



PHOSCRETE FORMULA 3E-VO

TECHNICAL DATA GUIDE

Rapid Hardening MKP (Magnesium Potassium Phosphate) mortar for hand-packed and trowel-applied concrete repairs.

DESCRIPTION

PHOSCRETE FORMULA 3E-VO (F3E-VO) is a two-part cementitious concrete repair mortar composed of magnesium oxide, potassium phosphate, aluminosilicates, aggregates (Dry Mix) that must be mixed with water, plus a liquid soy-methyl-ester polystyrene (PHOSCRETE ENDURE™) admixture that is a concrete durability enhancer. PHOSCRETE F3E-VO is rapid hardening, with high-early rapid strength gain. It mixes to a putty consistency, is easy to apply by hand or trowel, and can be feather-finished. Phoscrete F3E-VO allows fast completion of concrete repairs. PHOSCRETE F3E-VO meets ASTM C 928, Type R3.

PROVEN APPLICATIONS

- ▶ Vertical and overhead: above grade and below grade concrete structures
- ▶ New construction concrete's defects, including pre-cast shapes
- ▶ Small spalls on concrete pavements and floors
- ▶ Bridge structural elements, such as beams, caps, piers, and columns
- ▶ Marine structures such as seawalls, navigation locks, guide walls, and discharge tunnels
- ▶ Sidewalks, stairs, sills, and culverts
- ▶ Building facades, parking garages and tilt-up walls

ADVANTAGES

- ▶ Labor and time-saving - no sandblasting of steel bars, no anti-corrosion primer, no sacrificial anodes, no curing.
- ▶ Easy and accurate mixing: two components, dry mix in a bag and liquid activator in a jug. No water, pre-extended mix. self-consolidating, fast setting, easy clean up with water.
- ▶ Easy to apply: high-build, non-sag, easy clean-up with water.
- ▶ Easy to finish using a trowel or a stucco sponge: can be feather-finished.
- ▶ High compressive and bond strength for lasting repairs.
- ▶ Durable: freeze-thaw and salt scaling resistant.
- ▶ Fiber reinforced: high flexural strength and ductility
- ▶ Strong mechanical and chemical bond to clean cured concrete and to itself with no cold joints.
- ▶ Stops rust and inhibits corrosion: converts iron oxide to metal phosphate.
- ▶ Does not out-gas after cure: accepts sealers and polymer coatings as soon as 15 minutes following initial set.
- ▶ Chemically stable: no added chlorides, resists chloride penetration.
- ▶ Environmentally friendly - no odor, no free silica.
- ▶ All temperature use – heat/cool water and use Phoscrete Fast-Set/Slow-Set Admixtures to manage setting/working time.

Packaging

Dry Mix Bag: 27 lb. (12.2 kg)
HDPE pail contains Dry Mix.

Bag Yield: 0.45 ft³ (0.0129 m³)
48 kits per full pallet.

ENDURE Jug: 100 fl. oz. (3 l)
Add 2% ENDURE by weight of dry mix. Use provided measuring cup to measure 8 oz. per [Admixture Chart](#).

ENDURE Jar: 8 oz. (236 ml)
Use 1 ENDURE jar per 27 lb. Dry Mix Bag.

Small Pail: 11 lb. (5 kg)
HDPE pail contains Dry Mix Bag, HDPE jar contains: Endure 3 oz (89 ml) and water 24 oz (703 ml)
Small Pail Yield: 1.0 bf (144 in³, 0.0024 m³)

Mixing Ratio

Pre-extended mix. Do not extend with sand or aggregate.

Water-To-Dry Mix Ratio: 13.5%
Measure 3.65 lbs water (56 fl. oz., 1.66 l) per 27 lb. Dry Mix Bag.

Pre-measure water + 2% ENDURE Admix into clean plastic mixing bucket. Then add the entire pail of dry mix and mix thoroughly.

Storage

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

Shelf Life

Dry Mix: 24 months
ENDURE: 18 months
(when properly stored)

