



Designation: **C1054 – 03 (Reapproved 2008) C1054 – 13**

Standard Practice for Pressing and Drying Refractory Plastic and Ramming Mix Specimens¹

This standard is issued under the fixed designation C1054; 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 practice covers the pressing and drying of chemically and ~~nonchemically~~non-chemically bonded ~~aluminum-silicate~~alumin-silicate and high alumina plastic and ramming mix refractory specimens classified in accordance with Classification **C673**.

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 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

- ~~C16 Test Method for Load Testing Refractory Shapes at High Temperatures~~
- ~~C20 Test Methods for Apparent Porosity, Water Absorption, Apparent Specific Gravity, and Bulk Density of Burned Refractory Brick and Shapes by Boiling Water~~
- ~~C113 Test Method for Reheat Change of Refractory Brick~~
- ~~C133 Test Methods for Cold Crushing Strength and Modulus of Rupture of Refractories~~
- ~~C179 Test Method for Drying and Firing Linear Change of Refractory Plastic and Ramming Mix Specimens~~
- ~~C181 Test Method for Workability Index of Fireclay and High-Alumina Refractory Plastics~~
- ~~C288 Test Method for Disintegration of Refractories in an Atmosphere of Carbon Monoxide~~
- ~~C417 Test Method for Thermal Conductivity of Unfired Monolithic Refractories~~
- ~~C577 Test Method for Permeability of Refractories~~
- ~~C583 Test Method for Modulus of Rupture of Refractory Materials at Elevated Temperatures~~
- C673 Classification of Fireclay and High-Alumina Plastic Refractories and Ramming Mixes**
- ~~C704 Test Method for Abrasion Resistance of Refractory Materials at Room Temperature~~
- ~~C830 Test Methods for Apparent Porosity, Liquid Absorption, Apparent Specific Gravity, and Bulk Density of Refractory Shapes by Vacuum Pressure~~
- ~~C832 Test Method of Measuring Thermal Expansion and Creep of Refractories Under Load~~
- ~~C874 Test Method for Rotary Slag Testing of Refractory Materials~~
- ~~C885 Test Method for Young's Modulus of Refractory Shapes by Sonic Resonance~~
- ~~C914 Test Method for Bulk Density and Volume of Solid Refractories by Wax Immersion~~

3. Significance and Use

3.1 This practice is useful for producing uniform specimens of refractory plastics and ramming mixes for use in standard ASTM tests. Samples thus formed may be used for referee testing when setting specifications between producer and user. ~~Forming~~ Establish by mutual agreement and specify in the report the forming parameters such as sample size, workability, and forming pressure ~~should be agreed upon and specified in the report when referee testing.~~

¹ This practice is under the jurisdiction of ASTM Committee **C08** on Refractories and is the direct responsibility of Subcommittee **C08.09** on Monolithics. Current edition approved ~~March 1, 2008~~ April 1, 2013. Published ~~March 2008~~ June 2013. Originally approved in 1985. Last previous edition approved in ~~2003~~ 2008 as ~~C1054 – 03~~ C1054 – 03 (2008). DOI: ~~10.1520/C1054-03R08~~ 10.1520/C1054-13.

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 practice is applicable for preparing test specimens of various sizes. Note that 9 by 4½ by 2½ in. (228 by 114 by 64-mm) samples, because of their large cross-section, have a greater tendency to form flaws during pressing, handling, and drying than smaller cross-sectional samples.

~~3.3 Other tests for which these specimens may be used encompass, but are not limited to, the following ASTM standards: Method C16, Test Methods C20, Test Method C113, Test Methods C133, Test Method C179, Test Method C288, Test Method C417, Test Method C577, Test Method C583, Test Method C704, Test Methods C830, Test Method C832, Practice C874, Test Method C885, and Test Method C914.~~

~~3.3~~ The purpose of this practice is to minimize flaws in pressed specimens. It is not intended to duplicate all field installation conditions.

3.4 Variations in workability as determined by Test Method C181 can significantly affect the number of flaws contained in a specimen. ~~For comparison testing between two laboratories, Establish by mutual agreement the workability level should be established by mutual agreement when comparing tests between two laboratories.~~

3.5 This practice is not intended for preparing specimens of basic ramming mixes, anhydrous tap-hole mixes, nor resin bonded mixes.

4. Apparatus

4.1 *Power Press*, preferably of the hydraulic type, equipped with suitable molds for forming specimens of the required size (Note 1). ~~The press should be~~ and capable of pressing to a minimum of 1500 psi (10.34 MPa) pressure when forming the largest cross-sectional area specimen.

NOTE 1—It may be advisable to have the molds slightly oversized so that, after drying, the specimens will be close to the required size for the specific test.

4.2 *Drying Oven*, preferably forced-draft rather than natural convection, capable of ~~reaching~~ maintaining 230°F (110°C) with a capacity to hold ~~ten 9-in. (228-mm) straight brick~~ the specimens.

4.3 *Balance*, ~~15-lb (6.8 kg) capacity~~ sufficient capacity to measure specimens with sensitivity of 0.02 lb (9 g).

4.4 *Thermometer*, with a range of 0° to 180 ± 0.1°F (–18°(–18° to 80°C ± 0.05°C).

4.5 *Linear Measuring Device*, a 12-in. (305-mm) graduated ~~in~~ capable of being read to 0.02-in. (0.5-mm) increments.

4.6 *Mold Lubricant*—Either paraffin or silicone-based oils can be used as a parting agent for coating mold and die surfaces.

4.7 ~~Two Non-Porous Blocks—Blocks, (Two required)~~ approximately ½-in. (13-mm) thick. The cross-sectional dimensions of these pieces will vary, depending on the side dimensions of the bar being pressed.

5. Sampling

5.1 ~~The~~ Keep the container or package should not be opened prior to unopened until testing to ensure that the contents do sample does not dry out.

5.2 ~~At the time of the test, the sample should be~~ The ideal sample test temperature is between 65 and 75°F (18 and 24°C). Measure the temperature by inserting the full length of the thermometer stem into the material. Note and record temperature when the reading is constant.

6. Procedure

6.1 *Workability Index Measurement* (Note 2)—Determine and report workability of plastics at the time of pressing in accordance with the procedure described in Test Method C181 (Note 3).

NOTE 2—A workability index between 17 and 23 is the optimum range for pressing samples with a minimum amount of flaws. If higher workability material is used in referee tests between two or more laboratories, the workability should be the same, (±3 %), for the material being tested.

NOTE 3—Since no suitable standard test exists for gaging the workability of ramming mixes, participants in a referee test should agree that samples of similar formability are being tested.

6.2 *Molding of Filling the Mold Specimens*—Use the power press to form the test specimens. In order to facilitate filling the mold, break the material into pieces that vary in size, the largest dimension being 1-in. (25-mm). Carefully pack these pieces into the mold, in order to achieve uniform distribution of material.

6.2.1 Do not expose the material being pressed to the atmosphere for periods longer than 15 min. *Cover with an impermeable material if longer periods of air exposure are expected* (Note 4).

NOTE 4—Exposure in air may lead to a change in workability.

6.3 *Pressing of Specimens*—Apply a pressure sufficient to achieve a well-consolidated specimen (typically 750 to 1250 psi (5.17 to 8.62 MPa) for plastics, higher pressures may be necessary for ramming mixes) (Note 5). ~~This pressure should not be so high that~~ Avoid excessive pressure which forces a portion of the mix is forced-out of the mold by extrusion through the clearance space