

Pre-Construction Checklist Concrete Acceptance Testing

Project Information

Project Name: _____ **Location:** _____

Project Representatives:

Owner: _____ Architect: _____

Structural Engineer: _____ Construction Manager: _____

General Contractor: _____ Concrete Supplier: _____

Testing Agency: _____ Other: _____

Concrete Mixture Design Submittals

Application / Placement location	Mix Code	Special Attributes (See codes)	Specification Requirements for Mixtures				Approved Y/N
			Strength / age	Max w/cm	Slump/Slump flow	Air (%)	

Concrete Quality Control/ Assurance (NOTE 1)

(Circle Yes or No)

Does Owner's testing/laboratory comply with ASTM C1077? yes no*

If not, explain (is owner aware?). _____

Are the technician(s) performing concrete and aggregate testing on this project currently certified in accordance with ASTM C1077? (NOTE 2)

(Circle Yes or No)

Concrete Field Testing Technician yes no

Concrete Laboratory Testing Technician yes no

Concrete Aggregate Testing Technician yes no

Concrete Sampling and Testing Requirements (NOTE 3)

Sampling Frequency: _____

Sampling Location: Truck (C94) Placement

Method of sampling at placement _____

Tests to be performed on each sample (NOTE 4)

(Circle all that apply)

Slump	Slump Flow	Compressive Strength:	Standard Cured	Field Cured
Air Content: Method	_____	# cylinders / age	_____	_____
Density (unit wt.)	Temperature	Flexural Strength:	Standard Cured	Field Cured
Other	_____	# beams / age	_____	_____

Acceptance/Rejection of Fresh Concrete (NOTE 5):

Who is authorized to accept/reject a concrete delivery? _____

What criteria will be used to accept/reject a concrete delivery?

Slump: _____ Temperature: _____

Air Content: _____ Density (unit wt.) _____

w/cm Ratio (method?): _____ Time Limit / Revolutions: _____

Other _____

Who is responsible for requesting adjustment for slump and/or air content at the project site? (NOTE 6)

What methods or restrictions apply?

Test Specimen Storage and Transportation (NOTE 7-10)

Standard Curing Method: (Concrete Acceptance)	(Circle Yes or No)	
Immersed in water-controlled temperature environment (Preferred)	yes	no
Storage box-controlled temperature environment	yes	no
Exposed to the environment (does not comply with C31)	yes	no
Other _____		
Are field tests and jobsite curing being done by a different entity from that performing strength tests?	yes	no
Who's responsible for providing specimen storage water tank or curing box?	_____	
Who's responsible for maintaining and recording the temperature of the storage environment?	_____	

What is the expected duration that cylinders will be retained at the jobsite before transportation to the laboratory _____

When will specimens, cast on days preceding non-work days, be transported to the laboratory? **(NOTE 11)**

Please explain: _____

Field Curing of Cylinders or Beams (NOTE 12):

Purpose _____

Method _____

Contact Information for Test Results to be sent to (via email, fax, mail) to (NOTE 13, 14)

Owner: _____ Architect: _____

Engineer: _____ Concrete Supplier: _____

General Contractor: _____ Other: _____

Resolution of Non-conforming strength tests – based on core tests (NOTE 15):

- When results comply with requirements – cost of core tests will be borne by owner or representative
- When results do not comply with requirements – cost of core tests will be borne by the concrete supplier

Statement of Acknowledgement

The American Concrete Institute (ACI) and the ASTM International have established standards and practices for acceptance of concrete supplied to projects. If fresh concrete and strength tests are not performed in accordance with these standards, the results are invalid. We believe the information in this document accurately reflects the discussion(s) between all attendees.

	Circle (Yes or No)			Circle (Yes or No)	
	Yes	No		Yes	No
Owner	Yes	No	General Contractor	Yes	No
Engineer	Yes	No	Construction Manager	Yes	No
Architect	Yes	No	Concrete Supplier	Yes	No
Owner Testing Agency	Yes	No	Other Testing Agency	Yes	No
Meeting Location and Date					

Additional Discussion Items:

Subgrade prep, Scheduling, Delivery, Washout Location, Jointing, Curing (evaporation control, moisture protection, hot/cold weather)

Notes

Note 1: MS*, ACI 318-14 (26.12.1.1(b)), ACI 301-16 (Section 1.6.1.1), and ACI 311.6-09, *Specification for Ready Mixed Concrete Testing* (Section 1.2.2) require that the agency performing acceptance testing comply with ASTM C1077 *Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation*. Documentation of compliance can be through an inspection or accreditation agency. Documentation should be provided to the entity hiring the testing agency for acceptance testing.

