



Designation: C1610/C1610M – 06a

# Standard Test Method for Static Segregation of Self-Consolidating Concrete Using Column Technique<sup>1</sup>

This standard is issued under the fixed designation C1610/C1610M; 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 static segregation of self-consolidating concrete by measuring the coarse aggregate content in the top and bottom portions of a cylindrical specimen (or column).

1.2 This test method is not applicable to self-consolidating concrete containing lightweight aggregate.

1.3 The values stated in either inch-pounds or SI units are to be regarded separately as standard. Within the text, the SI 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. Combining values from the two systems may result in nonconformance with the standard.

1.4 The text of this standard 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 the 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 and health practices and determine the applicability of regulatory limitations prior to use. (Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.)*<sup>2</sup>

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>3</sup>

[C125 Terminology Relating to Concrete and Concrete Aggregates](#)

[C127 Test Method for Density, Relative Density \(Specific Gravity\), and Absorption of Coarse Aggregate](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.47 on Self-Consolidating Concrete.

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<sup>2</sup> Section on Safety Precautions, Manual of Aggregate and Concrete Testing, *Annual Book of ASTM Standards*, Vol. 04.02.

<sup>3</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.

[C173/C173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method](#)

[C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory](#)

[C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method](#)

[D1785 Specification for Poly\(Vinyl Chloride\) \(PVC\) Plastic Pipe, Schedules 40, 80, and 120](#)

## 3. Terminology

3.1 *Definitions*:

3.1.1 For definitions of terms used in this test method, refer to Terminology [C125](#).

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *Static Segregation, n*—settlement of coarse aggregate particles in an undisturbed mass of fresh concrete.

## 4. Summary of Test Method

4.1 A sample of freshly-mixed self-consolidating concrete is placed in a cylindrical mold without tamping or vibration. The mold is separated into three sections representing different levels of the cylindrical specimen (or column). Portions of concrete from the top and bottom section are washed on a 4.75 mm [No. 4] sieve, leaving the coarse aggregate on the sieve. The masses of coarse aggregate in the top and the bottom sections are determined and the percent static segregation is calculated.

## 5. Significance and Use

5.1 This test method provides users with a laboratory procedure to determine the potential static segregation of self-consolidating concrete.

5.2 This test method shall be used to develop self-consolidating concrete mixtures with segregation not exceeding specified limits. Self-consolidating concrete is a fluid concrete that can be prone to segregation if not proportioned to be cohesive. A cohesive self-consolidating concrete is important for all applications but is especially critical for deep-section applications such as walls or columns. Therefore, the degree of segregation can indicate if a mixture is suitable for the application.

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

NOTE 1—Some level of segregation is tolerable as long as the desired strength and durability performance is achieved.

6. Apparatus

6.1 Balance—as described in Test Method C127.

6.2 Column Mold—The column portion of the mold shall be poly(vinyl chloride) (PVC) plastic pipe Schedule 40 meeting the requirements of Specification D1785. The column shall be 8 in. [200 mm] in diameter × 26 in. [660 mm] in height and separated into 3 sections. The top section shall be 6.5 in. [165 mm] in height, the middle section 13 in. [330 mm] in height, and the bottom section 6.5 in. [165 mm] in height, as shown in Fig. 1. Each section shall have its ends flat and plane and be marked as “Top”, “Middle”, or “Bottom” relative to its location in the column. Couplers, brackets, clamps, or other equivalent fastening systems shall be used for securing the column sections together to form a mortar-tight joint and to secure the column to the base plate. The column mold shall be securely attached to a non-absorbent, rigid base plate measuring at least 12 in. [300 mm] × 12 in. [300 mm] square.

NOTE 2—Experience has shown that a base plate made from sealed or laminated plywood at least 0.75 in. [20 mm] thick is suitable for securing the column.

6.3 Collector Plate—The collector plate, used to obtain concrete from the top section of the column, shall be made of any nonabsorbent, rigid material measuring at least 20 in. [510 mm] × 20 in. [510 mm] square. The plate shall contain a cut out section in the center measuring 8.5 in. [215 mm] across and it shall contain a rigid lip that is at least 2 in. [50 mm] high running around three sides of the perimeter of the plate, as shown in Fig. 2.

NOTE 3—To facilitate the ease with which the test can be performed, the collector plate may contain legs or another support system so that only one person is needed to perform the concrete collection process from the top section.

