METHODS OF SAMPLING AND TESTING
MT 104-09
METHOD OF TEST FOR
SLUMP OF PORTLAND CEMENT CONCRETE
(Modified AASHTO T 119)

1 Scope:

1.1 This test method covers determination of slump of concrete, both in the laboratory and in the field (Note 1).

Note 1 - This test is not considered applicable to non-plastic and non-cohesive concrete, nor when there is a considerable amount of coarse aggregate over two inches (50 mm) in size in concrete.

1.2 This standard may involve hazardous materials, operations and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. *(**Warning –** Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure).*

2 Referenced Documents:

2.1 ***AASHTO:***
T 119 Slump of Portland Cement Concrete
T 141 Sampling Freshly Mixed Concrete

MT Materials Manual:
MT105 Sampling Fresh Concrete

3 Summary of Test Method:

3.1 A sample of freshly mixed concrete is placed and compacted by rodding in a mold shaped as the frustum of a cone. The mold is raised, and the concrete allowed to subside. The vertical distance between the original and displaced position of the center of the top surface of the concrete is measured and reported as the slump of the concrete.

4 Apparatus:

4.1 *Mold* - The test specimen shall be formed in a mold made of metal not readily attacked by the cement paste. The metal shall not be thinner than 0.060 in. (1.5 mm) and if formed by the spinning process, there shall be no point on the mold at which the thickness is less than 0.045 in. (1.15 mm). The mold shall be in the form of the lateral surface of the frustum of a cone with the base 8 in. (203 mm) in diameter, the top 4 in. (102 mm) in diameter, and the height 12 in. (305 mm). Individual diameters and heights shall be within ± 1/8 in. (3.2 mm) of the prescribed dimensions. The base and the top shall be open and parallel to each other and at right angles to the axis of the cone. The mold shall be provided with foot pieces and handles similar to those shown in Figure 1. The mold shall be constructed without a seam. The interior of the mold shall be relatively smooth and free from projections. The mold shall be free from projections. A mold which clamps to a nonabsorbent base plate is acceptable instead of the one illustrated provided the clamping arrangement is such that it can be fully released without movement of the

4 Apparatus: (continued)

mold and the base is large enough to contain all of the slumped concrete in an acceptable test..

4.1.1 Check and record conformance to the mold's specified dimensions when it is purchased or first placed into service and at least annually thereafter.

4.2 *Mold with Alternative Materials -* Molds other than metal are permitted if the following requirements are met: The mold shall meet the shape, height, and internal dimensional requirements of Section 4.1. The mold shall be sufficiently rigid to maintain the specified dimensions and tolerances during use, resistant to impact forces, and shall be nonabsorbent. The mold shall be demonstrated to provide test results comparable to those obtained when using a metal mold meeting the requirements of Section 4.1. Comparability shall be demonstrated on behalf of the manufacturer by an independent testing laboratory. Test for comparability shall consist of not less than 10 consecutive pairs of comparisons performed at each of three different slumps ranging from 2 to 8 inches (50 to 200 mm). No individual test results shall vary by more than 0.50 in. (15 mm) from that obtained using the metal mold. The average test results of each slump range obtained using the mold constructed of alternative material shall vary by more than 0.25 in. (6 mm) from the average test results obtained using the metal mold. Manufacturer comparability test data shall be available to users and laboratory inspection authorities (see Note 4). If any changes in material or method of manufacturer are made, tests for comparability shall be repeated.

Note 1 – Because the slump of concrete decreases with time and higher temperatures, it will be advantageous to perform comparability tests by alternating the use of metal cones and alternative material cones, to utilize several technicians, and to minimize the time between test procedures.

4.3 If the condition of any individual mold is suspected of being out of tolerance from the as manufactured condition, a single comparative test shall be performed. If the test results differ by more than 0.50 in. (15 mm) from that obtained using the metal mold, the mold shall be removed from service.

4.4 *Tamping Rod -* The tamping rod shall be a round, straight steel rod 5/8 in. (16 mm) in diameter and approximately 24 in. (600 mm) in length, having the tamping end rounded to a hemispherical tip the diameter of which is 5/8 in. (16 mm).

4.5 *Measuring Device* – A ruler, metal roll-up measuring tape, or similar rigid or semi-rigid length measuring instrument marked in increments of 1/4 in. (5 mm) or smaller. The instrument length shall be at least 12 in. (300 mm).

5 Sampling:

5.1 The sample of concrete from which test specimens are made shall be representative of the entire batch. It shall be obtained in accordance with MT 105.