VOC Content

0 g/L: Less exempt solvents



Fresh Properties					
Test	Specification	Description	Time	Independent Test Results	
Set Time	ASTM C191	Time of Setting by Vicat Needles	Initial Final	20 min	24 min
Slump	ASTM C143	Slump of Hydraulic-Cement Concrete	5 min	4.0 in	
Density	ASTM C387	Density (Unit Weight) of Concrete		136 lb/ft ³	2178 kg/m ³
Air Content	ASTM C231	Air Content by Pressure Method		4.0%	
Strength Properties					
Test	Specification	Description	Time	Independent Test Results	
				psi	MPa
Compressive Strength	ASTM C109	Compressive Strength of Hydraulic Cement Mortars Using 2-in. Cube Specimens	2 hours	3500	24.1
			1 day	5000	34.5
			28 days	7000	48.2
Flexural Strength	ASTM C78	Flexural Strength of Concrete Using Simple Beam with Third-Point Loading	1 day	500	3.4
			28 days	600	4.1
Bond Strength	ASTM C882	Bond Strength by Slant Shear: Phoscrete - Concrete	2 hours	2000	13.8
			1 day	2400	16.5
			28 days	3000	20.5
		Bond Strength by Slant Shear: Phoscrete - Phoscrete	2 hours	2400	16.5
			1 day	3000	20.5
			28 days	3500	24.1
Tensile	ASTM C496	Splitting Tensile Strength of Cylindrical Concrete	28 days	640	4.4
Modulus of Elasticity	ASTM C469	Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression	28 days	4.3 E ⁺⁰⁶	3.0 E ⁺⁰⁴
				0.274	
Durability Properties					
Test	Specification	Description	Test	Independent Test Results	
Free Shrinkage	ASTM C157	Length Change of Hardened Concrete (Std)	28 Days Wet Dry	0.04%	-0.04%
Freeze Thaw	ASTM C666-A	Resistance of Concrete to Rapid Freezing and Thawing in a Saturated Condition (300 cycles)	Durability Factor	95%	
Scaling	ASTM C672	Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals (50 cycles) Results = Visual Material Loss lbs./ft ² (%)	CaCl ₂	Visual 0	0.0 lbs/ft ²
Chlorides	ASTM C1202	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration (Coulombs)	28 days	450 C	
	AASHTO T260	Chloride Content (%)	28 days Acid Water	0.007%	0.002%
Abrasion	ASTM C779 Procedure B	Abrasion Resistance of Horizontal Concrete Surfaces	28 days	30 minutes	0.043 in
				60 minutes	0.060 in



GENERAL INSTALLATION GUIDELINES

- › Refer to [Phoscrete Formula 3 \[MKP Series\] Full Installation Guide](#), for the most complete documentation on best installation practices.
- › Refer to [Phoscrete Best Practices for Endure Admix Usage Chart](#) for details on working with Phoscrete Admixtures (Endure, Fast-Set, Slow-Set).
- › Cool water on ice below 40°F for additional working time during placement and finishing.
- › Warm water when working in cold temperatures for faster set.

SURFACE PREPARATION

- › Concrete surface must be sound and fully cured.
- › Remove loose, damaged, and contaminated concrete, such as oil, grease, and other bond-inhibiting materials.
- › Surface must be frost-free, dry, and free of standing water.
- › Concrete profile should reach minimum CSP (Concrete Surface Profile) of 7-9 per ICRI Guidelines.
- › Remove loose scale (rust) from steel bars with a wire brush. Sandblasting is not required.

MIXING

- › Mix PHOSCRETE F3E-VO at the placement site.
- › The mix ratio is 13.5% water to Dry Mix. On-site mixing of partial Dry Mix bags is not recommended. Inaccurate measurements will lead to poor material performance.
- › When mixing bags, use a heavy-duty five [5] gallon bucket for mixing. Mix with a paddle (Phoscrete's urethane auger is highly recommended), using a dual or variable speed drill suitable for mixing (min. 7-amp, ½" chuck, side handle).
- › When mixing Small Pails, use a minimum 18v variable speed drill on the high torque setting. For professional use, Phoscrete's small urethane auger is highly recommended.
- › When mixing Patch Kit tubs, use the provided stirrer and mix by hand until the material is completely wetted out.
- › Pre-measure and pour water into a clean bucket first. Next add pre-measured ENDURE Admix liquid, and other Phoscrete admixtures (Fast-Set, Slow-Set) as needed. Then add Dry Mix into the bucket while slowly running the mixer.
- › Mix for about 1 minute, until the material is fully wetted out and shows a uniform consistency. Do not over-mix.

APPLICATION

- › A batch of Phoscrete must be mixed, placed, and finished within 15 - 25 minutes from mixing, temperature dependent.
- › Phoscrete is thixotropic, vibration and tapping with a trowel increases flow.
- › Scrub in a thin layer of Phoscrete into the area to be repaired using a gloved hand, being careful to fill all voids.
- › Fill the repair in lifts using gloved hands and concrete margin trowels. In-between lifts, scarify the surface by scratching crisscross lines in the layer with a trowel prior to set for best adhesion bond. Phoscrete bonds to itself with no cold joints, whether wet or completely cured.
- › Finish the repair using margin trowels or a water-dampened stucco sponge. Phoscrete F3E-VO can be feather-finished.
- › Wipe Phoscrete from trowels with a water-dampened cloth. Do not pour water on repair.
- › If the material finishes higher than the adjacent surface, use a diamond grinder to level surface as soon as 15 minutes following final set.
- › If rain begins prior to final set, cover the surface with plastic sheeting for at least 15 minutes following initial set.



CLEANING

- › In-between batches, clean tools with a water-dampened towel, 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

- › Do not use any primer or admixtures other than those provided by Phoscrete.
- › Do not extend PHOSCRETE F3E-VO with aggregate. Do not add sand and/or any type of cement.
- › Do not mix partial units unless accurately pre-measured.
- › Minimum recommended thickness for partial depth repairs: ½ inch (1.27 cm). F3E-VO can be feather finished
- › Maximum application thickness for full and partial depth repairs: none
- › Minimum ambient temperature: 35°F (2°C)
- › When wet, PHOSCRETE F3E-VO cannot be placed in 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 NOTICE

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HEALTH, SAFETY, AND ENVIRONMENTAL

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