



Standard Practice for Verification and Classification of Extensometer¹

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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 Testing²

E 21 Test Methods for Elevated Temperature Tension Tests of Metallic Materials²

E 251 Test Methods for Performance Characteristics of Metallic Bonded Resistance Strain Gages²

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**—a device for sensing strain. An extensometer may be one of two types:

3.1.7 Self-contained type.

3.1.8 Non-self-contained type (that requires an auxiliary device (for example, recorder, digital readout, computer display, etc.)) for readout of strain values.

3.1.8.1 **Discussion**—For some extensometers the gage length is fixed, while for others the gage length is variable and must be set or determined before the linear strain can be calculated.

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

3.1.9.1 **Discussion**—The system may be an extensometer of the self-contained type or the combination of an extensometer of the non-self-contained transducer type with a suitable readout device.

3.1.10 **resolution of the strain indicator**—the smallest change in strain that can be estimated or ascertained on the strain indicating apparatus of the testing system, at any applied strain.

3.1.11 **resolution of analog type indicator (dials, recorders, and so forth)**—the strain represented by one graduation multiplied by the ratio of the width of the pointer or pen line to the center distance between two adjacent graduation marks. The typical ratios used are 1:1, 1:2, 1:5, or 1:10. A spacing of 0.10 in. (2.5 mm) or greater is recommended for a resolution equal to the strain represented by 1:10 of a graduation. A ratio less than 1:10 should not be used.

3.1.12 **resolution of the digital type strain indicators (numeric displays, printouts, and so forth)**—the resolution is the

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.