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Cold Weather Concreting Guide

The following policy reflects the standard of care required to place and cure concrete, masonry mortar, and grout when temperatures drop below code and standard practice temperatures as identified in the adopted building code and referenced guidelines. Every effort shall be exerted by the builder or contractor to assure that ground, forms, and reinforcement are at temperatures stated below for the requisite time to assure adequate conditions for concrete, mortar, and grout placement are met to assure against undue shock during the placement process. Every effort shall also be made to provide protection and heat for the concrete, mortar, and grout to allow their proper cure to assure that design strengths are achieved. The following guidelines state conditions and policy of this office and are the basis for inspection, release to pour, and final approval during cold weather conditions.

General

1. Concrete shall not be placed against or on frozen ground or surfaces. Frozen materials in trenches and in forms shall be removed or heated to achieve appropriate placement temperatures. Material that is heated shall meet the density and compaction requirements of the code or shall be removed and replaced with suitable, non-frozen material and re-compacted to meet 95 percent density.
2. Concrete shall not be placed against ice or snow. Ice or snow shall be removed and area shall be heated to assure that foundation soils meet the temperature conditions for placement and that material is of suitable density to meet the compaction requirements.
3. Concrete mixes may be created using heated ingredients. Such procedures shall follow standard American Concrete Institute cold weather practices.
4. Tenting and heating shall be in place when temperatures drop below the stated temperatures, before placement occurs, and shall be in place for a sufficient length of time to assure that even temperature of ground, materials, forms, and the like are met.
5. Once concrete or grout has been placed or blocks laid with mortar, temperature conditions shall be maintained to assure that adequate curing is achieved, as long as is necessary to assure design strength is achieved.
6. Placement of tenting and subsequent heating must be done with protection of the worker in mind, in addition to protection of project. Inadequate ventilation and poorly operating heaters can produce carbon monoxide gas, which can injure workers and may

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reduce the quality of the work, concrete, mortar, or grout.
7. Care must be used to assure against undesirable drying of concrete surfaces during the curing process.
8. Placement of blankets may be an appropriate alternative when weather and conditions permit. Temperature must be maintained and care must be exercised to assure against loss of moisture.
9. Curing times stated below are designed to assure optimum strengths and prevent potential for failure of materials once thawed and loaded. Allowance for reduction of curing times depends entirely on proof of having achieved design strengths at an earlier time and would require test backup on samples and engineering approval.
10. Stripping of forms, as long as it is done in a controlled environment, would follow standard practices.

Building Code Requirements for Concrete Placement in Cold Weather

1. Concrete, other than high early-strength shall be maintained above 50° F, and in a moist condition for at least the first seven days after placement. (IBC 1905.11.1)
2. High early-strength concrete shall be maintained above 50° F and in a moist condition for at least 3 days (72 hours.) (IBC 1905.11.2)
3. Accelerated curing may be used. (IBC 1905.11.3) Curing process shall be such as to produce concrete with durability at least equivalent to the curing methods stated above in Items 1 and 2.
4. Adequate equipment shall be provided for heating concrete materials and protecting concrete during freezing or near-freezing weather. (IBC 1905.12.1)
5. For purposes of near freezing weather considerations, 40° F shall be used. At that point, the Building Code Official will require that forms and curing concrete be enclosed by tenting or full accessible enclosures, to be built so that proper inspection may be performed while concrete is properly curing. These enclosures must be capable of maintaining the temperature of the curing concrete at or above the required 50° F for the required time periods mentioned above.
6. All concrete material and all reinforcement, embeds, forms, fillers, and ground with which concrete is to come in contact shall be free from frost, ice, and snow. (IBC 1905.12.2)
7. Reinforcement shall be thoroughly free of ice and other deleterious coatings and materials.

Masonry Placement and Grouting of Masonry in Cold Weather

1. The Building Code Official requires that an accessible tent or enclosure be built to protect grout and mortar from freezing for 48 hours at a temperature of 40°F. The first 24 hours of the 48 hour period is used to cure the mortar and also the third day of concrete curing, which is 3 days (see above.) The next 24-hour period is for the curing of the grout. After this curing cycle is complete, the enclosure may be removed.
2. When air temperatures fall below 40°F, grout mixing water and aggregates shall be heated to produce grout temperatures between 40°F and 120°F. (IBC 2104.3.2.1).
3. Masonry to be grouted shall be maintained above freezing during the grouting placement and at least 24 hours after placement. (IBC 2104.3.2.4) This means that the block must be brought up to appropriate temperatures before placement of the grout and maintained throughout the placement and cure process.
4. When atmospheric temperatures fall below 20°F, enclosures shall be provided around masonry during grout placement and for at least 24 hours after placement.

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