



Designation: C 426 – 99

Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units¹

This standard is issued under the fixed designation C 426; 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 approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This test method covers a routine standardized procedure for determining the linear drying shrinkage of concrete masonry units or related concrete units under specified accelerated drying conditions.

1.2 The values stated in inch-pound units are to be 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 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete²

C 1093 Practice for Accreditation of Testing Agencies for Unit Masonry³

2.2 *ANSI Standard:*

B94.11M—1993 Twist Drills⁴

3. Terminology

3.1 *Definition:*

3.1.1 *linear drying shrinkage*—in this test method, the change in linear dimension of the test specimen due to drying from a saturated condition to an equilibrium weight and length under specified accelerated drying conditions.

4. Significance and Use

4.1 This test method is intended to evaluate the drying shrinkage characteristics of a given unit. The results of this

laboratory method are considered in determining concrete masonry crack control provisions.

NOTE 1—The testing laboratory performing this test method should be evaluated in accordance with Practice C 1093.

5. Apparatus

5.1 *Strain Gage*—The instruments for measuring linear drying shrinkage shall be so designed as to permit or provide the conditions described in 5.1.1 through 5.1.5.

NOTE 2—Strain gages may be obtained with various gage lengths. The 10-in. (254-mm) gage length is recommended for use with regular concrete masonry units, however, particular sizes of products may require other lengths. The length of the shrinkage specimen shall not be less than required for a minimum gage length (distance between gage plugs) of 6 in. (152.4 mm).

5.1.1 A means of positive contact with the specimen that will ensure reproducible measurements of length.

5.1.2 Means for precise measurement, consisting of a dial micrometer or other measuring device graduated to read in 0.0001-in. (0.0025-mm) units, and accurate within 0.0001 in. (0.0025 mm) in any 0.0010-in. (0.025-mm) range, and within 0.0002 in. (0.0050-mm) in any 0.0100-in. (0.254-mm) range.

5.1.3 Sufficient range to allow for small variations in the gage lengths.

NOTE 3—If the shrinkage reference points are set carefully to position, a dial micrometer with a travel of 0.2 or 0.3 in. (5.1 or 7.6 mm) provides ample range in the instrument.

5.1.4 Means for checking the strain gage at regular intervals against a standard reference bar. The standard reference bar shall be protected from air currents by placing it inside a wooden box which should be closed except when the strain gage is being checked against it.

NOTE 4—A standard reference bar shall be furnished by the manufacturer of the instrument. A standard bar of ordinary steel is satisfactory, but corrections must be made for variations in its length due to temperature changes. When a more nearly constant datum is desired, Invar is preferable because of its low coefficient of thermal expansion.

5.1.5 Convenient and rapid measurement of specimens.

5.2 *Comparator*—When desirable to measure specimens end to end, a comparator conforming to the requirements of Practice C 490 may be used as an alternative to the strain gage for measuring linear drying shrinkage.

¹ This test method is under the jurisdiction of ASTM Committee C-15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.03 on Concrete Masonry Units and Related Units.

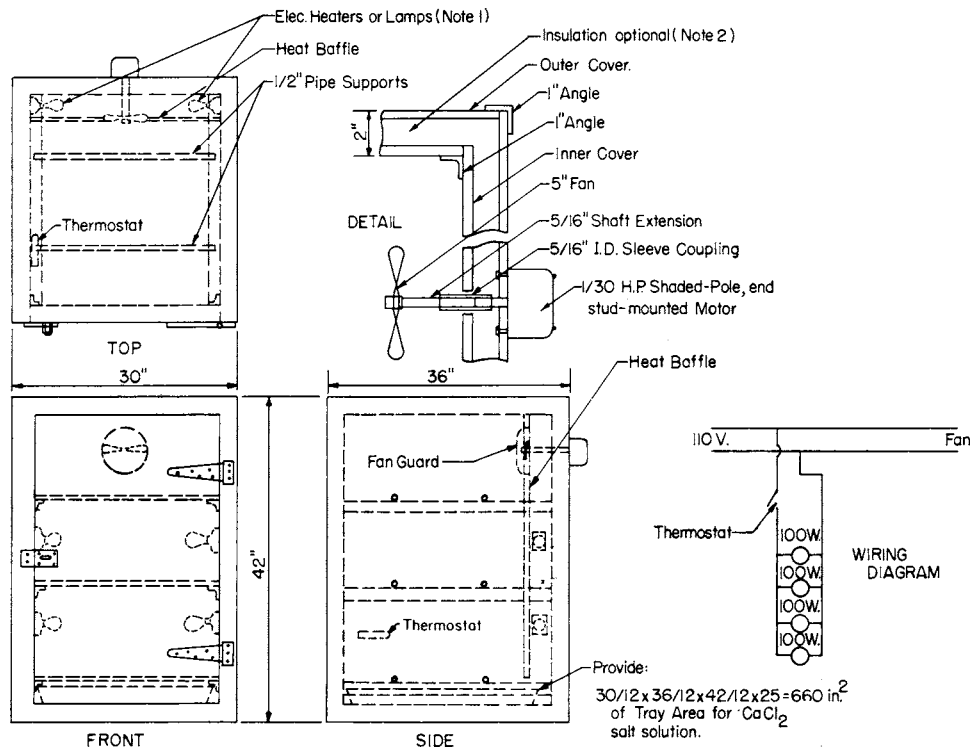
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² *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 04.05.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

