



ALL TEMPERATURE CONCRETE REPAIR GUIDELINES

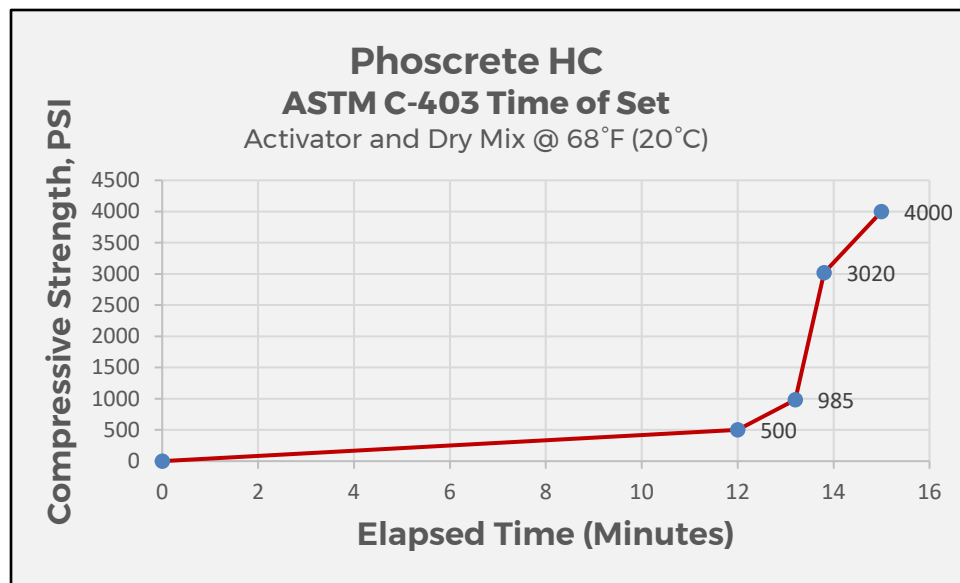
If you read only one page, turn to the **ADMIX USAGE CHARTS** on the last page of this document!

Phoscrete provides an effective concrete repair solution for use in a wide range of ambient temperatures, from very cold, to cool, to warm, to hot. Phoscrete is the go-to material for rapid exterior repairs in cold climates and for interior cold storage facilities.

MALP concretes do not mix with water, but instead mix with a Liquid Activator, freezing point < -17°F (-27°C). The addition of Phoscrete Fast-Set Admix (accelerator), makes Phoscrete concrete repairs typically traffic ready[†] in less than one hour, even in sub-freezing temperatures.

Phoscrete is well suited to warm temperature applications, with additional working time achieved using Phoscrete Slow-Set Admix (retarder), and by chilling the Liquid Activator.

Key to a successful Phoscrete installation is having sufficient working time for the mixed material to get a proper finish. Once finishing is completed, Phoscrete's repair surface can be ground and/or sealed as soon as 15 minutes following the final pour – the same time required for the repair to be opened to traffic.



For ambient temperatures below 50°F (10°C), use the appropriate number of provided scoops of Phoscrete Fast-Set Admix to speed up the working time, in accordance with the charts on page [6] of this document.

Considerations for working with Phoscrete in Cold Temperatures:

