



Standard Practice for Conducting a Ruggedness Evaluation or Screening Program for Test Methods for Construction Materials¹

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1. Scope*

1.1 This practice covers a procedure for evaluating the ruggedness of a test method by determining the effects of different experimental factors on the variation of test results. The procedure is intended for use during the development of a test method before the interlaboratory study is executed, such as those described in Practices C802 and E691.

1.2 This practice covers, in general terms, techniques for planning, collecting data, and analyzing results from a few laboratories. Appendix X1 provides the details of the procedure with an example and Appendix X2 provides additional information on the methodology.

1.3 The practice is not intended to give information pertinent to estimating multilaboratory precision.

1.4 The system of units for this practice is not specified. Dimensional quantities in the practice are presented only in illustrations of calculation methods.

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.*

2. Referenced Documents

2.1 ASTM Standards:²

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C802 Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials

E456 Terminology Relating to Quality and Statistics

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E1169 Practice for Conducting Ruggedness Tests

3. Terminology

3.1 Definitions:

3.1.1 For definitions of statistical terms used in this standard, refer to Terminology E456.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *determination, n*—numerical value of a characteristic of a test specimen measured in accordance with the given test method.

3.2.2 *effect, n—of a factor*, the difference in the measured characteristics at each level of a factor averaged over all levels of other factors in the experiment.

3.2.3 *factor, n*—a condition or element in the test procedure or laboratory environment that can be controlled and that is a potential source of variation of determinations.

3.2.4 *level, n*—the value or setting of a factor associated with a determination.

3.2.5 *replication, n*—the act of obtaining, under specified conditions, two or more determinations on identical specimens.

3.2.5.1 *Discussion*—Replicate determinations are typically required to be obtained by the same operator, using the same apparatus, on specimens that are similar as possible, and during a short time interval.

3.2.6 *ruggedness, n*—the characteristic of a test method such that determinations are not influenced to a statistically significant degree by small changes in the testing procedure or environment.

3.2.6.1 *Discussion*—Statistical significance is evaluated by comparing the observed variation due to a factor to the expected variation due to chance alone.

3.2.7 *screening, n*—a planned experiment using a low number of determinations to detect among many factors those that have a significant effect on variation of determinations compared with chance variation.

3.2.7.1 *Discussion*—In this practice, the influence of seven factors is evaluated using a replicated set of eight determinations, that is, a total of 16 determinations.

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).

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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.