

TECHNICAL BULLETIN

CAPITOL AGGREGATES, INC.



SHRINKAGE CRACKING

What is shrinkage cracking? As concrete cures, it dries out and the moisture that evaporates leaves voids in the concrete. These voids allow the concrete to shrink, and eventually crack, since it's so brittle.

"Plastic Shrinkage" is the shrinkage before the initial set.

"Drying Shrinkage" is the shrinkage that occurs after the initial set.

Cracks caused by both are a common defect in concrete surfaces.

WHAT DOES IT LOOK LIKE?

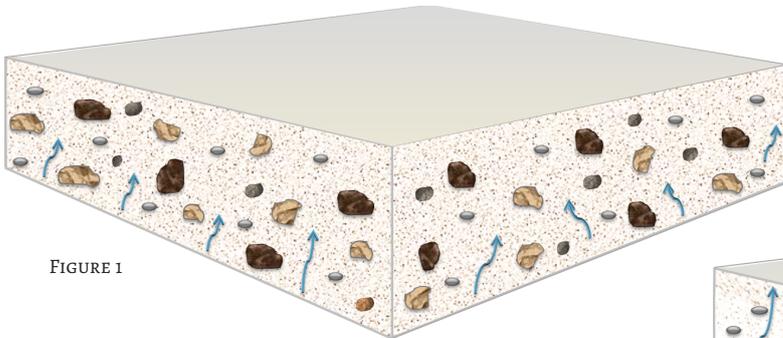


FIGURE 1

After concrete is placed, the aggregates and cement particles settle and consolidate forcing water to the surface of the slab. This is commonly called "bleeding." If the water evaporates too rapidly, the surface can become dry and it will shrink. This puts tension on the surface and it may crack before the concrete is strong enough to withstand the shrinking forces. Since the crack will appear while the concrete is still in a plastic state, they are known as Plastic Shrinking Cracks.