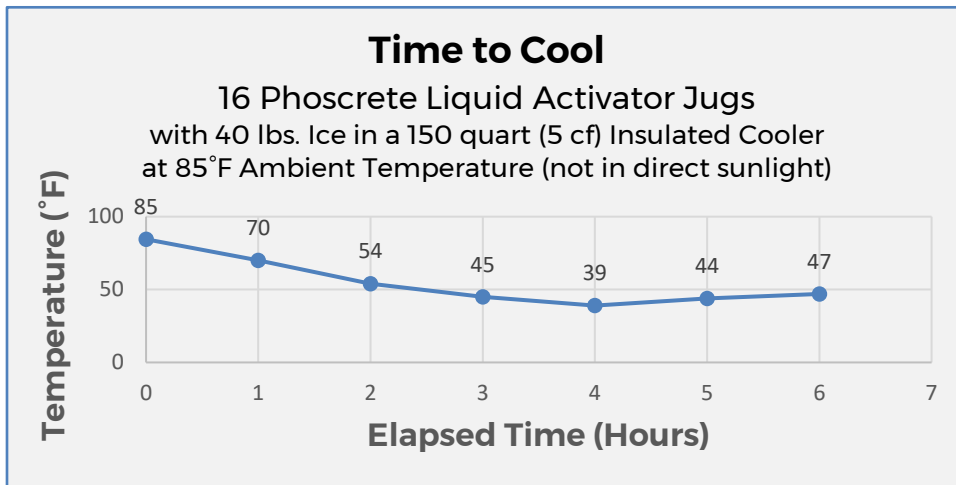
- Most important is the temperature of the Dry Mix and the Liquid Activator. If the two components are stored at warmer than ambient temperature, less Fast-Set Admix is required.
- The next important consideration is the temperature of the substrate. Frozen concrete acts as a heatsink, slowing the exothermic reaction between the Dry Mix and the Liquid Activator.
- Note that the heat from Phoscrete's exothermic reaction may allow use of sealants at the extreme low-end temperature of their recommended range. Be sure to keep sealants warmed prior to use.
- Never add more than [10] scoops of Fast-Set Admix to the Phoscrete mix, and always use the appropriate scoop based on product and packaging size (kit, pail). Refer to the Fast-Set Admix usage charts on page [6] of this document. Scoops are provided with all Phoscrete Admixtures.



Hot Weather Guidelines

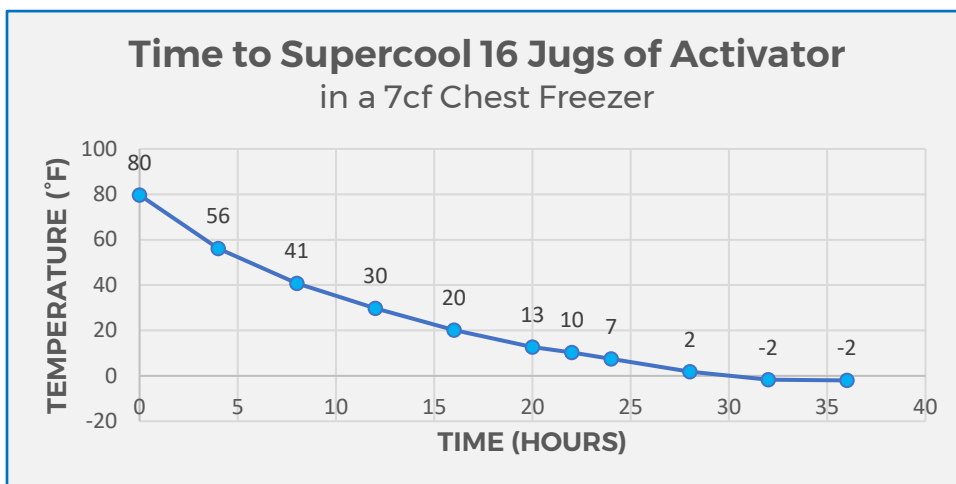
For ambient temperatures above 70°F (20°C), use [1] scoop of Phoscrete Slow-Set Admix to extend the working time up to 5 minutes. Refer to the Working Time charts and review best practices when working with Phoscrete in warm temperatures.

Phoscrete Activator can be chilled in a large (150 qt) cooler (available from Phoscrete). With 40 lbs. ice added, 16 jugs of Liquid Activator cool down from 85°F (30°C) to below 40°F (5°C) in [4] hours. In hot weather, at 85°F (30°C), the Liquid Activator temperature begins to rise approximately 5°F per hour after [4] hours, when melted ice is not replaced. Keep the cooler closed and out of direct sunlight to maintain the coldest possible Liquid Activator temperature. Add fresh ice after [4] hours to keep the Liquid Activator at 40°F (5°C) until site preparation is completed and mixing of Phoscrete begins.

