



Designation: C1922 – 23

Standard Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters by Way of Water Loss¹

This standard is issued under the fixed designation C1922; 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 provides for the determination of water retention of hydraulic cement based mortars and plasters. Water Retention is directly measured through the absorption of water from the mortar by the substrate. Various substrates may be chosen by the user based on the intended use of the tested mortar. This test method defines such substrates. Comparisons can be made between different mortars on the same substrate or the same mortar on different substrates.

1.2 This test method provides a water retention value via direct water loss, while Test Method C1506 provides a water retention value via mortar flow.

1.3 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. When combined standards are cited, the selection of the measurement systems is at the user's discretion subject to the requirements of the referenced standard.

1.4 The text of this test method references notes and footnotes that provide explanatory material. These notes and footnotes, excluding those in tables and figures, shall not be considered as requirements of this standard.

1.5 *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.* See the Safety Data Sheet for safety information regarding the materials being tested.

1.6 *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 C01 on Cement and is the direct responsibility of Subcommittee C01.22 on Workability. Current edition approved June 1, 2023. Published July 2023. DOI: 10.1520/C1922-23.

2. Referenced Documents

2.1 ASTM Standards:²

- C219 Terminology Relating to Hydraulic and Other Inorganic Cements
- C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C373 Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products
- C1325 Specification for Fiber-Mat Reinforced Cementitious Backer Units
- C1375 Guide for Substrates Used in Testing Building Seals and Sealants
- C1396 Specification for Gypsum Board
- C1506 Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters
- C1585 Test Method for Measurement of Rate of Absorption of Water by Hydraulic-Cement Concretes
- C1623 Specification for Manufactured Concrete Masonry Lintels

2.2 ANSI Standards:³

- A118 American National Standard Specifications for the Installation of Ceramic Tile

2.3 ISO Standards:⁴

- 13007-2 Ceramic Tiles: Products for Installation Part 2 Adhesives – Test Methods

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology C219.

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.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

4. Summary of Test Method

4.1 The mortar or plaster is mixed with a known amount of water according to the manufacturer's recommendation. A substrate is selected based on the mortar or plaster's intended use. The mortar or plaster is then applied to a specified surface area of a substrate within the test frame using the necessary volume of material to fill the frame and allowed to stand for 5 minutes. Upon completion of the 5 minute standing period, the material is removed and the substrate with the absorbed water is immediately weighed. The water retention is calculated from the amount of water that is lost from the mortar to the substrate expressed as a percentage.

4.2 If desired, the procedure is repeated using different substrates so that the mortar's or plaster's relative ability to retain water when applied to different substrates can be compared, or the procedure is repeated using different mortars or plasters so that different mortars' or plasters' relative ability to retain water can be compared.

5. Significance and Use

5.1 This test method provides a means for determining the ability of mortars and plasters to retain water when applied to specific substrates based on the intended use of the tested mortar.

5.2 The results obtained using this test method may be used to compare the relative ability of mortars and plasters to retain water when applied to different substrates or in comparison to other mortars or plasters applied to the same substrate.

5.2.1 If applied to the same substrate, water retention values of different mortar can be compared.

5.2.2 One mortar may be applied to different substrates to understand the impact of varying substrates on water retention of the mortar.

5.3 The results obtained using this test method do not necessarily indicate the degree of water retention when used with substrates found in the field. This is because the amount of water absorbed by the substrate depends not only on the ability of the mortar to retain water but also on the particular absorption of the substrate and environmental conditions. Environmental conditions are not taken into account in this test method.

5.4 The results obtained using this test method for plasters (stucco) do not necessarily indicate the degree of water retention when the plaster is applied as a second coat on the surface of a previously applied plaster base coat, since the amount of water absorbed from the second coat of plaster depends on the rate of absorption of the base coat. This is also true when a plaster is applied as a coating on masonry units.

