IRMCA ALERT

SPRING CONCRETE

The spring of the year brings with it a significant range of ambient temperatures, typically 30°f to 70°f. From day to day, or for a period of days, temperature variations within this range can and do occur affecting various characteristics of concrete.

ASTM* C94 and IDOT specifications require that concrete temperatures, as delivered, not be below 55°f or higher than 90°f (refer to these specifications for mass and bridge deck exceptions). After the concrete is place it becomes the contractor's responsibility to maintain specified temperatures. ACI*306, Cold Weather Concreting, lists the recommended in place temperatures based on the thickness of the section and the ambient temperature, generally between 45°f and 70°f (refer to ACI 306 for exact recommendations).

As seen from these graphs with fluctuations in ambient temperature as noted above, setting time, and rate of strength gain can significantly be affected. It should also be noted that cold subgrades will also contribute to lower in place concrete temperatures.

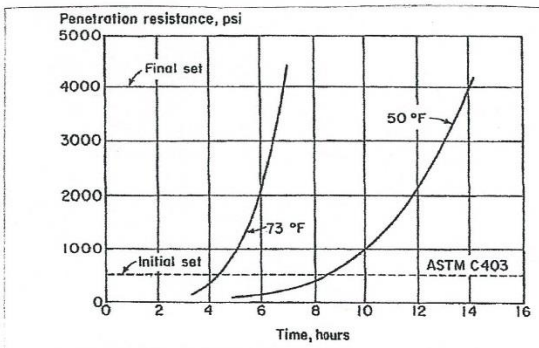

Fig. 12-3. Effect of cold temperature on rate of hardening. Reference 12-11.

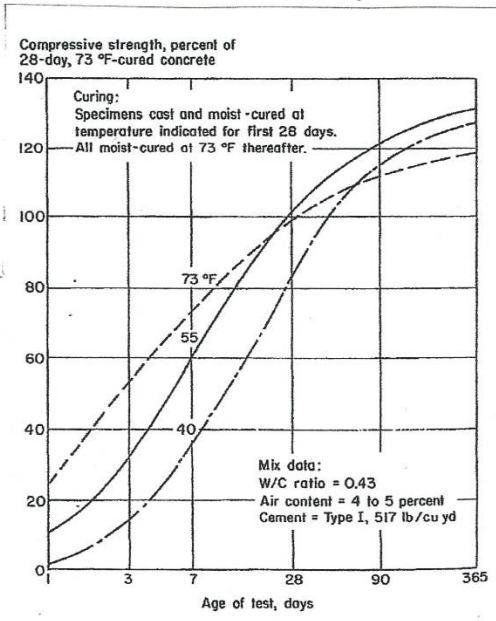

Fig. 12-5. Effect of low temperatures on concrete compressive strength at various ages. Reference 12-5.

Slower setting times also allow wind to dry the exposed surfaces commonly causing plastic cracking (plastic meaning before the concrete sets). If those conditions exist precautionary measures must be taken. See IRMCA ALERT, Plastic Shrinkage.

IRMCA ALERT

PLASTIC SHRINKAGE

Spring and summer are typically the times of year that exterior flatwork is most susceptible to plastic shrinkage, specifically when atmospheric conditions are hot and windy. Plastic cracks may occur when the ambient temperature is lower but wind velocity is high. This shrinkage, and resulting cracking, frequently occurs before the concrete has set. If the cracks occur before the concrete is finished the finisher may be able to rework the surface and close the cracks.

The mixes most susceptible to plastic cracking are those that set slow and therefore exposed to the heat and or wind for a longer period of time. Retarders should be used only to compensate for extended delivery times. Synthetic fibers can be effective in resisting plastic cracking.

The contractor should check the anticipated environmental conditions and make provisions to place, finish, and cure the concrete in a timely manner. Typically the early morning can afford better conditions. Dry subgrade should be dampened. A fog sprayer or evaporation retardant should be available when needed. If conditions are severe enough he may have to erect windbreaks or sunshades or cover the concrete with plastic sheeting between finishing operations.

The included nomograph can easily be used to predict the likelihood of plastic cracking. If you choose you may access a calculator that may be easier to use. Google "ACPA Evaporation Calculator".

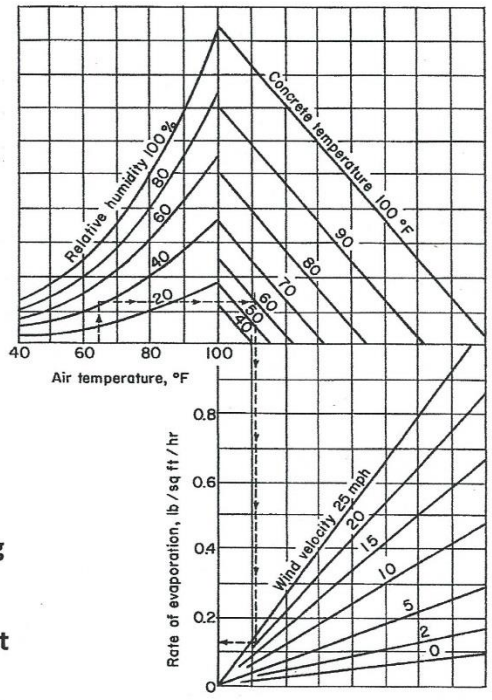

Fig. 11-8. Effect of concrete and air temperatures, relative humidity, and wind velocity on rate of evaporation of surface moisture from concrete. Reference 11-2.