WSDOT FOP for ASTM C 1611

Standard Test Method for Slump Flow of Self-Consolidating Concrete

1. Scope

1.1 This test method covers the determination of slump flow of self-consolidating concrete.

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 This standard does not purport to address all of the safety concerns, if any, 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.)

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

2. Referenced Documents

2.1 ASTM Standards

C 143/C 143M
Test Method for Slump of Hydraulic-Cement Concrete

C 172 Practice for Sampling Freshly Mixed Concrete

C 173/C 173M
Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

2.2 AASHTO Standards

T 119M/T 119
Standard Test Method for Slump of Hydraulic-Cement Concrete

T 347 Slump Flow of Self-Consolidating Concrete (SCC)

2.3 WAQTC Standards

TM 2 Sampling Freshly Mixed Concrete

3. Terminology

3.1 Definitions of terms specific to this standard:

3.1.1 *halo, n* – An observed cement paste or mortar ring that has clearly separated from the coarse aggregate, around the outside circumference of concrete after flowing from the slump cone.

3.1.2 *spread, n* – The distance of lateral flow of concrete during the slump-flow test.

3.1.3 *stability, n* – The ability of a concrete mixture to resist segregation of the paste from the aggregates.

3.1.4 *viscosity, n* – Resistance of a material to flow under an applied shearing stress.

4. Summary of Test Method

4.1 A sample of freshly mixed concrete is placed in a mold shaped as the frustum of a cone. The concrete is placed in one lift without tamping or vibration. The mold is raised, and the concrete allowed to spread. After spreading ceases, two diameters of the concrete mass are measured in approximately orthogonal directions, and slump flow is the average of the two diameters.

5. Significance and Use

5.1 This test method provides a procedure to determine the slump flow of self-consolidating concrete in the laboratory or the field.

5.2 This test method is used to monitor the consistency of fresh, unhardened self-consolidating concrete and its unconfined flow potential.

5.3 It is difficult to produce self-consolidating concrete that is both flowable and nonsegregating using coarse aggregates larger than 1 in (25 mm). Therefore, this test method is considered applicable to self-consolidating concrete having coarse aggregate up to 1 in (25 mm) in size.

6. Apparatus

6.1 Mold – The mold used in this test method shall conform to that described in FOP for AASHTO T 119.

6.2 Base Plate – The base plate on which the mold rests shall be nonabsorbent, smooth, rigid, and have a minimum diameter of 36 in (915 mm).

Note 1: Field experience and results from the round robin test program have shown that base plates made from sealed/laminated plywood, acrylic plastic, or steel are suitable for performing this test.

6.3 Strike-off Bar – As described in FOP for WAQTC T 152.

7. Sample

7.1 The sample of concrete from which test specimens are made shall be representative of the entire batch. Sample in accordance with FOP for WAQTC TM 2.

8. Procedure

8.1 The slump-flow test shall be performed on a flat, level, nonabsorbent base plate. Position and shim the base plate so it is fully supported, flat, and level.

8.2 Filling the Mold – WSDOT requires the use of Procedure B.

8.2.1 Filling Procedure B (Inverted Mold) – Dampen and place the mold, with the smaller opening of the mold facing down, in the center of a flat, moistened base plate or concrete surface. Using a suitable container, fill the entire mold continuously (Note 2). The mold shall be held firmly in place during filling. Do not rod or tamp the SCC. Slightly overfill the mold.

Note 2: Filling the mold with concrete by using multiple scoops or by pouring from a bucket or similar container has been found to be acceptable.

8.3 Strike off the surface of the concrete level with the top of the mold by a sawing motion of the strike-off bar. Remove concrete from the area surrounding the base of the mold to preclude interference with the movement of the flowing concrete. Remove the mold from the concrete by raising it vertically. Raise the mold a distance of 9 ± 3 in (225 ± 75 mm) in 3 ± 1 seconds by a steady upward lift with no lateral or torsional motion. Complete the entire test from start of the filling through removal of the mold without interruption within an elapsed time of 2½ minutes.

8.4 Wait for the concrete to stop flowing and then measure the largest diameter of the resulting circular spread of concrete to the nearest ¼ in (5 mm). When a halo is observed in the resulting circular spread of concrete, it shall be included as part of the diameter of the concrete. Measure a second diameter of the circular spread at an angle approximately perpendicular to the original measured diameter.

8.5 If the measurement of the two diameters differs by more than 2 in (50 mm), the test is invalid and shall be repeated.

9. Calculation

9.1 Calculate the slump flow using Eq 1:

$$\text{Slump flow} = \frac{(d^1 + d^2)}{2}$$

where:

d^1 = the largest diameter of the circular spread of the concrete, and

d^2 = the circular spread of the concrete at an angle approximately perpendicular to d^1

9.2 Record the average of the two diameters to the nearest ¼ in (5 mm).

10. Report

10.1 Report the slump flow to the nearest ¼ in (5 mm).

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

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

11. Precision and Bias

See ASTM C1611/C 1611M for precision and bias.

Performance Exam Checklist

WSDOT FOP for ASTM C 1611/C 1611M
Standard Test Method for Slump Flow of Self-Consolidating Concrete

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. Sample was taken per WSDOT FOP for WAQTC TM 2?	☐	☐
4. Molds and base plate dampened and base plate is flat, level, and fully supported?	☐	☐
5. Mold filled completely (slightly overfilled)?	☐	☐
6. Mold struck off level with top opening?	☐	☐
7. Excess material removed from base plate and mold raised 9 ± 3 inches, in 3 ± 1 seconds?	☐	☐
8. After flow stabilized, measured largest diameter (including halo if necessary)?	☐	☐
9. Second measurement taken approximately perpendicular to first measurement?	☐	☐
10.. First and second measurements agree within 2″?	☐	☐
11. Slump flow was reported as an average of the two measurements?	☐	☐
12. Slump flow reported to the nearest ¼″?	☐	☐

First Attempt: Pass ☐ Fail ☐ Second Attempt: Pass ☐ Fail ☐

Signature of Examiner _____

Comments: