



Designation: C1655 – 06 (Reapproved 2022)

Standard Classification of Fireclay and High-Alumina Mortars¹

This standard is issued under the fixed designation C1655; 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 classification pertains to fireclay and high-alumina refractory mortars that can be trowelled, dipped or painted to join or coat refractory bricks and shapes.

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 *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.*

1.4 *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

- [C27 Classification of Fireclay and High-Alumina Refractory Brick](#)
- [C199 Test Method for Pier Test for Refractory Mortars](#)

3. Significance and Use

3.1 Refractory mortars are used for laying, bonding and coating refractory brick. They become an integral part of the resulting refractory lining or structure. Therefore, such mortars should be selected in order to closely match those of the brick. A classification system is provided for use in producing, purchasing and using different types of refractory mortars.

¹ This practice is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.92 on The Joseph E. Kopanda Subcommittee for Editorial, Terminology and Classification.

Current edition approved Sept. 1, 2022. Published October 2022. Originally approved in 1976. Last previous edition approved in 2016 as C1655 – 06 (2016). DOI: 10.1520/C1655-06R22.

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.

4. Basis of Classification

4.1 *Heat-Setting Mortars*—This class hardens at elevated temperature by forming a ceramic bond. The minimum temperature required for forming the ceramic bond is usually at least 2000 °F (1095 °C).

4.2 *Air-Setting Mortars*—This class initially hardens at ambient temperatures in contact with air and forms a strong bond upon drying at 230 °F (110 °C).

4.3 *Chemically Bonded Mortars*—Mortars in this class cannot be said to truly airset, since they require some heating to initiate hardening. However, they harden at temperatures lower than those required for ceramic bonding. A common example of a chemically bonded mortar is a phosphate-bonded mortar.

4.4 Each of the above classes of mortar are further classified by the condition in which they are supplied:

4.4.1 *Dry Mortars*—This class is supplied dry and must be mixed with water prior to use.

4.4.2 *Wet Mortars*—This class is supplied in a ready for use.

4.5 The above classes of mortars are further classified for usage with a particular type of brick as prescribed in [Table 1](#).

5. Test Methods

5.1 The properties enumerated in this classification shall be determined in accordance with the following ASTM test methods:

5.1.1 *Pier Test*—Test Method [C199](#). For medium-duty, high-duty, super-duty and high-alumina mortar classes test with appropriate brick that meet requirements specified in Test Method [C199](#). For high-alumina mortars in the 80 %, 85 %, 90 %, and 99 % classes test with high-alumina brick from the appropriate class meeting the requirements specified in Classification [C27](#).

5.1.2 *Alumina Content*—XRF and ICP after calcining to 1830 °F (1000 °C).

6. Retests

6.1 Because of possible variables that may result from sampling or an unsatisfactory reproducibility of tests by different laboratories, the material may be resampled and retested at the request of either purchaser or the manufacturer. This could apply where the first test results may not conform to the requirements prescribed in this classification. Therefore,

TABLE 1 Classification of Fireclay and High-Alumina Mortars

Class of Brick	Class of Mortar	No Flow from Joints in Pier Test (Test Method C199) when fired to:	Minimum Alumina (Al ₂ O ₃) content, %
Medium-Duty	Medium-Duty	2550 °F (1400 °C)	
High-Duty	High-Duty	2730 °F (1500 °C)	
Super-Duty	Super-Duty	2910 °F (1600 °C)	
High-Alumina up 70 %	High-Alumina	3100 °F (1705 °C)	
High-Alumina 80 %	High-Alumina 80 %	3100 °F (1705 °C)	77.5
High-Alumina 85 %	High-Alumina 85 %	3100 °F (1705 °C)	83.0
High-Alumina 90 %	High-Alumina 90 %	3100 °F (1705 °C)	88.0
High-Alumina 99 %	High-Alumina 99 %	3100 °F (1705 °C)	97.0

the final results to be used shall be the average of at least two series of tests, each of which has been obtained by following the testing procedures in detail.

7. Keywords

7.1 classification; fireclay mortars; high-alumina mortars

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