

Recommendations for Winter Concreting

All temperatures are degrees Fahrenheit (°F)

	BUILDING AND PAVEMENT CONCRETE	MASS CONCRETE
Protection is Needed When		
	Temperatures are anticipated to drop below 40° during the 24-hour period after placement or below 30° for the succeeding 6 days. Also if the current temperature is below 35° on a rising thermometer or above 40° on a falling thermometer.	Temperatures are anticipated to drop below 35° in the 24-hour period after placement. Also if the current temperature is below 35° on a rising thermometer or above 40° on a falling thermometer.
Batching Procedures		
<i>Temp above 30°</i>	Heat water to obtain a concrete temperature of 50° to 80°	Heat water to obtain a concrete temperature of 50° to 70°
<i>Temp from 0° to 30°</i>	Heat sand and water to obtain a concrete temperature of 50° to 90°. No frozen lumps shall be found in the fine or coarse aggregate.	Heat sand and water to obtain a concrete temperature of 50° to 70°.
<i>Temp below 0°</i>	Water and all aggregates are to be heated to obtain a concrete temperature of 50° to 90°. The best way to heat aggregates is by steam coils. The use of live steam causes trouble with water contents. If the water or aggregate temperature is above 100°, the mixer must be loaded in such a manner that the cement does not contact such hot materials. The aggregate temperature is not to exceed 212° at any time. The average temperature for a batch of aggregates is not to exceed 150°.	Water and all aggregates are to be heated to obtain a concrete temperature of 50° to 90°. The water temperature should not exceed 180°. The aggregate temperature should not exceed 212°.
Placement Procedures		
Before Concreting	Do not allow placement in forms on subgrade or around any reinforcement until all signs of frost have been removed.	Do not allow placement in forms on subgrade or around any reinforcement until all signs of frost have been removed.
Curing Temperatures		
<i>Normal Cement</i>	50° minimum for five days, or not less than 70° for the first three days. Try to maintain a temperature of at least 40° for the next four days. After curing or stripping, protection shall be provided so that the temperature will not drop more than 40° in 24 hours. The surface temperature is not to exceed 100°. Loss of moisture during the curing period shall be prevented by sprinkling or other similar means of wetting. Steam is most effective.	40° minimum for fourteen days. After curing or stripping, protection shall be provided so that the temperature will not drop more than 20° in 24 hours. The surface temperature is not to exceed 100°. Loss of moisture during the curing period shall be prevented by sprinkling or other similar means of wetting. Steam is most effective.
<i>High-Early Strength</i>	50° minimum for three days, or not less than 70° for first two days. Otherwise, same as normal cement.	50° minimum for three days, or not less than 70° for first two days.

These winter concreting recommendations were developed from The Thompson & Lichtner Company's experience of over 75 years in concrete testing in New England and we have found them helpful for our field personnel up to this date. These recommendations were compiled by Dr. Miles Clair, Past President of The Thompson & Lichtner Company and past President of ASTM, and have been updated by Mr. Ara Shrestinian, V.P. of the firm and ASTM Committee C-9 Member and the writer, Mr. Evan Karalolos, current Director of the Laboratory and active Member of the New England Chapter ACI.

Project specifications and ACI may have requirements which are more stringent than these. We recommend that anyone dealing with concrete should make him or herself familiar with these general requirements, and be governed accordingly. ■

from experience

	BUILDING AND PAVEMENT CONCRETE	MASS CONCRETE
Protection		
<i>General</i>	Arrangements for covering newly-placed concrete should be made beforehand.	Arrangements for covering newly-placed concrete should be made beforehand.
<i>30° and Higher</i>	Heat not needed if placement is covered with canvas, burlap, straw, etc. 8-inch minimum coverage. Air space shall be maintained under canvas/burlap.	Heat not needed if placement is covered with canvas, burlap, straw, etc.
<i>Below 30°</i>	Artificial heat in enclosure to maintain a temperature of 50° to 70°. For floor slabs, covering should follow placement in such a way that only a few feet of fresh concrete are exposed to the air so as to avoid drying of the concrete. Heat should be provided both above and below the slab.	Artificial heat in enclosure to maintain a temperature of 40° to 70°.
Stripping		
	Forms usually provide adequate protection against freezing down to 30°, provided the top of the concrete is covered. Walls and columns should not be stripped for at least three days, following which curing should be continued as outlined above. Beam and slab strengths must be adequate to sustain their own weight plus temporary or permanent loads that may be placed thereafter.	The strength of the concrete must be adequate to sustain its own weight plus temporary or permanent loads that may be placed thereafter.

All field cylinder storage boxes should be provided with means of maintaining a storage temperature of 60° to 80°. The easiest method is to install a lighted bulb in the box. Cover all cylinders with non-absorbing covers to prevent moisture loss (e.g., plastic bags on the 6 x 12 cylinders).

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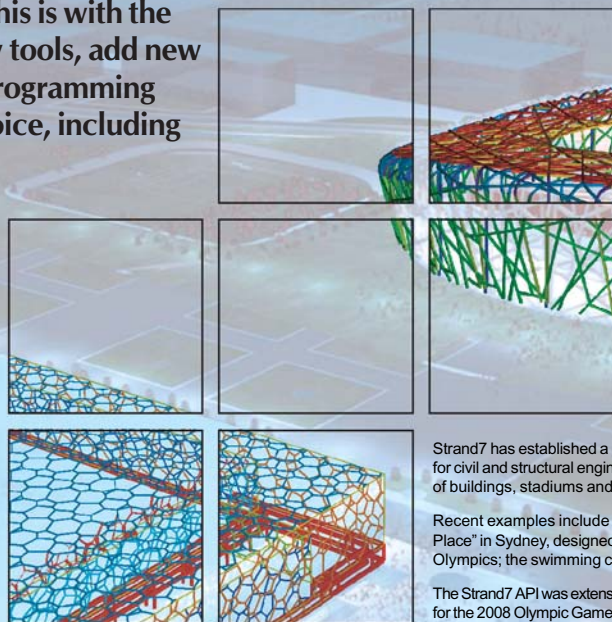
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