remains) and shows uniform consistency. Then, place and finish immediately.
- › Typical working time is 5-15 minutes (temperature dependent).
- › **Supercool PHOSCRETE Liquid Activator in advance** as cold as 0°F (-20°C) in a freezer, and/or transport to the job site in large coolers on ice to achieve maximum working time in warm temperatures. When cooling the Liquid Activator on ice only (no freezer), refresh the ice in the cooler after 4 hours to keep the Liquid Activator below 40°F (5°C) for longer working time.
- › **Use Slow-Set Admix in hot temperatures. Use Fast-Set Admix in cold temperatures.**
- › Phoscrete requires a dry surface (not SSD) for successful bond. Primer is not generally required.
- › **Use PHOSCRETE Primer** (scrub coat + thin layer) for challenging applications where maximum bond strength is required.
- › **Use PHOSCRETE ENDURE Admix** to improve freeze/thaw and salt-scaling durability.
- › Place Phoscrete using standard concrete tools (magnesium float, margin trowel).
- › Phoscrete does not bond to plastic, polystyrene (foam board), or petroleum products. Phoscrete does not bond to wet surfaces or wet/dry slurry from saw cut demolition.
- › Dampen gloves and wipe down tools with water (and shake off) for ease of placement and best finish, but do not pour water directly on wet Phoscrete.
- › Clean tools and buckets and boots with water. Clean hands with soap and water.

Phoscrete Installation Support

Phoscrete technical support personnel are available to travel on-site for application training and start of work. Virtual interactive training is also available, and the most up-to-date documentation and installation videos are published at phoscrete.com. Contractors with recent experience working with Phoscrete may receive a letter of qualification upon request.

Phoscrete Packaging, Delivery, Storage, Shelf Life, and Disposal

Phoscrete is manufactured and delivered in *Kits* (large Dry Mix bags plus Liquid Activator jugs, palletized separately), in *Small Pails* (containing small Dry Mix bags and Liquid Activator jars, boxed or palletized), and in *Patch Kit Tubs* (also containing Dry Mix bags and smaller jars, packaged in shippable boxes). Refer to the Technical Data Guides found at phoscrete.com for weights and yields of specific products.

Shelf Life

When components are properly stored, **shelf life of PHOSCRETE Dry Mix is two [2] years. Shelf life of PHOSCRETE Liquid Activator is one [1] year. Shelf life of PHOSCRETE ENDURE is 18 months.**

Store Dry Mix indoors, in low humidity. Store Activator indoors and minimize temperature swings.

LOT NUMBERS are printed on every bag of Dry Mix and every box that holds 4 jugs of Liquid Activator, so be sure to check the lot numbers before installing, and before discarding the box that holds the jugs. Here is how to decode a Phoscrete product batch number:

Dry Mix Bags: [YDDDBB]

First digit is the year, followed by day of year (3 digits). The last 2 digits are the batch number. For example: "101201" the Dry Mix was bagged on Jan. 12, 2021 (batch 01).

Liquid Activator Jugs (boxes): [6YDDDTTPP]

First digit (6) indicates PHOSCRETE Activator, second digit is year, followed by the day of year (3 digits) then the last 4 digits are the tank and pallet, respectively. For example: "610110403" Liquid Activator was jugged on Jan. 11, 2021 (tank 04, pallet 03).

Small Pails: DYDDD/L6YDDD

Inside the Small Pails the bags and jugs have the full lot numbers. On the outside label, the production date for the Dry Mix (DYDDD) and the production date for the Liquid Activator (6YDDD) is printed. Follow examples above to decode full lot numbers. On the pail, if the lot number reads D1012/L61015, the **D**ry Mix was produced on Jan 12, 2021 and the **L**iquid Activator was produced on Jan 15, 2021.

ENDURE Pails, Drums, or Totes: [9E-YYMMDD-TT]

9E indicates ENDURE. First two digits is the year, followed by two-digit month and two-digit day of month. TT indicates for the tank number. For example: "9E-210626-02" the ENDURE was batched on June 26, 2021 (tank 02).

Phoscrete STRONGLY advises against installing expired material, material improperly stored, or material opened or damaged. If you cannot avoid installing a questionable material, you should mix a full kit (or pail) in your shop and observe mixing properties, time of set, and maximum temperature to verify they are consistent with fresh materials.

