WSDOT FOP for AASHTO T 119[1]

Standard Test Method for Slump of Hydraulic-Cement Concrete

1. Scope

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

   1.2 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

   1.3 The text of the standard reference notes and footnotes provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

   1.4 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 Standards

   T 141 – Sampling Freshly Mixed Concrete

   2.2 ASTM Standards

   C 172 – Practice for Sampling Freshly Mixed 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 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. Significance and Use

   4.1 This test method is intended to provide the user with a procedure to determine slump of plastic hydraulic-cement concretes.

   Note 1: This test method was originally developed to provide a technique to monitor the consistency of unhardened concrete. Under laboratory conditions, with strict control of all concrete materials, the slump is generally found to increase proportionally with the water content of a given concrete mixture, and thus to be inversely related to concrete

[1]This FOP is based on AASHTO T 119-11.

strength. Under field conditions, however, such a strength relationship is not clearly and consistently shown. Care should therefore be taken in relating slump results obtained under field conditions to strength.

4.2 This test method is considered applicable to plastic concrete having coarse aggregate up to 1½ in (37.5 mm) in size. If the coarse aggregate is larger than 1½ in (37.5 mm) in size, remove per FOP for WAQTC TM 2.

4.3 This test method is not considered applicable to non-plastic and non-cohesive concrete.

Note 2: Concretes having slumps less than 0.5 in (15 mm) may not be adequately plastic and concretes having slumps greater than about 9 in (230 mm) may not be adequately cohesive for this test to have significance. Caution should be exercised in interpreting such results.

5. Apparatus

5.1 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 (200 mm) in diameter, the top 4 in (100 mm) in diameter, and the height 12 in (300 mm). Individual diameters and heights shall be within ± ⅛ 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 mold and the base is large enough to contain all of the slumped concrete in an acceptable test.

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

5.1.2 Mold With Alternative Materials

5.1.2.1 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 5.1. 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 5.1. 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 50 to 200 mm (2 to 8 in). No individual test results shall vary by more than 15 mm (0.50 in) from that obtained using the metal mold. The average test results of

each slump range obtained using the mold constructed of alternative material shall not vary by more than 0.25 in (6 mm) from the average of test results obtained using the metal mold. Manufacturer comparability test data shall be available to users and laboratory inspection authorities (Note 4). If any changes in material or method of manufacture are made, tests for comparability shall be repeated.

Note 3: The phrase "consecutive pairs of comparisons" does not mean without interruption or all in one day. At a schedule selected by the testing entity, the pairs of tests leading to 10 consecutive pairs may be accomplished in small groups. The word consecutive prevents ignoring pairs of tests which may not meet criteria.

Note 4: Because the slump of concrete decreases with time and higher temperatures, it will be advantageous for the comparability tests to be performed by alternating the use of metal cones and alternative material cones, to utilize several technicians, and to minimize the time between test procedures.

5.1.2.2 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.

5.2 Tamping Rod – The tamping rod shall be a round, straight steel rod ⅝ in (16 mm) in diameter and approximately 24 in (600 mm) in length, having the tamping end or both ends rounded to a hemispherical tip, the diameter of which is ⅝ in (16 mm).

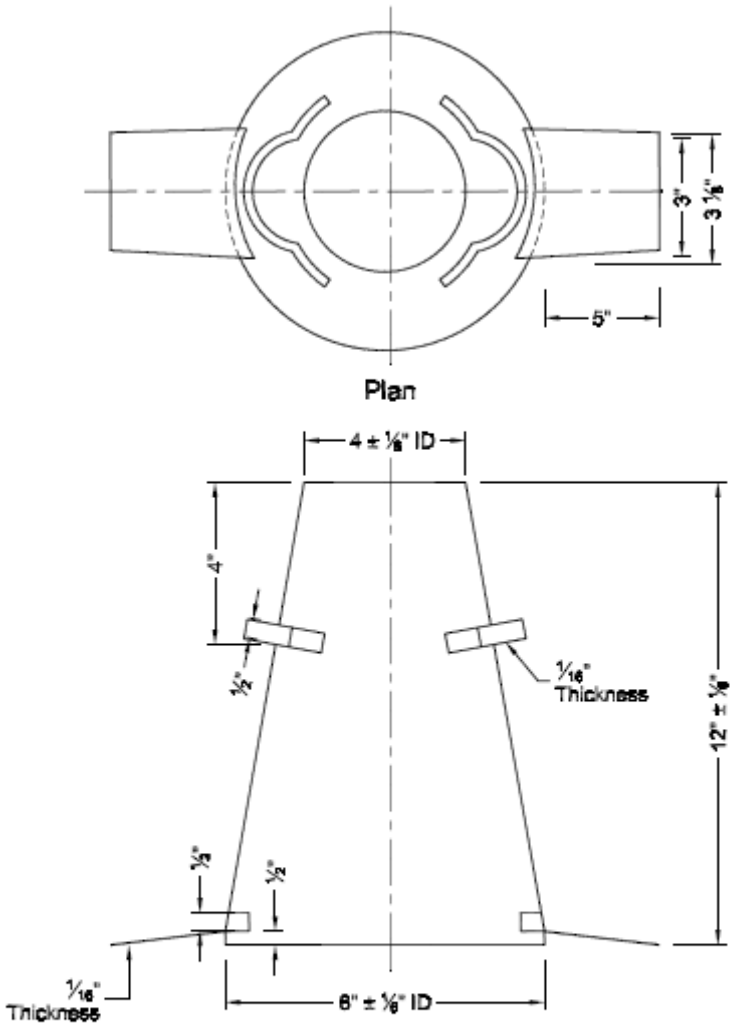
5.3 Measuring Device – A ruler, metal roll-up measuring tape, or similar rigid or semi-rigid length measuring instrument marked in increments of 5 mm (¼ in) or smaller. The instrument length shall be at least 300 mm (12 in).

