Concrete Craftsmanship Series
Cold Weather Concreting why and how…..

Cold Weather Concreting

At low temperatures, concrete sets slowly and strength gain is delayed. Not only may this result in the contractor being on the job longer than he planned, but freezing damage to the concrete is possible both before and after stiffening takes place.

1. Recognize Possible Problems
    A. When the air temperature is 40 degrees or below during the placing and early curing periods of concrete, adequate precautions should be taken.
    B. Longer set times should be expected in cold weather and will be made worse id precautions are not taken. As concrete temperatures drop from 60 degrees to 40 degrees setting time will increase approximately 80% from 8 hours to 14 1/3 hours (see table at the end)
2. Site Considerations
    A. Addition of water on the jobsite will prolong set times.
    B. Low slump concrete is particularly desirable for cold weather flatwork concrete, allowing the finishing work to be accomplished quicker.
    C. Concrete should *never be places on frozen ground* – unequal setting will occur when ground thaws, causing cracking. Remove all snow, ice and frost before placing concrete.

3. Mix Design Adjustments

A. The concrete's set time and early strength may be accelerated by one or more of the following:

- Request 3-4 inch slump
- Increases cement content by 100 lbs.
- Where available use hot water
- Use 1-2% calcium chloride or an accelerating admixture when steel reinforcement is not present.

Remember these measures by themselves may not prevent concrete from freezing.

B. If it is likely that any of the concrete will be exposed to freezing in a saturated condition during construction, it should be air entrained even though it will not be exposed to freezing in its normal use.

4. Protect and Cure Concrete

A. To prevent freezing damage, provide insulation to maintain concrete temperatures at 55 degrees for the length of time shown below:

2 days for footings

3 days for flatwork

B. Retain the heat generated by the concrete by insulating with one of the following:
    - A 12 inch or thicker blanket of straw with polyethylene plastic film above and below the straw.
    - Polystyrene foam sheets
    - Commercial insulating blankets

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Concrete Approximate Temperatures	*Setting Time*
70 F	*6 Hours*
60 F	*8 Hours*
50 F	*10 2/3 Hours*
40 F	*14 1/3 Hours*
30 F	*19 Hours*
20 F	*Set Does Not Occur... Concrete is Frozen*

***For additional information contact your local Ready Mix Producer*.**

This is a publication of the Quality Concrete Committee information herein is consistent with materials published by the American Concrete Institute and Portland Cement Association. For further information, see ACI 306 or PCA Design and Control of Concrete Mixtures.