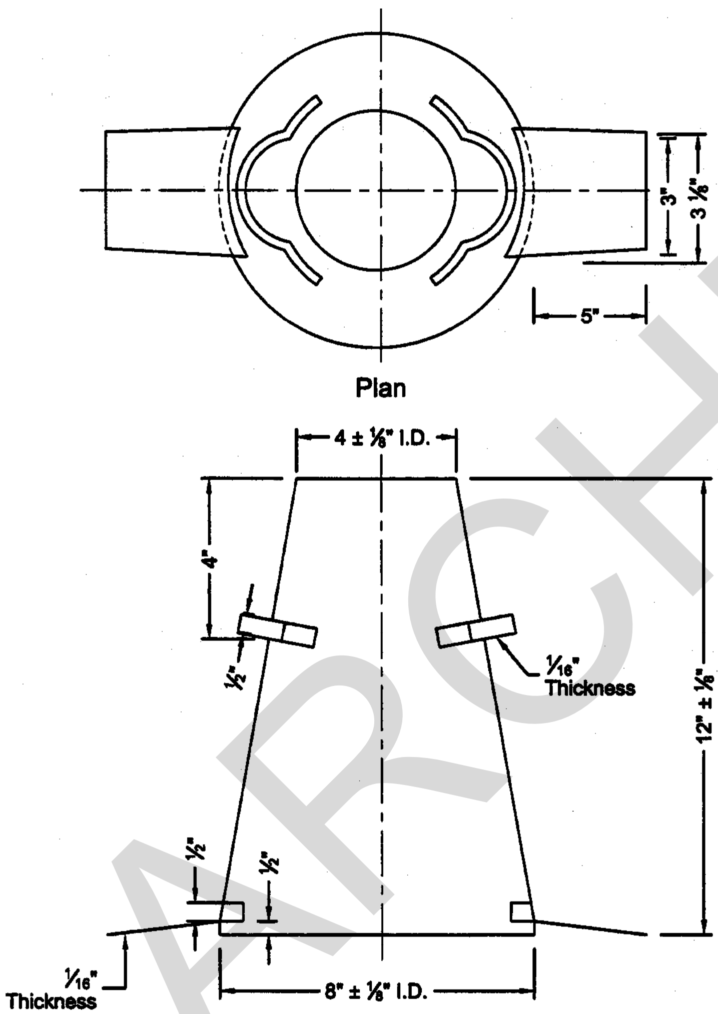
6 Procedure:

6.1 Dampen the mold and place it on a flat, moist, nonabsorbent (rigid) surface such as a pre-moistened concrete floor or a base plate. . It shall be held firmly in place during filling by the operator standing on the two foot pieces, or by clamping to a base plate as described in Section 4.1. From the sample of concrete obtained in accordance with

6 Procedure: (continued)

Section 5, immediately fill the mold in three layers, each approximately one third the volume of the mold (Note 2).

Note 2 - One third of the volume of the slump mold fills it to a depth of 2 5/8 in. (67 mm); two thirds of the volume fills it to a depth of 6 1/8 in. (155 mm).



Dimensional Units

mm	1.6	3.2	12.7	25.4	38.1	76.2	79.4	102	203	305
in.	1/16	1/8	1/2	1	1 1/2	3	3 1/8	4	8	12

Note: All dimensions shown in millimeters unless otherwise noted.

6 Procedure: (continued)

6.2 Rod each layer with 25 strokes of the tamping rod. Uniformly distribute the strokes over the cross section of each layer. For the bottom layer this will necessitate inclining the rod slightly and making approximately half of the strokes near the perimeter, and then progressing with vertical strokes spirally toward the center. Rod the bottom layer throughout its depth. Rod the second layer and the top layer each throughout its depth, so that the strokes just penetrate into the underlying layer.

6.3 In filling and rodding the top layer, heap the concrete above the mold before the rodding is started. If the rodding operation results in subsidence of the concrete below the top edge of the mold, add additional concrete to keep an excess of concrete above the top of the mold at all times. After the top layer has been rodded, strike off the surface of the concrete by means of a screeding and rolling motion of the tamping rod. Continue to hold the mold down firmly and remove concrete from the area surrounding the base of the mold to preclude interface with the movement of the slumping concrete. Remove the mold immediately from the concrete by raising it carefully in a vertical direction. Raise the mold a distance of 12 in. (300 mm) in 5 ± 2 seconds
by a steady upward lift with no lateral or torsional motion. Complete the entire test from the start of the filling through the removal of the mold without interruption and complete it within an elapsed time of 2 ½ min.

6.4 Immediately measure the slump by determining the vertical difference between the top of the mold and the displaced original center of the top surface of the specimen. If a decided falling away or shearing off of concrete from one side or portion of the mass occurs (Note 3), disregard the test and make a new test on another portion of the sample.

Note 3 - If two consecutive tests on a sample of concrete show a falling away or shearing off of a portion of the concrete from the mass of the specimen, the concrete probably lacks necessary plasticity and cohesiveness for the slump test to be applicable.

7 Report:

7.1 Report the slump in terms of inches (millimeters) to the nearest 1/4 in. (6 mm) of subsidence of the specimen during the test as follows:

Slump = 12 inches minus the inches of height after subsidence or 12” – 10 1/4 “ = 1 1/4”