6. Interferences

6.1 *Substrate water absorption*—Absorption of the substrate will have an impact on the test results. The substrate that is chosen for the test shall be reported with the results.

7. Apparatus

7.1 *Straightedge*—A steel straightedge not less than 200 mm long and not less than 1.5 mm nor more than 3.5 mm in

thickness (see [Note 1](#)). The edges when placed on a plane surface shall not depart from straightness by more than 1 mm.

NOTE 1—A trowel may be used for this purpose.

7.2 *Mixing Apparatus*—conforming to the requirements in Practice [C305](#).

7.3 *Balance*—A balance or scale accurate within 0.1 % of the test load at any point within the range of use, graduated to at least 0.1 g. The range of use shall extend from 0 g to the mass of the substrate and apparatus plus 200 g.

7.4 *Test Apparatus*—The apparatus consists of a nonabsorbent frame and nonabsorbent plate with a nonwoven filter paper. The nonabsorbent frame and nonabsorbent plate shall be made of plastic or metal that does not react with cementitious materials. If plastic, the nonabsorbent plate shall have a thickness of at least 2.0 mm. If metal, the nonabsorbent plate shall have a thickness of at least 1.0 mm. The frame shall provide an internal surface area of $169 \text{ cm}^2 \pm 1.3 \text{ cm}^2$ and internal volume of $255 \text{ cm}^3 \pm 36 \text{ cm}^3$.

NOTE 2—An example of the test apparatus is depicted in [Fig. 1](#).

7.5 *Timer*—Calibrated timer capable of measuring to the nearest second.

7.6 *Tamper*—A nonabsorptive, nonabrasive, nonbrittle material such as a rubber compound having a Shore A durometer hardness of 80 ± 10 , shall have a cross section of $13 \text{ mm} \pm 1.6 \text{ mm}$ by $25 \text{ mm} \pm 1.6 \text{ mm}$ and a length of 120 mm to 150 mm. The tamping face shall be flat and at right angles to the length of the tamper. Tampers shall be checked for conformance to the design and dimensional requirements of this test method at least every six months. (See [Note 3](#).)

NOTE 3—Each day that the tamper is used, a visual inspection should confirm that the end is flat and at a right angle to the long axis of the tamper. Rounded or peeling tampers should not be allowed for use.

7.7 *Mortar Assembly*—The test apparatus components with substrate and mortar are depicted in [Fig. 1](#).

NOTE 4—The nonwoven filter is depicted as round but could be cut to any shape larger than the inner area of the nonabsorbent frame.

8. Materials

8.1 The composition of the mortar or plaster to be tested for water retention shall be that described in the specification of the material being considered, or that desired.

8.2 *Nonwoven filter*—nonwoven filter paper Grade 2601 with diameter of at least 190 mm made of a material similar to rayon (viscose). The filter may be round or square.

8.3 *Substrates*—The piece of material the mortar will be applied to. The substrate shall be free of defects. Use a substrate which matches in absorption to that of the substrate in the intended application of the mortar or use different substrates to compare the behavior of the testing mortar or plaster sample when applied to various materials. Examples of possible substrates for the test include absorbing filter paper, concrete substrates, tile, gypsum board, and cement board. Other substrates can be used based on the application of the mortar. Job-specific substrates can be use if they fit the size

