



# Building Inspections Cold Weather Concrete Policy

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The following provisions shall apply to the placement of concrete in cold weather conditions.

**“Cold Weather”** is defined as a period when, for more than 3 consecutive days, the following conditions exist:

- 1) The average daily air temperature is less than 40 degrees F and 2) the air temperature is not greater than 50 degrees F for more than one-half of any 24-hr period.

The average daily temperature is the average of the highest and lowest temperatures occurring during the period from midnight to midnight. Cold weather, as defined in this report, usually starts during the fall and usually continues until spring.

## **Cold Weather Conditions and Inspections**

During cold weather conditions, concrete must be protected from low temperatures for the first 72 hours of the curing process in order to maintain the required minimum surface temperature of 55 degrees Fahrenheit. Cold weather conditions are in effect and cold weather protection measures are required when the weather forecast for Denton, Texas from local weather forecasts calls for the average daily temperature in Denton to:

- **“Below 40 degrees F but not a low temperature less than 25 degrees F”** for any part of the intended day of the concrete pour or at any point during the 3 day (72 hour) curing period that follows. When cold weather conditions exist, requests for city personnel to inspect the placement of concrete can be submitted based on the following conditions.
  1. The responsible builder provides a 3rd party Texas Registered licensed structural engineer’s report certifying that cold weather measures were adhered to.
  2. The engineer’s report must meet the “Engineer’s Reporting Requirements” section of this policy.

\*The City inspection is still subject to failure based on other code violations not related to cold weather conditions.

- **“When the temperature is 25 degrees F or less”** for any part of the intended day of the concrete pour or at any point during the 3 day (72 hour) curing period that follows. When cold weather conditions exist, requests for city personnel to inspect placement of concrete can be submitted and approved with the following **mandatory** conditions:
  1. The concrete pour must be done under the **direct supervision** of a 3rd party Texas Registered licensed structural engineer.
  2. The engineer will be required to provide a stamped sealed inspection report listing all the mandatory information in the “Engineer’s Reporting Requirements” section of this policy.
  3. The engineer’s report must be received and approved by the Building Official or city inspector before any future building inspections can be scheduled or approved for the project.

\*The City inspection is still subject to failure based on other code violations not related to cold weather conditions.

## **Code Requirement for Concrete**

Chapter 19 and section 1901.4 of the 2012 International Building Code (IBC) and Section R402.2 of the 2012 International Residential Code (IRC) requires that concrete construction meet the specifications stipulated in the American Concrete Institute’s (ACI) standard 318 Building Code Requirements for Structural Concrete. Those specifications are:

- Concrete for footings and basement slabs shall have a minimum compressive strength of 2500 psi.
- Concrete for foundation walls shall have a minimum compressive strength of 3000 psi.
- Concrete for exterior, garage, or structural slabs shall have a minimum compressive strength of 3500 psi.
- Concrete shall be air entrained.
- Total air content for concrete (percent by volume of concrete) shall not be less than 5% or greater than 7%.
- Concrete for a garage floor with a steel-trowel finish can have its total air content (percent by volume of concrete) reduced to not less than 3% if it has a minimum compressive strength of 4,000 psi.
- Note that all minimum compressive strengths listed above are calculated at 28 days.

For concrete to meet the above specifications it must at a minimum maintain a surface temperature of 55 degrees Fahrenheit for the first 72 hours of the curing process.



### **Engineer's Reporting Requirements**

If a 3rd party engineer's report is to be submitted for concrete poured during Cold Weather conditions, the report shall include the following mandatory information:

- Date and time of the inspection.
- Time that the concrete pour was initiated.
- Temperature at time of pour and the forecasted lows for the next 72 hours.
- Description of the soil conditions and soil load bearing assumptive value.
- Indicate either no frozen sub-grade was observed or frozen material was removed prior to pour. Under no circumstances will concrete be allowed to be poured on frozen sub-grade.
- Indicate that the reinforcement and layout of the inspected item matches the city approved plans.
- Type of concrete being used and slump mixture.
- Specify what cold weather protection measures were taken for the concrete.

### **Cold Weather Protection Measures**

The following are acceptable protection measures for concrete during cold weather conditions:

- Footings or slabs may be covered with insulated blankets or with 6 inches of straw secured in place with tarps or polyethylene sheeting.
- Foundation walls may be covered with insulated blankets.
- Hydronic heating pipes or electric heating blankets in combination with insulated blankets may be utilized.
- A temporary structure encapsulating the concrete construction and supplied by a powered heat source may be installed, but prior approval from the Chief Building Official must be obtained.

If the permit holder desires to utilize an alternate cold weather protection measure rather than one of those mentioned above, that proposed measure must be sealed by a Texas Registered licensed structural engineer, submitted to the City for review, and approved by the Building Inspections Division in advance of the pour.

### **Additional Considerations**

- If the footings require cold weather protection measures, then a minimum of 48 hours must elapse before the foundation walls can be poured upon those footings.
- The curing time and thus the time required for cold weather measures may be reduced from 72 hours to 48 hours if the cement content is increased by 100 lbs. per cubic yard or Type III Portland Cement is used, or if an approved accelerator is employed.
- After the initial curing period, it is recommended that the concrete be kept dry (protected from the elements) for at least two to three additional days before it is exposed to freezing conditions.

### **Penalties for Failure to Comply**

If concrete is poured during cold weather conditions and is not protected by an approved measure as described above in this policy, or has not been approved by City of Denton Inspection personnel, then the following requirements will be enforced:

1. Foundations poured without approved measures will require the responsible builder of the project to provide a sealed 3<sup>rd</sup> party report from an approved testing agency testifying that the concrete in question has been tested and verified to the meet the specifications dictated by the ACI 318, ACI 332, ACI 306 and the local adopted building codes.
2. Flat work poured without approved measures
  - a. Must be removed, reconstructed, re-inspected and approved before re-pour; OR,
  - b. A core sample of the flatwork may be taken 28 days after the pour and must pass a 4,000psi break test. A certified testing lab must provide written verification that the concrete passed the break test. The core in the flatwork must be re-filled prior to final inspection.