Disposal: Hardened Phoscrete concrete and PHOSCRETE Dry Mix powder can be disposed in any dumpster or landfill. PHOSCRETE Liquid Activator must be neutralized before disposing. Contact your Phoscrete representative and visit phoscrete.com for information on how to easily neutralize PHOSCRETE Liquid Activator, or for any questions regarding improperly stored or expired material. Always follow local environmental regulations when disposing of Phoscrete.

Safety and Personal Protection Equipment

Visit phoscrete.com to review the Safety Data Sheets for Dry Mix, Liquid Activator, and admixtures.

When mixing, placing, and finishing Phoscrete, wear a particle filtration mask, nitrile-coated gloves, and eye protection. Have water and an eye wash station handy. Wash your hands with soap and water after working with Phoscrete.

Surface Preparation

- ▶ Follow [ICRI Guidelines 310.1R](#)ⁱⁱⁱ for preparing the surface prior to placing Phoscrete.
- ▶ Remove all loose and damaged concrete from the repair area to reach sound concrete. Remove concrete contaminated by asphalt, oils, or other bond-inhibiting materials. Remove previously installed non-cementitious repair materials.
- ▶ Use appropriate mechanical means to obtain an exposed aggregate surface profile correspondent to a Concrete Surface Profile (CSP) rate between 7 and 9 according to [ICRI Guidelines 310.2R](#).^{iv} Hydro demolition is not recommended for Phoscrete.
- ▶ Remove exposed rust scale with a wire brush or use an angle grinder with a wheel brush. Because Phoscrete naturally stops rust on contact, sandblasting to completely remove rust from rebar is not necessary. Remove concrete beneath and around rebar whenever possible.
- ▶ For horizontal repairs, insure at least a one-inch [1"] depth throughout the repair (do not leave a feather edge). Thicker is better for lasting horizontal repairs, and two-inch [2"] minimum thickness is recommended. For expansion joint headers/nosings, four-inches [4"] (10 cm) minimum thickness is recommended. Encapsulate the rebar with Phoscrete for best results.
- ▶ For vertical and overhead repairs, VO material can be feather-finished. However, for best results, 1 in. minimum thickness is advisable.
- ▶ Use an angle grinder and wheel brush to remove slurry from the substrate after wet/dry saw cutting, especially over vertical edges. Blow out any remaining dust.
- ▶ Use a torch and lightly "kiss" the substrate surface to burn off residual oils (after thorough mechanical removal), to dry damp concrete. Be careful because extended heat on conventional concrete can cause concrete's thermal degradation.



Deck Spall
Ideal Site Preparation



Vertical Column
Site Preparation



Use Foam Board to Establish
Expansion Joints

- ▶ Use bond breaking materials such as polystyrene foam board to prevent Phoscrete from bonding across expansion joints. Mark form with a chalk line to substrate to establish the level for finishing. Soak wooden forms with and screeds with water, or paint with urethane paint or release agent to prevent bonding to the form and for slip-forming cast repairs. Note that release agents prevent the Phoscrete-to-Phoscrete bond.

Primer Treatment

PHOSCRETE Primer is not generally required for Phoscrete repair installations. The use of PHOSCRETE Primer is advised for challenging conditions to achieve a stronger bond. PHOSCRETE Primer improves bond strength as much as 50% by reducing voids at the bond line interface. All Phoscrete repair materials bond to itself, creating a monolithic pour (no cold joints) with PHOSCRETE Primer.

When using the Primer, pre-treat the concrete substrate: (1) aggressively scrub freshly mixed PHOSCRETE Primer on the prepared substrate surface to fill all voids; (2) apply a thin ¼" layer of PHOSCRETE Primer over the scrub coat; (3) wait at least 15 minutes for the thin layer to set up; (4) mix, place, and finish Phoscrete repair material.

Phoscrete's chemical and mechanical bond to Portland cement concrete is very good without primer treatment. Use PHOSCRETE Primer for best results in challenging conditions. Use PHOSCRETE HC, HF, and VO as alternatives to PHOSCRETE Primer, following the primer treatment described above.