TOP

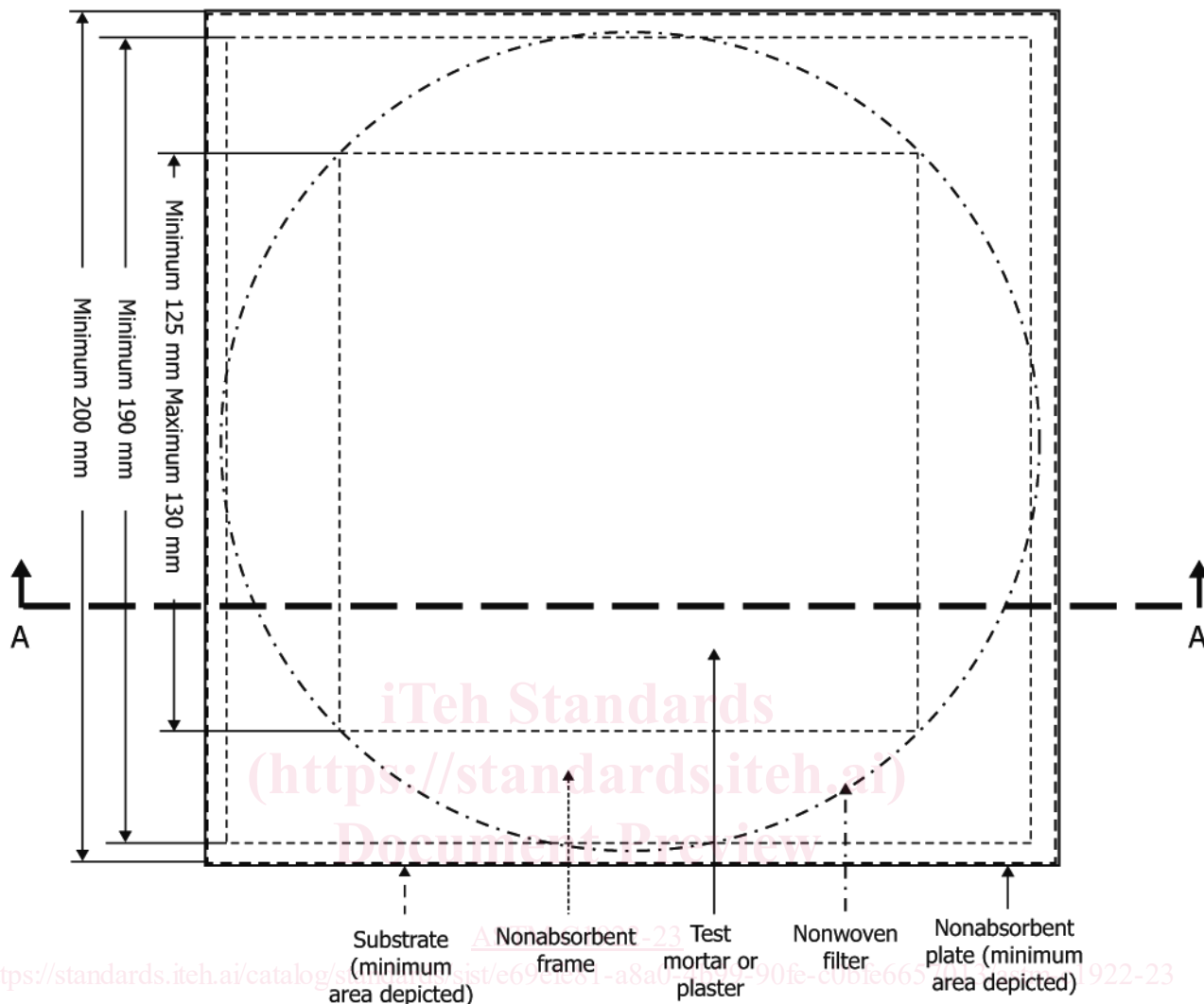


FIG. 1 Test Apparatus for Determining the Water Retention of a Mortar or Plaster (TOP)

requirements. The substrates listed are example materials that can be used and represent various absorption rates of materials.

8.3.1 *Absorbing filter paper*—shall be made of chromatography paper with a flow rate of 130 mm/30 min. It shall measure a minimum of 150 mm by 150 mm, weight 650 g/m², and have a measure of absorption of 110 mm/10 min or equivalent. (See Note 5.)

NOTE 5—This type of filter paper is typically 1.7 mm to 2.0 mm thick.