Note 2: ACI 318-14 (26.12.1.1 (c) and (d)) states that qualified field and lab testing technicians shall perform tests. MS*, ACI 301-16 and ACI 311.6-09 state that field tests shall be made by an ACI Field Testing Technician Grade I and lab tests shall be made by ACI Lab Testing Technician Level 1, or equivalent that includes a written and performance evaluation. These certification requirements are also required by testing agencies that conform to ASTM C1077.

Note 3: MS*, ACI 318-14, ACI 301-16, ASTM C94 require that concrete be sampled in accordance with ASTM C172 at the point of discharge from the transportation unit. ACI 301-16 recognizes the option of sampling at the point of placement and states that the method of sampling should be defined when this is required. Sampling from the end of a pump or other conveyance equipment can be complicated and the reader is referred to Section 3.17 of NRMCA Guide to Improving Specifications: http://www.nrmca.org/research_engineering/Documents/GuideToSpecs2015.pdf. The concrete supplier will be responsible for compliance of specification requirements when tests are performed on samples obtained in accordance with ASTM C172 and tests are in accordance with applicable ASTM standards. Duplicate tests may be needed to evaluate the impact of conveying methods.

Note 4: ASTM C172 (4.1.1) states: *Transport the individual samples to the place where fresh concrete tests are to be performed or where test specimens are to be molded.* Section 4.1.2 states: *Start tests for slump, temperature and air content within 5 min. after obtaining the final portion of the composite sample.* ACI 301-16 and ASTM C94 require the density to be measured in accordance with ASTM C138. This test provides useful information about the quality of concrete and is used to determine yield that can be compared to the quantity ordered.

Note 5: ASTM C94, (7.2) states, *the producer shall not be responsible for the limitation of minimum slump or slump flow after 30 min. have elapsed starting either on arrival of the vehicle at the prescribed destination or at the requested delivery time, whichever is later.*

Note 6: ASTM C94 Section 12.7, allows a water addition from the truck tank system or water addition by an automated system during transit provided the maximum water content for the batch as established by the mixture design proportions has not been exceeded. Water can be added as several distinct additions provided no concrete has been discharged except for a preliminary sample for slump or air content tests. When air content is below the specified level, Section 8.3 allows the concrete supplier to adjust the level with additional air-entraining admixture. It is also appropriate to increase slump by using admixtures when the limit of water addition has been reached.

Note 7: ASTM C31 states: *Immediately after molding and finishing, the specimens shall be stored for a period up to 48h in a temperature range from 60 and 80°F and in an environment preventing moisture loss from the specimens. For concrete mixtures with a specified strength of 6000 psi or greater, the initial curing temperature shall be between 68 and 78°F.* ASTM C31 also states: *The storage temperature shall be controlled by use of heating and cooling devices, as necessary. Record the temperature using a maximum-minimum thermometer.*

Note 8: MS*, and ACI 301-16 (1.6.2) addresses contractor's responsibilities regarding testing:

- Allow access to the project site or to the source of materials and assist Owner's testing agency in obtaining and handling samples at the project site or at the source of materials. MS* specifically states daily access to project site should be provided.
- Advise Owner's testing agency at least 24 hours in advance of operations to allow for scheduling of quality assurance tests, review of project requirements, and for the assignment of personnel.
- Provide space and source of electrical power on the project site for facilities to be used for initial curing of concrete test specimens as required by ASTM C31 for the sole use of Owner's quality assurance testing agency. MS* specifically states secure space, security and protection of test samples and source of water for initial curing at project site should be provided.

