



Concrete in Colorado

Jobsite Curing of Concrete Test Specimens

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

2012
Number 2

Jobsite Curing of Concrete Test Specimens

Jobsite curing of test specimens is a specific methodology designed to cure test specimens 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. There are two specific methods for curing specimens at the jobsite. Each method is designed to evaluate concrete for different reasons.

Standard-cured specimens are used for:

- Acceptance testing per project specifications
- Verification of mixture proportions and performance
- Quality control by the concrete producer

Field-cured specimens are used for:

- Determining when a structure can be safely put into service
- Evaluating how well the concrete structure is being cured and protected
- Timetables for form removal, shoring and re-shoring

Importance of Jobsite Curing of Test Specimens

The methodology for standard-cured specimens is designed to evaluate concrete delivered and placed at the jobsite, as if the specimens were fabricated and cured in a laboratory controlled environment. Field-cured specimens, on the other hand, are designed to evaluate the in-place performance of the concrete under field conditions, identical to those encountered by the structure.

Small, seemingly, insignificant deviations from the procedures outlined in ASTM C31 can result in a lower perceived strength, which creates, in many cases, unnecessary delays and higher costs for the project.

Procedure for Jobsite Curing of Test Specimens

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. Shortcuts will produce inconsistent and misleading results that lead to unnecessary delays and expense. Expectations must be well-defined and enforced to ensure satisfactory performance. The best time and place to discuss expectations relative to test specimen curing is at the preconstruction meeting.

At the preconstruction 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.
 - Both
- Who is responsible for providing the storage and curing facilities? This is always a source of friction.
 - The contractor should provide an area for storage, including water and power, specifically for curing specimens.
 - The 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? *Example:* Testing at the point of placement versus the point of discharge from the mixer.
- Any other items required to provide an acceptable curing environment.



Colorado
Count on Concrete



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 to the initial curing area immediately after finishing. *Note:* Excessive delay during moving will result in lower strength.



Initial Curing Environment - Immediately after molding and finishing, specimens shall be stored for a period up to 48 hours in the following conditions:

- Temperature range: 60 to 80 degrees F. If the specified strength is 6000 psi (40 MPa) or greater the temperature range changes to 68 to 78 degrees F. Storage temperature shall be controlled by using heating and cooling devices, as needed. Temperatures shall be recorded using a maximum-minimum thermometer.
- The environment must prevent moisture loss from the test specimens. Submersion in calcium hydroxide saturated 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.

Final Curing - Upon completion of initial curing and within 30 minutes after removing the molds, cure specimens with free water maintained on their surfaces at all times at a temperature of 73.5 +/- 3.5 degrees F using a water storage tank or a moist room.

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

- Store specimens in or 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. *Example:* Specimens from structures allowed to dry should be tested dry.
- Specimens shall be removed from the molds at the same time forms are removed from the structure.

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.

References:

1. CIP X, *Concrete in Practice Series*, NRMCA, Silver Spring, MD, www.nrmca.org.
2. ASTM C31, *Annual Book of ASTM Standards*, Volume 04.02, ASTM, West Conshohocken, PA, www.astm.org.



colorado
Count on Concrete

©Colorado Ready Mixed Concrete Association
All rights reserved