TECHNICAL SPECIFICATIONS

Hot Weather Concreting

CONCRETE ONTARIO
Ready Mixed Concrete Association of Ontario

THE Power of Concrete

Weather conditions can have a dramatic effect on both the setting time and concrete placing, finishing and protection systems that must be followed for proper concrete placement. Hot weather concreting conditions typically include:

- High ambient air temperatures (≥ 27°C)
- Low relative humidity conditions
- High wind speeds
- Solar radiation or heat gain

These conditions can result in the following challenges for the concrete contractor:

- Increased concrete water demand
- Accelerated concrete slump loss
- Increased rate of setting leading to placing and finishing difficulties
- Increased tendency for plastic shrinkage cracking
- Increased concrete temperature resulting in lower ultimate strength
- Increased potential for thermal cracking
- Need for early curing

The first step that must be taken is to identify when hot weather concreting conditions may apply and modify the normal concrete placing and finishing procedures accordingly. Possible steps that may be taken include:

Preparation

During hot weather conditions where plastic shrinkage cracking may be an issue, ACI 305R recommends that **the subgrade should be prewetted and forms and reinforcing steel should be dampened prior to concrete placing** (there should be no standing water). The purpose of these actions is to prevent the absorption of water from the concrete into the subgrade.

Temperature Control

To minimize concrete temperatures, concrete placements should be scheduled during cooler periods of the day (I.e. early morning or night) to limit the exposure to the elements. To help control concrete temperatures, the ready-mix supplier can use a combination of the following tactics:

- Spraying aggregate piles with water
- Cooling the mix water
- Use of ice or liquid nitrogen
- Increased use of SCMs
- Use of chemical admixtures

The maximum concrete temperature at delivery shall be according to CSA A23.1:19 Table 14.

Slump

A concrete slump which allows for rapid placement and consolidation should be considered. Chemical admixtures such as super-plasticizers can dramatically improve the concrete slump and reduce placement times.

Placing

After the concrete is properly mixed ensure that it is discharged as soon as possible. Consider the use of larger crews to accelerate placement rates.

Finishing

In cases where protection against rapid evaporation of water from the concrete surface is a concern (Figure D.1), consider the use of one or more of the following actions:

- Erect sunshades and wind breaks
- Cover the surface with white polyethylene sheets
- Apply fog spray
- Place and finish at night or early morning
- Apply temporary evaporation retarder after the screeding operation

Curing

Curing shall begin immediately following the placing and finishing operations and the concrete shall be cured for the duration outlined in CSA A23.1:19 Tables 2 and 19 for the identified class of exposure.

Testing

To avoid inaccurate strength test results, the initial test specimens shall be stored in a controlled environment that maintains the temperature at 20 ± 5°C as per CSA A23.1/.2 requirements. Concrete test cylinders that exceed these temperature requirements typically exhibit much lower 28-day strengths.

FIGURE D.1

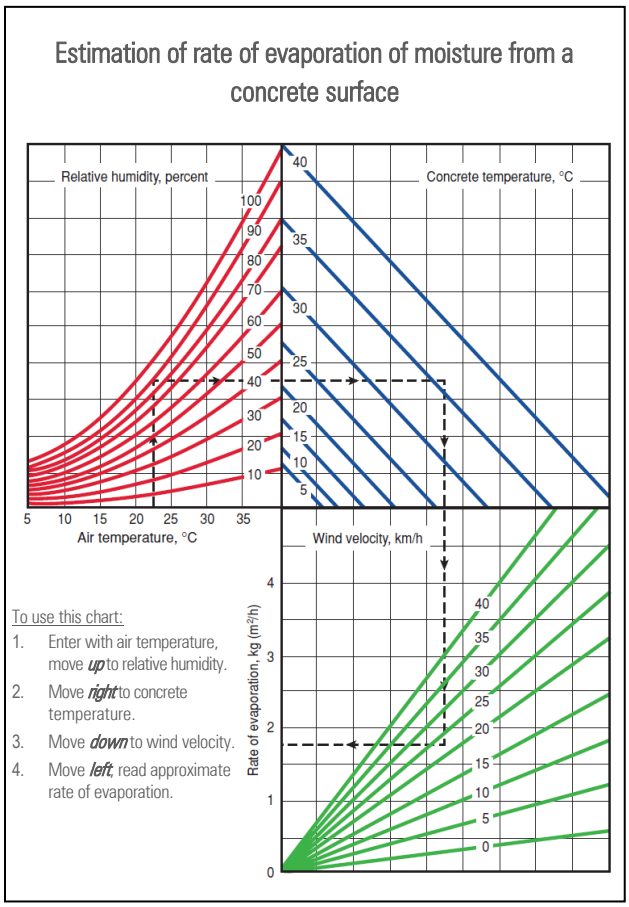

Table 14
Permissible concrete temperatures at placing
(See Clauses 5.2.5.4.1, 7.2.2.1, 7.5.1.3, 7.6.3.2.3, and 8.5.5.)

	Temperatures, °C	
Thickness of section, m	Minimum	Maximum
< 0.3	10	32
≥ 0.3 - < 1	10	30
≥ 1 - < 2	5	25
≥ 2	5	20

Source:
1. Annex D Figure D.1 & Table 14, **CSA A23.1:19/CSA A23.2:19 Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.** © 2019 Canadian Standards Association
2. ACI 305R-10 Guide to Hot Weather Concreting, American Concrete Institute
3. ACI 305.1M-14 Specification for Hot Weather Concreting, American Concrete Institute

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