PHOSCRETE® HF (Hot Floor)

Very Rapid Hardening MALP (Magnesium Alumino Liquid Phosphate) refractory concrete for full and partial depth horizontal and castable concrete repairs.

DESCRIPTION

Phoscrete HF is a cementitious two-part kit of dry mix composed of Magnesium and Aluminum Aggregates, plus a Liquid Phosphate Activator. Phoscrete is very rapid hardening, and gains strength suitable to vehicular traffic in less than one hour at moderate ambient temperatures. Phoscrete forms both a chemical and a mechanical bond to cured concrete and to itself, wet or cured.

PROVEN APPLICATIONS

- Full depth and partial depth concrete repairs in areas surrounding melting furnaces and welding operations.
- Interior and exterior concrete installation and repairs
- Horizontal surfaces: poured/castable applications.
- Vertical and overhead surfaces: form and pour applications.
- Highway concrete spall and rutting repairs
- Airport runway and apron concrete repairs, including vertical landing zones.
- Dowel bar retrofit, pre-cast joint grouting, bearing locations.
- Expansion joint nosing construction and repairs

ADVANTAGES

- Labor and time saving material: no curing compounds, no sandblasting of steel bars, self-consolidating, fast setting, easy clean up with water.
- Easy and accurate mixing: two components, powder + aggregates in a bag and liquid in a jug. No water, neat mix.
- Rapid return to service: achieves 5,000 psi compressive strength and 1,500 psi bond strength 1 hour following placement at 73°F.
- High Temperature Concrete: withstands sustained temperatures of 500°F and intermittent temperatures of 2000°F.
- High flexural strength, ductility, and durability.
- No cold joints: both mechanical and chemical bond to clean cured concrete. Phoscrete also bonds to itself with no cold joints.
- Shrinkage crack free, per ASTM C1581 Restrained Shrinkage (Ring) Test.
- Stops rust: converts iron oxide to metal phosphate; inhibits corrosion.
- Does not out-gas after cure: accepts sealants and polymer coatings as soon as 15 minutes following initial set.
- Freeze-thaw resistant, and salt scaling resistant: even when exposed to $MgCl_2$ and $CaCl_2$.
- Resists chloride penetration.
- Chemically stable: no added chlorides, no added sand, or aggregates.
- Not a vapor barrier: allows on grade applications.
- Environmentally friendly: no odor, no free silica.
- All temperature use: same formula works from -5°F to +105°F
  -when used with Phoscrete Fast Setting Admixture in cold temperatures.
  -contact Phoscrete technical support to discuss your specific application.

PACKAGING

1 Kit = 1 bag + 1 Jug

Dry Mix Bags: 55 lb. (25 kg) polyethylene-lined bags

Liquid Activator Jugs: 10.4 lb. (4.72 kg) HDPE plastic jugs 48 kits per pallet **Kit Yield:** 0.45 ft^3 (0.0127 m^3) pre-extended (neat) mix. Do not extend with aggregate.

Small Pail: 13.4 lb. (6 kg) HDPE pail contains Dry Mix paper bag and HDPE Liquid Activator jar. **Pail Yield**: 1.0 bf (144 in^3, 0.0024 m^3)

Patch Kit Tub: 1.1 lb. (0.5 kg) HDPE Patch Kit Tub contains zip plastic Dry Mix bag LDPE Liquid Activator jar plus plastic mixing stick.

Fast-Set Admix:

Kit: 0.25 lb. (113 g) per dose (two 3-oz. scoops by volume)
Pail: 0.7 oz. (20 g) per dose (two tablespoons by volume)
Tub: 0.12 oz. (3.3 g) per dose (two ½ teaspoons by volume)

Mixing Ratio

Mix Entire Kit: 1 jug+1 bag
Wet-To-Dry Ratio: 18.75%

Storage

Store in unopened, original packaging in clean, dry conditions.

Shelf Life

Dry Mix: 24 months
Liquid Activator: 12 months
(*when properly stored)*

VOC Content

0 g/L: Less exempt solvents

Color

Concrete Grey

Fresh Properties

Test	Specification	Description	Time	Typical Results		
Set Time	ASTM C191	Time of Setting by Vicat Needles	lab temp supercooled†	Initial 8 min 15 min	Final 10 min 19 min	
Slump	ASTM C143	Slump of Hydraulic-Cement Concrete	0 | 5 | 15 min	9.5 in (24cm)	8.7 in (22cm)	6.2 in (16cm)
Density	ASTM C387	Density (Unit Weight) of Concrete		141 lb/ft^3	2259 kg/m^3	
Air Content	ASTM C231	Air Content by Pressure Method	5.7%			
Free Shrinkage	ASTM C157	Length Change of Hardened Concrete (Std)	28 Days Wet | Dry	0.00%	-0.03%	
Restrained Shrinkage	ASTM C1581	Age at Cracking and Induced Tensile Stress Characteristics under Restrained Shrinkage	180 Days Age | Stress	Did Not Crack	-60 µstrain	

