



Designation: C544 – 03 (Reapproved 2013)

## Standard Test Method for Hydration of Dead Burned Magnesite or Periclase Grain<sup>1</sup>

This standard is issued under the fixed designation C544; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the measurement of the relative resistance of magnesia grain to hydration.

1.2 *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:*<sup>2</sup>

C92 Test Methods for Sieve Analysis and Water Content of Refractory Materials

C357 Test Method for Bulk Density of Granular Refractory Materials

C456 Test Method for Hydration Resistance of Basic Bricks and Shapes

C493 Test Method for Bulk Density and Porosity of Granular Refractory Materials by Mercury Displacement (Discontinued 2002) (Withdrawn 2002)<sup>3</sup>

### 3. Significance and Use

3.1 This test method determines relative hydration resistance of magnesia grain.

3.2 This test method is used in industry to evaluate grain samples and is used for specification purposes in some cases.

3.3 Care must be taken in interpreting the data.

### 4. Apparatus

4.1 *Autoclave*, suitable for operation at 80 psi (552 kPa) at 324°F (162°C) and equipped with pressure- and temperature-measuring devices and safety equipment.

<sup>1</sup> 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 April 1, 2013. Published August 2013. Originally approved in 1964. Last previous edition approved in 2008 as C544 – 03 (2008). DOI: 10.1520/C0544-03R13.

<sup>2</sup> 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.

<sup>3</sup> The last approved version of this historical standard is referenced on www.astm.org.

NOTE 1—A suitable apparatus is shown in Fig. 1 of Test Method C456.

4.2 *Standard Sieves*, ASTM No. 6 (3.35 mm), No. 12 (1.70 mm), No. 20 (850  $\mu$ m), No. 40 (425  $\mu$ m), and No. 50 (300  $\mu$ m).

NOTE 2—The equivalent Tyler Standard Series sieves described in Test Methods C92 may be substituted for the ASTM sieves.

### 5. Procedure

5.1 Remove the material retained on a No. 6 (3.35-mm) sieve, and crush it to pass the No. 6 sieve to obtain the maximum amount of coarse material. Recombine with the portion passing the No. 6 sieve, and screen the resultant sample to remove all material passing a No. 40 (425- $\mu$ m) sieve. If necessary, dry at 220 to 230°F (105 to 110°C).

5.2 Separate this sample into the following three fractions:

Passing Sieve No.	Retained on Sieve No.
6 (3.35 mm)	12 (1.70 mm)
12 (1.70 mm)	20 (850 $\mu$ m)
20 (850 $\mu$ m)	40 (425 $\mu$ m)

5.3 Prepare a 100-g specimen by using equal parts by weight of the three sizes listed in 5.2.

5.4 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.

5.5 Place each weighed specimen in a No. 3 porcelain crucible, and cover with a loosely crimped piece of aluminum foil to protect the specimen from drip or condensate. Dry the covered crucibles in a forced-air dryer at 220 to 230°F (105 to 110°C) for at least 2 h.

5.6 Place the preheated rack containing the specimens in the autoclave. 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) at 324°F (162°C) in a total time of 1 h. Maintain the autoclave at 80  $\pm$  5 psi (552  $\pm$  35 kPa) and 324  $\pm$  4°F (162  $\pm$  2°C) for 5 h.

5.7 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 dry to constant weight at 220 to 230°F (105 to 110°C) in a forced-air dryer. Record the individual specimen weight, *G*.