



Designation: **C456 – 93 (Reapproved 2008) C456 – 13**

Standard Test Method for Hydration Resistance of Basic Bricks and Shapes¹

This standard is issued under the fixed designation C456; 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 covers measurement of the relative resistance of basic brick and shapes to hydration.
- 1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.
- 1.3 *This standard does not purport to address all of the safety problems, 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. Significance and Use

- 2.1 This test method compares relative resistance to hydration of basic refractory brick and shapes in laboratory tests.
- 2.2 This test method allows an estimate to be made of the relative potential for hydration.
- 2.3 The test method is used in industry and in some cases it is used for specification purposes.
- 2.4 The results must be carefully used as a means of predicting whether or not basic brick or shapes will hydrate under actual conditions of storage or service.

3. Apparatus

3.1 *Autoclave*, suitable for operation at 80 psilb/in.^2 (552 kPa) at 324°F (162°C), and equipped with pressure- and temperature-measuring devices, a vent cock, and safety equipment. *Fig. 1* is illustrative of a suitable, commercially available apparatus. Capacity shall be sufficient to hot up to 12 specimens, generally 2 gallons.

4. Test Specimens

4.1 The test specimens shall be 1-in. (25-mm) cubes cut from the interior of basic refractory brick or shapes so that no original surfaces are present. Only one specimen shall be cut from each of five bricks or shapes.

5. Procedure

- 5.1 Dry the test specimens to constant weight at 220 to 230°F (105 to 110°C) in a forced-air drier.
- 5.2 Add sufficient water to the autoclave to maintain 80 psi (552 kPa) at 324°F (162°C) for the duration of each 5-h test, but not enough to permit contact with any of the specimens.
- 5.3 Place each specimen in a lidless No. 2 porcelain crucible, and place the crucible in the autoclave on a suitable rack to protect the specimen from drip or condensate (condensate. *Fig. 21*)—is an example of a rack designed for cylindrical autoclave.
- 5.4 Heat the autoclave with the pressure release valve open; after a steady flow of steam is obtained through the valve, continue to purge for 3 min to remove all air, close the valve, and bring the autoclave to 80 psi (552 kPa) and at 324°F (162°C) in a total time of 1 h. Maintain the autoclave at 80 ± 5 psi (552 ± 50 kPa) at $324 \pm 4^\circ\text{F}$ ($162 \pm 2^\circ\text{C}$) for 5 h.
- 5.5 Allow sufficient cooling to lower the autoclave to 20 to 30 psi (138 to 207 kPa) with the release valve closed, and then carefully open the relief valve to reduce the autoclave to atmospheric pressure in a total time between 30 and 60 min. Remove the specimens and examine them.

¹ This test method is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.04 on Chemical Behaviors. Current edition approved March 1, 2008; Sept. 1, 2013. Published March 2008; September 2013. Originally approved in 1960. Last previous edition approved in 2003; 2008 as C456 – 93 (2003); (2008). DOI: 10.1520/C0456-93R08; 10.1520/C0456-13.