



Designation: C1093 – 13a<sup>ε1</sup>

## Standard Practice for Accreditation of Testing Agencies for Masonry<sup>1</sup>

This standard is issued under the fixed designation C1093; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

<sup>ε1</sup> NOTE—Editorially corrected 7.1.1, 8.5.2.8, and 8.5.2.9 in February 2014.

### 1. Scope\*

1.1 This practice covers the minimum requirements for laboratory personnel, for establishing and maintaining a quality system, and it establishes minimum qualifications for agencies engaged in the testing of masonry materials.

1.2 Criteria are provided for evaluating the capability of an agency to properly perform designated tests on masonry materials, and for establishing guidelines pertaining to an agency's organization, personnel, facilities, and quality system. This practice may be supplemented by more specific criteria and requirements for particular projects.

1.3 This practice can be used as a basis to evaluate testing agencies, and it is intended for use for the qualifying or accrediting of testing agencies, or both, public or private, engaged in the testing of masonry materials.

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:<sup>2</sup>

- C67 Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
- C117 Test Method for Materials Finer than 75- $\mu\text{m}$  (No. 200) Sieve in Mineral Aggregates by Washing
- C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C140 Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
- C173/C173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- C185 Test Method for Air Content of Hydraulic Cement Mortar
- C230/C230M Specification for Flow Table for Use in Tests of Hydraulic Cement
- C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- C270 Specification for Mortar for Unit Masonry
- C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C470/C470M Specification for Molds for Forming Concrete Test Cylinders Vertically
- C780 Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
- C1072 Test Methods for Measurement of Masonry Flexural Bond Strength
- C1232 Terminology of Masonry
- C1506 Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters
- E4 Practices for Force Verification of Testing Machines
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.07 on Standards for Laboratory Accreditation.

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<sup>2</sup> 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.

\*A Summary of Changes section appears at the end of this standard

3.2.3 *user*—the person or organization engaging the agency to provide tests; or using this practice to evaluate or accredit the agency.

3.3 For additional terms used in this standard, refer to Terminology C1232.

#### 4. Significance and Use

4.1 This practice provides the basic minimum criteria for use in evaluating the qualifications of testing agencies for masonry materials. The criteria may be supplemented by more specific criteria and requirements. It can be used as a guide for internal audits by individual users.

4.2 The intent of this practice is to provide a consensus basis for evaluating a testing agency, with respect to that agency's capability to objectively and competently provide the specific services needed by the user.

4.3 This practice may be used as a basis for accreditation.

#### 5. Responsibilities and Duties

5.1 The agency shall ensure that only tests for which it is adequately equipped and staffed are performed.

5.2 The agency shall ensure that personnel perform only tests for which they are adequately trained, qualified, and certified in accordance with applicable specifications.

5.3 The agency shall ensure that all equipment is properly maintained in good operating condition and is calibrated or verified as applicable.

5.4 The agency shall perform all testing in accordance with appropriate standards and quality control criteria. Documents unique to the user shall be furnished to the agency.

#### 6. General Capabilities

6.1 *Laboratory Testing*—The laboratory testing services of the masonry materials testing agency shall include some or all of the following capabilities:

- 6.1.1 Testing of masonry units in the laboratory,
- 6.1.2 Testing of masonry mortars in the laboratory, and
- 6.1.3 Testing of aggregates for compliance with specification requirements.

NOTE 1—Since the requirements for construction control can vary from project to project depending upon the nature of the type, location, and intended use of the masonry in the project, the capability of the agency for testing should be that necessary to accomplish construction control for the user's specific project or special requirements.

#### 7. Personnel Qualifications

7.1 *Management and Supervision*—All relevant testing services shall be provided under the Full-Time technical direction of a registered professional Engineer, with at least 5 years of experience in inspecting and testing masonry materials or a person of equivalent science-oriented education and experience.

7.1.1 It is satisfactory for a person to fill one or more of the levels of management in an agency, Manager, Supervisor, or Technician positions in accordance with 7 and 7.2 providing that person is qualified for each position.

7.2 *Supervising Laboratory Technician*—The supervising laboratory technician shall have at least five years experience performing tests on materials, with at least two years testing masonry materials. This person shall be able to demonstrate, either by oral or written examination, or both, the ability to perform the tests normally required in the manner stipulated under ASTM or other governing procedures and shall be capable of evaluating the test results in terms of specification compliance.

#### 8. Quality System Criteria

8.1 The agency shall establish and implement a quality system that meets the criteria in subsections 8.2 to 8.14.

8.2 *Quality System Manual (QSM)*—The agency shall establish and maintain a QSM that conforms to the requirements in Section 9. Each document in the QSM shall indicate its preparation *date*. If a document is revised, the *date* of revision shall be indicated on the document. The QSM shall be available for use by laboratory staff.

8.3 *Quality System Management*—The agency shall designate a person(s) having responsibility for the quality system and its implementation. The quality manager ensures that activities are being conducted by agency staff in the manner specified in the agency's quality system manual and has responsibility for maintaining and revising it. This individual(s) shall have direct access to top management (see Note 2).

NOTE 2—This individual(s) may have other responsibilities (for example, laboratory manager).

8.4 *Laboratory Procedure Manual*—A written laboratory procedure manual outlining the method or inspection procedure for each test or service performed by the laboratory.

NOTE 3—Inspection and testing procedures may reference published standards.