Note 9: Testing Agency Responsibilities are as follows:

- MS*, ACI 318-14 (26.12.3.1), ACI 301-16 (1.6.3.2), and ACI 311.6-09 (2.5.1) state that cylinders for acceptance based on compressive strength tests shall be made and standard cured in accordance with ASTM C31.
- MS*, and ACI 311.6-09 (2.5.1) requires the testing agency verifies that the specimens are stored under the ASTM C31 requirements, that temperature controls are provided to maintain ASTM C31 requirements, and calibrated temperature recording devices are used to record maximum and minimum temperatures of the initial curing environment.
- ASTM C31 (12.1.5) and ACI 311.6-09 require that the maximum and minimum temperatures during the initial curing period of the standard cured cylinders be reported. ACI 301-16 (1.6.3.1.c) states that concrete test reports should include detailed information of storage and curing of specimens before testing. MS* specifically states that test reports include reporting requirements of ASTM C31, ASTM C39, and ACI 301 including Information on storage and curing of samples before testing, curing method and maximum and minimum temperatures during initial curing period.
- MS* requires the testing agency to provide the on-site curing facility (container) and verify that test specimens are maintained in accordance with ASTM C31 at the jobsite. ACI 311.6 requires the testing agency to verify that the specimens are stored under conditions in accordance with ASTM C31.

Note 10: ASTM C31 states: *Upon completion of initial curing and within 30 min after removing the molds, cure specimens with free water maintained on their surfaces at all times at a temperature of 73.5 ± 3.5°F.*

Note 11: ASTM C31 (11.1) states: *Specimens shall not be transported until at least 8 h after final set. During transporting, protect the specimens with suitable cushioning material to prevent damage from jarring. During cold weather, protect the specimens from freezing with suitable insulation material. Prevent moisture loss during transportation by wrapping the specimens in plastic, wet burlap, by surrounding them with wet sand, or tight fitting plastic caps on plastic molds. Transportation time shall not exceed 4 h.*

Note 12: Refer to ASTM C31 Section 4 that outlines the distinct purposes of strength results from standard-cured and field cured specimens. Field cured specimens should not be used for acceptance of concrete supplied on a project. Field cured specimens are used to estimate the strength of concrete in the structure – to determine when the structure can be put in service (open to traffic, time to post-tension, etc.); compare with test results of standard cured specimens or in-place tests; determine the adequacy of curing and protection of the structure; and to determine time for removal of forms or shoring.

Note 13: MS^{*}, ACI 318-14 (26.12.1.1 (e)), ACI 301-16 (1.6.3.1 (c)), and ACI 311.6-09 (3.2) require the Owner's testing agency to report ALL test results to the Architect/Engineer, Contractor, Concrete Supplier, and Owner. ACI 301 also requires that the testing agency issue the report to the parties within 7 days, but immediately when it appears that furnished material is not compliant with the specifications. MS^{*} specifically states that test reports be provided within 48 hours of testing. Test results from standard molded, cured strength specimens should be evaluated separately for each concrete mixture. Evaluation is valid only if tests have been conducted in accordance with specified procedures. Each validation of tests not conducted in accordance with specified procedures will be the responsibility of the Owner's testing agency.

Note 14: The strength of standard molded and cured strength specimens is satisfactory if the following criteria are met (ACI 301-16):
 1.6.6.1 a *Every average of three consecutive strength tests equals or exceeds the specified compressive strength f'_c .*
 1.6.6.1 b *No strength test result falls below f'_c by more than 500 psi when f'_c is 5000 psi or less, or by more than 0.10 f'_c when f'_c is more than 5000 psi.*

Note 15: NRMCA publication 133 describes a recommended sequence of steps when low strength results occur. The publication can be obtained from www.nrmca.org. Strength of cores cannot be expected to achieve the same strength level as standard-cured cylinders or the associated acceptance criteria. Strength of cores are also influenced by factors beyond the quality of concrete supplied. Some of these include handling, placing, finishing, curing and protection of the constructed structure, age since the pour and adverse environmental conditions that the structure has been exposed to. Cores should be obtained and conditioned in accordance with the procedures outlined in ASTM C42. Core strengths are also affected by the location of concrete in the structure and the orientation of the core relative to how concrete was placed.

MS^{*} - AIA MasterSpec December 2018 version

Suggested Special Attribute Codes

AE	Air Entrained	CLR	Color Addition	NCA	Non-Chloride Accelerator
NAE	Non-Air Entrained	CI	Corrosion Inhibiting	SF	Silica Fume
LTWT	Lightweight Agg.	SRA	Shrinkage Reduction	UFFA	Ultra Fine Fly Ash
SCC	Self-Consolidating	FP	Fiber Product	HVWT	Heavy Weight Aggregate
HRWR	High Range WRA	HE	High Early Strength	RE	Retarder
HS	Hydration Stabilizer	Other	<hr/>		