Designation: E 1595 – 98

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Practice for Evaluating the Performance of Mechanical Testing Laboratories[1]

This standard is issued under the fixed designation E 1595; 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.

INTRODUCTION

Criteria for laboratory assessment are commonly divided into two classes: generic (or general) and specific. The generic criteria are applicable to all laboratories regardless of the type of test being performed. Specific criteria are interpretations of the generic criteria applied to more limited areas of testing, such as a product class, type of test, or a particular test method.

The sources of the criteria for this practice include ISO/IEC Guide 25 (see Section 2), Guide E 548 and Practice A 880. If inconsistencies exist between these documents, the criteria given in this practice have precedence.

Accreditation is only an indicator of the quality of service furnished by the laboratory and does not relieve normal contractual responsibilities.

All information gained by an assessor or by an accreditation agency must be treated as confidential. Such information shall be handled on a "need to know" basis and shall not be divulged without the express written consent of the laboratory management.

1. Scope

1.1 This practice interprets the generic criteria listed in the referenced documents as they apply to mechanical testing. The omission of generic criteria contained in any of the reference documents does not necessarily mean that they are inapplicable to this practice.

1.2 The specific criteria assess features of organization, facilities, personnel, testing procedures, and record keeping to give an indication of the precision of the test results and the validity of the reports produced by a mechanical testing laboratory.

1.2.1 Some specific criteria of this practice may not be applicable when tests are only conducted for the company with which the lab is affiliated or when the tests are conducted on a company's own products and are reported only within the company or to purchasers of those products. When exceptions to this practice exist, the assessor shall be informed of them. The exceptions shall be made available to the assessor if requested.

1.2.2 An appendix applicable to a specific test method further defines the specific criteria listed in the main portion of the practice.

1.2.2.1 The test methods state some requirements without numerical values or recommended procedures for determining whether the requirements are met. One purpose of an appendix is to provide procedures and quantitative values which may be used during assessment. It is not to be considered as the requirements for assessment or for testing according to the method. Only the assessor or the accrediting agency can state requirements for assessment. Similarly, only the responsible subcommittee can state the requirements of the test method. Where mandatory requirements of the test method are referenced, mandatory wording is used in the appendix.

1.2.2.2 For the purposes of this appendix it is assumed that when a measurement is required, some degree of accuracy is implied even if none is stated.

1.2.2.3 If an assessor chooses to require any of these criteria, then the laboratory should be prepared to demonstrate compliance by measurement made during the assessment or to have at hand a report of such measurement made previously.

1.2.3 An appendix covering details peculiar to certain tests is appended to this practice as follows:

Rockwell Hardness Test (Test Methods E 18)	Appendix X1
Brinell Hardness Test (Test Method E 10)	Appendix X4

1.2.4 The specific test methods and practices applicable to the work of the laboratory and listed in 2.1 should be employed in assessing the capability of the laboratory.

1.3 The laboratory being accredited may be part of a larger organization.

1.4 Testing, approval, and certification of a company's own products or services, or both, by its own laboratory does not constitute a conflict of interest.

[1] This practice is under the jurisdiction of ASTM Committee E-28 on Mechanical Testingand is the direct responsibility of Subcommittee E28.12 on Accreditation of Mechanical Test Laboratories.

Current edition approved July 10, 1998. Published September 1998. Originally published as E 1595 – 94. Last previous edition E 1595 – 97a.

2. Referenced Documents

2.1 *ASTM Standards:*

A 880 Practice for Criteria for Use in Evaluation of Testing Laboratories and Organizations for the Exami-nation and Inspection of Steel, Stainless Steel, and Related Alloys[2]

E 4 Practices for Force Verification of Testing Machines[3]

E 6 Terminology Relating to Methods of Mechanical Testing[3]

E 8 Test Methods for Tension Testing of Metallic Materials[3]

E 8M Test Methods for Tension Testing of Metallic Materials [Metric][3]

E 10 Test Method for Brinell Hardness of Metallic Materials[3]

E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials[3]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[4]

E 83 Practices for Verification and Classification of Extensometers[3]