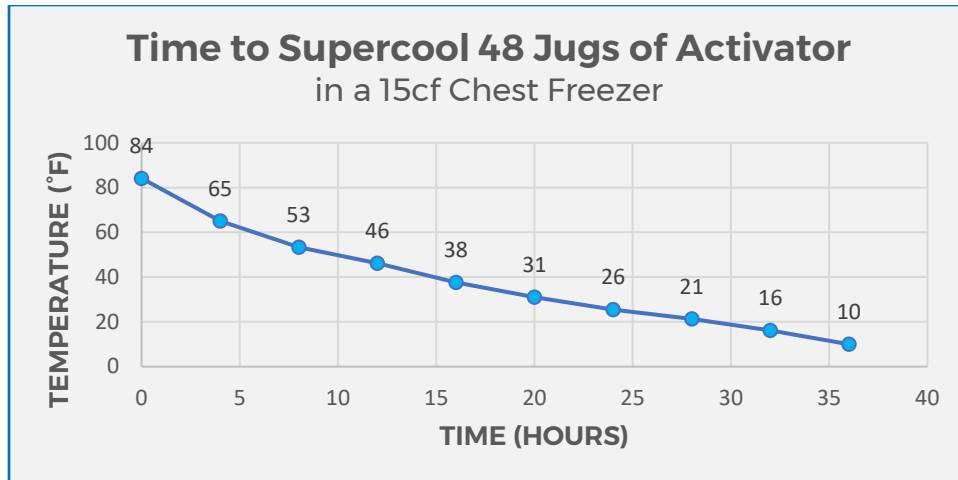


SUPERCOOLING

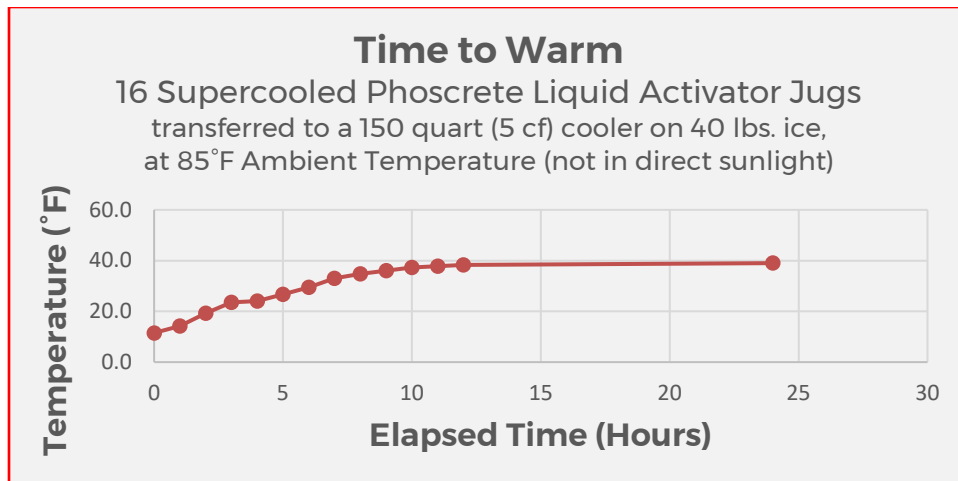
Phoscrete Liquid Activator delivers plenty of working time, even in hot weather when it is supercooled. Supercooling is easily achieved by pre-chilling the Liquid Activator jugs before leaving the shop. A 7cf chest freezer cools 16 jugs of Liquid Activator down from 85°F (30°C) to 10°F (-12°C) in approximately [22] hours. So, begin supercooling the Liquid Activator well in advance of the scheduled installation.



For concrete repair projects that require more than 16 kits of Phoscrete (7.5cf coverage), consider purchasing a larger chest freezer. A 15cf chest freezer will supercool 48 jugs of Phoscrete Liquid Activator from 85°F (30°C) to 10°F (-12°C) in less than [36] hours. Again, plan ahead when supercooling.



Just prior to driving to the jobsite, transfer 12-16 supercooled Liquid Activator jugs to a large cooler and cover with 40 lbs. ice. The temperature of the Liquid Activator is expected to increase on average 3°F per hour for the first [7] hours in the field. Then the temperature increases just 1°F per hour for the next [6] hours. Even in warm temperatures (85°F), supercooled Liquid Activator retains a cool temperature under 40°F (5°C) for longer than [24] hours without need to refresh the ice.



