

Cold Weather Concrete Placement

In order to expedite construction schedules, it is of great benefit to be able to place concrete even in very cold conditions. One of the objectives of low temperature (below 40°F or 4°C) concrete placement is to provide protection of the concrete during the early stages of curing to prevent damage caused by low temperature (and freezing). There are a number of steps required to effectively prevent damage to the concrete while placing in low temperatures.

Low temperatures and the possibility freezing of any exposed concrete will influence the curing rate and the ultimate strength of the concrete, both of which affect the quality and structural capacity of the finished wall. Building with Amvic™ ICF provides an insulated wall cavity that protects the concrete after placement.

Planning

Always anticipate weather conditions prior to the placement of concrete. Become familiar with proper procedures for cold weather concrete placement and the possibility of snow or ice on (or in) the walls. Necessary equipment and materials should be on site before the cold or extreme weather is likely to occur, not after concrete has been placed, thus allowing for the possibility of freezing. Always discuss the appropriate mix design and delivery temperature of the concrete with the concrete supplier, and make sure it is specific to the applicable weather conditions at the time of the pour.

Temperatures

All areas where the concrete is left exposed to temperatures at or below freezing (i.e. top of wall, opening perimeters, beam pockets, etc.) requires temporary thermal protection to prevent freezing within the first 24 hour period. Concrete that is protected from freezing until it has attained a compressive strength of at least 3.5 MPa (500psi) will not be damaged by exposure to a single freezing cycle (Powers 1962, ACI 306R). Concrete that has been protected to attain the 3.5 MPa (500psi) strength will mature to its full potential strength despite subsequent exposure to cold weather. No further protection is necessary unless a specified concrete strength must be attained in a few days.

Follow ACI-306R – Cold Weather Concreting for recommended concrete temperatures for concrete walls >12" (305mm). Testing has shown that concrete may

be placed in an ICF at temperatures well below freezing (32°F/0°C).

Removal of Ice and Snow Within the ICF Wall Cavity

All snow and ice must be removed from within the ICF wall prior to placement of concrete. Either heat the cavity at a temperature that will not damage the ICF forms, or use hot water or steam to melt any snow or ice within the wall system.

Protection against Freezing

To prevent concrete damage caused by early freezing, protection must be provided immediately after concrete placement. Any protection must be secured in place to combat all weather and high wind situations and remain in place for a 24 hour period depending on outside temperatures.

Cover the top of the wall and any exposed concrete surfaces with one of the following:

- Polystyrene (EPS) panels – cut EPS panels the width of the wall and fasten securely in place along the top of the wall.
- Insulated vinyl blankets – these are manufactured pliable blankets filled with insulation that cover the width of the wall and attach with fastening straps.
- Blanket or bat insulation – wrap bat insulation in a moisture proof membrane and secure to the wall.

All of these methods should provide the required moisture protection as well as the ability to insulate the exposed concrete in cold weather.

Summary

The natural characteristics of Amvic™ ICF with two insulated panels, helps retain the heat generated by the hydration of the concrete within the wall. Retaining this heat within the ICF wall is key to the protection of the concrete from the cold temperatures and the possibility of freezing. The ICF walls themselves do not require supplementary heating to protect the concrete, just the exposed concrete surfaces as identified here.