



## Cold & Hot Weather Masonry Construction Requirements PER “SPECIFICATION FOR MASONRY STRUCTURES,” ACI 530.1/ASCE 6-05/TMS 602-05

### INTRODUCTION

Minimum cold and hot weather construction requirements for masonry structures are mandated by the International Building Code 2003 edition (IBC 2003) and are contained in the publication “Specification for Masonry Structures”, ACI 530.1-05/ASCE 6-05/TMS 602-05, referenced herein as ACI 530.1. The requirements from ACI 530.1 are summarized as follows.

When *ambient air temperature* is below 40°F, implement cold weather construction procedures and comply with the following:

- Do not lay glass unit masonry.
- Do not lay masonry units having either a temperature below 20°F or containing frozen moisture, visible ice, or snow on their surface.
- Remove visible ice and snow from the top surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.

### COLD WEATHER CONSTRUCTION

**Construction Requirements:** These requirements apply to work in progress and are based on *ambient air temperature*. Do not heat water or aggregates



*Shielding Construction During Cold Weather.*

used in mortar or grout above 140°F. Comply with the following requirements during construction for the following ambient air conditions:

- **40°F to 32°F:** Heat sand or mixing water to produce mortar temperature between 40°F and 120°F at the time of mixing. Grout does not require heated materials, unless the temperature of the materials is below 32°F.
- **32°F to 25°F:** Heat sand and mixing water to produce mortar temperature between 40°F and 120°F at the time of mixing. Maintain mortar temperature above freezing until used in masonry.

Heat grout aggregates and

mixing water to produce grout temperature between 70°F and 120°F at the time of mixing. Maintain grout temperature above 70°F at the time of grout placement.

Heat Autoclaved Aerated Concrete (AAC) units to a minimum temperature of 40°F before installing thin-bed mortar.

- **25°F to 20°F:** Comply with the requirements for 32°F to 25°F and the following:

(1) Heat masonry surfaces under construction to 40°F and use wind breaks or enclosures when the wind velocity exceeds 15 mph.

(2) Heat masonry to a mini-



*Sand And Water Heated During Construction*

imum of 40°F prior to grouting.

- **20°F and below:** Comply with the requirements for 25°F to 20°F and the following:
  - (1) Provide an enclosure and auxiliary heat to maintain air temperature above 32°F within the enclosure.

**Protection After Erection:** These requirements apply after masonry is placed and are based on anticipated *minimum daily temperature* for grouted masonry and anticipated mean daily temperature for ungrouted masonry. Protect completed masonry in the following manner:

- Maintain the temperature of glass unit masonry above 40°F for the first 48 hrs after construction.
- Maintain the temperature of AAC masonry above 32°F for the first 4 hrs after thin-bed mortar application.
- **40°F to 25°F:** Protect newly

constructed masonry by covering with a weather-resistive membrane for 24 hrs after being completed.

- **25°F to 20°F:** Cover newly constructed masonry completely with weather-resistive insulating blankets, or equal protection, for 24 hrs after completion of work.
  - (1) Extend time period to 48 hrs for grouted masonry, unless the only cement in the grout is Type III Portland cement.
- **20°F and below:** Maintain newly constructed masonry temperature above 32°F for at least 24 hrs after being completed by using heated enclosures, electric heating blankets, infrared lamps, or other acceptable methods.
  - (1) Extend time period to 48 hrs for grouted masonry, unless the only cement in the grout is Type III Portland cement.

Implement approved hot weather procedures and comply with the following provisions:

- When the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph:
  - (1) Maintain sand piles in a damp, loose condition.
  - (2) Provide necessary conditions and equipment to produce mortar having a temperature below 120°F.
- When the ambient temperature exceeds 115°F or exceeds 105°F with a wind velocity greater than 8 mph, comply with the requirements above and shade materials and mixing equipment from direct sunlight.

**Construction Requirements:** These requirements apply to work in progress and are based on the following weather conditions:

- When the ambient air temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph:
  - (1) Maintain temperature of mortar and grout below 120°F.
  - (2) Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
  - (3) Maintain mortar consistency by retempering with cool water.
  - (4) Use mortar within 2 hrs of initial mixing.
  - (5) Spread thin-bed mortar no more than four feet ahead of AAC masonry units.
  - (6) Set AAC masonry units

within one minute after spreading thin-bed mortar.

- When the ambient temperature exceeds **115°F** or exceeds **105°F with a wind velocity greater than 8 mph**, implement the above requirements and use cool mixing water for mortar and grout. Ice is permitted in the mixing water prior to use. Do not permit ice in the mixing water when added to the other mortar or grout materials.

**Protection After Erection:** When the mean daily temperature exceeds **100°F** or exceeds **90°F with a wind velocity greater than 8 mph**, fog spray newly constructed masonry until damp at least three times a day until the masonry is three (3) days old.

#### SUMMARY

ACI 530.1 requirements are minimum requirements and more stringent requirements can be included in the Project Specifications if desired by the project professional or Owner. The Specification requirements have been in use for many years and are adequate for normal construction projects.

The use of admixtures in mortar and grout do not generally negate the requirements for the use of cold weather construction practices. Accelerators are often used in mortar to speed the set of the mortar in cold weather to permit continuation of construction and tooling of mortar joints. Accelerators do not prevent freezing of mortar.

#### DEFINITIONS

**Ambient air temperature:** The ambient temperature indicated

by a thermometer exposed to the air but sheltered from direct solar radiation. The temperature indicated by a thermometer placed in an instrument shelter 1.5 to 2 meters above ground.

**Mean daily temperature:** The average daily temperature of temperature extremes predicted by a local weather bureau for the next 24 hours.

**Minimum daily temperature:** The low temperature forecast by a local weather bureau to occur within the next 24 hours.

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