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Designation: E8/E8M - 16a

American Association of Highway and Transportation Builders
ASTM International
An American National Standard

Standard Test Methods for Tension Testing of Metallic Materials¹

This standard is based on the first designation (E8/E8M) 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 revision. A superscript letter indicates an editorial change since the last revision or approval.

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

1. Scope²
 - 1.1 These test methods cover the tension testing of metallic materials in any form at room temperature, specifically, the methods of determination of yield strength, yield point elongation, tensile strength, elongation, and reduction of area.
 - 1.2 The gauge lengths for most round specimens are required to be 4D for E8 and 5D for E8M. The gauge length is the most significant difference between E8 and E8M test specimens. Test specimens made from powder metallurgy (PM) materials are exempt from this requirement by industry-wide agreement to keep the pressing of the material to a specific projected area and density.
 - 1.3 Exceptions to the provisions of these test methods may need to be made in individual specifications or test methods for a particular material. For example, see Test Method/EPRM Definitions A370 and Test Methods E557, and E558M.
 - 1.4 Room temperature shall be considered to be 23°C (73°F) unless otherwise specified.
 - 1.5 The values stated in SI units are to be regarded as separate from inch-pound units. The values in each system are not exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.
 - 1.6 This standard does not purport to address all of the safety hazards, 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 that may apply.
2. Referenced Documents³
 - 2.1 ASTM Standards⁴
 - A588/A588M Specification for Steel Castings, Carbon, Low Alloy, and Stainless Steel, Heavy-Walled for Steam Turbines
 - A770 Test Methods and Definitions for Mechanical Testing of Steel Products
 - E57/E57M Methods for Tension Testing Wrought and Cast Aluminum and Magnesium Alloy Products
 - E8/E8M Test Methods for Tension Testing Wrought and Cast Aluminum and Magnesium Alloy Products (Metric)
 - E23 Practice for Force Verification of Testing Machines
 - E8 Terminology Relating to Methods of Mechanical Testing
 - E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
 - E53 Practice for Verification and Classification of Extensometer Systems
 - E545 Test Methods of Tension Testing of Metallic Foil
 - E902 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
 - E912 Practice for Verification of Testing Frames and Specimen Alignment Under Tensile and Compressive Axial Force Application
 - D1565 Terminology Relating to Rubber
 - E1855 Guide for Evaluating Computerized Data Acquisition Systems Used to Acquire Data from Universal Testing Machines
 - E255M Practices for Verification of Speed for Material Testing Machines
 - 2.2 Terminology⁵
 - 2.2.1 Definitions of Terms Common to Mechanical Testing—

¹ These test methods are under the jurisdiction of ASTM Committee E8 on Mechanical Testing and are under the responsibility of Subcommittee E8.01 on Tension Testing. Current edition approved July 1, 2016. Published September 2016. Originally approved in 1921. 1921 edition approved in 1927 by E8-1. 1937 edition approved in 1937 by E8-1. 1947 edition approved in 1947 by E8-1. 1957 edition approved in 1957 by E8-1. 1967 edition approved in 1967 by E8-1. 1977 edition approved in 1977 by E8-1. 1987 edition approved in 1987 by E8-1. 1997 edition approved in 1997 by E8-1. 2007 edition approved in 2007 by E8-1. 2012 edition approved in 2012 by E8-1. 2016 edition approved in 2016 by E8-1.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at 6383 West Lehigh Avenue, West Conshohocken, PA 19380. For general information on ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at 6383 West Lehigh Avenue, West Conshohocken, PA 19380.

¹ A Summary of Changes section appears at the end of this standard.

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Designation: E8 - 18

American Association of Highway and Transportation Builders
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Standard Test Method for Brinell Hardness of Metallic Materials¹

This standard is based on the first designation (E10) 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 revision. A superscript letter indicates an editorial change since the last revision or approval.

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

1. Scope²
 - 1.1 This test method covers the determination of the Brinell hardness of metallic materials by the Brinell indentation hardness principle. This standard provides the requirements for a Brinell testing machine and the procedures for performing Brinell hardness tests.
 - 1.2 This test method includes requirements for the use of portable Brinell hardness testing machines that measure Brinell hardness by the Brinell hardness test principle and also cover the requirements of this test method, including the direct and indirect calibrations of the testing machine. Portable Brinell hardness testing machines that cannot meet the direct calibration requirements and can only be verified by indirect calibration requirements are covered in Test Method E1130.
 - 1.3 This standard includes additional requirements in the following situations:

Verification of Brinell Hardness Testing Machines	Section 6.1
Direct Calibration of Brinell Hardness Testing Machines	Section 6.2
Indirect Calibration of Brinell Hardness Testing Machines	Section 6.3
Verification of Brinell Hardness Testing Machines	Section 6.4
 - 1.4 This standard includes supplementary information in the following appendices that relate to the Brinell hardness test:

Time of Brinell Hardness Testing	Appendix A1
Direct Calibration of Brinell Hardness Testing Machines	Appendix A2
Indirect Calibration of Brinell Hardness Testing Machines	Appendix A3
 - 1.5 As the time the Brinell hardness test was developed, the force levels were specified in units of kilogram-force (kgf). Although this standard specifies the use of force in the International System of Units (SI) as the Newton (N), because of the historical precedent and conversion constant range of 1 kgf units force values in kgf units are provided for information and needs of the discussion in this standard refer to force in kgf units.
 - 1.6 This standard does not purport to address all of the safety hazards, if any, associated with its use. It is the

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¹ A Summary of Changes section appears at the end of this standard.

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responsibility of the user of this standard to establish appropriate safety health and environmental practices and determine the applicability of regulatory limitations that may apply.

² This international standard was developed in accordance with internationally recognized principles on standardization established in the Declaration on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

- 2.1 ASTM Standards³
 - E10 Test Method for Indentation Hardness of Metallic Materials by Continuous Hardness Tester
 - E10 Test Method for Rock Hardness Testing of Steel Products
 - E1078 Test Method for Portable Hardness Testing by the Ultrasonic Contact Resonance Method
 - E1081 Test Method for Indentation Hardness of Aluminum Alloys by Means of a Sclerosity Hardness Cap
 - E129 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
 - E134 Practice for Calibration and Verification for Force-Measuring Instruments
 - E1110 Test Method for Rockwell and Brinell Hardness of Metallic Materials by Portable Hardness Tester
 - E1110 Hardness Conversion Tables for Metals Relating Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Sclerosity Hardness, Knoop Hardness, and Leeb Hardness
 - E1161 Test Method for Microindentation Hardness of Materials
- 2.2 American Society for Nondestructive Testing Standards⁴
 - ASNT 10-1987 Model Rule⁵

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at 6383 West Lehigh Avenue, West Conshohocken, PA 19380. For general information on ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at 6383 West Lehigh Avenue, West Conshohocken, PA 19380.

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⁵ Available from American Society for Nondestructive Testing, 1711 North Creek Road, Columbus, OH 43240. www.asnt.org

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