



Designation: C 531 – 00

Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes¹

This standard is issued under the fixed designation C 531; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the measurement of the linear shrinkage during setting and curing and the coefficient of thermal expansion of chemical-resistant mortars, grouts, monolithic surfacings, and polymer concretes.

1.2 A bar of square cross-section is cast to a prescribed length in a mold that holds measuring studs that are captured in the ends of the finished casting.

1.2.1 The change in length after curing is measured and used to calculate shrinkage.

NOTE 1—Shrinkage determinations should not be made on sulfur mortars, since this test method cannot truly reflect the overall linear shrinkage of a sulfur mortar.

1.2.2 The change in length at a specific elevated temperature is measured and used to calculate the coefficient of thermal expansion.

1.3 This test method is limited to materials with aggregate size of 0.25 in. (6 mm) or less.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *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:

C 287 Specification for Chemical-Resistant Sulfur Mortar²

C 490 Practice for Use of Apparatus for the Determination

of Length Change of Hardened Cement Paste, Mortar, and Concrete³

C 904 Terminology Relating to Chemical-Resistant Non-metallic Materials²

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology C 904.

4. Significance and Use

4.1 This test method offers a means of comparing the relative linear shrinkage and coefficient of thermal expansion.

4.1.1 The material to be tested is placed in the mold in a fluid or plastic state. As the material makes a transition to a solid state, it adheres to and captures the end studs.

4.1.2 The linear shrinkage measured is the change in length that occurs after the material is rigid enough and strong enough to move the studs.

4.2 This test method can be used for research purposes to provide information on linear changes taking place in the test materials. Other dimensional changes may occur that do not manifest themselves as changes in length.

5. Apparatus

5.1 *Weighing Equipment*, shall be capable of weighing materials or specimens to $\pm 0.3\%$ accuracy.

5.2 *Equipment for Mixing*, consisting of a container of suitable size preferably made of corrosion-resistant metal, or a porcelain pan, and a sturdy spatula or trowel.

5.3 *Specimen Mold*, (see Practice C 490) permitting the molding of bars with a metal stud embedded in each end. The bars shall be 1 in. (25 mm) square by 10 in. (250 mm) between studs when molded. A standard 10-in. (250-mm) metal bar shall be provided; this is used to space the studs.

5.4 *Studs*—Nickel alloy studs, which have linear coefficient of thermal expansion of 7.2×10^{-6} per $^{\circ}\text{F}$ (4×10^{-6} per $^{\circ}\text{C}$),

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² *Annual Book of ASTM Standards*, Vol 04.05.

³ *Annual Book of ASTM Standards*, Vol 04.01.