



## All Temperature Concrete Repair Guidelines

Phoscrete is an excellent choice for rapid concrete repair in cold climates and cold storage facilities. MALP concretes do not mix with water, and the freezing point of our Activator is below  $-17^{\circ}\text{F}$  ( $-27^{\circ}\text{C}$ ). Using Phoscrete Fast-Set Admix (accelerator), concrete repairs are typically traffic ready\* in less than one hour, even in sub-freezing temperatures.

Phoscrete also works great in warm temperatures, with additional working time achieved when using Phoscrete Slow-Set Admix (retarder), and by chilling the Liquid Activator.

Key to a successful Phoscrete Installation is having sufficient working time of the mixed material to get a nice finish. Often it is also important not to wait long for the concrete to set once finishing is completed.

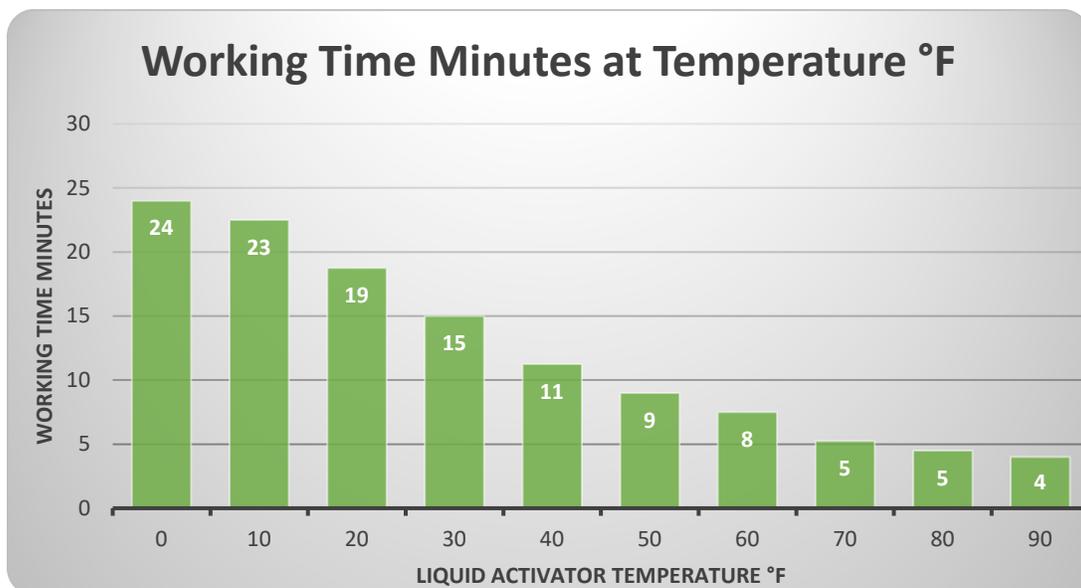
Recent testing shows that supercooling Phoscrete Liquid Activator delivers as much as 30 minutes working time, even hot weather.

Phoscrete can be chilled in a large cooler. 16 jugs cool down to  $40^{\circ}\text{F}$  in 2 hours. Make sure you have enough ice on the job site because the cooler lid is often left open and the final lifts are the most important to chill.

**Supercooling is easily achieved** by pre-chilling activator jugs before leaving the shop. A 5cf chest freezer cools 16 jugs down to  $0^{\circ}\text{F}$  in 2 hours. Transfer the jugs into a cooler, and that Activator stays cold throughout the shift without need for extra ice.

**For large volume pumping and shotcrete applications, Activator is supercooled inline with the mixing equipment. Contact your Phoscrete representative to discuss your specific application requirements.**

**Refer to the following chart for guidelines on how cold to chill Phoscrete Liquid Activator Jugs or Jars to achieve your desired working time.**





## Guidelines for using Fast-Set and Slow-Set Admixtures

Phoscrete HC is packaged as follows:

- Full Kits: 55 lb. (25kg) Dry Mix Bags and a Liquid Activator Jug
- Small Kits: 9.7 lb (4.4kg) pails and a Liquid Activator Jar

Phoscrete VO is packaged as follows:

- Full Kits: 62 lbs (28kg) in [2] Dry Mix Bags and a Liquid Activator Jug
- Small Kits: 9.7 lb (4.4kg) pails and a Liquid Activator Jar

Each scoop of admix is ½% of dry mix by weight. Scoops are provided with our admixture.

**Basic installation instructions for mixing Phoscrete in a bucket or pail:** Empty the entire contents of the Phoscrete Liquid Activator into the bucket. **Always add liquid first!** Then add one or more level scoops of Fast/Slow-Set Admix. Next, add the entire dry mix bag, and mix for approx. 45 seconds or until no dry material remains. *Do not over mix.*

Below is our recommended usage chart. Material temperature is both Dry and Liquid and assumes you are on a job site where the material cools or warms to ambient before using.

