Designation: C 874 – 99 (Reapproved 2004)

Standard Practice for Rotary Slag Testing of Refractory Materials[1]

This standard is issued under the fixed designation C 874; 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 practice describes a procedure for comparing the behavior of refractories to the action of molten slag in a rotating test furnace. A reference material should be included in each test and run for comparison. No numeric results are obtained from this practice. Numeric evaluation of test results is the responsibility of the test operator. The test and equipment are patterned after a method developed by Valley Dolomite Corporation[2].

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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. Significance and Use

2.1 This practice outlines a procedure which, when appropriate evaluation methods are added, can be useful in the development of new products or in the selection of products to be used in contact with a particular slag composition.

2.2 A gradient exists through the test specimens that is controlled by the thermal conductivity of the specimens and backup material. The slag is constantly renewed so that a high rate of corrosion is maintained. The flow of the slag can cause mechanical erosion of materials. The tilt and rotational speed of the furnace will affect the amount of mechanical erosion.

2.3 Use caution in interpreting results when materials of vastly different types are included in a single run. Care must be taken to prevent oxidation of carbon-containing materials during heat up; failure to do so can result in highly erratic results. A reference refractory specimen, or specimens, should be used for comparison.

3. Apparatus

3.1 *Furnace*, consisting of a cylindrical shell, typically 18 in. (456 mm) long and with a 10-in (254-mm) inside diameter, mounted on rollers and motor driven. Both the rotation and tilt of the furnace along its long axis should allow for adjustment.

3.2 *Burner*—A gas-oxygen torch capable of heating the furnace to 3200°F (1760°C). The burner should be equipped with flowmeters to monitor gas and oxygen flows.

3.3 *Optical Pyrometer*.

3.4 *Tools*, for (*1*) a means of feeding slag pellets into furnace, and (*2*) to assemble and dismantle the furnace.

3.5 *Gas Atmosphere Analyzer and Sampling Equipment*.

3.6 *Mold*, to form plastic, castable, and rammed samples.

3.7 *Molds*, to form slag pellets.

3.8 *Abrasive Saws*, to cut brick samples.

3.9 *Supply of Granular Refractory Backup Material*.

3.10 *Safety Equipment*.

4. Test Specimens

4.1 Test specimens should be 9 in. (228 mm) long and have a cross section as shown in Fig. 1. The 1.75 by 9-in. (44 by 228-mm) face should be an original surface.

4.2 One or more reference samples should be included in each test run.

5. Assembly

5.1 Six test specimens, as described in Section 4, shall constitute a test lining. This lining can be assembled around a hexagonal shaped mandrel with 1.75-in. (44-mm) faces and taped or steel-banded for subsequent handling. The lining should be positioned midway in the 18-in. (456-mm) length of the shell. Any suitable granular or castable refractory material may be installed behind the test lining.

5.2 It has been found convenient to use precast plugs to fill the two ends of the shell. These should be 4.5 in. (114 mm) thick by 10 in. (254 mm) in diameter to fit inside the shell. The hexagonal holes in the plug should match those of the test lining. For basic slags, the plugs should be formed using a 98 % MgO ramming or casting mix; for acid slags, the plugs shall be formed using a +90 % Al_2O_3 ramming or casting mix. The whole assembly should be held in place by retaining rings bolted to each end of the shell.

[1] This practice is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.04 on Chemical Behaviors.

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[2] Cash, P., "Measuring Refractory Resistance to Hot Slags," *Ceramic Age,* August 1966, pp. 20–29.