Designation: C 492 – 92 (Reapproved 1998)

Standard Test Method for Hydration of Granular Dead-Burned Refractory Dolomite[1]

This standard is issued under the fixed designation C 492; 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 amount of hydration of a granular dead-burned refractory dolomite when exposed to moist air.

1.2 The values stated in inch-pound units are to 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. Referenced Documents

2.1 *ASTM Standards:*

C 92 Test Methods for Sieve Analysis and Water Content of Refractory Materials[2]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[3]

3. Significance and Use

3.1 The hydration of dead-burned dolomite grains is an important aspect of both manufacturing and using such grains. Moisture from any source will cause the grains to partially disintegrate, eventually making the dead-burned dolomite unfit for use. This test method may prove useful for determining, in a relative manner, which grains are more resistant to hydration than others.

3.2 Data from one laboratory might help in establishing internal limits for determining whether a particular batch of grain is suitable for refractory production. However, this test method takes great care to run, and is not recommended as a quality control test. Possibly, a specification might be developed between two parties if sufficient care in establishing the bias between the laboratories is carried out.

4. Apparatus

4.1 *Sieve*, ASTM No. 40 (425-µm) (equivalent to a 35-mesh Tyler Standard Series) conforming to Specification E 11, with pan and cover.

4.2 *Glass Petri Dishes*, 95 by 20-mm.

4.3 *Circulating Hot-Air Oven*, capable of operating at 220 to 230°F (104 to 110°C).

4.4 *Steam-Humidity Cabinet*, to be maintained at 160 ± 2°F (71 ± 1°C) and 85 ± 3 % humidity.[4]

4.5 *Scale*, having a capacity of 200 g, accurate to 0.02 g.

5. Sampling

5.1 The sample used shall be quartered or riffled so that it is typical of the material being tested both in screen size and oiling. All material passing the No. 40 (425-µm) sieve shall be removed from this sample by screening. All screening shall be done in accordance with Test Methods C 92 for dry sieve analysis.

6. Procedure

6.1 Place a 100 ± 0.1-g portion of the representative sample retained on the No. 40 (425-µm) sieve sample in a 95 by 20-mm Petri dish. Then place this dish in a hot-air oven for 1 / 2 h at 220 to 230°F (104 to 110°C) to prevent condensation of water on the sample when placed in a hot steam-humidity cabinet.

6.2 Transfer the Petri dish containing the sample from the hot-air oven to the steam-humidity cabinet, and cover with a glass plate at an angle of 45° to prevent dripping on the sample. The edges of the glass plate shall overhang the Petri dish by about ¾ in. (19 mm).

6.3 Maintain the steam-humidity cabinet at 160 ± 2°F (71 ± 1°C) and 85 ± 3 % humidity for 24 h. The time to reach these conditions shall be approximately ½ h. Then immediately remove the Petri dish from the cabinet and place in a hot-air oven at 220 to 230°F (104 to 110°C) for ½ h or until a constant weight is attained. Then screen the sample on a No. 40

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[2] *Annual Book of ASTM Standards*, Vol 15.01.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] An apparatus manufactured by the American Instrument Co., 8030 Georgia Ave., Silver Spring, MD, or the Electric Hotpack Co., Philadelphia, PA, has been found suitable for this purpose.

(425-µm) sieve and weigh the material passing the sieve to the nearest 0.1 g. Always run the tests in triplicate.

7. Report

7.1 Report the hydration of a sample as the average percentage of material passing the No. 40 (425-µm) sieve after the hydration test.

8. Precision and Bias

8.1 *Interlaboratory Study*:

8.1.1 An interlaboratory test program between four laboratories was conducted. Each laboratory tested three dolomitic materials. Each of the three dolomitic materials was tested four times.

8.1.2 No ruggedness test was run on this test method prior to conducting the interlaboratory study.

8.2 *Precision*:

8.2.1 *Repeatability*—The maximum permissible difference due to test error between two test results obtained by one operator on the same material is given by the repeatability interval and the relative repeatability interval (coefficient of variation). The 95 % repeatability intervals are given in Table 1. Two test results that do not differ by more than the repeatability interval will be considered to be from the same population, and, conversely, two test results that do differ by more than the repeatability interval will be considered to be from different populations.

8.2.2 *Reproducibility*—The maximum permissible difference due to test error between two test results obtained by two operators in different laboratories on the same type of material using the same type of test equipment is given by the reproducibility interval and relative reproducibility interval (coefficient of variation). The 95 % reproducibility intervals are given in Table 1. Two test results that do not differ by more than the reproducibility interval will be considered to be from the same population, and, conversely, two test results that do differ by more than the reproducibility interval will be considered to be from different populations.

8.3 *Bias*—This test method does not lend itself to a statement of bias.

9. Keywords

9.1 dolomite; grain; humidity cabinet; hydration resistance; refractories;

TABLE 1 Precision Data

Material Number	Average, $\bar{X}$	Standard Within, S_r	Deviation Between, S_R	Repeatability Interval, r	Reproducibility Interval	Coefficient of Variation		Relative Repeatability, % r	Relative Reproducibility, % R
						Within Lab, V_r	Between Labs, V_R		
1	23.94	0.8752	1.513	2.450	4.236	3.656	6.320	10.23	17.69
2	4.820	0.2325	0.5299	0.6510	1.484	4.824	10.99	13.51	30.79
3	3.645	0.1355	0.3007	0.3795	0.8419	3.717	8.250	10.41	23.10