8.3.2 *Concrete substrate*—shall conform to normal weight concrete as classified by Specification C1623. It shall have an absorption rate of 208 kg/m³ to 240 kg/m³ as measured by Test Method C1585. The dimensions shall be 200 mm ± 5 mm by 200 mm ± 5 mm. The mass of the substrate plus the water and the retention apparatus shall be lower than the scale capacity by at least 200 g. Substrates can be cut from a larger unit. (See Note 6.)

NOTE 6—This substrate is similar to a patio block. It represents a concrete with high absorption.

8.3.3 *Mortar substrate*—shall conform to Guide C1375, ISO 13007-2, or ANSI A118 for a concrete test substrate. The substrate shall have an absorption rate of 0.5 cm³ to 1.5 cm³ after 4 hours of testing. The dimensions shall be 200 mm ± 5 mm by 200 mm ± 5 mm. The mass of the substrate plus the water and the retention apparatus shall be lower than the scale capacity by at least 200 g. Substrates can be cut from a larger unit. (See Note 7.)

NOTE 7—This substrate represents a mortar with low absorption.

8.3.4 *Tile*—shall have an absorption maximum of 5% as measured by Test Methods C373 and shall be at least 200 mm ± 5 mm by 200 mm ± 5 mm. The mass of the substrate plus the water and the retention apparatus shall be lower than the scale capacity by at least 200 g. Substrates can be cut from a larger unit. (See Note 8.)

NOTE 8—This tile is similar to unglazed quarry tile.

8.3.5 *Gypsum board*—shall conform to Specification C1396 and shall have two sides, a paper side and plaster side. Two

