PCI Plant Quality Talk
Quality Enhancement Committee

SERIES 3, ISSUE 8– HANDLING, TRANSPORTING, AND CURING TEST SPECIMENS

During fresh concrete production, concrete samples are taken to make test specimens (typically cylinders or cubes) in accordance with ASTM C31/C31M, and per PCI MNL 116 and PCI MNL 117 requirements. Quality control teams use test specimens to evaluate hardened properties of concrete products such as the compressive strength of the concrete. Care must be taken while handling, transporting, and curing test specimens because the strength of a test specimen can be greatly affected by jostling, changes in temperature, and exposure to drying conditions, particularly within the first 24 hours after casting.

Handling Test Specimens

- Make test specimens as near as possible to the location where they will be cured.
- When moving freshly made test specimens, use your hands, a large trowel, or a similar device to lift and support them from the bottom of the molds.
- If the top surface of the test specimen is marred during movement, immediately refinish the top surface as instructed by ASTM C31/C31M.
- If a test specimen is cast from concrete with slump less than approximately 1 in. (25 mm), do not disturb it even in the first 15 to 30 minutes after casting. These test specimens are especially susceptible to damage such as cracks or weakened planes when handled.
- Store test specimens on a level, stable surface until they are to be tested for product stripping or transported for final curing. Test specimens made with self-consolidating concrete (SCC) may be more greatly affected by uneven surfaces. Do not place completed test specimens in an area of residual vibration from the formwork, and shield all test specimens from direct sunlight.
- Protect all specimens from rough handling at all ages.
- Once the test specimens have been placed in their initial curing spot, do not disturb them in any way until they are either ready to be stripped or tested.

Transporting Test Specimens

- Upon completion of initial curing, transport test specimens to the laboratory for final curing. Transport should occur within 48 hours after specimens were cast, but at least 8 hours after final set (as determined by ASTM C403/C403M). Note that test specimens are typically 12 to 14 hours old when they are transported and are very susceptible to damage if mishandled.
- Move test specimens carefully, and only remove the test specimen mold after they reach the laboratory.
- Ensure that plastic caps or bags remain on test specimens to avoid moisture loss during transit. Use insulation material to retain heat during cold-weather exposure.
- Ensure that test specimens are cushioned and well secured during transit to prevent damage from vibration and jarring.
- Do not exceed 4 hours of transportation time.
- Record any mishaps that occur during transportation, such as test specimens being chipped, cracked, or dropped.
- Retain test specimen identification throughout the entire life cycle of each test specimen.
- When a third-party testing laboratory is involved, record when the test specimens are transported and when final curing begins.

Initial Curing of Test Specimens

- All test specimens are subject to a period of initial curing:
  - Cure test specimens by applying the same methods as those used for the units they represent, up to the time of detensioning or stripping from the form/mold.
  - Store the specimens in or on the form where the concrete they represent is being poured.
  - To the fullest extent possible, protect all surfaces of the test specimens from the elements in the same way (temperature and moisture environment) that the formed unit is protected.
  - In lieu of actual curing with the component, test specimens may be cured in curing chambers correlated in temperature with the product they represent. In such a case, constantly verify the correlation by use of recording thermometers in the curing chambers and comparison with the temperature records of the product, and by use of the same methods of moisture retention for curing chambers and casting beds.

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NPCA National Precast Concrete Association

PCI Precast/Prestressed Concrete Institute

Final Curing of Test Specimens

- Cure test specimens by one of the two methods described in ASTM C31/C31M:
  - Standard curing—used for acceptance testing and quality control (typical production plant curing)
  - Field curing—used to estimate the in-place strength of product for stripping purposes or to determine whether a structure is capable of being put in service (typical field-placed concrete curing, or special contract document requirement)
- Standard curing:
  - Control and record the initial curing temperature.
  - Upon completion of initial curing and within 30 minutes after removing the test specimens from their molds, cure test specimens with free water maintained on their surfaces at all times at a temperature of 73.5°F ± 3.5°F (23°C ± 2°C).
  - During the curing period, use lime-saturated water storage tanks or moist rooms maintained at 100% relative humidity until time of testing, except when capping with sulfur mortar capping compound.
- Field curing:
  - After stripping of the unit, remove the remaining test specimens from their molds and field-cure them in the same ambient conditions as required by project specifications for the product they represent until the time of testing.

Note: Please complete this form and return it to the Quality Control Manager. All crew members should be observant and report to their supervisor anything out of the ordinary on a project. See something, say something.

NOTES	ATTENDEE SIGNATURES
_____ DATE _____ PRESENTER	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____