Designation: C863 – 00(Reapproved 2010)

Standard Test Method for Evaluating Oxidation Resistance of Silicon Carbide Refractories at Elevated Temperatures[1]

This standard is issued under the fixed designation C863; 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 test method covers the evaluation of the oxidation resistance of silicon carbide refractories at elevated temperatures in an atmosphere of steam. The steam is used to accelerate the test. Oxidation resistance is the ability of the silicon carbide (SiC) in the refractory to resist conversion to silicon dioxide (SiO_2) and its attendant crystalline growth.

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:*[2]

C20 Test Methods for Apparent Porosity, Water Absorption, Apparent Specific Gravity, and Bulk Density of Burned Refractory Brick and Shapes by Boiling Water

C830 Test Methods for Apparent Porosity, Liquid Absorption, Apparent Specific Gravity, and Bulk Density of Refractory Shapes by Vacuum Pressure

C914 Test Method for Bulk Density and Volume of Solid Refractories by Wax Immersion

3. Significance and Use

3.1 The oxidation of silicon carbide refractories at elevated temperatures is an important consideration in the application of these refractories. The product of oxidation is amorphous silica or cristobalite, depending upon the temperature at which oxidation takes place. This oxide formation is associated with expansion and degradation of strength. The quantity of water vapor in the atmosphere greatly affects the rate of oxidation.

3.2 The test, which creates and measures the expansion, is suitable for guidance in product development and relative comparison in application work where oxidation potential is of concern. The variability of the test is such that it is not recommended for use as a referee test.

4. Apparatus

4.1 *Heated Chamber*—The chamber shall be muffled (Note 1) to confine the atmosphere. The size of the chamber and the heat source are optional. The temperature capability within the chamber shall be at least 1200°C (2190°F) with an allowable deviation of ±15°C (27°F) measured across the hearth.

NOTE 1—Silicon carbide refractory material is recommended for use as the muffle but other suitable refractory materials may be used.

4.2 *Instrument*—Control and record the temperature of the chamber by a suitable instrument capable of maintaining the requirements in 4.1. Recommended thermocouple location is within 1 in. (25 mm) of the top of the specimens and over the center of the same assemblage.

5. Test Specimen

5.1 *Specimen Size*—Obtain a quarter-brick size from a 229-mm (9-in.) straight by cutting the brick along planes parallel to both the 229 by 64-mm (9 by 2½-in.) and the 114 by 64-mm (4½ by 2½-in.) faces. Alternative specimens may be tile, 165 by 114 by 22 mm (6½ by 4½ by 7/8 in.), or other convenient shapes.

5.2 Three specimens are required for each set of conditions.

6. Conditions

6.1 *Atmosphere*—Steam is passed into the chamber (4.1) at the rate of 32 kg/m^3 (2 lb/ft^3) of chamber volume per hour. Provisions should be made to uniformly distribute steam within the chamber.

6.2 The standard test temperatures are as follows with new samples used at each temperature. Each temperature constitutes a test.

800°C	(1470°F)
900°C	(1650°F)
1000°C	(1830°F)
1100°C	(2010°F)
1200°C	(2190°F)

[1] 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 Nov. 1, 2010. Published November 2010. Originally approved in 1977. Last previous edition approved in 2005 as C863 – 00 (2005). DOI: 10.1520/C0863-00R10.

[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.