

Design Engineers of the Carolinas

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Ref.: Concrete Construction Projects in North and South Carolina

Subject: Testing and Acceptance of Ready Mixed Concrete

To Whom It May Concern:

Member producers of the Carolinas Ready Mixed Concrete Association would like to take this opportunity to request that you take a moment to recognize the contractual requirements related to the testing of ready-mixed concrete on projects throughout the Carolinas.

Our concrete mixes are designed and produced in accordance with relevant ACI and ASTM requirements. We are often required to provide submittal data supporting our concrete mix designs in accordance with ACI 301-Specifications for Structural Concrete. Quite frequently, we feel this is the extent of adherence to ACI 301. ACI 301 clearly indicates requirements that **must** be met by the contractor and the owner's independent testing laboratory as well; especially in relation to the sampling and testing of ready mixed concrete. The following information is presented in an effort to engage all parties, from the Engineer-of-Record to the technician in the field, in a productive dialogue intent on saving the tremendous amount of time, effort, and money that many member producers are incurring on a more-and-more frequent basis.

First, with respect to testing labs and technicians, ACI 301, Article 1.6.2 indicates, "Agencies that perform testing services on concrete materials shall meet the requirements of ASTM C 1077" and that "Field tests of concrete shall be made by an ACI Concrete Field Testing Technician Grade 1 in accordance with ACI CP1 or equivalent. Equivalent certification programs shall include requirements for written and performance examinations as stipulated in ACI publication CP1." We believe it is entirely reasonable to require the independent testing agency to verify the certification of anyone testing materials on the project.

In addition, ACI 301, Article 1.3.1.2 –"ASTM Standards" references ASTM C 31 – "Standard Practice for Making and Curing Concrete Test Specimens in the Field". This standard addresses the sampling, testing, and curing

requirements for concrete specimens to meet “acceptance” criteria in concrete construction. It is key to note this standard specifies three tests to be performed each time strength specimens are fabricated and cured for “acceptance” purposes. When concrete is sampled for strength acceptance purposes, slump (ASTM C 143), air content (ASTM C 173 or C 231) and temperature (ASTM C 1064) tests are to be performed and reported. Please be aware this standard does not differentiate between air entrained and non-air entrained concrete. Testing agencies consistently fail to perform an air content test on non-air entrained concrete. Though this may seem insignificant, it is required by this standard and such testing can be very useful in determining mix performance.

Also noted in this standard are specific curing requirements for strength acceptance. Section 9, Article 9.1.2 Initial Curing, states “Immediately after molding and finishing, the specimens shall be stored for a period up to 48h in a temperature range from 60 to 80 °F and in an environment preventing moisture loss from the specimens.” This is likely the most abused specification in ASTM C31. It is vital to realize that it is necessary to provide protection for the freshly cast cylinders year round. Cylinders that are not initially maintained at 60 to 80 °F cannot be considered legitimate strength “acceptance” specimens. Additionally, Article 9.1.3.1 stipulates the final curing requirements and transporting the specimens to the lab is outlined in Section 10.

ASTM C39, “Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens”, is another source of serious concern among our member producers. This standard requires that each specimen must be tested to complete failure. Testing is not complete when the first “stall” or decrease in load is observed. We frequently visit testing agencies and notice concrete specimens discarded with little or no visible failure; therefore, these specimens could not have been tested to “complete failure”. Too often loading is terminated when the first sign of load decrease is noticed. This practice fails to complete a legitimate test, but intentionally avoids the related clean up of a successful test.

Finally, ACI 301, Article 1.6.4.1.a, states the following - “when it appears that material furnished or work performed by the Contractor fails to conform to Contract Documents, the testing agency will immediately report such deficiency to the Architect/Engineer, Contractor, and **concrete supplier**.” Plainly stated, when the testing agency determines that concrete fails to meet contractual requirements, the concrete supplier is to be notified immediately. This is imperative to allow the ready mix producer to evaluate the testing and/or performance of the concrete materials.

Article 1.6.4.1.c of this specification states that “The testing agency will report test and inspection results that pertain to the Work to the Architect/Engineer, Contractor, and concrete supplier within 7 days after tests and inspections are performed.” Again, in clear language, concrete suppliers are

to receive copies of all test results (not just failing tests) within 7 days. This process is vitally important in that it allows the concrete producer the opportunity to analytically evaluate the performance of their mix designs on the project.

Our member producers understand that the above concerns are not always a priority for the project engineer, but we feel these are vital issues, to all parties involved, for the success of every project. For this reason, a similar letter outlining the testing agency's duties is being sent to all testing agencies performing this work in the Carolinas.

Anything less than strict compliance with the ASTM Standards noted in this letter, as well as others referenced in those standards, will result in illegitimate test results. These results will typically be lower than the results had sampling and testing been performed in accordance with the standards. As stated above, poorly handled low/marginal and inaccurate test results often burden the member producer with significant costs in time, effort, and money, to prove the strength of the in-place concrete. Testing agencies have had little, if any, financial liability in their failure to accurately perform and report testing.

As the Engineer of Record and/or the Engineer responsible for the administration of the Contract you are equally responsible to insure that the Contractor, his concrete producer and the Owner's testing agency meet all the requirements of the Contract. We are bringing these issues to your attention due to our member producers regularly facing undue costs to prove their products because of improper sampling and testing or poor/incomplete reporting by testing agencies. While we acknowledge we are required to meet stringent ACI and ASTM requirements for concrete production, we expect our products to be tested with the same judicious adherence to the relevant ACI and ASTM requirements. We are asking that you regularly monitor the testing agencies on your projects.

Further, we have asked our member producers to notify the CRMCA when testing and/or reporting deficiencies are observed so that a Technical Committee representative can notify the Engineer and testing agency involved.

Thank you for your time and consideration regarding this issue. If you have any question or concerns please feel free to call the Carolinas Ready Mixed Concrete Association at (704) 717-9199.

Sincerely,

William L. Arent, PE
Executive Vice President, CRMCA

cc: Eric T. Misenheimer, PE, Technical Committee Chairman
CRMCA Producer Members
CRMCA Technical Committee Members