



Hot Weather Concreting ?

Any operation of concreting done at atmospheric temperatures above 40°C or any operation of concreting (other than steam curing) where the temperature of concrete at time of its placement is expected to be beyond 40°C.

Cold Joint ?

A joint or discontinuity formed when a concrete surface hardens before the next batch is placed against it, characterized by poor bond unless necessary treatment is given to the joint.

Climatic factors affecting concrete in hot weather

- High ambient temperature
- High concrete temperature
- Low relative humidity
- Wind speed
- Solar radiation
- The effects of hot weather are most critical during periods of rising temperature, falling relative humidity, or both.
- They may occur at any time of the year in warm tropical or arid climates, and generally occur during the summer season in other climates.
- Precautionary measures required on a calm, humid day will be less strict than those required on a dry, windy day, even if air temperatures are identical.

Effects of Hot weather Concreting

1. Accelerated Setting :

The duration of time during which the concrete, It may also result in cold joints.

2. Reduction in strength

3. Increased tendency to crack: Either before or after hardening plastic shrinkage cracks may form in the partially hardened concrete due to rapid evaporation of water. Cracks may be developed in hardened concrete either by increased drying shrinkage resulting from greater mixing water used or by cooling of the concrete from its elevated initial temperature.

d) Rapid Evaporation of Water During Curing Period

TEMPERATURE CONTROL OF CONCRETE INGREDIENTS

Aggregates:

1. Shading stockpiles from direct rays of the sun.
2. Sprinkling the stockpiles of coarse aggregate with water and keeping them moist. This results in cooling by evaporation, and this procedure is especially effective when relative humidity is low.
3. Successive layers should be sprinkled as the stockpile is built up.