Strength Properties

Test	Specification	Description	Time	Typical Results	
				psi	MPa
Compressive Strength	ASTM C109	Compressive Strength of Hydraulic Cement Mortars Using 2-in. Cube Specimens	1 hour	5000	34.5
			1 day	9000	62.1
			28 days	11500	79.3
Flexural Strength	ASTM C78	Flexural Strength of Concrete Using Simple Beam with Third-Point Loading	1 day	4500	3.1
			7 days	600	4.1
			28 days	700	4.8
Bond Strength	ASTM C882	Bond Strength by Slant Shear Phoscrete - Concrete	1 hour	1500	10.3
			1 day	2000	13.8
			28 days	2500	17.2
		Bond Strength by Slant Shear Phoscrete - Phoscrete	1 hour	1750	12.1
			1 day	2500	17.2
			28 days	3000	20.7
Tensile Strength	ASTM C496	Splitting Tensile Strength of Cylindrical Concrete Specimens	1 day	1000	6.9
			28 days	1200	8.3
Modulus of Elasticity	ASTM C469	Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression	28 days	3.1 E^{+06}	21 E^{+06}
				0.274	

Durability Properties

Test	Specification	Description	Test	Typical Results	
Freeze Thaw	ASTM C666-A	Resistance of Concrete to Rapid Freezing and Thawing in a Saturated Condition (300 cycles)	Durability Factor	94%	
Scaling	ASTM C672	Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals (25 cycles) Results = Visual | Material Loss lbs./ft^2	NaCl	0	0.00
			$CaCl_2$	0	0.00
			$MgCl_2$	0	0.00
Chlorides	ASTM C1202	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration (Current @5 min)	28 days	1331 C	36.2mA
	ASTM C1543	Penetration of Chloride Ion into Concrete by Ponding	90 days	10-20 mm	0.135%
				55-65 mm	0.117%
			180 days	10-20 mm	0.195%
				55-65 mm	0.145%
Abrasion	California CT-550	Determining the Surface Abrasion Resistance of Concrete Specimens (mass loss)	24 hours	16 g	1.8%

†*Time of Set reported for lab temp 68°F (20°C) for dry mix and activator. Supercooled Activator at 17°F (-8°C) and lab temp dry mix.*

GENERAL INSTALLATION GUIDELINES

- Refer to the latest and most complete documentation on best installation practices. Phoscrete Full Installation Guide is published on Phoscrete's website.
- Contact Phoscrete technical support install@phoscrete.com or call +1-561-420-0595 with any questions regarding a specific application.

SURFACE PREPARATION

- No primer is required, however for maximum bond strength in high stress environments, use Phoscrete Primer and follow the primer coat procedure in the Phoscrete Full Installation Guide.
- Concrete must be sound and fully cured.
- Loose, damaged, and contaminated concrete must be removed.
- Clean the surface of the area to be repaired from oil, grease, and other bond-inhibiting materials.
- Surface must be dry, free of standing water.
- Remove rust from steel bars with a wire brush. Sandblasting is not required.
- Replace reinforcing bars that have lost 25% or more of their original diameter with new bars spliced in place, lapping sufficiently to transfer stress.
- Concrete profile should reach CSP of 7-9 per ICRI Guidelines.
- Repair area should not be less than 1-inch deep. >2-inch minimum depth is recommended
- Saw-cut the edges of the repair area insuring at least 1-inch depth.
- Saw-cut the edge of the repair parallel and perpendicular to traffic to limit the number of load-bearing stress points.

MIXING

- Mix Phoscrete HF at the placement site.
- Use a heavy-duty five-gallon bucket for mixing single kits of Phoscrete HF. Mix with a paddle (Phoscrete's urethane auger highly recommended), using a dual or variable speed drill suitable for mixing (min. 7-amp, ½", side handle).
- Use a paddle-style mortar mixer for mixing multiple kits at once, when placing large quantities (>2 cy) of Phoscrete.
- Pour Phoscrete HF Liquid Activator in a clean bucket or mortar mixer. Add Phoscrete HF Dry Mix to the Liquid Activator, preferably while mixing.
- Mix Phoscrete HF Dry Mix into the liquid for about 1 minute, until the material is fully wetted out. Do not over-mix.
- A batch of Phoscrete HF must be mixed, placed, and finished within 5 - 15 minutes depending on ambient temperature.
- The mix ratio is 18.75% Wet to Dry. On-site measurement for partial unit mixing is NOT recommended. Inaccurate measurements will lead to poor material performance.
- In warm (>70°F/20°C) and cold climates (<50°F/10°C), refer to Phoscrete's All Temperature Guidelines for usage of Phoscrete Fast- and Slow-Set Admixtures, and for best practices on cooling/supercooling Phoscrete Liquid Activator.

