Designation: E 83 – 02

Standard Practice for Verification and Classification of Extensometer System[1]

This standard is issued under the fixed designation E 83; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This practice covers procedures for the verification and classification of extensometer systems, but it is not intended to be a complete purchase specification. The practice is applicable only to instruments that indicate or record values that are proportional to changes in length corresponding to either tensile or compressive strain. Extensometer systems are classified on the basis of the magnitude of their errors.

1.2 Because strain is a dimensionless quantity, this document can be used for extensometers based on either SI or US customary units of displacement.

NOTE 1—Bonded resistance strain gages directly bonded to a specimen cannot be calibrated or verified with the apparatus described in this practice for the verification of extensometers having definite gage points. (See procedures as described in Test Methods E 251.)

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:*

E 6 Terminology Relating to Methods of Mechanical Testing[2]

E 21 Test Methods for Elevated Temperature Tension Tests of Metallic Materials[2]

E 251 Test Methods for Performance Characteristics of Metallic Bonded Resistance Strain Gages[2]

3. Terminology

3.1 *Definitions:* In addition to the terms listed, see Terminology E 6.

3.1.1 *calibration*—a determination of the calibration factor for a system using established procedures.

3.1.2 *calibration factor*—the factor by which the change in extensometer reading must be multiplied to obtain the equivalent strain.

3.1.2.1 *Discussion*—For any extensometer, the calibration factor is equal to the ratio of change in length to the product of the gage length and the change in the extensometer reading. For direct-reading extensometers the calibration factor is unity.

3.1.3 *compressometer*—a specialized extensometer used for sensing negative or compressive strain.

3.1.4 *deflectometer*—a specialized extensometer used for sensing of extension or motion, usually without reference to a specific gage length.

3.1.5 *error, in extensometer systems*—the value obtained by subtracting the correct value of the strain from the indicated value given by the extensometer system.

3.1.6 *extensometer, n*—a device for sensing strain.

3.1.7 *extensometer systems*—a system for sensing and indicating strain.

3.1.7.1 *Discussion*—The system will normally include an extensometer, conditioning electronics and auxiliary device (recorder, digital readout, computer, etc.). However, completely self-contained mechanical devices are permitted. An extensometer system may be one of three types.

3.1.8 *Type 1 extensometer system, n*—an extensometer system which both defines gage length and senses extension, for example, a clip-on strain gage type with conditioning electronics.

3.1.9 *Type 2 extensometer system, n*—an extensometer which senses extension and the gage length is defined by specimen geometry or specimen features such as ridges or notches.

3.1.9.1 *Discussion*—A Type 2 extensometer is used where the extensometer gage length is determined by features on the specimen, for example, ridges, notches, or overall height (in case of compression test piece). The precision associated with gage length setting for a Type 2 extensometer should be specified in relevant test method or product standard. The position readout on a testing machine is not recommended for use in a Type 2 extensometer system.

[1] This practice is under the jurisdiction of ASTM Committee E28 on Mechanical Testing and is the direct responsibility of Subcommittee E28.01 on Calibration of Mechanical Testing Machines and Apparatus.

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[2] *Annual Book of ASTM Standards*, Vol 03.01.

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