5.4 Torpedo level.

5.5 Base – Flat, nonabsorbent, rigid surface.

6. Sample

6.1 The sample of concrete from which test specimens are made shall be representative of the entire batch. It shall be obtained in accordance with FOP for WAQTC TM 2. With concrete using 1½ in (37.5 mm) or larger aggregate, the aggregate larger than 1½ in (37.5 mm) must be removed per FOP for WAQTC TM 2. Contact the Materials Laboratory for directions.



Dimensional Units

mm.	2	3	15	25	75	80	100	200	300
in.	[1/16]	[1/8]	[1/2]	[1]	[3]	[3 1/8]	[4]	[8]	[12]

Mold for Slump Test
Figure 1

7. Procedure

7.1 Dampen the mold and place it on a flat, level, moist, nonabsorbent rigid horizontal surface, free from vibration and other disturbances, such as a pre-moistened concrete floor or a base plate on a rigid surface. It shall be held firmly in place during filling and perimeter cleaning by the operator standing on the two foot pieces, or by clamping arrangements to a base plate as described in Section 5.1. From the sample of concrete obtained in accordance with Section 6, immediately fill the mold in three layers, each approximately one-third the volume of the mold.

Note 5: One-third of the volume of the slump mold fills it to a depth of 2⅝ in (67 mm); two-thirds of the volume fills it to a depth of 6⅛ in (155 mm).

7.2 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.

7.3 In filling and rodding the top layer, heap the concrete above the mold before 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 slumping concrete.

Remove the mold from the concrete by raising it carefully in a vertical direction. Raise the mold a distance of approximately 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 removal of the mold without interruption and complete it within an elapsed time of 2½ min.

7.4 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 6), disregard the test and make a new test on another portion of the sample.

Note 6: 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. Report material cannot be slumped due to shearing or falling away.

8. Report

8.1 Report the slump in terms of inches (millimeters) to the nearest ¼ in (5 mm) of subsidence of the specimen during the test.

Report results on concrete delivery ticket (i.e., Certificate of Compliance).

The name of the tester who performed the field acceptance test is required on concrete delivery tickets containing test results.

9. Precision and Bias

9.1 Precision – See AASHTO T 119 for precision and bias.

Performance Exam Checklist

Slump of Hydraulic Cement Concrete
FOP for AASHTO T 119

Participant Name _____ Exam Date _____

	Procedure Element	Yes	No
1.	The tester has a copy of the current procedure on hand?	❒	❒
2.	All equipment is functioning according to the test procedure, and if required, has the current calibration/verification tags present?	❒	❒
3.	Cone and floor or base plate dampened?	❒	❒
4.	Cone held firmly against the base by standing on the two foot pieces? Cone not allowed to move in any way during filling?	❒	❒
5.	Representative samples scooped into the cone?	❒	❒
6.	Cone filled in three approximately equal layers by volume?	❒	❒
7.	Each layer rodded throughout its depth 25 times with hemispherical end of rod, uniformly distributing strokes?	❒	❒
8.	Middle and top layers rodded to just penetrate into the underlying layer?	❒	❒
9.	When rodding the top layer, excess concrete kept above the mold at all times?	❒	❒
10.	Concrete struck off level with top of cone using tamping rod?	❒	❒
11.	Excess concrete removed from around the base?	❒	❒
12.	Cone lifted upward approximately 12 in (300 mm) in one smooth motion, without twisting the cone, in 5 ± 2 seconds?	❒	❒
13.	Slump measured to the nearest ¼ in (5 mm) from the top of the cone to the displaced original center of the top surface of the specimen?	❒	❒
14.	Test performed from start to finish within 2½ minutes?	❒	❒

First Attempt: Pass ❒ Fail ❒ Second Attempt: Pass ❒ Fail ❒

Signature of Examiner _____

Comments: