Designation: E 139 – 00$^{\epsilon 1}$

Standard Test Methods for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials[1]

This standard is issued under the fixed designation E 139; 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.

ϵ[1] NOTE—Section 9.2.3 was editorially updated in February 2003.

1. Scope

1.1 These test methods cover the determination of the amount of deformation as a function of time (creep test) and the measurement of the time for fracture to occur when sufficient force is present (rupture test) for materials when under constant tensile forces at constant temperature. It also includes the essential requirements for testing equipment. For information of assistance in determining the desirable number and duration of tests, reference should be made to Section 9.

1.2 These test methods list the information which should be included in reports of tests. The intention is to ensure that all useful and readily available information is transmitted to interested parties. Reports receive special attention for the following reasons: (*1*) results from different, recognized procedures vary significantly; therefore, identification of methods used is important; (*2*) later studies to establish important variables are often hampered by the lack of detailed information in published reports; (*3*) the nature of prolonged tests often makes retest impractical, and at the same time makes it difficult to remain within the recommended variations of some controlled variables. A detailed report permits transmittal of test results without implying a degree of control which was not achieved.

1.3 Tests on notched specimens are not included. These tests are addressed in Practice E 292.

1.4 Tests under conditions of short times are not included. These test methods are addressed in Test Methods E 21.

1.5 The values stated in inch-pound units are to be regarded as the standard.

1.6 *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 4 Practices for Force Verification of Testing Machines[2]

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

E 8 Test Methods for Tension Testing of Metallic Materials[2]

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

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications[3]

E 74 Practice for Calibration of Force-Measuring Instruments for Verifying the Force Indication of Testing Machines[2]

E 83 Practice for Verification and Classification of Extensometers[2]

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods[3]

E 220 Method for Calibration of Thermocouples by Comparison Techniques[4]

E 292 Practice for Conducting Time-for-Rupture Notch Tension Tests of Materials[2]

E 633 Guide for Use of Thermocouples in Creep and Stress Rupture Testing to 1800°F (1000°C) in Air[2]

E 1012 Practice for Verification of Specimen Alignment Under Tensile Loading[2]

2.2 *Military Standard:*

MIL-STD-120 Gage Inspection[5]

2.3 *ASTM Adjuncts:*[6]

Standard unmachined specimens for calibrating creep testing machines (4 by 15⁄16 in. square bar)

3. Terminology

3.1 *Definitions*—The definitions of terms relating to creep testing, which appear in Section E of Terminology E 6 shall

[1] This practice is under the jurisdiction of the ASTM Committee E-28 on Mechanical Testing and is the direct responsibility of Subcommittee E28.10 on Effect of Elevated Temperature on Properties.

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

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] *Annual Book of ASTM Standards*, Vol 14.03.

[5] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[6] Available from ASTM Headquarters. Order Adjunct: ADJE0139.

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