



Designation: C199 – 22

Standard Test Method for Pier Test for Refractory Mortars¹

This standard is issued under the fixed designation C199; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers the determination of refractoriness of all types of refractory mortar by heating a pier of brick laid up with the test mortar to learn whether the prescribed heat treatment causes the mortar to flow out of the joints.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

C24 Test Method for Pyrometric Cone Equivalent (PCE) of Fireclay and High-Alumina Refractory Materials

C113 Test Method for Reheat Change of Refractory Brick

3. Significance and Use

3.1 This test method is used to estimate the application temperature limits of a refractory mortar and will establish its classification.

¹ This test method is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.01 on Strength.

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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.

3.2 This test method will be regarded as a pass or fail test because the results are based on observations of whether the mortar flowed from the joints as a result of the heat treatment used.

3.3 Results obtained by this test method will not agree with those obtained in service when heating is done from only one side.

3.4 This test method is not applicable for testing nonaqueous mortars.

4. Apparatus

4.1 **Brick**—Three 9-in. (228-mm) straight fireclay or high-alumina brick, conforming to the following respective requirements for refractories:

Class of Mortar to be Tested	PCE, ^A Not Lower Than Cone No.
High-alumina	36
Super-duty	33
High-duty	31½
Medium-duty	29

^A See Test Method C24.

4.2 **Spacing Rods**—Nine joint-thickness spacing rods made of 3/32-in. (2-mm) diameter drill rod, cut into 6-in. (152-mm) lengths.

4.3 **Drying Oven**, to accommodate five 9-in. (228-mm) straight brick standing on end, for use at 220 to 230 °F (105 to 110 °C).

4.4 **Furnace**, capable of heating the test pier uniformly at one of four temperatures, the highest being 3100 °F (1705 °C).

5. Sampling

5.1 The sample of mortar evaluated will be a prepared test sample of about 10 lb (4.5 kg). If a larger quantity is presented, ranging in size up to a commercial container, it must be reduced in size to about 10 lb (4.5 kg) for evaluation. To do this, the contents of the container shall be thoroughly mixed in the container, or transferred without loss to a clean impervious receptacle of larger size and mixed thoroughly to a uniform consistency. A 10-lb (4.5-kg) test sample shall then be taken and sealed in a metal or glass container.