

725.10 Tests and Test Methods

725.10.1 Concrete shall be sampled in accordance with ASTM C172 for determination of temperature, slump, unit weight and yield (when required) and air content (when required) as well as for fabrication of test cylinders for compressive strength determination at 28 days. Samples shall be of sufficient size to perform all the required tests and fabricate the necessary test cylinders but in no case less than 1 cubic foot. Concrete shall be sampled during discharge of the middle portion of the batch. At the discretion of the Agency and/or Engineer or his representative, a sample may be obtained at the beginning of the discharge if the properties of the concrete do not appear to be within the specification limits for slump or temperature. All testing shall be done by a certified technician meeting the requirements of the ACI Concrete Field Testing Technician, Grade I.

Temperature of the concrete mixture will be determined in accordance with ASTM C1064. Slump of the concrete mixture will be determined in accordance with ASTM C143. Air content of the concrete mixture (when required) will be determined in accordance with ASTM C231 or C173, whichever is applicable. Unit weight and yield of the concrete mixture (when required) will be determined in accordance with ASTM C138. All compressive strength test specimens will be made, cured, handled, protected, and transported in accordance with the requirements of ASTM C31. The contractor shall provide and maintain for the sole use of the testing laboratory/technician adequate facilities for safe storage and proper curing of concrete test cylinders on the project site including sufficient access on weekends and holidays to allow the timely pick-up of cylinders specimens. Any and all deviations from the standard procedure of any test method shall be promptly identified and corrected. Any deviations shall be clearly noted by the testing laboratory on all written reports. Testing results obtained from non-standard testing procedures may be considered invalid and discarded by the Agency and/or Engineer.

725.10.2 In accordance with ACI 318 Chapter 5 Section 5.6.2.4, a cylinder strength test shall be the average of the strengths of at least two 6 inch by 12 inch cylinders or at least three 4 inch by 8 inch cylinders made from the same sample of concrete and tested at 28 days. An adequate number of cylinder specimens will be made for each 50 cubic yards or not less than each half-day's placement of each class of concrete. All specimens will be tested in a laboratory approved by the Agency and/or Engineer in accordance with ASTM C39 for concrete acceptance. Should an individual cylinder show evidence of improper sampling, molding, curing, or testing, the results shall be discarded and the compressive strength shall be the result of the average of the remaining cylinder(s). Additional cylinder specimens may be made and tested at other ages to obtain additional compressive strength information and may not be considered as acceptance tests.

725.10.3 If the 28-day strength test does not meet the compressive strength requirements, the contractor may choose to contest the compressive strength results of any test for purposes of acceptability or payment. This may involve an engineering study to determine the acceptability of the concrete in question or core testing to determine in-place concrete strengths. If core testing is performed, at least three representative cores shall be obtained, conditioned and tested in accordance with ASTM C42 from each concrete member or area of concrete to be tested at locations designated by the Agency and/or Engineer. Cores damaged subsequent to or during removal shall be rejected and additional core samples taken. Cores must be obtained and delivered to a laboratory acceptable to the Agency and/or Engineer in time to allow complete strength testing within 48 days of original concrete placement. The contractor may elect to have a representative present during sampling and testing. A core strength test shall be the average of the results of the three cores. Should an individual core show evidence of improper sampling, curing, or testing, the results shall be discarded and the compressive strength shall be the result of the average of the remaining core(s). Results of the core strength testing will replace the results of the cylinder strength test for that sample.

725.11 ACCEPTANCE

Concrete represented by a cylinder strength test obtained in accordance with section 725.10.2 shall be acceptable if the 28-day strength meets or exceeds the specified design strength. Concrete achieving at least 85% of the specified 28-day strength will be evaluated by the Agency and/or Engineer for acceptability. Core strength tests obtained in accordance with section 725.10.3 shall be considered satisfactory if their average is equal to or greater than 85 percent of the specified strength and no single core is less than 75 percent of the specified strength. If the core strength test meets or exceeds the minimum 28-day strength, the concrete will be accepted by the Agency at full contract price. All concrete failing to meet the acceptability requirement as evidenced by tests of either standard cylinder or drilled core specimens shall be rejected, removed and replaced by the Contractor at the contractor's expense, unless the Contractor can submit evidence that will indicate to the Agency and/or Engineer that the strength and quality of the concrete is such that the concrete should be considered acceptable and be allowed to remain in place.

When concrete is accepted on the basis of cylinder or core strength tests of less than 100% of the required minimum 28-day compressive strength, an adjustment in the concrete unit price may be made for the quantity of concrete represented by such strength tests in accordance with the following schedule:

Adjustment in Concrete Unit Price Based on Cylinder or Core Strength Testing

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Percent of Specified Minimum 28-day Compressive Strength Attained (Nearest 1%)	Percent of concrete Unit Price Allowed
100 % or greater	100
95-99	95
90-94	90
85-89	85