



Designation: C862 – 16 (Reapproved 2020)

Standard Practice for Preparing Refractory Concrete Specimens by Casting¹

This standard is issued under the fixed designation C862; 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 practice covers the mixing, casting, and curing of monolithic refractory concrete specimens under laboratory conditions for use in further testing. It does not apply to monolithic castable refractories intended primarily for gunning applications.

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 Various specimen sizes are required for specific test methods. Refer to these test methods to determine the size and number of specimens, which will be required from the sample.

1.4 *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.*

1.5 *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

C133 Test Methods for Cold Crushing Strength and Modulus of Rupture of Refractories

C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

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 Nov. 1, 2020. Published November 2020. Originally approved in 1977. Last previous edition approved in 2016 as C862 – 16. DOI: 10.1520/C0862-16R20.

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. Significance and Use

3.1 This practice is used to standardize mixing, mold conditions, placement, and curing of refractory concrete specimens to be used for testing and evaluation under other test methods.

3.2 This practice standardizes laboratory conditions for producing refractory concrete specimens to minimize laboratory-to-laboratory variation and does not attempt to duplicate the conditions of field installations.

3.3 This practice can be used for the preparation of specimens used in referee testing.

4. Apparatus and Conditions

4.1 *Laboratory Conditions*—The laboratory ambient should be controlled between 70 and 80 °F (20 and 27 °C) (**Note 1**) and from 40 to 60 % relative humidity for preconditioning materials and equipment, batching and mixing casting test specimens, stripping molds, and testing specimens. Report laboratory temperature and relative humidity with physical test results if other than specified.

NOTE 1—A 5 to 6 °F temperature difference can drastically change the set time of a mix. It is a good practice to always record ambient temperature conditions for each cast.

4.2 *Balances*—Appropriately sized scales having a sensitivity of 0.2 % of the related batch size.

4.3 *Castable Mixers*—An electrically operated mechanical mixer (**Fig. 1**) may be used for preparing castable batches for casting specimens. A 2-ft³ (0.057 m³) mixing bowl or a 2½-ft³ (0.071 m³) concrete mixer has sufficient capacity to mix about 1 ft³ (0.0285 m³) of refractory castable. The smallest batches required for casting 1-in. (25 mm) square bars can be mixed in a 0.10-ft³ (0.0028 m³) bowl available with bench mixers. Size mixing bowl to contain from 50 to 75 % volume loading with the dry batch. Castable water requirement variation becomes more significant as dry volume loadings drop below 40 % because the water required to wet the bowl surfaces changes more rapidly with decreasing volume loadings.

4.4 *Molds*—Typical molds are 9 by 2 by 2 in. and 2 by 2 by 2 in. made from metal, plastic, or rubber and are watertight, rigid, and removable. There are commercially available molds from concrete testing suppliers and other sources. Molds may



FIG. 1 Five-Quart Mixer

be reusable or for single use. Although brick-sized shapes may be cut with a diamond saw to obtain a specific size, it is preferable to fabricate the desired shape. The smallest mold dimension should be a minimum of three times the largest aggregate diameter, as specified in Practice C192/C192M. In some cases, when smaller specimens are required and grain sizing does not allow for smaller castings, cut specimens may be used. See Table 1.

4.5 *Calipers*—Suitable for measuring internal longitudinal mold dimensions and subsequent specimen length size to the nearest 0.01 in. (0.25 mm).

4.6 *Mold Lubricant*—Either paraffin or silicone-based oils can be used as a release or parting agent for coating molds. Other mold lubricants such as vegetable oils and petroleum-based oils can be used.

4.7 *Strike-Off Bar*—Straightedge tool (trowel, bar, or other) at least 2 in. wider than mold width.

4.8 *Thermometer*—Digital or dial-type, metal, with a range from 0 to 180 °F (–18 to 80 °C).

4.9 *Timer*—Signal-type. (A stopwatch may be used.)

4.10 *Trowels*—6 in. pointing and 2 by 6 in. (51 by 152 mm) square, and a 10-in. (254-mm) stainless steel spatula.

4.11 *Oven*—For curing and drying, preferably forced draft rather than natural convection, with a capacity to hold a minimum of one sample group of specimens (12 by 12 by 12 in.) (30 by 30 by 30 cm).

4.12 *Heavy Rubber Gloves*—For castables containing metal fibers.

4.13 *Scoop*—For transferring the castable from the mixer to the mold more easily.

4.14 *Vibration Table*—For use in 6.4.2.

4.15 *Sample Splitters*—The sample splitter opening shall be a minimum of three times the maximum grain size.

4.16 *Hoe*—Handheld hoe for mixing lightweight castable.

4.17 *Humidity Cabinet*—A cabinet capable of maintaining a relative humidity of greater than 95 % within 90 to 95 °F (32 to 35 °C) is optional.

5. Sampling

5.1 A sufficient amount of dry castable should be batched to overfill the molds by at least 10 %. This should eliminate the use of both trailings and scrapings of wet castable.

5.2 At the time of use, the dry sample should be between 70 and 80 °F (20 and 27 °C). Measure the temperature (Note 2) by inserting the full length of the thermometer stem into the material until the reading is constant. Record and report with physical test results.

NOTE 2—It is recommended that in referee tests involving more than one laboratory, the temperature of the dry refractory concrete mix and mixing water be within the specified range, in all laboratories.

5.3 The contents of the container should be thoroughly mixed dry prior to water addition. When less than a full bag is required, reduce the contents of the sample container with a sample splitter to obtain a representative sample of the desired size. When the sample consists of more than one bag or container, the contents should be combined and mixed thoroughly before being sent through the sample splitter. Take precautions to prevent segregation.

6. Molding Test Specimens

6.1 *Water Addition*—Determine the amount of water to be used in the mix for casting test specimens in accordance with

TABLE 1 Metric Mold Equivalents

	Metric Equivalents										
in.	1/32	1/8	5/32	3/16	1/4	5/16	3/8	1/2	9/16	5/8	11/16
mm	0.8	3	4	5	6	8	10	13	14	16	17
in.	7/8	13/16	1 1/2	2 1/2	2 5/8	3 3/16	4	4 1/2	9	14 3/4	
mm	22	30	38	65	67	81	102	114	230	375	