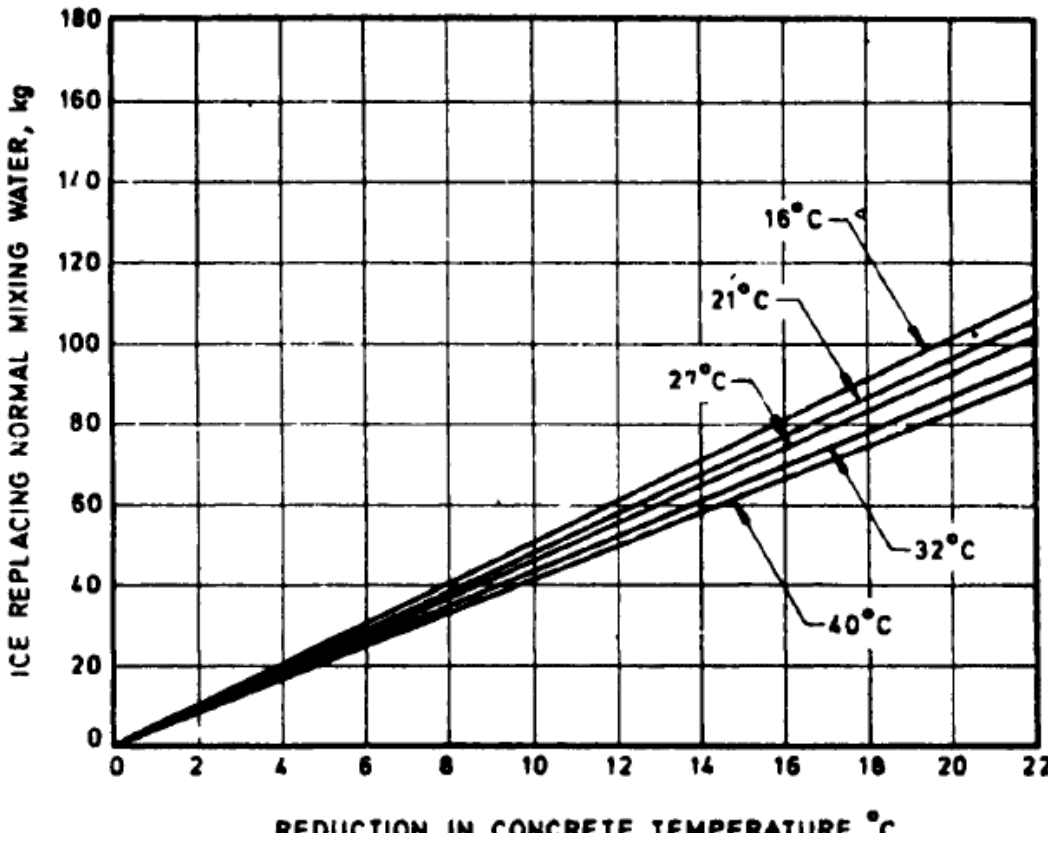
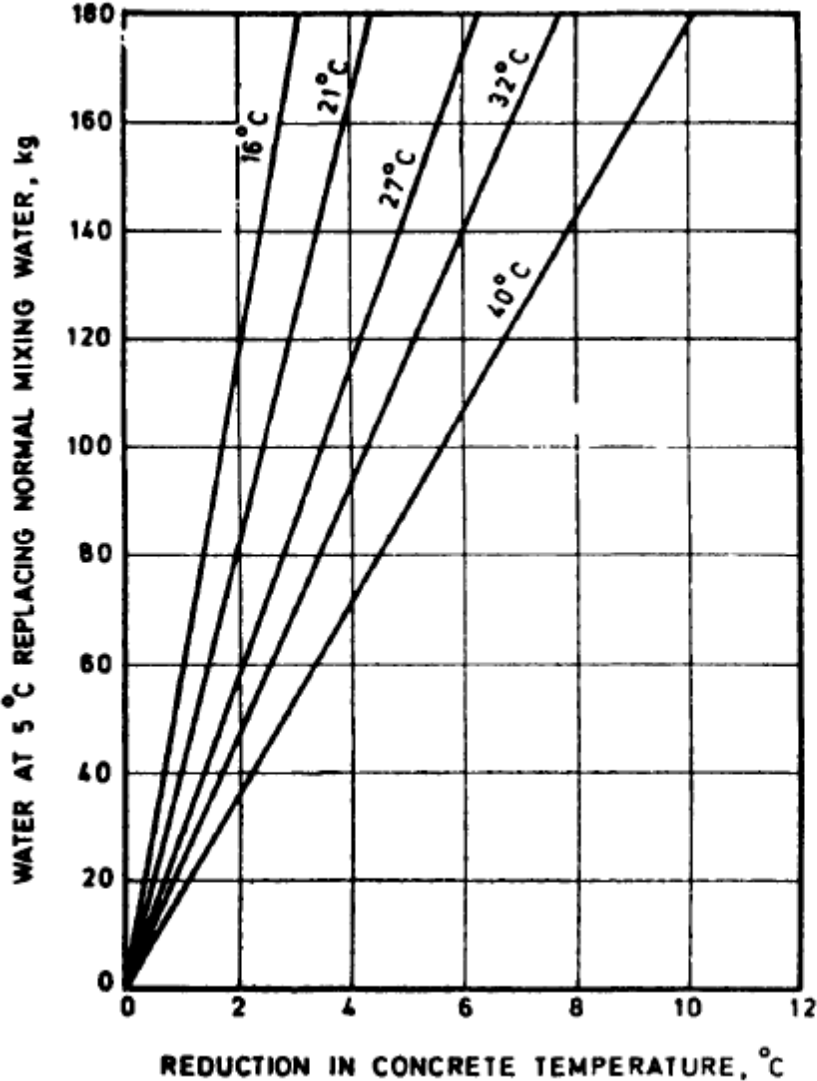
TEMPERATURE CONTROL OF CONCRETE INGREDIENTS

Water:

1. The mixing water has the greatest effect on temperature of concrete, since it has a specific heat of about 4-5 to 5 times that of cement or aggregate.
2. Use of Ice water as part of mixing water is most effective



TEMPERATURE CONTROL OF CONCRETE INGREDIENTS



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Cement:

1. The temperature has a direct effect on the rate of hydration of cement. High concrete temperature increases the rate of hydration, the rate of stiffening and generally results in increased water demand thus contributing to reduced strength and to plastic shrinkage.
 2. Cement shall preferably not be used at temperatures in excess of about 77°C.
 3. Use of supplementary cementitious materials (fly ash, ground granulated blast furnace slag) can help in hot weather conditions.
- These material slow the rate of setting as well as the rate of slump loss

TEMPERATURE CONTROL OF CONCRETE INGREDIENTS

Admixtures

- **A retarding admixtures** can be very helpful in delaying the setting time, despite increased rate of slump loss resulting from their use.
- **A hydration control admixture** can be used to stop cement hydration and setting. As a general rule a 5°C to 9°C temperature rise per 45 kg of Portland cement can be expected from the heat of hydration.