E 140 Hardness Conversion Tables for Metals[3]

E 208 Test Method for Conducting Drop-Weight Test to Determine Nil-Ducility Transition Temperature of Ferritic Steels[3]

E 548 Guide for General Criteria Used for Evaluating Laboratory Competence[4]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[4]

E 919 Specification for Software Documentation for a Computerized System[5]

E 1187 Terminology Relating to Laboratory Accreditation[4]

E 1301 Guide for the Development and Operation of Laboratory Proficiency Testing Programs[4]

E 1323 Guide for Evaluating Laboratory Measurement Practices and the Statistical Analysis of the Resulting Data[4]

E 1856 Guide for Evaluating Computerized Data Acquisition Systems Used to Acquire Data from Universal Testing Machines[3]

2.2 *ISO Standard:*

ISO/IEC Guide 25 General Requirements for the Competence of Calibration and Testing Laboratories[6]

2.3 *Other:*

ANSI/NSCL-Z540–1 Military Standard Calibration Systems Requirements[6]

3. Terminology

3.1 Definitions for terms used are found in Terminology E 6, E 1187, ISO/IEC Guide 25, ANSI/NSCL-Z540–1 and the Compilation of ASTM Standard Definitions.[7]

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *batch*—a definite quantity of some product or material produced under conditions that are considered uniform.

3.2.2 *calibration*—the comparison of measuring and test equipment or a measurement standard of unknown accuracy to a measurement standard of known accuracy in order to detect, correlate, report, or minimize by adjustment any variation in the accuracy of the measuring and test equipment or measurement standard being compared.

3.2.3 *standardization of an instrument*—the correlation of an instrument response to a standard of known accuracy.

3.2.4 *verification*—checking or testing of the measuring and test equipment to assure conformance to specified requirements. Verification may be accomplished in two ways, direct and indirect, and may or may not include calibration as defined in 3.2.2.

3.2.4.1 Direct verification involves comparison with standards of known value (for example, mass, length, time, voltage) which have an unbroken chain of traceability to national standards.

3.2.4.2 Indirect verification involves testing materials having known properties.

4. Significance and Use

4.1 This practice contains criteria for assessing a laboratory's performance and reporting of results of mechanical tests. The criteria have been selected to serve the interests of the three parties most concerned: the purchaser of the service, the assessor who acts as agent for the purchaser, and the supplier of the service.

NOTE 1—In some cases, one individual may represent two of the parties.

4.2 In some instances, additional criteria may be specified by the assessor or purchaser.

5. Quality System

5.1 The laboratory shall establish and maintain a quality system appropriate to the type, range, and volume of its activities. The laboratory shall document its policies and objectives for good laboratory practice and quality services. The laboratory management shall ensure that the quality system policies and objectives are understood and implemented by all laboratory personnel.

5.2 The quality system shall be formally documented in a Quality Manual which shall be available for use by all laboratory personnel. The quality manager (however named) shall be responsible for maintaining and keeping current the Quality Manual (see 5.3).

5.2.1 The Quality Manual and related quality documentation shall state the policies, organizational structure, and procedures established by the laboratory in order to meet the requirements of this practice.

NOTE 2—Technical procedures such as test methods and lists of current vendors may be contained in separate documentation provided that the Quality Manual refers to this documentation by name and describes the scope of its contents.

5.3 The quality system adopted to satisfy the requirements of this practice shall be reviewed at least annually by the management to ensure its continuing suitability and effectiveness and to introduce any necessary changes or improvements.

[2] *Annual Book of ASTM Standards*, Vol 01.03.
[3] *Annual Book of ASTM Standards*, Vol 03.01.
[4] *Annual Book of ASTM Standards*, Vol 14.02.
[5] *Annual Book of ASTM Standards*, Vol 14.01.
[6] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.
[7] Available from ASTM Headquarters.

6. Organization

6.1 Where relevant, the following information about the laboratory organization shall be made available to the accrediting authority for on-site assessment:

6.1.1 The specific identity, address, and location of the organization to be accredited.

6.1.2 Brief history of the laboratory, scope of operation, and type of users served.

6.1.3 A list or chart showing the relevant internal organizational components, including their location and primary functions.