Considerations for best results and maximum working time in warm temperatures:

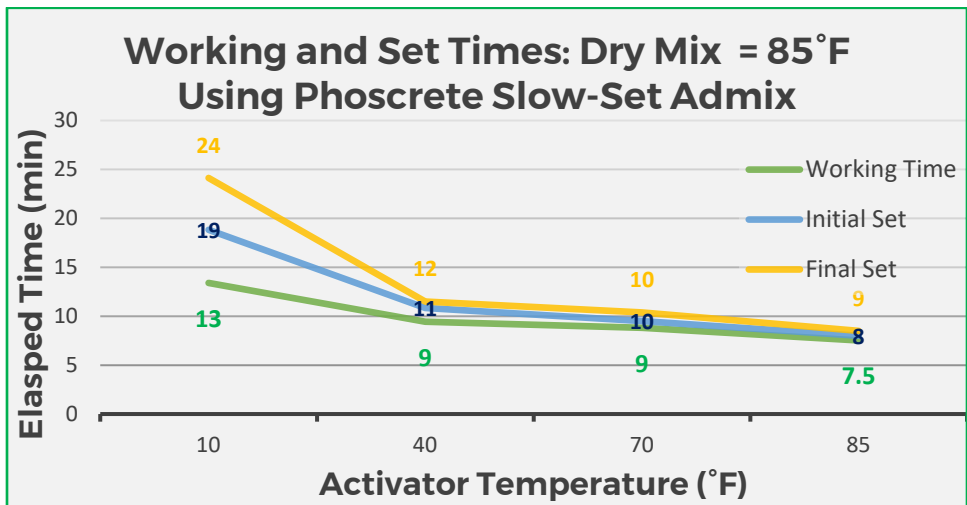
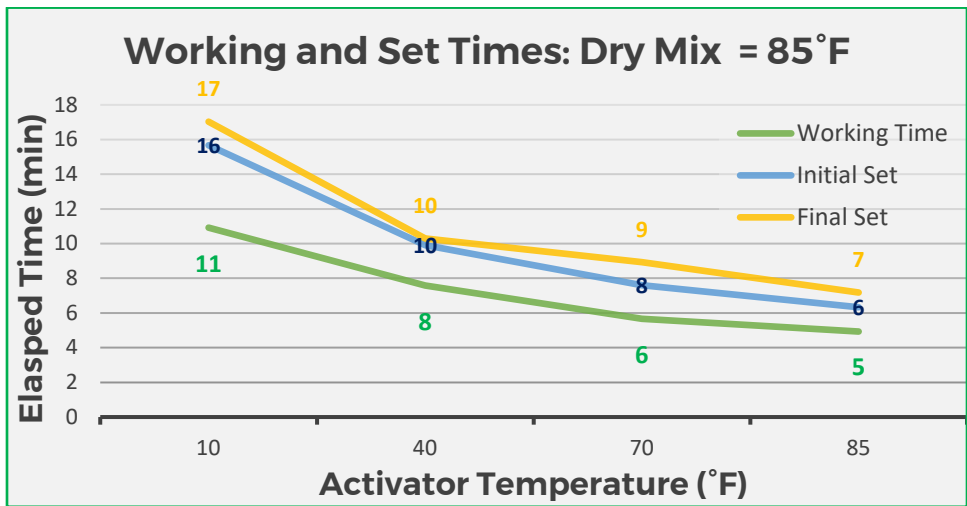
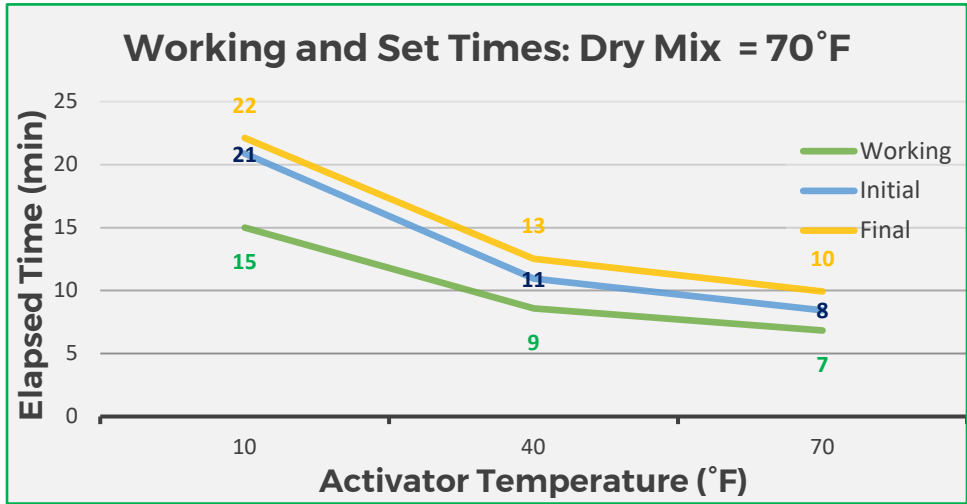
- Keep the cooler with Liquid Activator jugs and the Dry Mix bags out of direct sunlight. Use reflective blankets (available from Phoscrete).
- When working with small pails of Phoscrete, the entire pail can be cooled, including Dry Mix.
- Limit the amount of times you open the cooler. Use quality insulated coolers, when possible.
- Save the coldest jugs of Liquid Activator for the final lifts to get the best finish.
- Never add more than [1] scoop Slow-Set Admix, and always use the appropriate size scoop based on Dry Mix packaging. Refer to the charts on Page [6] of this document for guidelines.
- Use a temperature gun. Phoscrete can be ground and sealed when the finished material cools down below 100°F (38 °C).

