T 119

SLUMP OF HYDRAULIC CEMENT CONCRETE

FOP FOR AASHTO

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01

Significance

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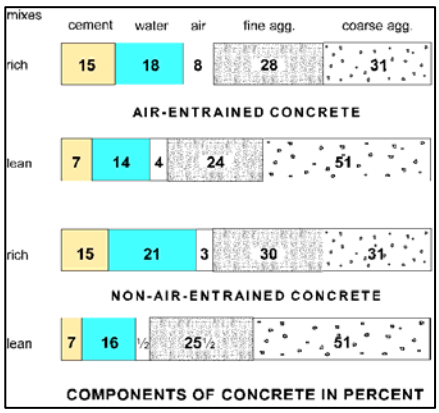
The slump test is used to determine the consistency of concrete. Consistency is a measure of the relative fluidity or mobility of the mixture. Slump does not measure the water content of the concrete. While it is true that an increase or decrease in the water content will cause a corresponding increase or decrease in the slump of the concrete, many other factors can cause slump to change without any change in water content.



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Also, water content may increase or decrease without any change in slump. Factors such as a change in aggregate properties, grading, mix proportions, air content, concrete temperature, or the use of special admixtures can influence the slump of the concrete. These can also result in a change in the water requirement for maintaining a given slump. For these reasons, one cannot assume that the water/cement ratio is being maintained simply because the slump is within the specification limits.

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Scope

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This procedure provides instructions for determining the slump of hydraulic cement concrete in accordance with AASHTO T 119. It is not applicable to non-plastic and non-cohesive concrete. With concrete using aggregate larger than 1½ in., the +1½ in. aggregate must be removed in accordance with the FOP for WAQTC TM 2.

Warning—Fresh Hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.

Apparatus

- Mold: The metal mold shall be provided with foot pieces and handles. The interior of the mold shall be relatively smooth and free from projections such as protruding rivets, and be constructed without a seam. The mold shall be free from dents. A mold that clamps to a rigid nonabsorbent base plate is acceptable provided the clamping arrangement is such that it can be fully released without movement of the mold.

Apparatus

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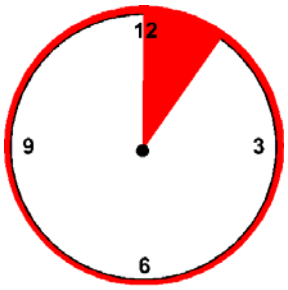
- Mold: If other than metal, it must conform to AASHTO T 119 Sections 5.1.2.1 & 5.1.2.2.
- Tamping rod: 5/8 in. diameter and approximately 24 in. long, having a hemispherical tip. (Hemispherical means "half a sphere." The tip is rounded like half of a ball.)
- Scoop
- Tape measure or ruler with at least 1/8 in. graduations
- Base: Flat, rigid, non-absorbent moistened surface on which to set the slump cone



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5 Minutes!

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Procedure

1. Obtain the sample in accordance with FOP for WAQTC TM 2. If any aggregate larger than 1½ in. is present, the oversize aggregate must be removed in accordance with the Wet Sieving portion of the FOP for WAQTC TM 2.

Note 1: Testing shall begin within five minutes of obtaining the sample.

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2. Dampen the inside of the mold and place it on a dampened, rigid, nonabsorbent surface that is level and firm.
3. Stand on both foot pieces in order to hold the mold firmly in place.

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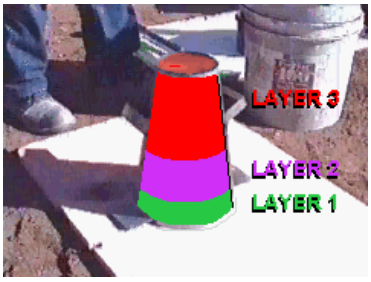
4. Fill the mold 1/3 full by volume, to a depth of approximately 2⅝ in.



Three layers by volume

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5. Consolidate the layer with 25 strokes of the tamping rod, using the rounded end. Distribute the strokes evenly over the entire cross section of the concrete. For this bottom layer, incline the rod slightly and make approximately half the strokes near the perimeter, and then progress with vertical strokes, spiraling toward the center.