Small Pail Mixing Instructions

Phoscrete Small Pails are 1.25-gallon pails containing a paper bag of Dry Mix and a jar of Liquid Activator. PHOSCRETE HC, HF and VO are available in the Small Pail package for small concrete repairs, or for a final, finishing mix to save a full bag. PHOSCRETE Primer is also packaged in Small Pails and smaller tubs. Refer to Technical Data Guides for coverage details.

- ▶ Remove all items from the small pail and empty the entire content of PHOSCRETE Liquid Activator jar into the empty pail.
- ▶ Measure 2 fluid ounces (60 ml, 44 g) of Phoscrete ENDURE™ in a provided measuring cup, Add scoop(s) of Fast-Set, or Slow-Set admixtures per Phoscrete's [Admixture Chart](#)⁴.
- ▶ Empty entire contents of the Dry Mix bag into the pail.
- ▶ Insert the PHOSCRETE Small Mixing Paddle or similar into the pail. Slowly power up the 3/8" drive, min. 18V portable mixing drill and run on the highest torque setting for approximately one [1] minute, or until the material is completely wetted out (no dry material remains) and shows a uniform consistency. VO mixes to a paste consistency, HC and HF mix to a flowable consistency.

Bucket Mixing Instructions

- ▶ PHOSCRETE Dry Mix bags and Liquid Activator jugs are typically mixed as kits in [5] gallon (or larger) buckets. Refer to the Technical Data Guides for coverage details.
- ▶ When mixing more than 5 cubic feet (10+ kits of Phoscrete) for a single placement, it is recommended that [2] persons mix from [2] buckets each, with a runner steadily delivering freshly mixed material to the finishers.
Watch installation videos at phoscrete.com for mixing examples.
- ▶ Remove chilled Liquid Activator jugs from cooler with ice and invert 3 times.
 - **HC/HF:** pour the entire content of the Liquid Activator jug into the bucket.
 - **VO:** pour the entire content of the Liquid Activator jug into a large bucket (6 or 8 gallon) to accommodate the [2] bags of PHOSCRETE VO Dry Mix.
 - When using only one [1] bag of PHOSCRETE VO Dry Mix, use the provided cup to measure ½ jug of Liquid Activator, [54 fluid ounces, 1,6 l]. Be careful to measure accurately.
- ▶ Pour the Liquid Activator against the walls of the bucket to avoid splashing, and to clean the bucket walls after each mix.

Bucket Mixing Instructions (continued)

- › Add scoop(s) of PHOSCRETE ENDURE, Fast-Set, or Slow-Set admixtures as appropriate into the bucket. Refer to Phoscrete's [All Temperature Guidelines](#)^{vi} for usage of PHOSCRETE ENDURE, Fast-Set and Slow-Set Admixtures, and for best practices on cooling/supercooling PHOSCRETE Liquid Activator.
- › Empty entire content of the Dry Mix bag(s) into the bucket.
- › Use PHOSCRETE's Large Urethane Mixing Augers with a dual or variable speed drill mixer (minimum 7-amp drill, ½" chuck with side handle), and mix approximately 45 seconds, or until the material is completely wetted out (no dry material remains) and shows a uniform consistency. Do not overmix.
- › Empty the bucket into prepared site, place and finish immediately.
- › Clean bucket and mixing paddle with water only after the final pour.



Phoscrete recommends:
Bosch GBM9-16
9 Amp 5/8" Drill Mixer
with Side and D-Handles

Mortar Mixer Instructions (Mix Multiple Kits at Once)

- › Position mortar mixer close to prepared site. Turn on mortar mixer.
- › Remove chilled Liquid Activator jugs from cooler with ice and invert 3 times. Pour the entire content of up to six [6] jugs of PHOSCRETE Liquid Activator into a rubber-tipped, paddle-style mortar mixer. A polyethylene drum is recommended for easy cleanup.
- › Add scoop(s) of PHOSCRETE ENDURE, Fast-Set, or Slow-Set admixtures as appropriate into the drum. Refer to PHOSCRETE's [All Temperature Guidelines](#) for usage of PHOSCRETE ENDURE, Fast-Set and Slow-Set Admixtures, and for best practices on cooling/supercooling PHOSCRETE Liquid Activator.
- › Empty the content of the corresponding bags of PHOSCRETE Dry Mix into the mortar mixer and run until the material is completely wetted out (no dry material remains) and shows a uniform consistency. Mix for a maximum of 3 minutes. Do not overmix.
- › Stop the mixer and empty the content directly into the prepared site.
- › Return mixer to upright position and add the next batch of PHOSCRETE Liquid Activator, allowing the mixer to spin continuously to prevent material remaining in the drum from hardening. Add Dry Mix bags when ready for the next placement.
- › Clean mixer with water after final pour.



