



COLORADO READY MIXED
CONCRETE ASSOCIATION

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Concrete in Colorado

Jobsite Curing of Concrete Test Specimens

*Technical information prepared by:
Colorado Ready Mixed Concrete Association (CRMCA)*

JOBSITE CURING OF CONCRETE TEST SPECIMENS

Jobsite curing of test specimens should follow one of two methodologies according to their specific purpose. Test specimens are fabricated and cured to evaluate concrete performance in accordance with project specifications or to assist the contractor with construction limitations. Each method is designed to evaluate concrete for different reasons.

Standard-cured specimens are used for:

- Acceptance testing for specified strength.
- Adequacy of mixture proportions for strength.
- Quality control.

Field-cured specimens are used for:

- Determination of whether a structure can be put into service or form/shoring removal.
- Comparison with test results of standard-cured specimens or from various in-place test methods.
- Adequacy of curing and protection of concrete in the structure.
- Form or shoring removal time requirements.

IMPORTANCE OF JOBSITE CURING

The methodology for **standard-cured** specimens is designed to evaluate:

- Concrete delivered and placed at the jobsite.
- As if cylinders were fabricated and cured in a laboratory-controlled environment.

Field-cured specimens are designed to evaluate:

- In-place performance of the concrete under field conditions.
- Identical conditions by the structure.



Small, seemingly insignificant, deviations from the procedures outlined in ASTM C31, **Standard Practices for Making and Curing Test Specimens in the Field**, can result in a lower perceived strength, which creates, in many cases, unnecessary delays and higher costs for the project.

PROCEDURES FOR JOBSITE CURING

According to ASTM C31, the process for curing test specimens is well defined and simple. Proper fabrication and curing of test specimens will provide useful information to architects, engineers, contractors, and suppliers.



Improper curing procedures will produce:

- Inconsistent results.
- Misleading results.
- Unnecessary delays.
- Additional expenses.

Expectations must be well defined and enforced to ensure satisfactory performance.

Pre-construction Meeting

The best time and place to discuss expectations relative to test specimen curing is at the pre-construction meeting. At the meeting, the construction team, including the testing laboratory, should discuss the following items related to test specimen curing:

- What type of curing is required by specifications or construction limitations?
 - Standard-curing for acceptance testing of the specified strength.
 - Field-curing to determine whether a structure can safely be put into service.
- Who is responsible for providing the storage and curing facilities? This is always a source of friction.
 - Contractor should provide an area for storage, including water and power, specifically for curing specimens.
 - Testing laboratory must ensure the facility and



equipment meet the requirements of the ASTM standard.

- How much equipment and manpower will be necessary to sample concrete, fabricate specimens, and complete initial curing in accordance with ASTM standards?

Ex: Testing at the point of placement versus the point of discharge from the mixer.

- Any other items required to provide an acceptable curing environment.

STANDARD-CURING REQUIREMENTS

For specimens requiring **standard curing** (acceptance testing), strict adherence to the following conditions and procedures is required.



Storage

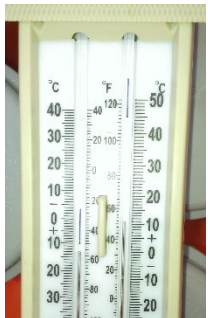
Specimens should be molded at the place where they will receive initial curing, however, if this is not practical, they may be moved a short distance to the initial curing area immediately after finishing.

Note: Excessive delay during moving will result in inaccurate strength results.

Initial Curing Environment

Immediately after molding and finishing, specimens shall be stored in the following conditions:

- Temperature range must be between 60-80°F, unless specifications require strengths greater than 6,000 psi. Then the cylinders must be between 68-78°F.
- Storage temperature shall be controlled by using heating and cooling devices, as needed.



- Temperatures shall be recorded using a maximum-minimum thermometer or other accepted temperature monitoring device, and the data shall be provided on the break data sheet.
- The environment must prevent moisture loss from the test specimens. Submersion in calcium hydroxide saturated

REFERENCES:

ASTM C31/C31M-18b Standard Practice for Making and Curing Concrete Test Specimens in the Field, ASTM International, West Conshohocken, PA, 2018, www.astm.org/C31

CIP Series, Concrete In Practice, NRMCA, Silver Spring, MD, www.nrmca.org/.../cip/

water is the easiest way to prevent moisture loss and maintain consistent temperatures.

- Specimens shall be shielded from exposure to direct sunlight or radiant heating devices.
- Cylinders should not be moved or transported for at least 8 hours after final set or 16 hours after casting. Cylinders must be transported to the testing laboratory within 48 hours of casting unless otherwise specified.

Final Curing

Upon completion of initial curing:

- Store within 30 minutes after removing the molds.
- Use water storage tank or moist room.
- Cure with free water always maintained on their surfaces.
- Temperature of 73.5°F ±3.5°F .

FIELD-CURING REQUIREMENTS

For specimens requiring **field curing** (form removal or service requirements), strict adherence to the following conditions and procedures is required:

- Store specimens in/on the structure as close to the area represented by the sample.
- Protect the surfaces of the specimens in the same manner the structure is protected.
- Ensure the specimens receive the same temperature and moisture condition as the structure.
- Test the specimens in the same moisture condition as the structure.

Ex: Specimens from structures allowed to dry should be tested dry.

- At the specified test time, as required by the project, immediately transport specimens to the testing



laboratory and perform compressive strength testing.

DISCLAIMER

Contact with wet (unhardened) concrete, mortar, cement, or cement mixtures can cause SKIN IRRITATION, SEVERE CHEMICAL BURNS (THIRD-DEGREE), or SERIOUS EYE DAMAGE. Frequent exposure may be associated with irritant and/or allergic contact dermatitis. Wear waterproof gloves, a long-sleeved shirt, full-length trousers, and proper eye protection when working with these materials. If you have to stand in wet concrete, use waterproof boots that are high enough to keep concrete from flowing into them. Wash wet concrete, mortar, cement, or cement mixtures from your skin immediately. Flush eyes with clean water immediately after contact. Indirect contact through clothing can be as serious as direct contact, so promptly rinse out wet concrete, mortar, cement, or cement mixtures from clothing. Seek immediate medical attention if you have persistent or severe discomfort.



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