Surface drying and plastic-shrinkage cracking is frequently associated with hot weather concreting. It occurs in exposed concrete, primarily in flatwork, when the evaporation rate is greater than the rate at which water rises to the surface of recently placed concrete, i.e. bleeding. One or a combination of the following factors can lead to this condition:

- High air temperature
- High concrete temperature
- High wind speed
- Low humidity

The probability for surface drying and plastic-shrinkage cracking may be increased if the setting time of the concrete is delayed.

ACI 305 states that caution should be taken when the evaporation rate is less than 0.2 lbs/ft²/h. This rate is dependent upon the air and concrete temperatures, wind speed and relative humidity. Knowing these four factors one can effectively estimate the rate of evaporation by using the following chart.

**RATE OF EVAPORATION CHART FOR HOT WEATHER**
If the evaporation rate exceeds 0.1 lbs/ft\(^2\)/hr but is less than 0.2 lbs/ft\(^2\)/hr, provide the following concrete evaporation protection.

1. Take special precautions to ensure that the forms and subgrade are sufficiently moist or protected to avoid lowering the water content at the pavement/subgrade interface. In hot weather conditions, moisten the subgrade prior to placing the concrete.
2. Minimize solar heat by shading or wetting concrete chutes or other equipment that comes in contact with the plastic concrete.
3. Use a fog spray to increase the relative humidity of the ambient air if there is a delay in immediately starting the curing process.
4. Ensure that the time between placing and curing is minimized.
5. Immediately apply an approved evaporation retarder to the concrete or increase the surface cure application to 1.5 times the standard specified rate.
6. Use monofilament fibers to reduce the potential for plastic shrinkage.

**If the evaporation rate is 0.2 lbs/ft\(^2\)/hr or greater, take EXTREME CAUTION.**

### THEORETICAL RATE OF EVAPORATION CHART

If the evaporation rate exceeds 0.1 lbs/ft\(^2\)/hr but is less than 0.2 lbs/ft\(^2\)/hr, provide the following concrete evaporation protection.

1. Take special precautions to ensure that the forms and subgrade are sufficiently moist or protected to avoid lowering the water content at the pavement/subgrade interface. In hot weather conditions, moisten the subgrade prior to placing the concrete.
2. Minimize solar heat by shading or wetting concrete chutes or other equipment that comes in contact with the plastic concrete.
3. Use a fog spray to increase the relative humidity of the ambient air if there is a delay in immediately starting the curing process.
4. Ensure that the time between placing and curing is minimized.
5. Immediately apply an approved evaporation retarder to the concrete or increase the surface cure application to 1.5 times the standard specified rate.
6. Use monofilament fibers to reduce the potential for plastic shrinkage.

### HYDRATION STABILIZER ADMIXTURE USE AT HIGH TEMPERATURES

Hydration stabilizers are an admixture which slows the hydration of cement that preserve workability.

Hydration stabilizing admixtures are used for making more uniform and predictable high-performance concrete. Hydration stabilizing admixture retard set time by controlling the hydration of Portland cement and other cementitious materials while facilitating placing and finishing operations.

#### RECOMMENDED HYDRATION STABILIZING ADMIXTURE DOSAGE CHART

<table>
<thead>
<tr>
<th>Concrete Temperatures</th>
<th>0.5 - 1 Hours</th>
<th>1 - 1.5 Hours</th>
<th>1.5 - 2 Hours</th>
<th>2 - 2.5 Hours</th>
<th>2.5 - 3 Hours</th>
<th>3 - 3.5 Hours</th>
<th>4 - 4.5 Hours</th>
<th>5 - 5.5 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>100°F - 109°F</td>
<td>5 oz./cwt</td>
<td>6 oz./cwt</td>
<td>7 oz./cwt</td>
<td>8 oz./cwt</td>
<td>9 oz./cwt</td>
<td>10 oz./cwt</td>
<td>11 oz./cwt</td>
<td>12 oz./cwt</td>
</tr>
<tr>
<td>90°F - 99°F</td>
<td>4 oz./cwt</td>
<td>5 oz./cwt</td>
<td>6 oz./cwt</td>
<td>7 oz./cwt</td>
<td>8 oz./cwt</td>
<td>9 oz./cwt</td>
<td>10 oz./cwt</td>
<td>11 oz./cwt</td>
</tr>
<tr>
<td>80°F - 89°F</td>
<td>3 oz./cwt</td>
<td>4 oz./cwt</td>
<td>5 oz./cwt</td>
<td>6 oz./cwt</td>
<td>7 oz./cwt</td>
<td>8 oz./cwt</td>
<td>9 oz./cwt</td>
<td>10 oz./cwt</td>
</tr>
<tr>
<td>70°F - 79°F</td>
<td>2 oz./cwt</td>
<td>3 oz./cwt</td>
<td>4 oz./cwt</td>
<td>5 oz./cwt</td>
<td>6 oz./cwt</td>
<td>7 oz./cwt</td>
<td>8 oz./cwt</td>
<td>9 oz./cwt</td>
</tr>
<tr>
<td>60°F - 69°F</td>
<td>1 oz./cwt</td>
<td>2 oz./cwt</td>
<td>3 oz./cwt</td>
<td>4 oz./cwt</td>
<td>5 oz./cwt</td>
<td>6 oz./cwt</td>
<td>7 oz./cwt</td>
<td>8 oz./cwt</td>
</tr>
</tbody>
</table>

**cwt - 100 lb of Cementitious Material**