~~Designation:C 181–03~~ Designation: C 181 – 09

Standard Test Method for Workability Index of Fireclay and High-Alumina Plastic Refractories[1]

This standard is issued under the fixed designation C 181; 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 determination of the workability index of fireclay and high-alumina plastic refractories by measuring the plastic deformation of a molded test specimen when subjected to impacts.

~~1.2~~

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]

D 2906 Practice for Statements on Precision and Bias for Textiles

3. Significance and Use

3.1 Workability index serves as a measure of the facility with which plastic refractory materials can be rammed, gunned, or vibrated into place.

3.2 Workability index is commonly used to control consistency of plastics during manufacture. It has also been found useful for specification acceptance by the consumer.

3.3 The workability index determination can provide information for developing a plastic body. When a sample splits under impact at various water contents, it is an indication that the material is "short" or lacking in plasticity.

3.4 Determinations on samples that split during impact will be difficult to reproduce. If the sample splits, the measurement is not a true indication of deformation. This should be noted in the report.

4. Apparatus

4.1 *Rammer*—The apparatus shall consist of the device known as the sand rammer for refractories (see Fig. 1). It shall consist essentially of a steel cylindrical mold (specimen tube) 2.00 in. (50.8 mm) in inside diameter and 4.75 in. (120.6 mm) in length, supported in a vertical position on the same axis as a shaft to which shall be fastened a plunger that fits inside the mold. A 14-lb (6.4-kg) cylindrical weight slides on the same shaft and is arranged to fall a distance of 2 in. (51 mm) before engaging a collar fastened to the shaft. As shown in Fig. 1~~, the weight may be raised by a manually rotated cam. Provision shall be made to support the weight, thereby removing the load from the vertical shaft by the installation of two hooks (having a 10-32 screw thread) in the top side of the weight in a position that enables them to engage with pins (having an 8-32 screw thread) placed on each side of the upper portion of the framework, as shown in Fig. 1 and in detail in~~ , the weight may be raised by a manually rotated cam. Provision shall be made by the equipment manufacturer to support the weight, thereby removing the load from the vertical shaft (example shown in Fig. 2~~. A steel rule, one edge graduated in 0.02-in. (0.5-mm) increments, shall be attached~~ (). The sand rammer will include a linear scale capable of measuring sample height to 0.02 in. (0.5 mm) with a typical range of 1.7–2.5 in. (Note 1~~) to the rammer so that the position of the end of the vertical shaft can be read. The portion of the rule to be used shall be adjusted so that when the vertical shaft is in the lowest position, its machined end is in alignment with the graduation on the rule that~~

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Current edition approved Sept. 1, 2009. Published October 2009. Originally approved in 1943. Last previous edition approved in 2003 as C 181 – 03.

[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.

