Designation: C1445 – 07

StandardTest Method for Measuring Consistency of Castable Refractory Using a Flow Table[1]

This standard is issued under the fixed designation C1445; 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 procedure for determining the consistency of castable refractory mixes by the flow table method.

1.2 This test method applies to regular weight castable refractories, insulating castable refractories, and castable refractories that require heavy vibration for forming, which are described in Classification C401. They also apply to such castables containing metal fibers.

1.3 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.

1.4 *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]

C71 Terminology Relating to Refractories

C230/C230M Specification for Flow Table for Use in Tests of Hydraulic Cement

C401 Classification of Alumina and Alumina-Silicate Castable Refractories

C860 Test Method for Determining the Consistency of Refractory Castable Using the Ball-In-Hand Test

D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis

3. Significance and Use

3.1 The amount of water used in a castable mix for preparing test specimens has a significant influence on subsequent test results. This test method is used primarily to determine and reproduce the consistency required for the optimum casting of refractory castables in the preparation of test specimens and to express that consistency quantitatively. The correct water content is one of the major factors that must be controlled to obtain uniform test specimens. Excess water can reduce strength, increase volume shrinkage, and promote segregation of the castable ingredients. Insufficient water can produce "honeycombs" (air voids) in the castable because of poor consolidation during placement and prevent complete hydration of cement.

3.2 The flow table (see sketches in Specification C230/C230M) has been found to be an excellent tool for measuring the consistency of a castable and should be used in cases where a numerical result is required. Since castables differ somewhat in their "body" or plasticity, it has been found that a good casting range, expressed numerically, might vary from castable to castable. While one material may cast well between 40 and 60 % flow, another material may need to be in the 60 to 80 % flow range to properly flow. Because of this, it has been found that no arbitrary optimum range can be stated for all castables. The flow table then becomes a tool for measuring the flow and not determining it. It can allow the operator to follow the manufacturer's recommendations or to reproduce the consistency of a particular castable between laboratories.

3.3 Total time of wet mixing must be closely controlled to obtain reproducible results.

[1] This test method is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.09 on Monolithics.

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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.

Plibrico Ruggedness Test C1445 3/8/2006 23 C Material & Lab Temp

Material used : NIST Calibration Material for C239 Flow Table
Assigned Flow:
Sample # AF-4 111
Plibrico Flow (25 taps) : 109, 109

Ruggendsness Variables

A	Tamper rectangular
a	Tamper round
B	Tamper sealed
b	Tamper unsealed
C	1/2 half fill / 1/2 half tamp - repeat
c	Full mold / full tamp
D	Tamp 44 times
d	Tamp 36 times
E	Table drop 15X in 7 sec
e	Table drop 15X in 11 sec
F	Operator 1 (Len)
f	Operator 2 (Pat)
G	Dummy
g	Dummy

Ruggedness Matrix

1	2	3	4	5	6	7	8
A	A	A	A	a	a	a	a
B	B	b	b	B	B	b	b
C	c	C	c	C	c	C	c
D	D	d	d	d	d	D	D
E	e	E	e	e	E	e	E
F	f	f	F	F	f	f	F
G	g	g	G	g	G	G	g

Results (flow in mm)

Replicate

1	196	196	195	195	197	197	195	197
	199	196	197	200	197	197	196	198
	199	196	196	201	199	199	199	199
	199	197	195	198	200	199	199	198
avg	**198**	**196**	**196**	**199**	**198**	**198**	**197**	**198**
2	195	199	199	196	198	196	198	197
	198	198	199	198	199	197	198	197
	199	200	198	201	201	197	200	199
	198	198	198	199	201	196	198	198
avg	**198**	**199**	**199**	**199**	**200**	**197**	**199**	**198**
3	196	196	196	198	194	194	199	194
	196	197	197	200	197	196	199	196
	196	197	197	197	201	196	199	197
	197	197	194	197	199	195	199	195
avg	**196**	**197**	**196**	**198**	**198**	**195**	**199**	**196**

Results (flow %)

Replicate

1	94.1%	92.2%	92.2%	95.1%	94.1%	94.1%	93.1%	94.1%
2	94.1%	95.1%	95.1%	95.1%	96.1%	93.1%	95.1%	94.1%
3	92.2%	93.1%	94.1%	94.1%	94.1%	91.2%	95.1%	92.2%

FIG. 1 Plibrico Ruggedness Test Results