



## Standard Test Method for Measuring Length of Concrete Cores<sup>1</sup>

This standard is issued under the fixed designation C 1542/C 1542M; 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.

### 1. Scope

1.1 This test method covers the determination of the length of a core drilled from a concrete structure when the reason is other than measuring dimensional tolerances of concrete elements.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other.

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 42/C 42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete<sup>2</sup>

C 174 Test Method for Measuring Thickness of Concrete Elements Using Drilled Concrete Cores<sup>2</sup>

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials<sup>2</sup>

### 3. Significance and Use

3.1 This test method provides two procedures for determining the length of a core as measured along its axis. This length is used in conjunction with length to diameter relationships, condition surveys, absorption, density and voids analysis, petrography, cement content analysis, and other applications. It does not meet requirements for determining the distance between two parallel surfaces, which represents the thickness of a structural element often used to establish compliance with design specifications as outlined by Test Method C 174.

### 4. Apparatus

4.1 *Jaw Caliper*, depth of jaw 65 mm [2.5 in.]. Measuring

range 0 to 300 mm [0 to 12 in.]. Accuracy to 0.03 mm [0.001 in.].

4.2 *Ruler*, 300 to 380 mm [12 to 15 in.] divided into 1 mm [ $1/16$  or 0.1 in.] graduations.

### 5. Procedure

#### 5.1 *Jaw Caliper Procedure:*

5.1.1 Hold the specimen and place the open jaws of the caliper midpoint between the center and edge of the specimen. Measure and record the value to the nearest 0.25 mm [0.01 in.]. Rotate the specimen 90°, 180°, and 270° and repeat procedure. Obtain one measurement across the center of the specimen and record.

#### 5.2 *Ruler Procedure:*

5.2.1 Position core with finished or formed face placed down against flat and level surface. Place ruler on flat surface against side of core and measure length to nearest 1 mm [ $1/16$  or 0.1 in.] and record. Rotate core and repeat measurements at approximately 90°, 180°, and 270°.

NOTE 1—This procedure does not intend to include in the length measurement adhered pieces of material not part of the original concrete mixture.

### 6. Report

6.1 *Jaw Caliper*—Average five measurements and report to nearest 1 mm [0.1 in.].

6.2 *Ruler*—Average four measurements and report to nearest 1 mm [0.1 in.].

### 7. Precision and Bias

#### 7.1 *Precision:*

7.1.1 With-and between-lab precision of the jaw caliper and ruler procedures was estimated from the results of an interlaboratory study that included 12 laboratories, each measuring three times a core from each of three concretes. The length of the cores ranged approximately from 64 to 117 mm [2.5 to 4.6 in.]. A report of the results of the interlaboratory study is available from ASTM International Headquarters.<sup>3</sup>

7.1.2 *Jaw Caliper Procedure*—The single-operator coefficient of variation (1S %)<sup>4</sup> has been found to be 1.02 %, therefore, two measures of the same core should not differ by

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: C09-1024.

<sup>4</sup> As described in Practice C 670.

more than 2.89 % (D2S %)<sup>4</sup> of the mean length of the core. The between-laboratory coefficient of variation (1S %)<sup>4</sup> has been found to be 1.60 %, therefore, two measures of the same core by two different laboratories should not differ by more than 4.23 % (D2S %)<sup>4</sup> of the mean length of the core.

7.1.3 *Ruler Procedure*—The single-operator coefficient of variation (1S %)<sup>4</sup> has been found to be 1.94 %, therefore, two measures of the same core should not differ by more than 5.43 % (D2S %)<sup>4</sup> of the mean length of the core. The between-laboratory coefficient of variation (1S %)<sup>4</sup> has been found to be

4.35 %, therefore, two measures of the same core by two different laboratories should not differ by more than 12.18 % (D2S %)<sup>4</sup> of the mean length of the core.

7.2 *Bias*—Since there are not acceptable reference cores suitable for determining the bias of these procedures, no statement on bias is being made.

## 8. Keywords

8.1 concrete; core; jaw caliper; length; ruler

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