For large volume pumping and shotcrete applications, Liquid Activator is supercooled in-line with the mixing equipment using liquid nitrogen.

Contact the Phoscrete representative in your area to discuss your specific application requirements.



Refer to the following charts for guidelines on how cold to chill Phoscrete Liquid Activator Jugs or Jars to achieve your desired working time at different ambient/dry mix temperatures.





Basic instructions for mixing Phoscrete in a bucket or pail using Admixtures:

- Never exceed 10 scoops of Fast-Set Admix. Better to warm the two components, Dry Mix and Liquid Activator, prior to mixing in very cold temperatures. Never use more than 1 scoop Slow-Set Admix.
- Always chill the Liquid Activator to 40°F (5°C) or colder when temperatures exceed 70°F (20°C) to extend working time. This is particularly important when working with large volumes of Phoscrete.
- Empty the entire contents of Phoscrete Liquid Activator into the bucket. **Always add liquid first!** Then add the appropriate number of level scoops of Fast/Slow-Set Admix to the liquid.
- Next, add the entire Dry Mix bag to the liquid, and mix for approximately 45 seconds or until no dry material remains. **Do not over mix!**
- Refer to Phoscrete Installation Guides for complete instructions.

Considerations for using Phoscrete Admixtures and Cooling the Liquid Activator:

For practical purposes when on the job site, refer to the following definitions:

Working Time is how long Phoscrete can be moved with a trowel to improve the finish.

Initial Set Time is when the central core of the placed Phoscrete material begins to harden.

Final Set Time is when Phoscrete is hardened to the point that a carpenter nail cannot be pressed into the edge of the placed material. Phoscrete sets from the inside out and is traffic-ready[†] almost immediately following the final set.

The Admix usage charts on Page [6] assume equivalent Dry Mix, substrate, and ambient temperatures. However, on the job site, many factors impact working and set times, including:

- Ambient temperature
- Substrate temperature
- Volume of material placed
- Liquid Activator temperature
- Dry Mix temperature

If the substrate is significantly colder (freezer floor), or hotter (hot sunny day) than Phoscrete's two components, consider that the heatsink from the cold substrate will slow the set time down. When the substrate is hotter, the heat from the hot substrate will reduce the working time and speed up the set.

