



Designation: D5971/D5971M – 16

Standard Practice for Sampling Freshly Mixed Controlled Low-Strength Material¹

This standard is issued under the fixed designation D5971/D5971M; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This practice explains the procedure for obtaining a representative sample of freshly mixed controlled low-strength material (CLSM) as delivered to the project site on which tests are to be performed to determine compliance with quality requirements of the specifications under which the CLSM is furnished (**Note 1**). This practice includes sampling from revolving-drum truck mixers and from agitating equipment used to transport central-mixed CLSM. This Practice is based on Practice **C172** for concrete.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

NOTE 1—Composite samples are required by this practice unless specifically excepted by procedures governing the tests to be performed, such as tests to determine uniformity of consistency and mixer efficiency. Procedures used to select the specific test batches are not described in this practice. It is recommended that random sampling be used to determine overall specification compliance.

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. (**Warning**—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.²)*

1.4 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be*

judged, nor should this document be applied without consideration of a project's many unique aspects. The word “standard” in the title of this document means only that the document has been approved through the ASTM consensus process.

2. Referenced Documents

2.1 *ASTM Standards:*³

- C172** Practice for Sampling Freshly Mixed Concrete
- D653** Terminology Relating to Soil, Rock, and Contained Fluids
- D3740** Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4832** Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders
- D6023** Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM)
- D6103** Test Method for Flow Consistency of Controlled Low Strength Material (CLSM) (Withdrawn 2013)⁴

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of common technical terms in this standard, refer to Terminology **D653**.

3.1.2 *controlled low-strength material (CLSM), n*—a mixture of soil, aggregates (sand, gravel, or both), cementitious materials, water, and sometimes admixtures, that hardens into a material with a higher strength than the soil, but less than about 8400 kPa [1200 psi].

3.1.2.1 *Discussion*—Used as a replacement for compacted backfill, CLSM can be placed as a slurry, a mortar, or a compacted material and typically has strengths of 350 to 700 kPa [50 to 100 psi] for most applications.

3.2 *Definitions of Terms Specific to This Standard:*

¹ This practice is under the jurisdiction of ASTM Committee **D18** on Soil and Rock and is the direct responsibility of Subcommittee **D18.15** on Stabilization With Admixtures.

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

³ 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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

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



3.2.1 *flow consistency, n*—measured by the average diameter of the spread achieved by removal of the flow cylinder.

4. Significance and Use

4.1 This practice shall be used to provide a representative sample of the material for the purpose of testing various properties. The procedures used in sampling shall include the use of every precaution that will assist in obtaining samples that are truly representative of the nature and condition of the CLSM.

NOTE 2—The quality of the result produced by this standard is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/ and the like. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors. Practice D3740 provides a means of evaluating some of these factors.

5. Apparatus

5.1 *Hand Tools*—Shovels, hand scoops, and rubber gloves as required.

5.2 *Receptacle*—A container of suitable size, 14 L [0.5 ft³], and having a non-absorbent surface.

6. Sampling

6.1 *Size of Sample*—The sample of CLSM for compressive strength testing shall be a minimum of 14 L [0.5 ft³]. For other tests, the composite size shall be large enough to perform the test and to ensure a representative sample of the batch was taken.

6.2 The procedures used in sampling shall include the use of every precaution that will assist in obtaining samples that are truly representative of the nature and condition of CLSM sampled as outlined in 7.1.

7. Procedure

7.1 *Sampling from Revolving-Drum Truck Mixers or Agitators*—Sample the CLSM by collecting two or more portions taken at regularly spaced intervals during discharge of

the middle portion of the batch (Note 3). These samples shall be obtained within the time limit specified in 7.2 and composited into one sample for test purposes. In any case do not obtain samples until after all water has been added to the mixer; also do not obtain samples from the very first or last portions of the batch discharge (Note 4). Sample by repeatedly passing a receptacle through the entire discharge stream or by completely diverting the discharge into a sample container. Regulate the rate of discharge of the batch by the rate of revolution of the drum and not by the size of the gate opening.

NOTE 3—Sampling normally should be performed on the CLSM as delivered from the truck to the job site excavation.

NOTE 4—No samples should be taken before 10 % or after 90 % of the batch has been discharged. Due to the difficulty of determining the actual quantity of CLSM discharged, the intent is to provide samples that are representative of widely separated portions, but not the beginning and the end of the load.

7.2 The elapsed time between obtaining the first and final portions of the composite sample shall be as short as possible and in no instance shall it exceed 2 min.

7.3 Transport the composite samples to the place where fresh CLSM tests are to be performed or where test specimens are to be molded. The composite sample shall be combined and remixed with a shovel or scoop the minimum amount necessary to ensure uniformity and compliance with the minimum time limits specified in 7.4.

7.4 Start tests for flow consistency (Test Method D6103), density (unit weight), and air content (Test Method D6023) within 5 min after obtaining the final portion of the composite sample. Complete these tests as expeditiously as possible. Start molding specimens for strength tests (Test Method D4832) within 10 min after obtaining the final portion of the composite sample. Keep the elapsed time between obtaining and using the sample as short as possible and protect the sample from the sun, wind, and other sources of rapid evaporation, and from contamination.

8. Keywords

8.1 air content; CLSM; composite sample; density; flow consistency; quality control; sampling; unit weight

SUMMARY OF CHANGES

Committee D18 has identified the location of selected changes to this standard since the last issue (D5971 – 13) that may impact the use of this standard. (December 1, 2016)

(1) Revised Section 3.



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