



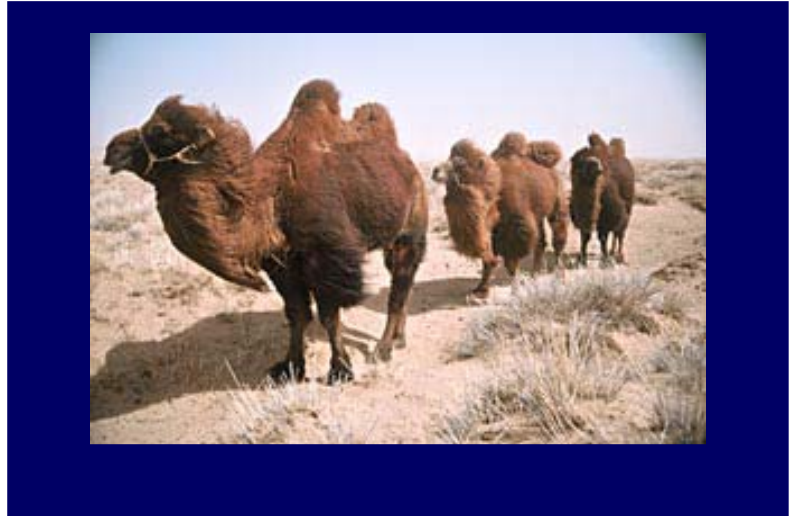
Tech Corner

Stay Cool

Strategies for Hot Weather Concreting

Daily and seasonal temperature variations can impact fresh concrete. Concrete stiffens, sets, and gains strength faster as the temperature rises. Hot weather can be a source of problems for the paving process.

The American Concrete Institute (ACI) categorizes hot weather as a period when, for more than three consecutive days, the following conditions exist:



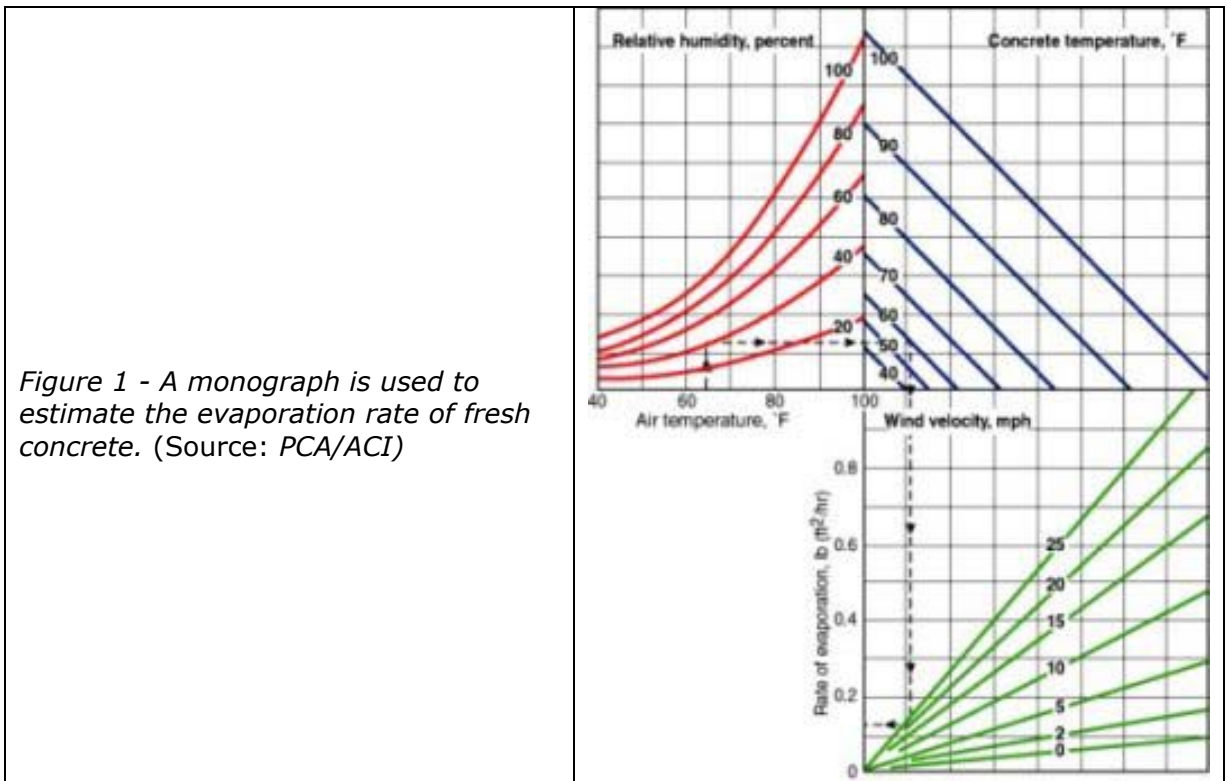
Paving Train? *Hot weather can take its toll on animals and humans, but also on concrete pavements during placement. Tips from ACPA can help prevent problems when paving in hot weather.*

- The average daily air temperature is greater than 25 °C (77 °F). The average daily temperature is the mean of the highest and the lowest temperatures occurring during the period from midnight to midnight.
- The air temperature for more than one-half of any 24-hour period is not less than 30 °C (86 °F).

Hot weather affects concrete materials and construction practices. The hydration of cement generates heat, and the hydration rate is accelerated with increasing temperature. Concrete expands with increasing temperature and shrinks with decreasing temperature, so cool nights will lead to temperature and ambient temperature. Preparation for hot-weather paving should take place long before paving begins.

Whenever the construction team anticipates building a project in the summer, they should verify the concrete mixture for these conditions. Verification testing shock which can cause uncontrolled cracking. The amount of expansion and shrinkage is governed primarily by the aggregate type.

In general, the risk of cracking is increased with increasing placement temperature and ambient temperature. Preparation for hot-weather paving should take place long before paving begins.



Whenever the construction team anticipates building a project in the summer, they should verify the concrete mixture for these conditions. Verification testing is conducted in the laboratory during the mix design phase.

The testing laboratory should mix trial batches and cast specimens at temperatures representative of the site conditions to flag whether compatibility problems may arise.

During hot weather, problems that might occur include: rapid slump loss; reduced air contents; premature stiffening; plastic shrinkage cracking; or thermal cracking.

The construction team should take steps to reduce the evaporation rate from the concrete. The likelihood of plastic shrinkage cracking increases when the evaporation rate increases. Plastic shrinkage cracking results from the loss of moisture from the concrete before initial set.

The evaporation rate is a function of: air temperature; concrete temperature; relative humidity; and wind speed. (*See Figure 1.*)

If conditions of temperature, relative humidity, and wind are too severe to prevent plastic shrinkage cracking, or if corrective measures are not effective, paving operations should be stopped until weather conditions improve.

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Tech Corner is seen in ACPA's "On the Grade" and "Concrete Pavement Progress" newsletters.



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