

TESTING AIR WHEN CASTING CYLINDER

Casting concrete cylinder specimens for acceptance testing, requires that the air content of the concrete sample be determined.

Air content, either entrapped or entrained is an important factor in the performance of concrete. Testing to determine air content is necessary when evaluating plastic concrete. In air entrained concrete, the air test provides information on the long term durability and freeze / thaw resistance of the concrete. In non-air entrained concrete any air above the normal amount entrapped is an indicator of a possible batching error and can result in reduced compressive strength and non conformance to project specifications.

Some testing laboratories only test the air content of concrete if they know it is air entrained. They reason that if the concrete is not air entrained, then it is not important to test for air content. This is a faulty concept that **DOES NOT** comply with the requirements of the ASTM standards for casting concrete specimens nor ready mixed concrete. Section 8 of **ASTM C 31, Standard Practice for Making and Curing Concrete Test Specimens in the Field**, lists the specific tests that must be conducted when cylinders are cast. These tests are Slump (C 143), Air Content (C 231 or C173) and Temperature (C 1064). The Standard does not provide for discretion on the part of the testing agency to opt out of performing any test mandated. **ASTM C 94 Standard Specification for Ready-Mixed Concrete**, Section 17.4 amplifies this by stating “...**these tests (slump, air-content and temperature) shall be made when specified and always when strength specimens are made**”.

Air occurs naturally in concrete during mixing. Concrete is designed to provide specific performance based on accommodating the

entrapped air or entrained air content. When the amount of air in the concrete exceeds the design content the compressive strength is reduced about 3 to 5 percent for each one percent of additional air. This condition is magnified in non-air concrete where a 3 or 5 percent increase in air could result in low or non-compliant compressive strengths.

Concrete is one of the few products that are delivered to the project in a “raw” form. The preliminary testing (slump, air and temperature) provide information necessary to those in charge to take an informed decision to accept or reject a load of potentially defective concrete.

Those that purchase and use ready mixed concrete deserve the full benefit of information provided by testing. The air content test provides a measure of the concrete’s quality and potential compressive strength.

Whenever concrete is sampled for compressive or flexural strength testing, an air test must be conducted and reported to the contractor.

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