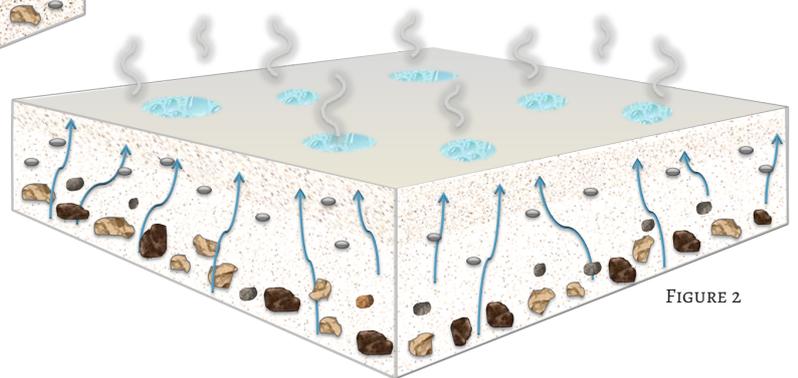


FIGURE 2

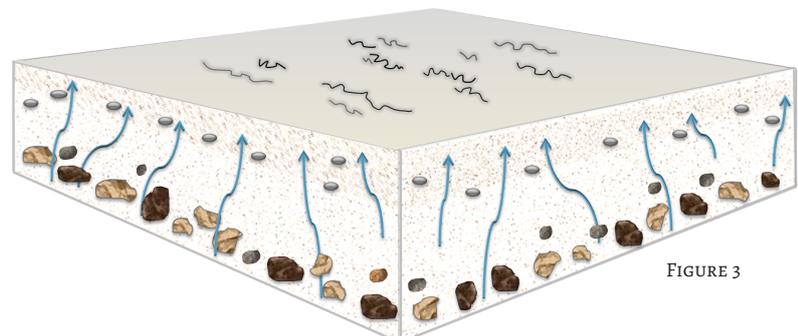
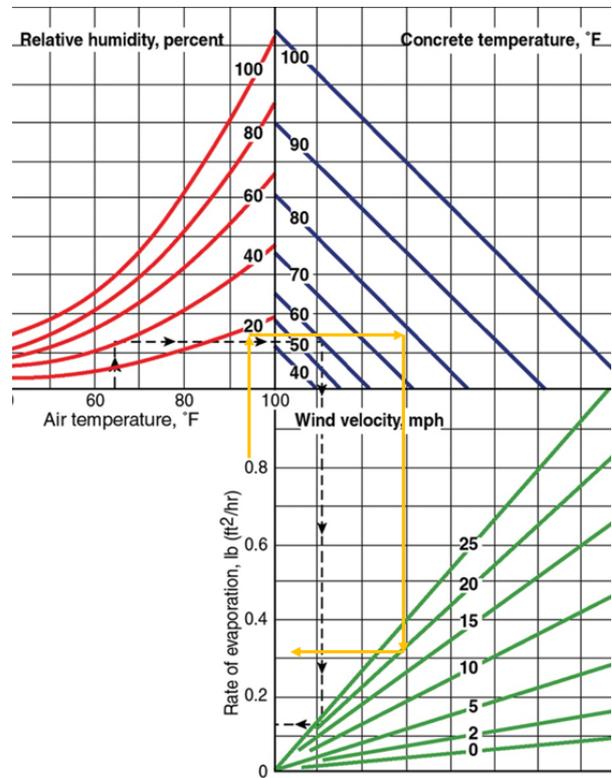
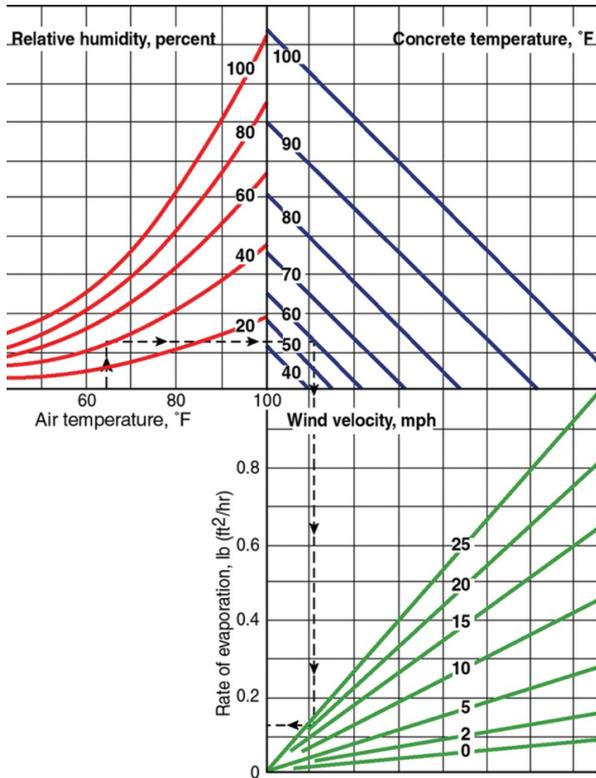


FIGURE 3

SHRINKAGE CRACKING

HERE'S A GUIDE TO HOT WEATHER CONCRETING:



So what does this tell us?

- If the Rate of Evaporation approaches 0.2 lbs/SF/hr then precautions are necessary.
- Contractors will rarely cooperate.
- They blame it on the concrete.
- There is little we can do to make concrete plastic shrinkage crack proof.
- But there are some things that can help:



This handheld weather station is an easier and quicker method that allows us to predict if any extra measures need to be made to prevent any shrinkage cracking.

- If the conditions are likely to cause plastic shrinkage adjustments to the mix design should be made to accelerate setting.
- We can also recommend protecting the slab with a curing compound as soon as the first pass of finishing is complete.

SHRINKAGE CRACKING

What can we do about it?

- We can predict when it is likely to occur and recommend steps to minimize or prevent it.
- Most of the precautions are jobsite practices.
- Very little can be done to the materials or mix design.
- It is not caused by cement brand, type, or performance.

Contractors' Responsibility

Protect the surface from drying rapidly by erecting wind breaks.

Apply a curing compound immediately following the completion of finishing operations.

Spend a little more money on concrete:

- Accelerators
- Fibers

What can an RM supplier do?

- The faster concrete sets the less opportunity for plastic shrinkage cracking to occur.
- Richer mix.
- Accelerators.
- Reduce/eliminate fly ash.
- Less sand/more coarse aggregate can help.

Drying Shrinkage Cracking

- All of the same conditions lead to drying shrinkage.
- Plus concrete always shrinks when it cures and dries out.
- Wet curing is the best.
- Curing compounds help.
- Proper jointing practices are the best option.

Drying Shrinkage Cracking

- Most of the time in Texas.
- Worse in fall and spring:
 - Temperature changes
 - RH is lower
 - Concrete is setting slower