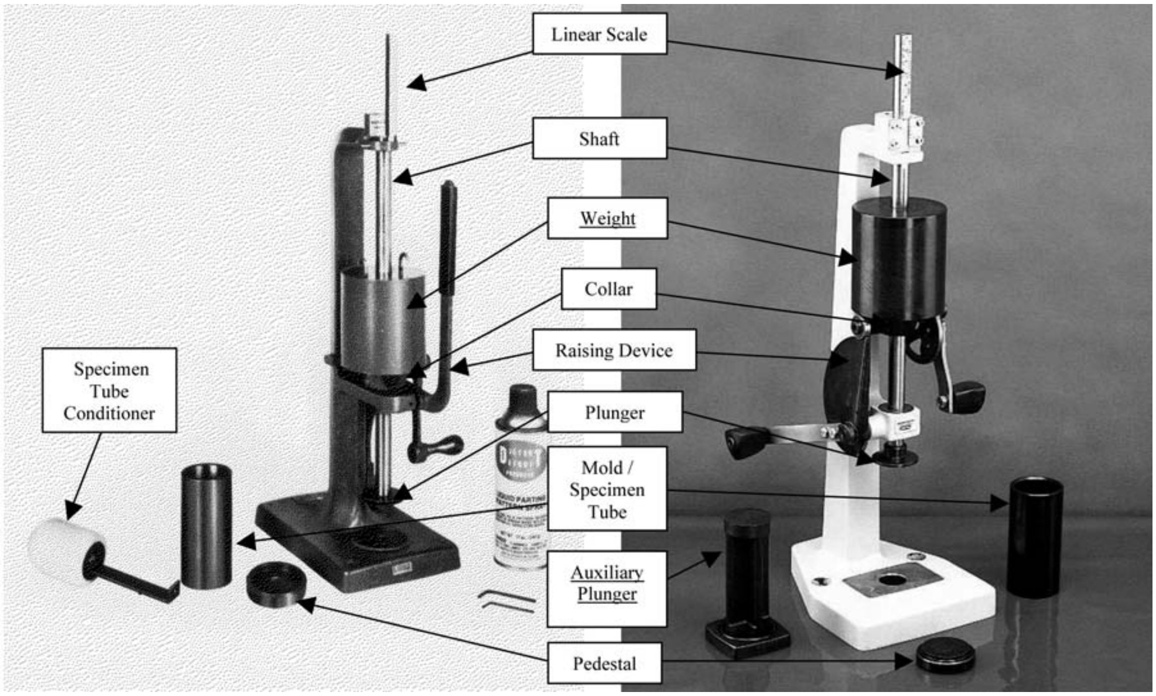

FIG. 1 Apparatus for Workability-Index Test

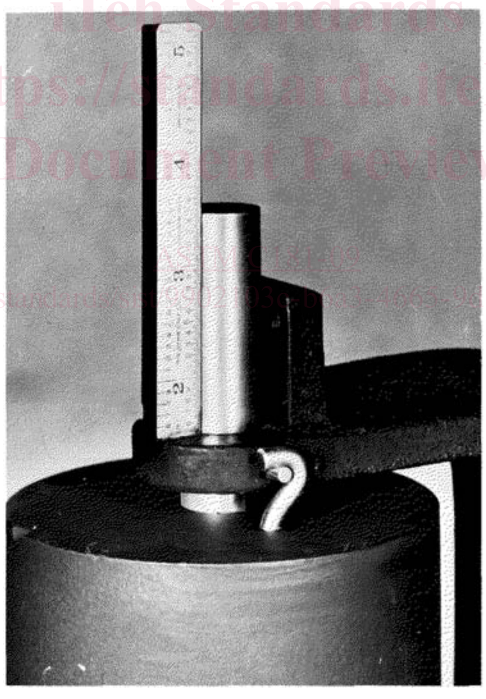

FIG. 2 Example of Provision to Suspend Weight

~~represents the exact distance between the top and bottom of the bottom plate of the mold (approximately 1.7 in. (43 mm)). The upper end of the scale may be cut off flush with the top of the rod (see Note 1), which provides a rule of sufficient length for measuring the maximum distance obtainable between the ends of the mold (Note 2).~~). The portion of the scale to be used shall be adjusted so that when the vertical shaft is measuring a 3.00 in. standard, 3.00 in. is read on the scale.

~~NOTE 1—One method of mounting the rule is to install in a vertical position a ⅜-in. (9.5-mm) square rod, 4⅛ in. (105 mm) in length, in that part of the framework which constitutes the top bearing for the shaft. One end of the rod is reduced to a ¼-in. (6.4-mm) round section for a length of ⅜ in., and this is threaded for a ¼-20 screw. A tapped hole, to receive the threaded rod, is made in the framework and on the center line (from front to back) of the apparatus. When tightening the rod in place, one face must be in a position so that the rule can be sweat-soldered to it as shown in Fig. 2.~~

~~NOTE 2—The apparatus as described in this section is capable of measuring workabilities up to about 32%. For products of higher workability a suitable spacer block may be installed under the specimen.~~ 1—The apparatus as described in this section is capable of measuring workabilities up to about 32 %.