


ASTM C1437

Standard Test Method for Flow of Hydraulic Cement Mortar

Understanding ASTM International Test Procedures for Cement and Concrete - Staying Up to Standard


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Outline

- ▶ Objectives
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- ▶ Key Terminology
- ▶ Apparatus
- ▶ Temperature and Humidity Requirements
- ▶ Procedure Molding Specimen
- ▶ Procedure Determining Flow
- ▶ Understand Limitations of Procedure


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Objectives


- ▶ Define Key Terminology
- ▶ Identify Necessary Equipment
- ▶ Understand Sources of Errors
- ▶ Understand Limitations of Procedure

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Related Procedures

- ▶ ASTM C109 - Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- ▶ ASTM C185 – Test Method for Air Content of Hydraulic Cement Mortar
- ▶ ASTM C230 – Specification for Flow Table for Use in Tests of Hydraulic Cement
- ▶ ASTM C511 - Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes

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Scope/Significance and Use

- ▶ **Scope:** This test method covers the determination of flow of hydraulic cement mortars.
- ▶ **Significance and Use:** This test method is intended to be used to determine the flow of hydraulic cement mortars, and of mortars containing cementitious materials other than hydraulic cements.
- ▶ While flow is not usually included in hydraulic cement specifications, it is commonly used in standard tests that require the mortar to have a water content that provides a specified flow level.

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Key Terminology

- ▶ Hydraulic Cement - a binding material that sets and hardens by chemical reaction with water and is capable of doing so underwater. For example, portland cement and slag cement are hydraulic cements
- ▶ Mortar - a mixture of cement paste and fine aggregate.
- ▶ Flow – a measure of the consistency of freshly mixed mortar, or cement paste expressed in terms of the increase in diameter of a molded truncated cone specimen after jiggging a specified number of times.


Source: American Concrete Institute CT-13: ACI Concrete Terminology 

Apparatus: Flow Table, Flow Mold, and Caliper (1/2)


▶ **Flow Table**



Diameter: 255 ± 2.5 mm




Raised Height: 12.7 ± 0.13 mm


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Apparatus: Flow Table, Flow Mold, and Caliper (2/2)


▶ **Conical Mold and Caliper**



Diameter Top: 70 ± 0.5 mm
Diameter Bottom: 100 ± 0.5 mm
Height: 50 ± 0.5 mm







Distance to Zero: 100 ± 0.25 mm

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Apparatus: Other

- ▶ **Tamper:** conforming to the requirements of Test Method C109. The tamping face of the tamper shall be flat and at right angles to the length of the tamper.
- ▶ **Steel Straightedge:** not less than 200 mm long and not less than 1.5 mm nor more than 3.5 mm in thickness.
- ▶ **Trowel:** steel blade 100 to 150 mm long

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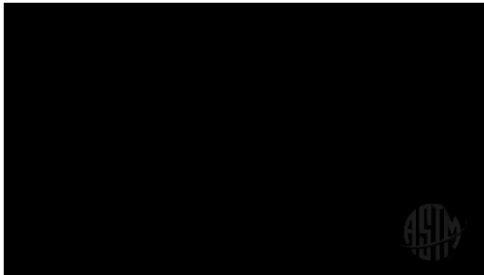
Temperature and Humidity Requirements

- ▶ The temperature of the air and mixing water shall conform to the requirements of Specification C511.
 - Air – Temp. $23.0 \pm 4.0^{\circ}\text{C}$
 - Mixing Water - shall be $23.0 \pm 2.0^{\circ}\text{C}$
- ▶ The relative humidity of the laboratory shall conform to the requirements of Specification C511.
 - Relative Humidity - not less than 50 %

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Procedure: Determination of Flow



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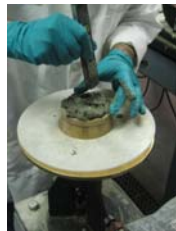
Procedure: Determination of Flow (1/3)



1. Place 25 mm Layer



2. Tamp 20 Times. Incline Tamper when Near Perimeter.



3. Fill Mold and Tamp as Specified.

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Procedure: Determination of Flow (2/3)



4. Cut off Mortar Plane with Sawing Motion with Straightedge or Trowel.



5. Wipe off Table Top.

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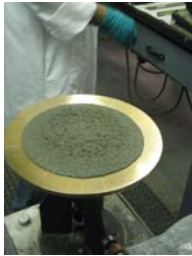
Procedure: Determination of Flow (3/3)



6. Lift Mold 1 Minute after Mixing.



7. Immediately Drop the Table 25 times in 15s.



8. Measure the Diameter Across Four Scribed Lines.

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Procedure: Calculation

- ▶ Flow is the resulting increase in average base diameter of the mortar mass, expressed as a percentage of the original base.
- ▶ Using ASTM C230 Caliper, add the four readings, and record the total. This gives the flow in percent.



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Limitations and Errors

- ▶ Gauging time should be strictly observed.
- ▶ Room temperature should be well maintained as per test requirement.
- ▶ All apparatus used should be clean.
- ▶ Uniformly compress and fill conical mold.
- ▶ Over-tamping causes water to extrude towards bottom of molds and causes increased (erroneous) flow.

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Questions & Answers