Phoscrete recommends:
Whiteman WM70PHS
Polyethylene-Drum Mortar Mixers
for mixing up to 6 kits at a time.

Placing and Finishing Phoscrete

Plan on between 5-15 minutes working time (ambient and activator temperature dependent) to place and finish each batch of Phoscrete. **Cool or Supercool PHOSCRETE Activator** in advance to extend working time in temperatures above 70°F (20°C). Refer to [Phoscrete All Temperature Guidelines](#) for details.

When mixing, empty into prepared site immediately. If a delay causes Phoscrete to begin setting up in the bucket, discard the mix. When mixing in a mortar mixer, whenever possible, empty the material directly into the prepared site.

PHOSCRETE Primer: Before mixing and placing PHOSCRETE HC, HF or VO on a prepared site, when appropriate, first install PHOSCRETE Primer per directions in the site preparation section. PHOSCRETE HC, HF and VO can be used for scrub coat and thin layer application when PHOSCRETE Primer is not available.

PHOSCRETE VO: On vertical and overhead surfaces, wearing lightly dampened nitrile coated gloves, Follow the primer application instructions for the scrub coat and thin layer using either Primer or VO. Then grab a handful of freshly mixed Phoscrete and hand pack the material in lifts. For multiple layers, start applying thin lifts, allowing time to set up, then increase the thickness. For vertical installations, do not apply more than 3 inches in one lift. Do not apply more than 2 inches per lift for overhead installations.

PHOSCRETE HC/HF: On inclines, start at the bottom of the slope and work your way up. On steep inclines, allow the material placed first to set to control the slump from subsequent pours. Remember, Phoscrete bonds to itself wet or cured with no cold joints.



Expansion Joint Header Installation



Bridge Deck Spall Repair



Vertical Column Repair

Finish using standard concrete tools: magnesium floats, steel margin trowels, and screeds. Push material toward (not away from) edges for maximum bond. Wipe trowels and rinse gloves with water to prevent Phoscrete from sticking to the trowel or gloves for the smoothest finish. Be sure to shake off excess water. DO NOT pour water directly onto wet Phoscrete.

Blend multiple pours: Before the material has set, wiggle your trowel in the Phoscrete mix to blend each new pour with the previous pour at the point of contact to get a nice finish.

Install in lifts: When installing PHOSCRETE HC, HF or VO greater than 4" thick, install Phoscrete in lifts, and leave 2" for the final lift to achieve the best finish (less is okay for VO). Scarify the surface of each lift to improve the mechanical bond. For best finish, save the coldest Liquid Activator and/or wait for the material to begin cooling down before placing the final lift.

Use a **concrete pencil vibrator** to increase material flow in tight spaces, to blend multiple batches, to reduce expansion in horizontal applications, reduce voids at the substrate interface, and increase density by allowing air bubbles to escape.

Prior to final set, PHOSCRETE HC and HF expand slightly, more in cold conditions (because it takes longer to set). Expansion improves the mechanical bond to the adjacent concrete with no damage. When you observe expansion, compensate by using slightly less material at the center of the patch to avoid "doming." PHOSCRETE VO does not expand.

Once the Phoscrete surface starts to develop a "**skin**," stop finishing.

Grinding Phoscrete

For horizontal patches subject to heavy traffic, and for headers of expansion joints, Phoscrete will last longer when finished level to the concrete approach. When finished too high, constant vehicular impact will ultimately damage Phoscrete, same as any concrete. In addition, smoother rideability enhances user satisfaction.

As soon as 15 minutes following the final set of the last finishing pour, Phoscrete can be milled using a walk-behind grinder or an angle grinder. Grind before Phoscrete achieves ultimate strength if possible.

