



Designation: E 180 – 99

Standard Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial and Specialty Chemicals¹

This standard is issued under the fixed designation E 180; 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 establishes uniform standards for expressing the precision and bias of test methods for industrial and specialty chemicals. It includes an abridged procedure for developing this information, based on the simplest elements of statistical analysis. There is no intent to restrict qualified groups in their use of other techniques.

1.2 *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:

- D 1013 Test Method for Total Nitrogen in Resins and Plastics²
- D 1727 Test Method for Urea Content of Nitrogen Resins³
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specification⁴
- E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods⁴
- E 178 Practice for Dealing with Outlying Observations⁴
- E 456 Terminology Relating to Quality and Statistics⁴
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method⁴
- E 1169 Guide for Conducting Ruggedness Tests⁴

3. Significance and Use

3.1 All test methods require statements of precision and bias. The information for these statements is generated by an interlaboratory study (ILS). This practice provides a specific design and analysis for the study, and specific formats for the precision and bias statements. It is offered primarily for the guidance of task groups having limited statistical experience.

3.2 It is recognized that the use of this simplified procedure will sacrifice considerable information that could be developed through other designs or methods of analyzing the data. For example, this practice does not afford any estimate of error to be expected between analysts within a single laboratory. Statements of precision are restricted to those variables specifically mentioned. Task groups capable of handling the more advanced procedures are referred to the literature (1, 2, 3, 5, 13)⁵ and specifically to Practice E 691, the current Committee E-11 practice for interlaboratory studies. The latter includes graphical display and interpretation of ILS data.

3.3 The various parts appear in the following order:

- Part A—Glossary.
- Part B—Preliminary Studies.
- Part C—Planning the Interlaboratory Study.
- Part D—Testing for Outlying Observations.
- Part E—Statistical Analysis of Collaborative Data.
- Part F—Format of Precision Statements.
- Part G—Bias (Systematic Error).
- Part H—Presentation of Data.

4. Keywords

4.1 bias; industrial chemicals; interlaboratory study; precision

PART A—GLOSSARY

5. Scope

5.1 The following statistical terms are defined in the sense in which they will be used in presenting precision and bias information. These definitions have been simplified and are not necessarily universally acceptable nor as defined in Terminology E 456 and Practice E 177. For definitions and explanations of other statistical terms used in this practice, refer to Terminology E 456 and Practice E 177.

6. Terminology

6.1 Definitions and Descriptions of Terms:

6.1.1 *accuracy*—the agreement between an experimentally determined value and the accepted reference value. In chemical work, this term is frequently used to express freedom from

¹ This practice is under the jurisdiction of ASTM Committee E15 on Industrial and Specialty Chemicals and is the direct responsibility of Subcommittee E15.01 on General Standards.

Current edition approved Sept. 10, 1999. Published December 1999. Originally published as E 180 – 61 T. Last previous edition E 180 – 94.

² Annual Book of ASTM Standards, Vol 06.03.

³ Discontinued. See 1983 Annual Book of ASTM Standards, Vol 06.01.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ The boldface numbers in parentheses refer to the list of references at the end of this practice.