



Standard Practice for Determining Variability of Ingredients of Concrete From a Single Source¹

This standard is issued under the fixed designation C1451; 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 (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice covers a procedure for determining the variability of properties of concrete materials from a single source. It includes recommendations on sampling, testing, analysis of data, and reporting.

1.2 The system of units for this practice is not specified. Dimensional quantities in the practice are presented only as illustrations of calculation methods that are applicable independent of the system of units.

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:²

C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)

C125 Terminology Relating to Concrete and Concrete Aggregates

C219 Terminology Relating to Hydraulic Cement

C494/C494M Specification for Chemical Admixtures for Concrete

C917 Test Method for Evaluation of Cement Strength Uniformity From a Single Source

D75 Practice for Sampling Aggregates

D3665 Practice for Random Sampling of Construction Materials

3. Terminology

3.1 Definitions:

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.94 on Evaluation of Data (Joint C09 and C01).

Current edition approved July 1, 2011. Published August 2011. Originally approved in 1999. Last previous edition approved in 2005 as C1451–05. DOI: 10.1520/C1451-11.

² 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.

3.1.1 For definitions of terms relating to this practice refer to Terminology C125 and Terminology C219.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *grab sample, n*—a specified quantity of material obtained in a single operation from a sampling unit.

3.2.1.1 *Discussion*—The goal of procuring a grab sample is to obtain a small portion of material that is characteristic of that in the sampling unit.

3.2.2 *lot, n*—a user-defined quantity, typically representing any amount of material for which variability information is to be calculated.

3.2.2.1 *Discussion*—The minimum lot size is generally the amount of material in a single conveyance, such as a truck load, a rail-car load, or a barge load. At the other extreme, a lot might be defined by a user as the total amount of material used in a single construction or by a supplier as the amount of material produced over a given interval of time.

3.2.3 *sampling unit, n*—amount of material from which a grab sample is taken.

3.2.3.1 *Discussion*—Generally a lot is subdivided into sampling units, and then sampling units are chosen at random for taking of grab samples. The size of the sampling unit is user-defined, depending on the purposes of the evaluation. The term *sub lot* is sometimes used to define this concept.

4. Significance and Use

4.1 This practice provides a systematic procedure for sampling and determining the variability of user-selected properties of ingredients of concrete. Results derived from application of the practice are generally intended for information only and are not requirements of any existing ASTM specification on concrete or concrete materials. A concrete materials specification may make reference to this practice as a means of obtaining variability information, but needs to define the properties to be measured and the lot size and sample unit to be used. The practice is applicable to both producers of concrete materials and to consumers of concrete materials, although details of application of the practice may vary, depending on the intended purpose of the user of the practice.

4.2 The procedure is applicable to any quantitative property of any concrete ingredient that can be measured by a standard

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