APPLICATION

- Empty the mixing container of Phoscrete HF immediately after mixing is completed.
- Install immediately after mixing. Discard the batch if the material begins to setup in the pail or mixer.
- Using a trowel or float, work Phoscrete HF into the bottom and sides of the patch, being careful to fill all voids. Force the material against the edges of the repair.
- Level Phoscrete HF to the existing concrete surface. Screed off excess. Phoscrete may expand slightly so finish the surface to accommodate for expansion. If the material finishes higher than the adjacent surface, to reduce impact on the repair and for rideability, use a diamond grinder to level surface as soon as 15 minutes following initial set.
- Finish Phoscrete HF using clean concrete floats and trowels. Magnesium floats work best. Tap on surface with trowel to bring liquid to the surface for best finish. Clean Phoscrete from trowels with a water-dampened cloth. Do not pour water on repair. Stop finishing once the surface of the placed material develops a "skin".
- When using forms, apply vibration for maximum penetration and bond.

**Supercool Phoscrete Activator below 10°F (-12°C) in a freezer for additional flow during placement, and for additional working time when finishing. The freezing point of Phoscrete Activator is -20°F (-29°C). Dry mix may also be cooled.*

APPLICATION *(continued from page 3)*

- When multiple layers are applied, scarify the surface for best bond. Phoscrete bonds to itself with no cold joints, whether wet or completely cured. If installing in lifts, do not apply a final layer thinner than 2 inches.
- If rain begins prior to final set, cover the surface with plastic sheeting for at least 15 minutes following initial set.
- On sloped surfaces, pour the material at the bottom of the slope and work your way up. Use a hand screed to move the material up the slope. When installing on steep inclines, use forms, or work in smaller increments (one kit at a time), and allow the material to setup prior to the next pour.
- For expansion joint nosings, ensure that the repair material is not higher than the approach slab. Use a grinding tool to cut a 45° bevel at the edge of the joint no sooner than 15 minutes after initial set. Standard compression or silicone seals can be applied immediately after grinding the bevel edge. Refer to Phoscrete's Expansion Joint Installation and Repair.
- No curing compound is required,

CLEANING

- In-between batches, clean tools with water and wipe off excess water prior to contact with Phoscrete.
- When the job is completed, clean tools with water. Clean hands with soap and water.

LIMITATIONS

- Minimum application thickness: 1-inch, Maximum application thickness: none
- Do not apply Phoscrete HF as a thin veneer.
- Minimum ambient temperature: -5°F
- Do not use water when mixing and/or placing Phoscrete HF
- Do not extend Phoscrete HF with aggregate. Do not add sand and/or any type of cement.
- Do not use water when finishing Phoscrete HF.
- No direct contact with galvanized steel (zinc).
- Proper application is the responsibility of the user. Field visits by Phoscrete personnel are for the purpose of making technical recommendations, not for supervising or providing quality control on the jobsite.

LIMITED WARRANTY

LIMITED WARRANTY NOTICE Phoscrete Corporation (Phoscrete) warrants this product to be free from manufacturing defects and to meet the technical properties on the current Technical Data Guide, when used as directed within shelf life. Satisfactory results depend not only on quality products but also upon many factors beyond Phoscrete's control. PHOSCRETE MAKES NO OTHER WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ITS PRODUCTS. The sole and exclusive remedy of Purchaser for any claim concerning this product, including but not limited to, claims alleging breach of warranty, negligence, strict liability or otherwise, is the replacement of product or refund of the purchase price, at the sole option of Phoscrete. Any claims concerning this product must be received in writing within one (1) year from the date of shipment and any claims not presented within that period are waived by Purchaser. PHOSCRETE WILL NOT BE RESPONSIBLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFITS) OR PUNITIVE DAMAGES OF ANY KIND. Purchaser must determine the suitability of the products for the intended use and assumes all risks and liabilities in connection therewith. This information and all further technical advice are based on Phoscrete's present knowledge and experience. However, Phoscrete assumes no liability for providing such information and advice including the extent to which such information and advice may relate to existing third party intellectual property rights, especially patent rights, nor shall any legal relationship be created by or arise from the provision of such information and advice. Phoscrete reserves the right to make any changes according to technological progress or further developments. The Purchaser of the Product(s) must test the product(s) for suitability for the intended application and purpose before proceeding with a full application of the product(s). Performance of the product described herein should be verified by testing and carried out by qualified experts.

HEALTH, SAFETY, AND ENVIRONMENTAL

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