



Standard Test Method for Isothermal Corrosion Resistance of Refractories to Molten Glass¹

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1. Scope

1.1 This test method covers the determination of the corrosion resistance of refractories in contact with molten glass under static, isothermal conditions.

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

2. Referenced Documents

2.1 ASTM Standards:²

E220 Test Method for Calibration of Thermocouples By Comparison Techniques

3. Significance and Use

3.1 This test method provides a rapid, inexpensive method for comparing the corrosion resistance of refractories. The isothermal conditions of this test method represent the most severe static corrosion environment possible at the specified test temperature. This test method is suitable for quality control, research and development applications, and for product value studies on similar materials. Tests run at a series of temperatures are often helpful in determining the use temperature limitations of a particular material. Melt-line corrosion results are also a useful indication of relative resistance to both upward and downward drilling corrosion mechanisms. Exami-

nation of test specimens also provides information about the tendency for a particular refractory to form stones or other glass defects.

3.2 Because this test method is both isothermal and static and since most glass-contact refractories operate in a dynamic system with a thermal gradient, test results do not directly predict service in a furnace. The effects of differing thermal conductivities, refractory thickness, artificial cooling or insulation upon the refractory thermal gradient, and the erosive action of moving molten glass currents are not evaluated with this test.

4. Apparatus

4.1 *Glass-Melting Test Furnace*, heated with some type of electrical resistor (**Note 1**) and having a chamber large enough to receive four crucible assemblies of the type used in the test (**Fig. 1**) is required. The zone of the furnace in which the crucibles will rest should possess a maximum transverse thermal gradient of $\pm 1.8^\circ\text{F}$ ($\pm 1^\circ\text{C}$). **Fig. A1.1** shows a schematic drawing of a furnace that is satisfactory for this test.

NOTE 1—It has been demonstrated that gas-fired furnaces show greater variability and higher average corrosion with this test method and are therefore generally unsuitable.

4.2 *Temperature-Control Instrumentation*, capable of maintaining the desired temperature to $\pm 1.8^\circ\text{F}$ ($\pm 1^\circ\text{C}$).

4.3 *Thermocouple*, for use as the temperature-measuring device. The type of thermocouple chosen will depend on the normal use temperature of the furnace. Since thermocouples age with a consequent drift in the signal fed to the control instrument, check the couple before each test run with a calibrated thermocouple. Method **E220** specifies calibration procedures for thermocouples. If drift becomes severe, replace the thermocouple. Position the thermocouple hot junction in the furnace to coincide with the level of the glass line of the test samples.

4.4 *Platinum Crucibles* (**Fig. 1**).

4.5 *Sintered Zircon*, or other refractory wafers (**Annex A2**).

4.6 *Zircon Cement* (**Annex A3**).

4.7 *Measuring Microscope*.

¹ This test method is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.10 on Refractories for Glass.

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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.