8.5 *Equipment*—The agency shall calibrate or verify all significant testing equipment associated with tests covered by the scope of this standard which the agency performs. As a minimum, the equipment listed in 8.5.2 shall be included if it is associated with tests performed by the agency. Applicable equipment shall be calibrated or verified at the intervals specified in the agency's QSM. The intervals specified in the QSM shall be no greater than those indicated in 8.5.2 (see Note 4). Newly acquired equipment without manufacturer's certification and equipment that has not been calibrated or verified because it has been removed from service shall be calibrated or verified before being placed in service. The agency shall have detailed written procedures for all in-house calibration and verification activities not addressed in standards. These procedures shall indicate the equipment required to perform the calibration or verification. In addition to standard test method requirements, the conditions listed in 8.5.2 shall be met.

8.5.1 *Calibration and Verification Records*—The agency shall maintain calibration and verification records for all equipment specified in the QSM. Such records shall include:

8.5.1.1 Description of the equipment calibrated or verified, including identification of the specific piece of equipment using the equipment serial number or other unique identifying designator provided by the agency (see Note 5),

- 8.5.1.2 Date the work was done,
- 8.5.1.3 Identification of individual performing work,
- 8.5.1.4 Identification of calibration or verification procedure used,
- 8.5.1.5 The previous calibration or verification date and next due date,
- 8.5.1.6 Identification of any calibration or verification device used, and
- 8.5.1.7 Specific criteria required for each piece of equipment listed in 8.5.2.

#### 8.5.2 *Masonry Test Equipment:*

8.5.2.1 *Balances and Weights*—Calibrate balances and weights at intervals not exceeding 12 months. Record shall include test points and corresponding percentage of error.

8.5.2.2 *Cube Molds and Tampers*—Verify cube molds and tampers for conformance to the design and dimensional requirements of Test Method C109/C109M. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.3 *Compression Test Machine*—Compression test machine shall conform to the applicable requirements of Test Methods C67, C109/C109M, or C140 and have a capacity, loading range, and the appropriate heads and bearing plates for the specimens tested. Calibrate compression testing machines in accordance with Practices E4. Record shall include test points and corresponding percentage of error. Calibration shall be performed at intervals not exceeding 12 months.

8.5.2.4 *Flexural Bond Apparatus*—Flexural bond apparatus shall conform to the applicable requirements of Test Method C1072. Calibrate the load measuring apparatus in accordance with Practices E4. Record shall include test points and corresponding percentage of error. Calibration shall be performed at intervals not exceeding 12 months.

8.5.2.5 *Mechanical Shakers*—Verify the period of mechanical agitation of mechanical shakers for adequacy of sieving as described in Test Method C136. Record shall include length of time for the proper efficiency of sieving. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.6 *Mixers (for Specification C270)*—Inspect and verify mixers for conformance to the requirements of Practice C305. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.7 *Cylindrical Molds*—Cylindrical molds shall comply with the requirements of Specification C470/C470M. Record shall include dimensions and results of water-tightness test. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.8 *Ovens*—Verify oven settings with a verified reference temperature measuring device. Record shall include oven settings, temperature reading at each oven setting, and adjustments if necessary. Verification shall be performed at intervals not exceeding twelve months.

8.5.2.9 *Sieve Accuracy*—Verify sieve accuracy at least annually on each sieve used for sieve analysis (Test Methods C117 and C136). Use any of the following methods of verification:

Method (1) Verification of each sieve in accordance with the procedures prescribed in the Annex of Specification E11.

Method (2) A comparison of the results of a split sample sieved on different sieve sets. Results shall be verified that a single operator precision is within the acceptable range of two results stated in the test method.

Method (3) Participation in a sieve analysis test in an aggregate proficiency sample program. Results shall be verified for multi-laboratory precision to be within the acceptable range of two results stated in the test method.

Each method of sieve verification shall include an inspection of the sieve cloth for punctures or obvious defects.

8.5.2.10 *Temperature Measuring Device*—Verify temperature measuring devices using a NIST-traceable reference temperature measuring device. Record shall include test points and readings at test points. Verification shall be performed at intervals not exceeding twelve months.

8.5.2.11 *Timers*—Verify timers for accuracy. Record shall include test points, readings at test points. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.12 *Water Retention*—Verify water retention apparatus for conformance to the applicable requirements of Test Method C1506. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.13 *Air Content Measure*—Verify air content measure following the procedures described in Test Method C185. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.14 *Flow Table*—Verify flow table using the calibration material described in Specification C230/C230M. Verification shall be performed at intervals not exceeding 30 months, and when table is moved.

8.5.2.15 *Cone Penetrometer*—Verify cone penetrometer for the applicable requirements of Test Method C780. Record shall include measured dimensions and masses. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.16 *Slump Cone and Tamping Rod*—Verify slump cone and tamping rod for the applicable requirements of Test Method C143/C143M. Record shall include measured dimensions. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.17 *Pressure Meter*—Calibrate pressure meter using the procedure found in Test Method C231. Record shall include determination of expansion factor; size of the calibration vessel used; and the reading of the meter at the calibration test point(s). Calibration shall be performed at intervals not exceeding 3 months.

8.5.2.18 *Volumetric Air Meter*—Verify volumetric air meter using the procedure found in Test Method C173/C173M. Record shall include dimensions and volume of meter and calibration cup. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.19 *Measuring Devices*—Devices used to measure dimensions shall be verified to be accurate and readable to the precision required by the test methods where they are used. Verification record shall include test points used during verification, and readings at test points. Verification shall be performed at intervals not exceeding 12 months.

NOTE 4—When a maximum calibration or verification interval for a specific piece of test equipment is specified in a standard, the maximum