



Design Tips

Technical Bulletin #48

Hot Weather Setting Practices

Special precautions must be taken when setting Cast Stone in hot weather. The installer must take measures to ensure that the quality of the installation does not suffer from high temperatures. Hot weather is defined to be temperatures above 90° F (32° C).

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

Temperature of the materials can be adjusted to aid the construction of quality masonry in hot weather conditions. ACI 530.1 specifies construction methods to produce quality masonry in hot weather conditions.

Cast Stone units are one of the materials in masonry construction least effected by hot weather. However, the interaction between the Cast Stone and the mortar or grout is critical. As the temperature of the Cast Stone units increase, they will absorb more water from the mortar. Lower bond strength between the mortar and the units may result if enough water is not present in the mortar when the units are laid. Thus, lower absorption units may be desirable since they allow more complete hydration of the mortar.

Mortar:

According to the Industry Associations e.g. Brick Industry Association (BIA), Mason Contractors Association of America (MCAA), National Concrete Masonry Association (NCMA) and the Portland Cement Association (PCA) mortar in hot weather will tend to lose its workability rapidly due to evaporation of the water from the mix and the increased rate of hydration of the cement. The use of admixtures (sometimes called modifiers) to increase workability is not recommended unless their full effect on the mortar is known and that they comply with ASTM C 1384 – Standard Specification for Admixtures for Masonry Mortars. Retempering of the mortar should be permitted except for pigmented 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.

Mortar temperatures need to be controlled per the ambient air temperatures as specified in ACI 530.1. The installer should follow the requirements in The Masonry Industry Council's (BIA, MCAA, NCMA & PCA) Tables 1 & 2 for temperature control. High mortar temperatures will affect the mortars set times. 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. When used, 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.

When possible, shade should also be provided for laborers, whose productivity decreases with increasing temperature and humidity. Starting work earlier in the day and scheduling masonry construction, avoiding the hot mid-day periods, can reduce the effect of high temperatures on laborers and materials.

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.
2. Mix small batches and avoid prolonged mixing of mortar. Ice may be used to lower the mix water temperature and must be completely melted before adding the water to the other ingredients. Cold water should always be used when mixing mortar and grout. Use the mortar within 2 hours of the initial mixing.
3. The surfaces of the Cast Stone should always be thoroughly moistened with potable water prior to setting. This procedure is even more critical during hot weather.

4. Limit the spread of mortar beds to 4 ft (1.2 m) 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.
5. Place Cast Stone within one minute of laying mortar. Fog spray all newly constructed masonry units, until moist, at least three times a day.
6. Cover the units at the end of the day with plastic sheets to control moisture evaporation.

Note: 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.

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