Consolidating top layer

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6. Fill the mold 2/3 full by volume, to a total depth of approximately 6⅛ in.
7. Consolidate this layer with 25 strokes of the tamping rod, just penetrating into the bottom layer. Distribute the strokes evenly.
8. Fill the mold to overflowing.
9. Consolidate this layer with 25 strokes of the tamping rod, just penetrating into the second layer. Distribute the strokes evenly. If the concrete falls below the top of the mold, stop, add more concrete, and continue rodding for a total of 25 strokes. Keep an excess of concrete above the top of the mold at all times. Distribute strokes evenly as before.

Striking off surface

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10. Strike off the top surface of concrete with a screeding and rolling motion of the tamping rod.
11. Clean overflow concrete away from the base of the mold.
12. Remove the mold from the concrete by raising it carefully in a vertical direction. Raise the mold 12 in. in 5 ±2 seconds by a steady upward lift with no lateral or torsional (twisting) motion being imparted to the concrete.

The entire operation from the start of the filling through removal of the mold shall be carried out without interruption and shall be completed within an elapsed time of 2 1/2 minutes.

Lifting slump mold

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Measuring slump

17 Immediately measure the slump by:

13. Invert the slump mold and set it next to the specimen.
14. Lay the tamping rod across the mold so that it is over the test specimen.
15. Measure the distance between the bottom of the rod and the displaced original center of the top of the specimen to the nearest 1/4 in.

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19 ***Note2:*** If a decided falling away or shearing off of concrete from one side or portion of the mass occurs, disregard the test and make a new test on another portion of the sample. 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 the plasticity and cohesiveness necessary for the slump test to be applicable.

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Report

Results shall be reported on standard forms approved for use by the agency. Record the slump to the nearest 1/4 in.

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Tips!

- Start within 5 minutes of obtaining sample.
- Avoid locations subject to vibration.
- Consolidation strokes in middle and top layers do not go through entire sample.
- Fill in thirds by volume, not height.

REVIEW QUESTIONS

1. This procedure is not for all concrete. Under what concrete conditions would this procedure not be used?

2. Describe the mold used for making the slump test.

3. The surface on which the slump mold will be placed must be _____.

4. The approximate concrete depth (in vertical distance) after placing the first layer is _____ and the second layer is _____.

5. When rodding the bottom layer, the tamping rod must be _____ to uniformly distribute the strokes.

6. If, while rodding the top layer, the concrete drops below the top of the slump mold, what must be done?

7. The measurement for slump is made from the top of the mold to what point of the concrete specimen?

8. While the technician is checking the slump of the concrete, there is a decided falling away or shearing off of concrete from one side of the sample. What should the technician do?

PERFORMANCE EXAM CHECKLIST

SLUMP OF HYDRAULIC CEMENT CONCRETE
FOP FOR AASHTO T 119

Participant Name _____ Exam Date _____

Record the symbols "P" for passing or "F" for failing on each step of the checklist.

Procedure Element	Trial 1	Trial 2
1. Mold and floor or base plate dampened?	_____	_____
2. Mold held firmly against the base by standing on the two foot pieces? Mold not allowed to move in any way during filling?	_____	_____
3. Representative samples scooped into the mold?	_____	_____
4. Mold filled in three approximately equal layers (by volume), the first to a depth of 2 5/8 in, the second to a depth of 6 1/8 in, and the third to just over the top of the cone?	_____	_____
5. Each layer rodded throughout its depth 25 times with hemispherical end of rod, uniformly distributing strokes?	_____	_____
6. Middle and top layers rodded to just penetrate into the underlying layer?	_____	_____
7. When rodding the top layer, excess concrete kept above the mold at all times?	_____	_____
8. Concrete struck off level with top of mold using tamping rod?	_____	_____
9. Concrete removed from around the outside bottom of the mold?	_____	_____
10. Mold lifted upward 12in. in one smooth motion, without a lateral or twisting motion of the mold, in 5 ±2 seconds?	_____	_____
11. Test performed from start of filling through removal of the mold within 2 1/2 minutes?	_____	_____
12. Slump immediately measured to the nearest 1/4 in. from the top of the mold to the displaced original center of the top surface of the specimen?	_____	_____

Comments: First attempt: Pass ☐ Fail ☐ Second attempt: Pass ☐ Fail ☐

_____

_____

Examiner Signature _____WAQTC #:_____

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