



Designation: **C92 – 95 (Reapproved 2010) C92 – 95 (Reapproved 2015)**

Standard Test Methods for Sieve Analysis and Water Content of Refractory Materials¹

This standard is issued under the fixed designation C92; 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 These test methods cover a wet and a dry method for sieve analysis of refractory materials.

1.1.1 *Wet Sieve Analysis*—Water promotes the slaking of clays and helps to separate fine particles, washing them from the larger grains. This method is recommended for use with materials that require water addition, and that slake in normal industrial use.

1.1.2 *Dry Sieve Analysis*—The dry method is not as effective as the wet method in determining the amount of material present in the smaller particle sizes. It is recommended (1) for clays, when the slaking action of water is undesirable, (2) when the material is in the form of coarsely ground grog and calcine, and (3) when the clay is to be used in such a way that the ultimate particle size is of secondary importance.

1.2 These test methods also cover determination of the water content of refractory materials in the wet condition and of air-dried samples as received, so that the sieve analysis can be calculated on the dry basis. Included is a method for obtaining the water content of other refractory materials, such as plastic refractories and wet mixes.

1.3 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.

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:²

[C429 Test Method for Sieve Analysis of Raw Materials for Glass Manufacture](#)

[E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves \(2015\)](#)

[E105 Practice for Probability Sampling of Materials](#)

[E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process](#)

2.2 *Other Document*:

[ASTM STP 447 Manual on Test Sieving Methods](#)³

3. Significance and Use

3.1 Particle size distribution has a major affect upon most of the refractory properties. These test methods provide a means of measuring the distribution for the purpose of comparison to the desired distribution.

3.2 These test methods also cover determination of the water content of refractory materials in the wet condition and of air-dried samples received, so that the sieve analysis can be calculated on the dry basis.

3.3 These methods can produce data for specification acceptance, design purposes, manufacturing control, and research and development.

¹ These test methods are under the jurisdiction of ASTM Committee C08 on Refractories and are the direct responsibility of Subcommittee C08.03 on Physical Properties. Current edition approved Nov. 1, 2010/March 1, 2015. Published November 2010/April 2015. Originally approved in 1943. Last previous edition approved in 2005/2010 as C92 – 95 (2005) (2010). DOI: 10.1520/C0092-95R10-10.1520/C0092-95R15.

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 Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

3.4 A reference set of standard matched or calibrated sieves⁴ shall be provided for use in checking the set of sieves used in the actual sieve analysis of samples. The sieves for use in sieve analysis may also be standard matched sieves or may be unmatched sieves conforming to the Specification Table in Specification E11, provided that such sieves will give results that differ by no more than 5 % from those obtained with the reference set when the two sets are compared in accordance with the section of Test Method C429 on testing of sieves and samples splitters.

4. Apparatus

4.1 ASTM sieves, or the equivalent Tyler Series listed in Table 1, shall be used. The wire cloth for the sieves, described in Specification E11, shall be woven (not twilled) and mounted without distortion or looseness in 8-in. (200-mm) diameter circular frames. Pans and covers shall be provided for the sieves.

5. Sampling, Test Specimens, and Test Units

5.1 A representative sample of the material to be tested shall weigh at least four to five times the required weight of the actual test specimen. Material on which the water content is to be determined shall be packed in a watertight container.

5.2 Water Content:

5.2.1 *Wet-Type Air-Setting Refractory Mortars*—Remove approximately 50 g of the material immediately after opening the original container and after carefully mixing the contents. To facilitate handling the specimen, place it on a tared piece of waxed paper or aluminum weighing dish. Weigh the test specimen to the nearest 0.1 g both before and after drying for 24 h at 220 to 230°F (105 to 110°C). Calculate the percentage of water to the nearest 0.1 % on the as-received basis.

5.2.2 *Materials Other Than Wet-Type Air-Setting Refractory Mortars* (ground fire clays, fireclay mortars, dry-type air-setting mortars, plastic refractories, and similar materials)—If the material is shipped in the wet condition, prevent loss of water before obtaining a test specimen of approximately 250 g. Weigh the test specimen to the nearest 0.1 g both before and after drying for 3 h at 220 to 230°F (105 to 110°C). Calculate the percentage of water to the nearest 0.1 % on the as-received basis. The dried specimen may be required for further tests (see Sections 6 and 7).

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6. Dry Materials

6.1 If the material is received in the dry condition, the test specimen (Note 1) shall consist of the dried and weighed test specimen prepared in accordance with 5.2.2.

NOTE 1—The size of the test specimen may be changed by reason of the nature of the material. For example, some clays tend to pack or cake on the sieves when ground to exceedingly fine particle size, in which case a 100-g sample may be used. For plastic refractories or coarsely ground mixes, the weight of the specimen could be increased to 500 g.

7. Wet Materials

7.1 Materials prepared with water (plastic refractories, wet-type high-temperature bonding mortars, etc.) shall be tested as received. Take two test specimens immediately after opening the original container and, in the case of mortars, after carefully mixing the contents. Use one specimen for determining the water content in accordance with either 5.2.1 or 5.2.2. Obtain

⁴ The sole source of supply of matched sieves known to the committee at this time is W. S. Tyler, Inc., Mentor, OH 44060. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

TABLE 1 ASTM Sieves and the Equivalent Tyler Standard Series

	Tyler Standard Series (Mesh Designation)	Sieve Opening
0.265 in.	3	6.7 mm
4	4	4.75 mm
6	6	3.35 mm
8	8	2.36 mm
12	10	1.70 mm
16	14	1.18 mm
20	20	850 μm
30	28	600 μm
40	35	425 μm
50	48	300 μm
70	65	212 μm
100	100	150 μm
140	150	106 μm
200	200	75 μm