

Cold Weather Concrete Tips and Practices

Amanda Schweighardt – Chairman, IMI

Joe Diedrich – CEMEX

TCA Technical Committee

The American Concrete Institutes (ACI) defines cold weather as a period when the average daily temperature falls below 40°F [4°C] for more than three successive days. These conditions warrant special precautions when placing, finishing, curing and protecting concrete against the effects of cold weather. Since weather conditions can change rapidly in the winter months, good concrete practices and proper planning are critical.*¹

Most people are aware of the typical cold weather information which is available. The National Ready Mixed Concrete Associations (NRMCA) and ACI are probably the two most common and popular available both in print and electronic forms.

What we would like to offer are quick bullet point items for both the ready mixed concrete producer and the concrete contractor (finisher) for use as a reference.

- Understanding temperature, both ambient and concrete, are critical during hot and cold weather
- When the daily ambient temperature falls below 40°F, know what to do.

Ready Mix Producer
• Heat or cover materials, sand and stone.
• If it is not feasible to cover aggregate stock piles, remove the crusting over surface of frozen material.
• When using of hot water, target a starting point for your area.
• Use the appropriate accelerating admixtures.
• Use the correct mixture for the conditions.
• If the wash down of mixers is allowed after loading, ensure that hot water is available for the process.

Contractor
<ul style="list-style-type: none"> • NEVER place concrete on ice, frost, or frozen ground.
<ul style="list-style-type: none"> • Pay attention to the weather forecast. If in doubt, order a concrete mixture that will develop high early strength to resist frost and freezing action early on.
<ul style="list-style-type: none"> • Consider the use of hot water and/or accelerators; request a specific minimum concrete temperature.
<ul style="list-style-type: none"> • Request a concrete that will gain sufficient strength quickly in order to prevent possible frost or freezing (instead of 3000 psi, order 5000 psi)
<ul style="list-style-type: none"> • Protect the concrete after placement. Use concrete blankets or plastic with sufficient straw cover (remember, plastic coverings can cause unsightly staining).
<ul style="list-style-type: none"> • In cold weather, take precautions when using a sealer. Watch the weather forecast before making a decision. Often times, a “good” step can have bad consequences and always follow instructions for application and use.
<ul style="list-style-type: none"> • Use caution when using any fuel heaters or gas powered equipment in enclosed areas. Carbon dioxide gases can create surface issues such as dusting.
<ul style="list-style-type: none"> • Concrete bleeds slower in cold weather, prepare and plan for additional waiting and finishing time. NEVER finish concrete with bleed water on the surface.
<ul style="list-style-type: none"> • Steel, aluminum, and wood forms can have a direct effect upon the concrete surface and edges. Steel forms will wick any available heat from concrete in cold weather, whereas wood has the least impact on robbing heat from concrete.
<ul style="list-style-type: none"> • Order the slump and additional products required for adequate placement. Water added on site, if not hot, will increase set times and bleed.

Remember, Concrete sets more slowly when it is cold—very slow when the concrete temperature falls below 50°F. When the concrete temperature falls below 40°F, the hydration reactions stop and the concrete will no longer gain strength. How you prepare for your concrete placement and perform the finishing tasks can make the difference between a good job, and one that is filled with ghosts.

If you have any questions, please send your question to the TCA Technical Committee or directly to Alan Sparkman at TCA.

Rule of Thumb: For every 20 degree decrease in ambient temperature, concrete set times will typically double.

References:

1 – ACI Committee 305 “*Guide to Cold Weather Concreting*”, American Concrete Institute, Farmington Hills, MI, 2007