

## Method of Test for Unit Weight (Density) of Concrete

---

### 1. Scope:

This test is for determining the unit weight of freshly mixed concrete.

### 2. Apparatus:

- 2.1 Scale or balance having the capacity to weigh any sample which may be tested utilizing this procedure and readable to the nearest 0.1 lb.
- 2.2 Tamping rod. A round, smooth 5/8" steel rod with the tamping end rounded to a hemispherical top of 5/8" diameter. The minimum length shall be 18".
- 2.3 Measure. A cylindrical rigid metal measure with a capacity of approximately 1/2 ft.<sup>3</sup> or the measuring bowl of the air meter may be used (SD 403).
- 2.4 Straight-edge. A metal straight-edge with a minimum length of 12".
- 2.5 Miscellaneous. Rubber mallet, small scoop or shovel.
- 2.6 Cover plate. A flat rectangular metal plate at least 1/4 in. thick or a glass or acrylic plate at least 1/2 in. thick with a length and width at least 2 in. greater than the diameter of the measure with which it is to be used.

**NOTE: The edges of the plate shall be straight and smooth within a tolerance of 1/16 in. The corners and edges may be beveled.**

### 3. Procedure:

- 3.1 Calibrate the measure as described in SD 205, paragraph 3.3.
- 3.2 Obtain a sample of concrete in accordance with SD 402.

**NOTE: Samples of volumetric mixed low slump dense concrete shall be placed in a covered container for 5 minutes prior to testing.**

- 3.3 Weigh the empty measure and moisten the inside before beginning the test.
- 3.4 Fill the measure with concrete in 3 approximately equal layers. Rod each layer 25 times. Distribute the strokes uniformly over the cross section of the layer being rodded.

Rod the lower layer its total depth, but the rod shall not forcibly strike the bottom of the bucket so as to cause excessive vibration. Rod the second and third layers with the rod penetrating slightly (Approximately 1 inch) into the layer below.

Heap the concrete above the top of the measure for the final layer, adding additional concrete, as required, to keep the surface above the measure as it is rodded.

After each layer is rodded, tap the outside of the bucket sharply 10 to 15 times with the mallet. Tap with enough force to close any holes left by rodding and to release any large air bubbles that may have been trapped. For concrete with a slump of less than 2" the number of taps can be increased to achieve consolidation.

- 3.5 After consolidation of the concrete, strike off the surface with a straightedge or cover plate. Use the following procedure for striking off the measure with a cover plate.

Press the cover plate on top of the measure to cover approximately 2/3 of the measure. Withdraw the cover plate with a sawing motion. Place the cover plate on the measure in the original position to cover the same 2/3 of the measure. Advance the cover plate with downward pressure and a sawing motion until it slides completely off the measure. Finish the surface with several strokes of the plate at an inclined angle

**NOTE: Cover plate shall be used for strike off on all unit weight determinations for low slump dense concrete.**

- 3.6 Clean all excess concrete from the measure and weigh to the nearest 0.1 lb.

**4. Report:**

- 4.1 Calculations.

A. Subtract the weight of the empty measure from the total weight to determine the weight of the concrete to fill the measure.

B. Unit weight of concrete lbs./ft<sup>3</sup> = Weight of the concrete to fill the measure times the factor for the measure.

Example:

Total weight of measure & fresh concrete (0.1 lbs.)	Weight of empty measure (0.1 lbs.)	Weight of fresh concrete (0.1 lbs.)
---	------------------------------------	-------------------------------------

44.3 lbs.	-	8.0 lbs.	=	36.3 lbs.
-----------	---	----------	---	-----------

(Factor of measure)	4.00	x	36.3 lbs.	=	145.2 lbs./ft <sup>3</sup> unit weight of concrete
---------------------	------	---	-----------	---	--

**5. References:**

SD 205  
SD 402  
SD 403