6.1.4 A written outline or chart delineating job titles and incumbents.

6.1.5 A list of external technical services used by the laboratory for calibration, verification, repair, and subcontracted testing and the service performed by each.

6.1.5.1 Documentation concerning periodic quality surveys of vendors and verification services listed in paragraph 6.1.5.

6.1.6 Security rules and procedures for handling clients' proprietary rights and confidential information which shall be clearly described in the quality manual.

7. Personnel

7.1 The following information shall be available for on-site assessment:

7.1.1 A written outline or chart delineating the responsibility and authority of each relevant position category, including a summary description of work performed, authority, responsibility, education, and training.

7.1.2 A description of the training programs for each relevant position and a record of the task certification(s) for current employees.

7.1.3 A cross-index listing of each of the tests being accredited and the names of the persons fully qualified to perform those tests.

7.2 The minimum requirements for qualification and training of persons operating the testing machines, recording data, or reporting results should include:

7.2.1 Ability to demonstrate familiarity with and depth of understanding of the quantitative measurements involved.

7.2.2 Detailed knowledge of the test method(s) and the operation of the testing equipment used for the tests for which that person is qualified. The test methods may be simplified versions, but must include all instructions related to the function performed. An assessor may ask the technician to demonstrate competency by performing tests and discussing the test methods.

7.2.3 Access to advice from a technical leader who can answer questions regarding interpretation of test methods and repeatability of the results.

7.3 A technician in training may perform tests only if a qualified technician is present. The qualified technician shall act as trainer and shall review the results. Both shall sign all log sheets and reports.

NOTE 3—The terms technician-in-training, qualified technician, and technical leader are not required titles. They are only to be considered as descriptors of three levels of competence analogous to the apprentice, journeyman, and master classifications used by the skilled trades. A qualified technician in one test may be a technician in training in another test.

7.3.1 When the technician in training is judged competent, by performance, examination, or both, an annotation shall be made in the training record or a report shall be written stating the dates of the training and the completion date. Other information may be included such as the results of examination or the number of tests performed while in training. The report shall be signed by the supervisor and the qualified technician who acted as trainer.

7.4 The qualifications and training of the technical leader shall include:

7.4.1 Knowledge of the tests being accredited, including testing technique, theoretical basis of the calculation(s), and operating principles of the equipment.

NOTE 4—This information may be found in textbooks on testing written for college-level courses in engineering, metallurgy, or polymeric materials.

7.4.2 Sufficient knowledge of metrology and elementary statistics to identify out-of-control conditions, set schedules for verification, and organize collaborative-test programs.

7.5 The technical leader may be a consultant and need not be employed full time in the laboratory being accredited, but should have regular contact with the laboratory and be available for discussions with the assessor.

7.6 There shall be no evidence of commercial, financial, or other pressures which might adversely affect the integrity of the test results.

8. Measuring and Test Equipment

8.1 The testing laboratory shall have in its possession or have access to all items of measuring and test equipment specified by the test method(s) for which the laboratory is being accredited. Operating instructions pertinent to the test(s) being assessed shall be available for the operator(s) and for on-site assessment.

8.2 Appropriate maintenance procedures for laboratory measuring and test equipment shall be available to operating personnel and for on-site assessment.

8.3 When an item of measuring and test equipment has been subjected to overloading or mishandling, gives suspect results, or is shown by verification or other means to be defective, it shall be taken out of service and clearly labeled until it has been repaired, recalibrated if necessary, and re-verified.

8.4 A maintenance record shall be maintained for each major item of equipment. This record shall include:

8.4.1 The name of the item of equipment,

8.4.2 The manufacturer's name, type identification, and serial number,

8.4.3 Date received and date placed in service,

8.4.4 Current location, when appropriate, and

8.4.5 Details of maintenance.

8.4.6 In the case of measuring equipment:

8.4.6.1 Date and results of the previous verifications,

NOTE 5—It is recommended that all prior verification results be made a permanent part of this record.

8.4.6.2 The scheduled period of time between successive verifications, and