



Designation: C121/C121M – 20

Standard Test Method for Water Absorption of Slate¹

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INTRODUCTION

It is often desirable to gain some idea of the porosity of a material in question. Actual determinations of the pore space require the use of rather elaborate and refined equipment as well as considerable precision in carrying out the tests. For comparative purposes the absorption test affords a simple and sufficiently accurate means of obtaining the desired information. As applied to slate this test requires somewhat more care and precision than many other materials because of its dense nature and, consequently, the small quantities to be dealt with. Furthermore, the cleavage of slate—that property which permits it to be split into thin sheets of uniform thickness—must be taken into consideration when this test is made. On this account misleading results are often obtained on cubical specimens due to accidental cleavage cracks in the specimens. The shapes of specimens and larger number of specimens recommended in the following procedure are intended to eliminate to a large extent the inconsistent results which may be obtained on this material.

1. Scope

1.1 This test method covers the determination of the water absorption of slate.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This test method is under the jurisdiction of ASTM Committee C18 on Dimension Stone and is the direct responsibility of Subcommittee C18.01 on Test Methods.

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2. Referenced Documents

2.1 *ASTM Standards*:²

C119 Terminology Relating to Dimension Stone

C1799 Guide to Dimension Stone Test Specimen Sampling and Preparation

3. Terminology

3.1 *Definitions*—All definitions are in accordance with Terminology C119.

4. Significance and Use

4.1 This test method is useful in indicating the differences in water absorption of slates. This test method also provides one element in the comparison of slates.

5. Test Specimens

5.1 The test specimens shall consist of square or rectangular slabs from $\frac{3}{16}$ to $\frac{5}{16}$ in. [5 to 8 mm] in thickness and not less than 4 in. [100 mm] on any side.

5.2 Not less than six specimens shall be prepared from each sample of slate, the sample being considered as any number of pieces selected to represent a definite part or grade of the deposit.

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.

6. Sampling

6.1 Select the sample to represent a true average of the type or grade of stone under consideration and of the quality supplied to the market under the type designation to be tested. The sample may be selected by the purchaser or his authorized representative from the quarried stone or taken from the natural ledge and shall be of adequate size to permit the preparation of the desired number of test specimens. When perceptible variations occur, the purchaser may select as many samples as are necessary for determining the variations in water absorption of slate.

NOTE 1—Refer to Guide C1799 for additional information on selecting, preparing, and conditioning test specimens.

7. Preparation of Specimens

7.1 Split the slate to the required thickness and saw to size. When the specimens are prepared from shingles no saw cut shall be nearer than 1 in. [25 mm] to the sheared edge of the shingle.

7.2 Free the specimens from loose particles by scrubbing with a fiber brush and clean water.

8. Procedure, Preferred Method

8.1 Dry the specimens for 48 h in a ventilated oven at a temperature of $140 \pm 4^\circ\text{F}$ [$60 \pm 2^\circ\text{C}$]. At the 46th, 47th, and 48th hour, weigh the specimens to ensure that the weight is the same. If the weight continues to drop, continue to dry the specimens until there are three successive hourly readings with the same weight.

8.2 After drying, cool the specimens in the room for 15 min and then weigh. When the specimens cannot be weighed immediately after cooling, place them in a desiccator. Determine the weight to the nearest 0.0005 oz [0.01 g].

8.3 Entirely immerse the specimens in filtered or distilled water at approximately $68 \pm 9^\circ\text{F}$ [$20 \pm 5^\circ\text{C}$] for 48 h, remove one at a time, wipe the surface dry with a slightly damp, absorbent towel (Note 2) and immediately weigh each specimen to the nearest 0.0005 oz [0.01 g].

NOTE 2—The operator should distinguish between a damp towel and a wet one. In starting the operation, the towel should be sprinkled lightly. When the surface of the specimen is properly wiped off, it should appear dry.

9. Procedure, Alternative Method

9.1 Occasionally it is desirable to obtain results in a shorter period than that required by the procedure described in Section 8. In such cases, the 48 h immersion period may be supplanted by an 8 h boiling period (Note 3). In this alternative method the operations shall be the same as described in Section 8 up to that of immersion. Instead of allowing the specimens to soak for 48 h place them in an enameled pan or other suitable vessel, cover

with water, and boil for 8 h. Before the final weighing, cool the specimens by allowing tap water to flow over them for at least 30 min.

NOTE 3—Boiling for 8 h has been found to give practically the same saturation as immersion for 48 h.

10. Calculation

10.1 Calculate the percentage of absorption as follows:

$$\text{Absorption, \%} = [(W_2 - W_1)/W_1] \times 100 \quad (1)$$

where:

W_1 = weight of the dried specimen, oz [g], and

W_2 = weight of the specimen after immersion, oz [g].

10.2 Calculate the average value of the test results using the following equation:

$$Cav = (\text{sum of individual test results})/(\text{number of tests}) \quad (2)$$

10.3 Calculate the standard deviation(s) of the test results using the following relation:

$$S = [(\text{sum of (test result} - Cav)^2 / (\text{number of tests} - 1))]^{1/2} \quad (3)$$

11. Report

11.1 The report shall include the following:

11.1.1 Date,

11.1.2 Testing agency,

11.1.3 Personnel responsible for reporting the test results,

11.1.4 Description of the testing equipment or apparatus used,

11.1.5 Identification of the samples, including name and location of the quarry, date when sample was taken and trade name or grade of slate,

11.1.6 Dimensions of each individual specimen,

11.1.7 Conditioning procedures used,

11.1.7.1 Amount of time the specimens were dried,

11.1.7.2 Amount of time the specimens were immersed,

11.1.8 Individual test results for each specimen,

11.1.9 Average value of the test results,

11.1.10 Standard deviation(s) of the test results, and

11.1.11 Statements describing deviations from the above-described testing procedures, as well as any variance from the test specimen dimensional and preparatory requirements.

12. Precision and Bias

12.1 Individual variations in a natural product may result in deviation from accepted values. A precision section will be added when sufficient data are available to indicate acceptable tolerances in repeatability and reproducibility.

13. Keywords

13.1 dimension stone; slate; test; water absorption