When installing Phoscrete for expansion joint headers, grind the exposed corner to a 45° angle prior to installing the joint seal.

Film-forming sealers, such as epoxies can be applied as soon as 15 minutes following the final set of the last pour of Phoscrete since Phoscrete does not outgas after cure.

In many instances, sealers can be applied after 15 minutes following the final set of Phoscrete even in cold temperatures, thanks to the heat given off on set. Wait until the temperature of the installed Phoscrete material drops below 100°F (38°C) before applying any type of sealers.

Expansion Joints

Phoscrete HC is an excellent material for installation and repair of expansion joint headers. Because Phoscrete mixes, places, and finishes fast, joint seals can be installed as soon as 15 minutes following initial set of the final pour, allowing an expansion joint installation to be completed in one lane closure. Refer to Phoscrete's Best Practices Guidelines for [Expansion Joint Installation and Repair](#)^{vii} for details.

Opening Phoscrete to Traffic

Phoscrete achieves initial set when a nail can no longer be pressed into the center of a Phoscrete repair area. Phoscrete typically achieves final set less than five [5] minutes after initial set and is ready for heavy traffic one [1] hour following initial set of the final pour.

When ENDURE Admix is used, the surface of the repair may be slippery. After allowing one hour for the ENDURE admixture to penetrate, brush sand, concrete dust from the demolition, or other similar material to absorb any admixture remaining on the surface, and ensure the road is safe for vehicular traffic.

Ensure the Phoscrete repair is level to the adjacent concrete. Grind as noted above.

Prior to installing any type of sealers, and prior to leaving the job site, hammer-test the Phoscrete repair and listen for any hollow spots. Common reasons Phoscrete may not adequately bond to the concrete substrate include:

- › Placed Phoscrete that already began to set in the bucket/mixer.
- › Contaminated substrate (oils, dirt, moisture)
- › Excessive voids in the bond interface.
- › Phoscrete placed against unsound concrete substrate.

If you detect delamination in your Phoscrete repair, quickly remove the delaminated areas, and correct the cause (mechanically remove contaminated substrate), use Phoscrete Primer if appropriate, then mix, place and finish with additional Phoscrete. The fresh Phoscrete will bond strong to the adjacent Phoscrete that remains in place with no cold joints.

Phoscrete Repairs Last!

When properly installed, Phoscrete is fast, easy to use, and it lasts. The more often you use Phoscrete, the better experienced you become, and the more you will turn to Phoscrete to fix damaged concrete once and for good.

Phoscrete Technical Support

Visit our website for the latest installation guides and technical data. Contact Phoscrete installation support anytime for guidance for your concrete repair projects:

install@phoscrete.com

+1-561-420-0595

Phoscrete Corporation
1800 NW 15th Ave, Suite 130
Pompano Beach FL 33069

URLs for Referenced Hyperlinks in this Document

This document is published at phoscrete.com where you can click on the referenced hyperlinks in the document. If you have a printed version, full URLs are end-noted below.

ⁱ Refer to the latest published Phoscrete Quick Start Guides, Full Installation Guides, Best Practices, and Videos:

<https://www.phoscrete.com/installation-guides/>

ⁱⁱ Refer to the latest published Phoscrete Technical and Safety Data Guides for product-specific data:

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

ⁱⁱⁱ <https://icri.ce21.com/item/3101r2008-english-pdf-guideline-surface-preparation-repair-deteriorated-concrete-resulting-reinforcing-steel-corrosion-342512>

^{iv} <https://icri.ce21.com/item/3102r2013-english-pdf-selecting-concrete-surface-preparation-sealers-coatings-polymer-overlays-concrete-repair-342521>

^v <https://www.phoscrete.com/wp-content/uploads/Installation-Guides/phoscrete-quick-start-installation-guide-admixture-chart.pdf>

^{vi} <https://www.phoscrete.com/wp-content/uploads/Installation-Guides/phoscrete-best-practices-all-temperature-concrete-repair-guidelines.pdf>

^{vii} <https://www.phoscrete.com/wp-content/uploads/Installation-Guides/phoscrete-best-practices-expansion-joint-installation-and-repair.pdf>