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



NOTE 1—Provide access to heaters.

NOTE 2—Insulating fill is recommended in cabinets having outer covers of sheet metal

NOTE 3—The following materials are required:

Quantity	Description
1	5-in. (127-mm) fan assembly, as shown
1	1/30-hp (25-W) shaded-pole, fan-cooled, stud-mounted electric motor
75 ft (22.9 m)	1-in. (25.4-mm) angle, steel or aluminum
60 ft² (5.6 m²)	Outer cover, 1/2-in. (12.7-mm) plywood or equivalent, faced with sheet metal or other material to provide a positive vapor barrier
60 ft² (5.6 m²)	Inner cover, 3/8-in. (9.5-mm) asbestos board or equivalent
1	Heat baffle, 25 by 34-in. (635 by 864-mm), sheet metal
16 ft (4.8 m)	1/2-in. iron pipe
4	100-W porcelain light fixtures
1	500-W thermostat
1	24 × 30 × 1 1/2-in. (610 × 762 × 38-mm) tray, borosilicate glass or equivalent
1 pr	8-in. (203-mm) hinges and hasp

FIG. 1 Drying Oven Suitable for Determining Drying Shrinkage of Concrete Block

5.3 *Gage Plugs*—The gage plugs shall be made from metal that is resistant to corrosion. Plugs for use with strain gages shall be 3/8 to 1/2 in. (9.5 to 12.7 mm) in diameter and 1/2 ± 1/8 (12.7 ± 3.2 mm) in thickness. Plugs for use with the comparator shall consist of 1/4-in. (6.4-mm) diameter stainless steel gage studs shown in Practice C 490.

5.4 *Drying Oven*—The oven shall be reasonably airtight and provide the features described in 5.4.1 through 5.4.4.

NOTE 5—One suggested oven construction is shown in Fig. 1.

5.4.1 A minimum storage capacity of three whole test specimens and a clearance of 1 in. (25.4 mm) on all sides of each test specimen.

5.4.2 A constant, uniform temperature of 122 ± 2°F (50 ± 0.9°C) throughout the insulated cabinet attained by means of an electrical heat source (Note 6).

NOTE 6—Direct heating of test specimens with the combustion products of gas or other carbonaceous fuels is not satisfactory due to the

presence of carbon dioxide and water and their possible effect on the drying characteristics of portland cement products.

5.4.3 A means of drying specimens to a condition of equilibrium with a relative humidity of 17 ± 2% (Note 7).

5.4.3.1 Calcium chloride (CaCl₂), if used for this purpose, shall be in flake form. Suitable dishes or trays shall be provided to give an exposed solution area of not less than 25 in.² for each cubic foot (5800 cm² for each m³) of oven volume. Dishes or trays shall contain sufficient solid calcium chloride so that the crystals will be exposed above the surface of the solution throughout the test. The calcium chloride solution shall be thoroughly stirred every 24 h, and more often if necessary, to prevent the formation of lumps and crusting over.

NOTE 7—The air immediately above a saturated solution of calcium chloride (CaCl₂) at 122°F (50°C) is approximately 17%.

5.4.4 Moderate circulation of air within the oven, over and around all test specimens and the drying agent.