Phoscrete <b>Fast-Set</b> and <b>Slow-Set</b> Admix Usage Chart				
Material Temperature	Admix Scoops	Working (min)	Initial (min)	Traffic Ready (min)
Below +5°F [Below -15°C]	10 <sup>†</sup> Fast-Set	15 - 25	30	90
+5°F to +15°F [-15° to -10°C]	8 - 10 Fast-Set	12 - 15	20	75
15°F to 25°F [-10° to -5°C]	6 - 8 Fast-Set	11 - 14	20	60
25°F to 35°F [-5°C to 0°C]	4 - 6 Fast-Set	11 - 14	20	60
35°F to 45°F [0°C to 5°C]	3 - 4 Fast-Set	11 - 14	17	60
45°F to 50°F [5°C to 10°C]	2 - 3 Fast-Set	10 - 13	15	60
50°F to 75°F [10°C to 25°C]	None	10 - 13	15	30
75°F to 85°F [25°C to 30°C]	2 <sup>‡</sup> Slow-Set	8 - 10	15	30
85°F to 95°F [30°C to 35°C]	2 <sup>‡</sup> Slow-Set	6 - 8	15	30
Above 95°F [Above 30°C]	2 <sup>‡</sup> Slow-Set	4 - 6	7 - 10	30

\* Phoscrete concretes typically achieve compressive strengths of 4,000 psi in less than one hour. FHWA advises >2,000 psi to open a repaired concrete road or bridge deck to heavy-duty rubber-tire traffic.

<sup>†</sup> Never exceed 10 scoops of Fast-Set. Better to warm dry and liquid prior to mixing in very cold temps.

<sup>‡</sup> Never use more than 2 scoops Slow-Set, and **always chill the Liquid Activator** to 40°F (+5°C) when temperatures exceed 75°F (25°C) to extend working time.



## Additional Considerations when using Admixtures and Cooling Activator

When determining the amount of Fast-Set or Slow-Set to use, or Liquid Activator cooling temperature, consider your desired working time. Refer to the two charts in this technical document for guidance.

For practical purposes on the job site, **Working Time** is how long you are able move the material with a trowel and improve the finish. **Initial Set Time** is when you can no longer push a nail into the center of the placed material. **Final Set Time** is when you can no longer push a nail into the edge of the placed material. Phoscrete achieves initial set minutes after the end of working time, and Phoscrete achieves final set around one minute after initial set. Phoscrete sets from the inside out and is traffic-ready almost immediately following final set.

When Phoscrete Dry Mix and Liquid Activator are mixed, an exothermic chemical reaction occurs, and the placed material gets very hot, oftentimes greater than 150°F (70°C).

Please note that many external factors impact working and set times, including:

- Ambient temperature
- Surface temperature
- Volume of material placed (*use less Fast-Set admix after mixing multiple kits of Phoscrete into a repair because of the heat from material already placed*)
- Jug temperature
- Bag temperature

In other words, storing Phoscrete in a warmer (or cooler) environment prior to mixing and placement is the most effective way to decrease (or increase) working and set times. Also, a hot or cold substrate will affect the actual working time, as will the volume of material that is mixed and placed.

**Unlike conventional repair materials, Phoscrete bonds strong to itself wet or cured with no cold joints. The entire patch does not need to be poured and finished all at once.**

In cold storage facilities and cold climates, heating the substrate evaporates moisture, and the warm substrate allows the exothermic reaction to “kick” faster, by preventing the cold surface from pulling heat from the freshly placed mix. Use a blow torch and gently “kiss” the substrate surface prior to placement of Phoscrete to heat the surface and remove ice crystals. *Be careful not to heat the surface for an extended period to avoid loss of compressive strength of the substrate!* Placed Phoscrete may also be gently heated to accelerate the set.

In warm climates, the most effective way to extend working time is to chill the activator and use Slow-Set Admix. Place activator jugs on ice in a large cooler prior to heading to the job site. **Allow at least two hours for the jugs to cool before using.** Using conventional ice, activator will cool to around 40°F (5°C). Using Dry Ice, Activator will cool down to 0°F (-17°C). The most cost-effective way to supercool jugs of activator is to place them in a chest freezer at your shop and then transfer the very cold jugs to coolers on ice prior to heading to the job site.

An easy way to remember this strategy is to **THINK BEER**: *When you buy a case of beer at the store on your way to the boat, beach or park, you take the cold beer from the refrigerated section and place it in/on ice in your cooler. No need to wait for warm beer to cool down before opening your first cold one!*

**Final thoughts:** Keep the dry mix bags out of direct sunlight. Use a temperature gun to measure the dry, liquid, substrate, and ambient temperatures. And the more experience you have working with Phoscrete products, the faster and better you will finish your concrete repairs.

If you have questions, please do not hesitate to contact your local Phoscrete representative or call our corporate offices for application assistance.