

What's Happening in Masonry

by: Gary Porter



Cold Weather Masonry

In the masonry world this topic comes up seasonally. There are necessary procedures needed to follow for successful installation of masonry in the cold weather. This information is helpful for mason contractors, general contractors, building inspectors and owners, who need to be conscious of the weather. The Masonry Society (TMS) in their Specification for Masonry Structures (TMS-602 Specification) provide the code specifying hot and cold weather provisions for masonry and the Brick Industry Association (BIA) has created a technical note #1, Hot and Cold Weather Construction with this information in a table, The International Building Code (IBC) and the National Concrete Block Association (NCMA) include a list of required cold and hot weather construction provisions for masonry.

If you can remember the number 40. When the temperature hits 40, there are certain things that need to be implemented on a masonry project. When the temperature is between 40°F and 32°F, ice and snow need to be removed from foundations or existing masonry. Masonry units need to be free of any frozen ice or snow, the mixing water needs to be heated to obtain mortar that has a temperature between 40°F and 120°F. Newly installed masonry or where new masonry will be installed needs to be covered with a weather resistive membrane.

One big factor in the cold weather problem is that the cold materials in conjunction with cooler air, lower the temperature of the mortar. This in turn slows the reaction rates between cement and water and reduce the strength gains. The tooling time and setting time of the units is delayed. If the units are cold enough the temperature of the mortar may drop below freezing causing an expansion of the mortar as it freezes. Wet or ice covered units prevent development of a good bond between mortar and unit.

As the temperature drops to between 32°F and 25°F there are more restrictions. When the temperature drops below 25°F to 20°F more restrictions. With yet even more restrictions below 20°F. All of these provisions are detailed conveniently in the Brick Industry Association technical note #1 – and a Table 1 (next page), Requirements for Masonry Construction in Hot and Cold Weather per the TMS Specifications.

One important point to emphasize is that the covering for masonry is required for 24 hours. If this masonry is containing grouted cells or any grouting, typical in cavity wall construction, that provision extends to 48 hours as the grout takes longer to cure.

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Cold Weather Masonry (cont.)

Requirements for Masonry Construction in Hot and Cold Weather per the TMS Specification

	Temperature ¹	Preparation Requirements (Prior to Work)	Construction Requirements (Work in Progress)	Protection Requirements (After Masonry is Placed)
Hot Weather	Above 115 °F, or 105 °F with a wind velocity over 8 mph (46.1 °C, or 40.6 °C with a wind velocity greater than 12.9 km/hour)	Shade materials and mixing equipment from direct sunlight. Comply with hot weather requirements below.	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. Comply with hot weather requirements below.	Comply with hot weather requirements below.
	Above 100 °F, or 90 °F with a wind velocity greater than 8 mph (above 37.8 °C, or 32.2 °C with a wind velocity greater than 12.9 km/hour)	Provide necessary conditions and equipment to produce mortar having a temperature below 120 °F (48.9 °C). Maintain sand piles in a damp, loose condition.	Maintain temperature of mortar and grout below 120 °F (48.9 °C). Flush mixer, mortar transport container, and mortar boards with cool water before they come into contact with mortar ingredients. Maintain mortar consistency by rettempering with cool water. Use mortar within 2 hours of initial mixing.	Fog spray newly constructed masonry until damp, at least three times a day, until the masonry is three days old.
Normal Weather	100 °F to 40 °F (37.8 °C to 4.4 °C)	Normal procedures	Normal procedures	Normal procedures
Cold Weather	Below 40 °F to 32 °F (4.4 °C to 0 °C)	Do not lay masonry units having either a temperature below 20 °F (-6.7 °C) or containing frozen moisture, visible ice or snow on their surface. Remove visible ice and snow from the surface of existing foundations and masonry to receive new construction. Heat these surfaces above freezing, using methods that do not result in damage.	Heat mixing water or sand to produce mortar between 40 °F and 120 °F (4.4 °C and 48.9 °C). Do not heat water or aggregates used in mortar or grout above 140 °F (60 °C). Heat grout materials when their temperature is below 32 °F (0 °C).	Protect newly constructed masonry by covering with a weather-resistive membrane for 24 hours after being completed.
	Below 32 °F to 25 °F (0 °C to -3.9 °C)	Comply with cold weather requirements above.	Comply with cold weather requirements above. Maintain mortar temperature above freezing until used in masonry. Heat grout materials so grout is between 70 °F and 120 °F (21.1 °C and 48.9 °C) during mixing and placed at a temperature above 70 °F (21.1 °C). Maintain grout temperature above 70 °F (21.1 °C) at the time of grout placement.	Comply with cold weather requirements above.
	Below 25 °F to 20 °F (-3.9 °C to -6.7 °C)	Comply with cold weather requirements above.	Comply with cold weather requirements above. Heat masonry surfaces on both sides to 40 °F (4.4 °C). Use windbreaks or enclosures when the wind velocity exceeds 15 mph (24 km/hour). Heat masonry to a minimum of 40 °F (4.4 °C) prior to grouting.	Cover newly constructed masonry completely with weather-resistive insulating blankets, or equal protection, for 24 hours after completion of work. Extend time period to 48 hours for grouted masonry, unless the only cement in the grout is Type III portland cement.
	Below 20 °F (-6.7 °C)	Comply with cold weather requirements above.	Comply with cold weather requirements above. Provide an enclosure and auxiliary heat to maintain air temperature above 32 °F (0 °C) within the enclosure.	Maintain newly constructed masonry temperature above 32 °F (0 °C) for at least 24 hours, by using heated enclosures, electric heating blankets, infrared lamps or other methods. Extend time period to 48 hours for grouted masonry, unless the only cement in the grout is Type III portland cement.

1. Preparation and construction requirements are based on ambient temperatures. Protection requirements are based on mean daily temperatures.