SECTION A-A

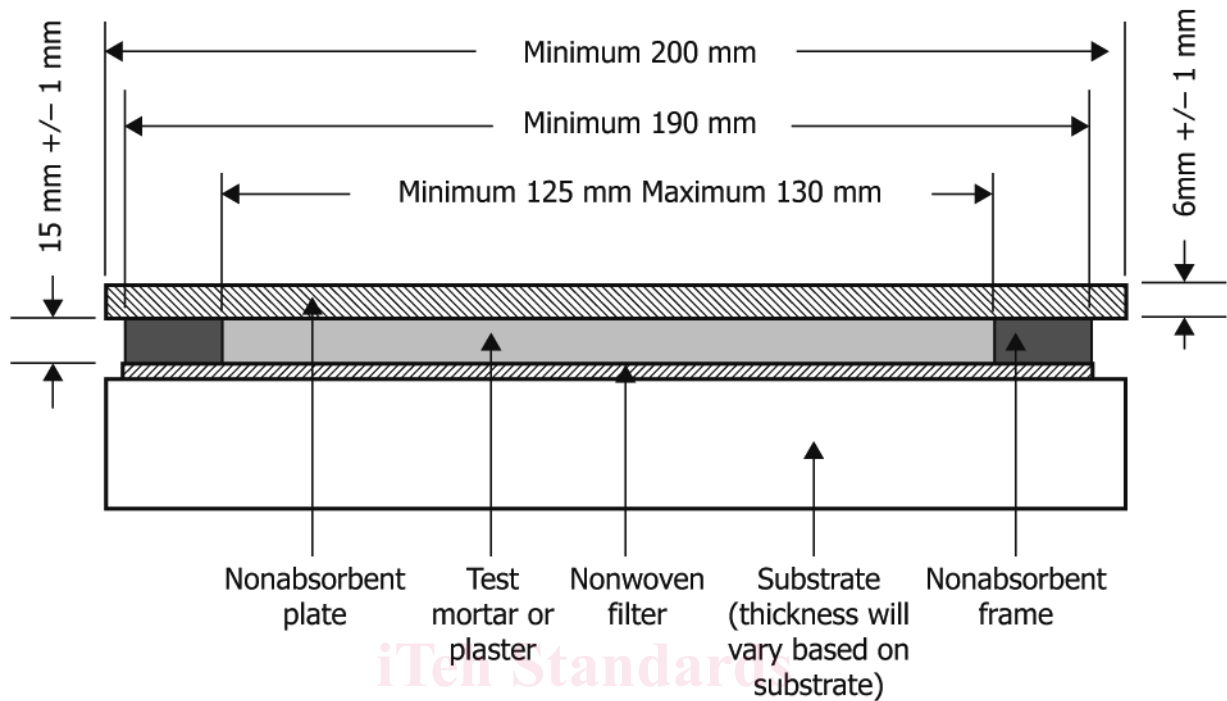


FIG. 1 Test Apparatus for Determining the Water Retention of a Mortar or Plaster (SECTION A-A) (continued)

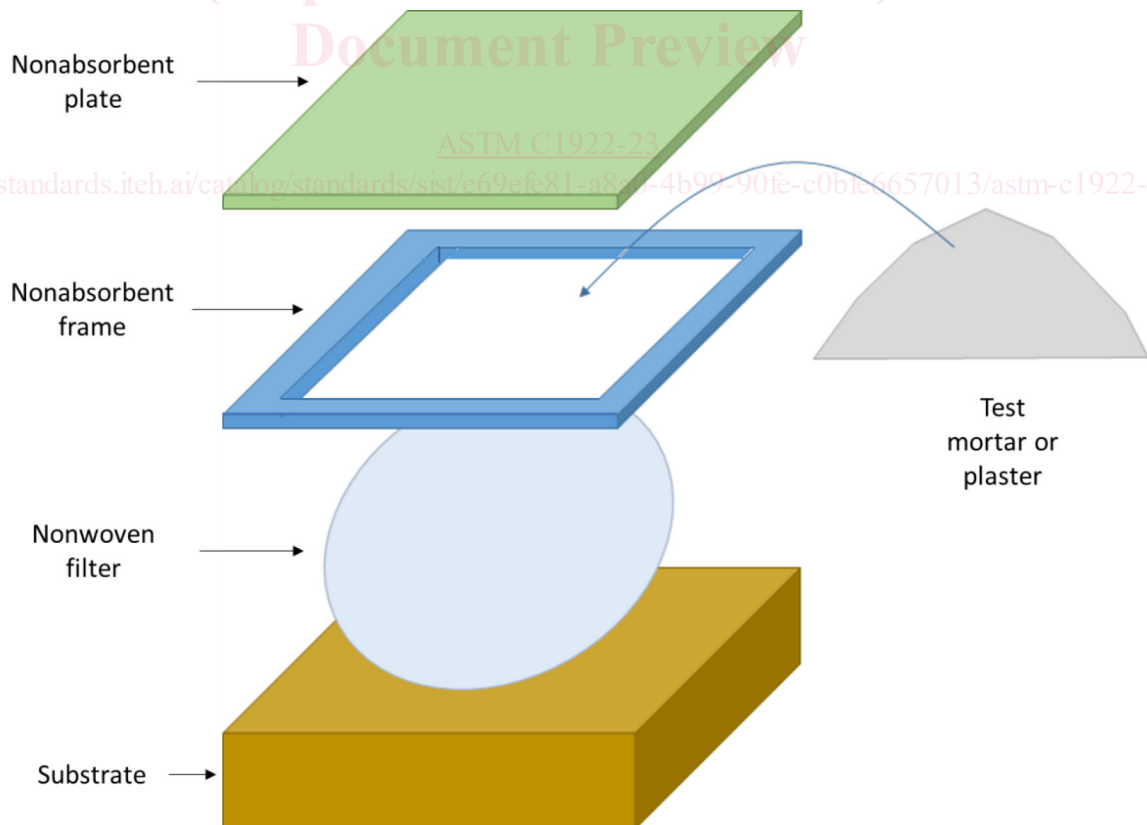


FIG. 2 Test Apparatus for Determining the Water Retention of a Mortar or Plaster (SIDE)