Production and delivery

1. Temperatures of aggregate, water, and cement shall be maintained at the lowest practical levels so that the temperature of the concrete is below 40°C at the time of placement.
2. Mixing time shall be held to the minimum which will ensure adequate quality and uniformity.
3. Painting and keeping the mixer drum yellow or white and spray it with cool water.
4. Thus the period between mixing and delivery shall be kept to an absolute minimum



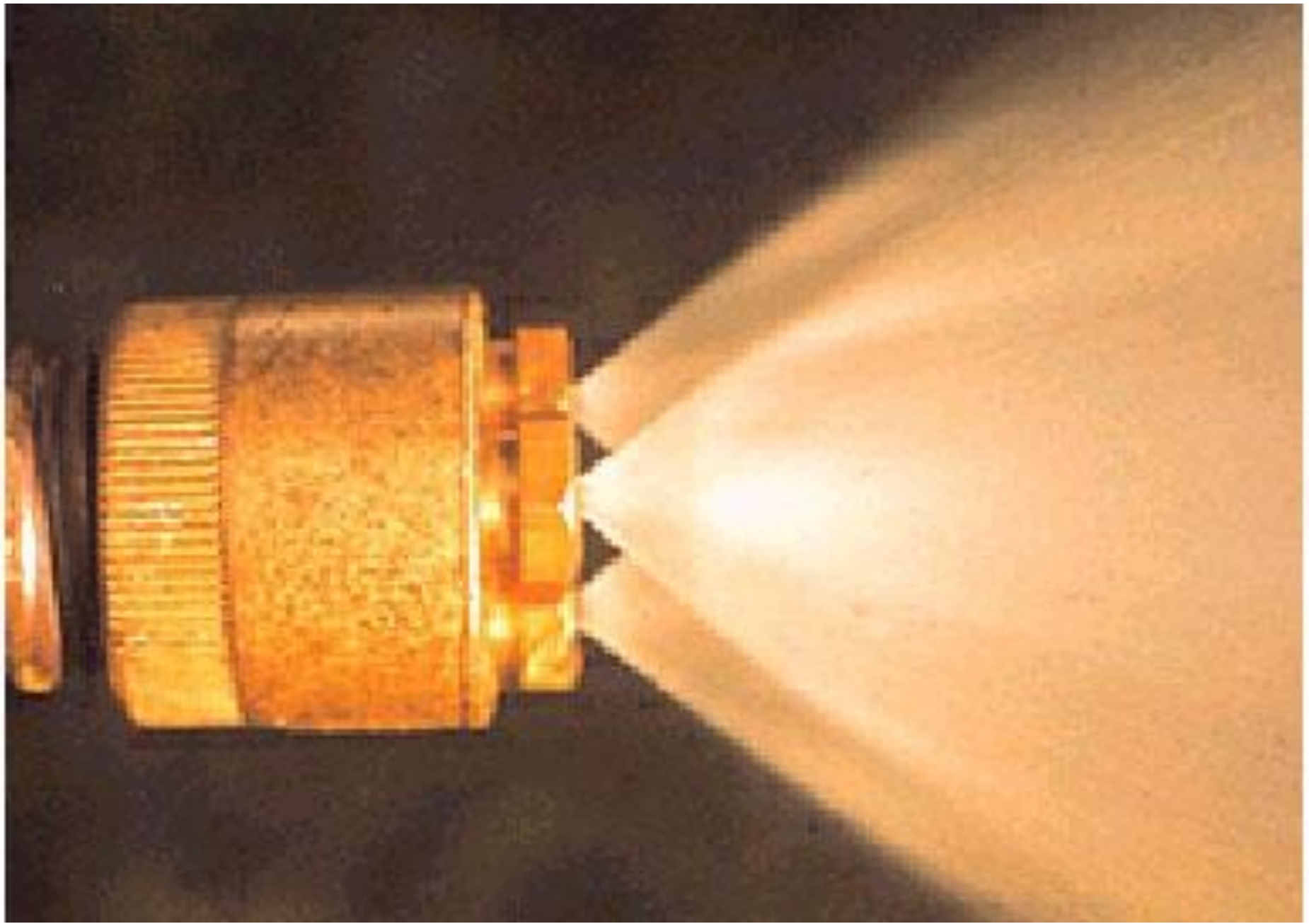
PLACEMENT AND FINISHING

1. Forms, reinforcement, and subgrade shall be sprinkled with cool water just prior to placement of concrete.
2. The area around the work shall be kept wet to the extent possible to cool the surrounding air and increase its humidity, thereby reducing temperature rise and evaporation from the concrete.
3. Speed of placement and finishing helps to minimize problem in hot weather concreting.
4. On flat work all steps in finishing shall be carried out promptly.
5. Use of liquid nitrogen in TM

PLACEMENT AND FINISHING

1. Concrete shall be placed in layer thin enough and in area small area so that the time interval between consecutive placement reduced ad vibration or other working of the concrete will ensure complete union of adjacent portion.
2. If cold joints tend to form or if surfaces set and dry too rapidly, or if plastic shrinkage cracks tend to appear, the concrete shall be kept moist by means of fog spray, wet burlap, cotton matts or other means
3. Fog sprays applied shortly after placement and before finishing, have been found to be particularly effective in preventing plastic shrinkage cracks when other means have failed.







Precaution in Slab Casting or Casting of Horizontal Member

1. Immediately after consolidation and surface finish, concrete shall be protected from evaporation of moisture, without letting ingress of external water, by means of wet (not dripping) gunny bags, hessian clothes etc
2. Once the concrete has attained some degree of hardening sufficient to withstand surface damage (approximately 12 hrs) moist/ impounding curing shall commence.
3. Curing shall continue for 10 days
4. Continuous curing is important, because volume changes due to alternate wetting and drying promote the development of surface cracking.
5. There should not be any interruption between the concreting and formation of cold joints must be strictly avoided. If any such situations arises it must be brought to notice of seniors and approved sop must be followed

