



Designation: ~~D2453 – 03 (Reapproved 2009)~~ D2453 – 15

Standard Test Method for Shrinkage and Tenacity of Oil- and Resin-Base Caulking Compounds¹

This standard is issued under the fixed designation D2453; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method describes a laboratory procedure for determining the shrinkage of oil- and resin-base (Note) caulking compounds, as well as the evaluation of the tenacity property of such compounds. This test method is applicable to both gun (Type I) and knife (Type II) grades.

NOTE 1—This is not a suitable test method for water-base products.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 The subcommittee with jurisdiction is not aware of any similar ISO standard.

1.4 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[C717 Terminology of Building Seals and Sealants](https://standards.iteh.ai/C717)

3. Terminology

3.1 *Definitions*—Definitions of the following terms are found in Terminology [C717](https://standards.iteh.ai/C717): caulking, caulking compound, compound, cure, ~~joint~~-joint, standard conditions.

4. Summary of Test Method

4.1 A 1/4-in. layer of caulking compound is aged 120 h at $65 \pm 2^\circ\text{C}$ ($149 \pm 3.6^\circ\text{F}$) and its shrinkage is determined by comparing its initial volume to the volume after the aging period.

4.2 After the shrinkage has been determined, this same specimen is also used to test tenacity by folding the aged material 180° six times.

5. Significance

5.1 Shrinkage is a measure of the nonvolatile solids of an oil- or resin-base compound. A compound that exhibits excessive shrinkage may have a tendency to crack or sink from the sides of a joint when in service.

5.2 Tenacity is the measure of the flexibility of an oil- or resin-base caulking compound. Oil- or resin-base caulking compounds that cure excessively hard and do not remain flexible may fail prematurely because of the inability to absorb movement.

6. Apparatus and Materials

6.1 *Cabinet or Room*, capable of maintaining a ~~temperature of $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) at $50 \pm 5\%$ relative humidity~~ standard conditions for extended periods of time.

¹ This method is under the jurisdiction of ASTM Committee [C24](https://standards.iteh.ai/C24) on Building Seals and Sealants and is the direct responsibility of Subcommittee [C24.20](https://standards.iteh.ai/C24.20) on General Test Methods.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- 6.2 *Oven* (convection-type), controlled at $65 \pm 2^{\circ}\text{C}$ ($149 \pm 3.6^{\circ}\text{F}$).
- 6.3 *Oven* (convection- or blower-type), controlled at $104 \pm 2^{\circ}\text{C}$ ($220 \pm 3.6^{\circ}\text{F}$).
- 6.4 *Titration Buret*, 50-mL capacity, marked in 0.1 mL.
- 6.5 *Brass Ring*, metal, 0.8 to 3.2 mm ($1/32$ to $1/8$ in.) thick; inside diameter, 66.7 mm ($2\frac{5}{8}$ in.); and 12.7 mm ($1/2$ in.) wide, with ends of the ring ground flat.
- 6.6 *Cover Plates*, ground glass, two, 76 to 89 mm (3 to $3\frac{1}{2}$ in.) in diameter.
- 6.7 *Limestone Block*, standard 89 mm ($3\frac{1}{2}$ in.) square by 16 to 19 mm ($5/8$ to $3/4$ in.) thick.
- 6.8 *Steel Spatula or Putty Knife* about 102 mm (4 in.) long and about 19 mm ($3/4$ in.) wide.
- 6.9 *Leveling Tool* for spreading compound (Fig. 1).
- 6.10 *Knife*, thin-pointed blade.
- 6.11 *Putty Knife*, steel, stiff, about 102 mm (4 in.) long and about 51 mm (2 in.) wide at the end.
- 6.12 *Distilled Water*.

7. Sampling

7.1 The compound to be tested shall be taken from a previously unopened container. Remove the compound from the container and work with a putty knife to a homogeneous consistency on a nonporous surface.

8. Conditioning

- 8.1 Condition limestone blocks in an oven at $104 \pm 2^{\circ}\text{C}$ ($220 \pm 3.6^{\circ}\text{F}$) for 24 h and then cool to room temperature.
- 8.2 Condition the unopened cartridge or can of caulking compound for at least 5 h at $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$), standard conditions.

9. Procedure for Shrinkage Determination

9.1 Place the brass ring on one of the ground-glass plates. Determine the volume of the ring by filling it with distilled water at $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$), standard conditions from a titrating buret. Pour the water slowly from the buret into the ring so that there are no air bubbles visible when the glass cover plate is centered on top of the ring. Record the amount of water required to fill the ring to the nearest 0.03 mL, as V_r .

9.2 Center the ring on the limestone block. Spread a 6-mm ($1/4$ -in.) layer of compound in the ring, using the leveling tool to form good contact with ring and stone (Fig. 1). The leveling tool should fit firmly against the inside surface of the ring while the tool is rotated. Pour distilled water from the buret into the ring until it is exactly filled (without air bubbles), as determined by covering with a ground-glass plate (Fig. 2). Record the quantity of water needed to fill the ring (reading the buret to an accuracy of 0.03 mL) and designate the amount as V_i .

9.3 Pour out the water from the ring and place the specimen, at the same level as the temperature measuring device, in an oven set at $65 \pm 2^{\circ}\text{C}$ ($149 \pm 3.6^{\circ}\text{F}$) for 120 h. At the end of this exposure period and after the specimen has cooled for 2 h at room temperature, repeat the filling of the ring using the buret and record the volume of water used as V_f .

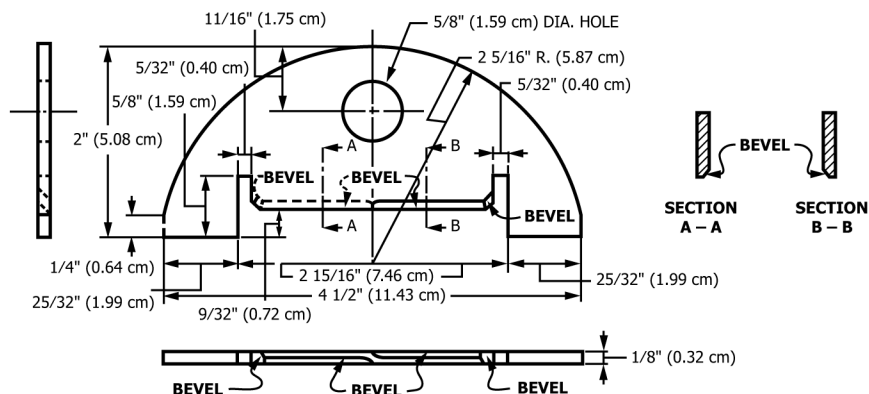


FIG. 1 Tool for Leveling Caulking Compound in the Shrinkage Test Specimen