

## HOT WEATHER SETTING PRACTICES

Masonry construction often occurs during periods of elevated temperatures. Hot weather is defined to be temperatures above 90° F (32° C). In such conditions, additional steps must be taken when setting cast stone to ensure that the quality of the installation does not suffer from high temperatures.

The primary concern of masonry construction during hot weather is the evaporation of water from the mortar. The increased rate of hydration of the mortar and accelerated curing conditions in hot, humid weather will help develop masonry strength provided sufficient water is present at the time of construction and for a period of three days. If sufficient water is not present, the strength of the mortar and bond between the cast stone unit and mortar may be compromised.

Cast stone is one of the materials in masonry construction that is least affected by hot weather. However, the interaction between the cast stone and mortar is critical. During hot weather construction, cast stone units tend to contain less moisture. This in turn will cause them to absorb more water from the mortar. Lower bond strength between the mortar and the units may result if insufficient water is not present in the mortar when the units are laid. A masonry wall can be fogged after it is constructed to assure the availability of adequate curing moisture.

According to industry sources, mortar will lose its workability rapidly due to evaporation of the water and the increased rate of hydration of the cement. Admixtures, specifically hydration stabilizers or retarders can be used to extend the life and increase the workability of the mortar. It is recommended that they comply with ASTM C1384 – Standard Specification for Admixtures for Masonry Mortars. Mortar mixed at high temperatures often has higher water content, lower air content, and a shorter board life than those mixed at normal temperatures. Tempering the mortar with cool water shall be permitted, but the mortar should be used within two hours.

Mortar temperatures must be controlled per the ambient air temperatures as specified in ACI 530.1. The installer should also follow the requirements in Tables 1 & 2 of The Masonry Industry Council's Hot and Cold Weather Masonry Construction guide for temperature control. High mortar temperatures will affect the mortars set times and mortar temperatures above 120° F (49° C) may cause flash set of the cement. Cold water may be used to help control the temperature of the mortar. Ice is highly effective in reducing the temperature of the mix water, but the ice should be completely melted before combining the water with any other ingredients. In any case, mortar should be used within two hours of initial mixing.

During periods of hot weather the temperature of the materials should be controlled for best results. Storing cast stone units and sand under cover of shade will help control heat gain of the materials. Sand should be stored on a raised platform and not in contact with a cover during the hot part of the day. Sand piles should be kept in a damp condition by sprinkling with water during times of high evaporation. This can help lower the temperature of the sand through evaporative cooling.

The following items are suggested for hot weather masonry construction. These items can be incorporated in the specifications of the project where applicable:

1. Mixers, mortar pans, wheelbarrows, mortar boards and other tools should be moistened with water prior to use to reduce their temperature and satisfy absorptiveness
2. Mix small batches and avoid prolonged mixing of mortar
3. Use cold water when mixing mortar and grout
  - Ice may be used to lower the mix water temperature, but it must be completely melted before adding the water to the other ingredients



4. Use the mortar within 2 hours of the initial mixing
5. Use caution when wetting the cast stone as this may lead to increased shrinkage after drying
6. Limit the spread of mortar beds to 4 ft (1.2m) ahead of the cast stone units when temperatures are 100° F 38° C) or above, or 90° F (32° C) with an 8 mph (3.6 m/s) or greater wind
7. Place cast stone within one minute of spreading mortar
8. Fog spray newly constructed masonry at least three times a day until moist
9. Cover the units at the end of the day with plastic sheets to control moisture evaporation

Construction requirements while work is in progress are based on ambient temperatures. Protection requirements, after masonry is placed, are based on mean daily temperatures. (The temperature calculated to be the average of the extremes forecast by the local weather bureau over the next 24 hours). For additional information, please refer to the Masonry Industry Council's Hot and Cold Weather Masonry Construction guide.

This Technical Bulletin addresses generally accepted practices, methods and general details for the use of Architectural Cast Stone. This document is designed **only as a guide** and is **not** intended for any specific application or project. It is the responsibility of design and construction professionals to determine the applicability and appropriate application of any detail to a specific project based on professional judgment, specific project conditions, manufacturer's recommendations and solid understanding of product characteristics. The Cast Stone Institute makes no express or implied warranty or guarantee of the techniques or construction methods identified herein. Technical references shall be made to the edition of the International Building Codes for the location of the structure, the latest edition of the TMS 402/406 Masonry Standards document and TMS 404, 504, 604 Standards for Design, Fabrication and Installation of Architectural Cast Stone.

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