Precaution in Slab Casting or Casting of Horizontal Member

6. Look back after an hour of concreting for any signs of shrinkage crack or before the concrete reaches final set, revibrate the surface with the float and reworked it to level finish

PROTECTION AND CURING

1. Particular attention shall be paid to having all surfaces protected from drying.
2. Immediately after consolidation and surface finish, concrete shall be protected from evaporation of moisture, without letting ingress of external water, by means of wet (not dripping) gunny bags, hessian clothes etc.
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PROTECTION AND CURING

1. Other conditions being equal, a gentle wind of 15 km/h will cause four or more times as much evaporation from a flat surface as still air. Hence wind breakers shall be provided as far as possible.
2. On hardened concrete and on flat surfaces in particular, curing water shall not be much cooler than the concrete because of the possibilities of thermal stresses and resultant cracking.

Following precautions must be taken during the hot weather concreting,

1. Sprinkle water over 10 and 20mm aggregates and take their moisture at regular intervals and send in the group so that if required desired correction can be done.

2. Take the temperature of concrete after production of concrete at plant and during placement.

3. There should not be any interruption between the concreting and formation of cold joints must be strictly avoided. If any such situations arise it must be brought to notice of seniors and approved SOP must be followed

4. The shuttering must be properly washed just before concreting surface

Precautions during the hot weather concreting,

5. Preparations must be made to transport, place, consolidate, and finish the concrete at the fastest possible rate.

6. In placing concreting slabs of any kind, it may be necessary in hot weather to keep the operation confined to a small area and to proceed on a front having a minimum amount of exposed surface to which concrete is to be added.

7. Before the concrete reaches final set, revibrate the surface with the float and retroweled it to level finish.

8. Start moist curing just after 2 hrs of finishing the part of concrete and start impounding curing for atleast 10 days after 12 hrs of concreting. In no case concrete must be allowed to dry fast