In cold storage facilities and/or cold climates, heating the substrate allows the exothermic reaction to set faster. Use a blow torch and gently "kiss" the substrate surface prior to placement of Phoscrete to remove ice crystals and warm the surface. *Be careful not to heat the substrate for an extended period to avoid loss of compressive strength!* Placed Phoscrete may also be gently heated to accelerate the set.

When Phoscrete Dry Mix and Liquid Activator are mixed, an exothermic reaction occurs, and the placed material gets very hot, oftentimes reaching a temperature greater than 150°F (70°C). Large volumes of material is placed in cold temperatures suggests using less Fast-Set Admix toward the end of the placement. In hot temperatures, save the coldest Activator for the final mixes.

Unlike conventional Portland cement-based 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.* On large volume pours, it may be advisable to wait for the material to set and cool down before mixing and placing the final lift to get the best finish.

Final recommendations: Keep Dry Mix and Liquid Activator cool and out of direct sunlight. Use a temperature gun to monitor the temperature of the applied product to know when to start grinding and/or sealing. Always take time for quality site preparation. Phoscrete requires a clean, dry, and structurally sound concrete substrate. When the surface develops a "skin" stop finishing. The more experience contractors gain working with Phoscrete products, the faster and better they will become.

If you have questions, contact your local Phoscrete representative or call our corporate offices for application assistance.



Guidelines for using Fast-Set and Slow-Set Admixtures

Scoops are provided with all Phoscrete Admixtures. **Be careful to use the correctly labeled scoop!**

Phoscrete Dry Mix and Admix Measure and Scoop Sizes						
Packaging	Lbs	Kg	Fast-Set Scoop (1/4%)		Slow-Set Scoop (1/2%)	
			grams	scoop label	grams	scoop label
HC Pail	9.7	4.4	11	[A] 10 cc (0.33 oz)	22	[D] 23 cc (0.78 oz)
HC Bag	55.0	25	62	[B] 53 cc (1.8 oz)	125	[E] 150 cc (5 oz)
VO Pail	9.7	4.4	11	[A] 10 cc (0.33 oz)	22	[D] 23 cc (0.78 oz)
VO Bag*	31.0	14	35	[C] 30 cc (1 oz)	70	[F] 90 cc (3 oz)
SG Bag	55	25	62	[B] 53 cc (1.8 oz)	125	[E] 150 cc (5 oz)

* Phoscrete VO kit is packaged [2] bags Dry Mix to [1] jug of Activator. This table assumes mixing only [1] bag with a measured ½ jug of Activator. Double the dose indicated in this chart for a full [2] bag kit mix.

In addition to using the Admixtures, chill Liquid Activator to 40°F (5°C) when the ambient temperature exceeds 70°F (20°C) When the ambient temperature is above 95°F (35°C) use the Liquid Activator supercooled to 10°F (-12°C). Please review additional considerations on Page [5] of this document because actual field conditions are different from controlled laboratory testing environments.

Phoscrete Fast-Set and Slow-Set Admix Usage Chart					
Dry Mix Temperature	Activator Temperature	Admix Scoops	Working (min)	Initial (min)	Traffic Ready† (min)
Below +15°F [Below -10°C]	same as dry	8 – 10 Fast-Set	12 - 15	20	75+
15°F to 25°F [-10° to -5°C]	same as dry	6 – 8 Fast-Set	11 - 14	20	60
25°F to 32°F [-5°C to 0°C]	same as dry	4 - 6 Fast-Set	11 - 14	20	60
32°F to 40°F [0°C to 5°C]	same as dry	2 - 4 Fast-Set	11 - 14	17	60
40°F to 50°F [5°C to 10°C]	same as dry	1-2 Fast-Set	10 - 13	15	60
50°F to 70°F [10°C to 20°C]	same as dry	None	7 - 13	10-15	30
70°F to 85°F [20°C to 30°C]	40°F (5°C)	1 Slow-Set	8 - 10	10-12	30
85°F to 95°F [30°C to 35°C]	40°F (5°C)	1 Slow-Set	5 - 9	7-11	15
Above 95°F [Above 35°C]	10°F (-12°C)	1 Slow-Set	4 - 6	6 - 8	12

†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.

If you have questions, contact your local Phoscrete representative or call our corporate offices for application assistance.