6.4 Strike-off Bar—As described in Test Method C173/C173M or Test Method C231.

6.5 Sieve—A 4.75 mm [No. 4] rectangular sieve with minimum dimensions of 13 in. [330 mm] × 25 in. [630 mm].

6.6 Sample Receptacle—The receptacle shall be a heavy-gage metal pan, wheelbarrow, or flat, clean nonabsorbent board of sufficient capacity to allow easy remixing of the entire sample with a shovel, trowel, or scoop.

6.7 Small Tools—Tools and items such as shovels, plastic pails, trowels, scoops and rubber gloves shall be provided.

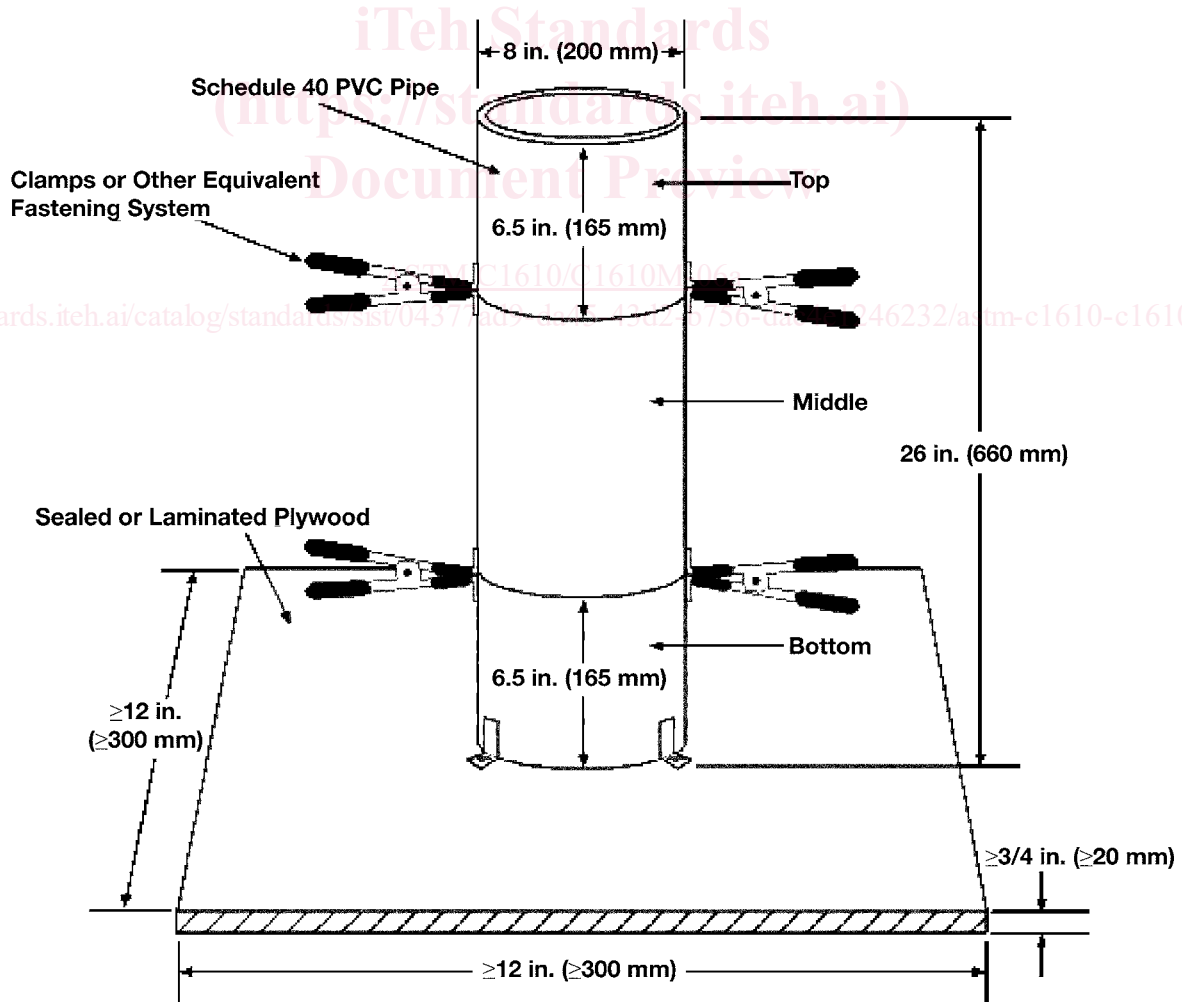


FIG. 1 Detail of Column Mold