



Designation: E6 – 23a

Standard Terminology Relating to Methods of Mechanical Testing¹

This standard is issued under the fixed designation E6; 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 U.S. Department of Defense.

1. Scope

1.1 This terminology covers the principal terms relating to methods of mechanical testing of solids. The general definitions are restricted and interpreted, when necessary, to make them particularly applicable and practicable for use in standards requiring or relating to mechanical tests. These definitions are published to encourage uniformity of terminology in product specifications.

1.2 Terms relating to fatigue and fracture testing are defined in Terminology **E1823**.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision 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 Standards:²

E8/E8M Test Methods for Tension Testing of Metallic Materials

E74 Practices for Calibration and Verification for Force-Measuring Instruments

E796 Test Method for Ductility Testing of Metallic Foil (Withdrawn 2009)³

E1823 Terminology Relating to Fatigue and Fracture Testing

¹ This terminology is under the jurisdiction of ASTM Committee **E28** on Mechanical Testing and is the direct responsibility of Subcommittee **E28.91** on Terminology except where designated otherwise. A subcommittee designation in parentheses following a definition indicates the subcommittee with responsibility for that definition.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

2.2 BIPM Standard:⁴

JCGM 200 : International vocabulary of metrology — Basic and general concepts and associated terms (VIM).

3. Index of Cross-References and Associated Definitions

3.1 The terms listed below are associated with terminology that is fundamental or commonly used. The definition for the term of interest is related to or is given below the definition for the fundamental term cited.

Term	
angular strain	indexed under strain
axial strain	indexed under strain
bending strain	indexed under strain
chord modulus	see modulus of elasticity
direct verification	indexed under verification
compressive stress	indexed under stress
elastic constants	see modulus of elasticity and Poisson's ratio
elastic modulus	use modulus of elasticity
elastic true strain	indexed under strain
engineering strain	indexed under strain
engineering stress	indexed under stress
fracture stress	indexed under stress
indirect verification	indexed under verification
initial tangent modulus	see modulus of elasticity
instantaneous strain	see initial strain
linear (tensile or compressive) strain	indexed under strain
load	use force
malleability	see ductility
modulus of rigidity	see shear modulus
movable Brinell hardness testing machine	indexed under Brinell hardness testing machine
movable Rockwell hardness testing machine	indexed under Rockwell hardness machine
nominal stress	indexed under stress
normal stress	indexed under stress
permanent set	see set
physical properties	see mechanical properties
plastic true strain	indexed under strain
portable Brinell hardness testing machine	indexed under Brinell hardness testing machine
portable Rockwell hardness testing machine	indexed under Rockwell hardness machine
principal stress (normal)	indexed under stress

⁴ Available from BIPM - Pavillon de Breteuil F-92312 Sèvres Cedex FRANCE. this document is available free-of-charge at <https://www.bipm.org/en/publications/guides/vim.html>



residual strain	indexed under strain
residual stress	indexed under stress
Rockwell hardness standardizing machine	indexed under Rockwell hardness machine
Rockwell hardness testing machine	see Rockwell hardness machine
Rockwell superficial hardness number	see also Rockwell hardness number
secant modulus	see modulus of elasticity
shear strain	indexed under strain
shear stress	indexed under stress
static fatigue strength	see creep rupture strength
stress-rupture strength	see creep rupture strength
tangent modulus	see modulus of elasticity
tensile stress	indexed under stress
torsional modulus	see shear modulus
torsional stress	indexed under stress
transverse strain	indexed under strain
true strain	indexed under strain
true stress	indexed under stress
Type 1 extensometer system	indexed under extensometer
Type 2 extensometer system	indexed under extensometer
Type 3 extensometer system	indexed under extensometer
ultimate tensile strength (UTS)	use tensile strength
yield point	use upper yield strength
yield strength	see also upper yield strength and lower yield strength

4. Terminology

4.1 Terms and Definitions:

absorbed energy [FL], *n*—work spent to fracture a specimen in a single pendulum swing, as measured by a compensated indicating device (E28.07)

accuracy, *n*—the permissible variation from the correct value. (E28.01)

adjusted length of the reduced section—the length of the reduced section plus an amount calculated to compensate for strain in the fillet region. (E28.04)

alignment, *n*—the condition of a testing machine that influences the introduction of bending moments into a specimen (or alignment transducer) during the application of tensile or compressive forces. (E28.01)

batch, *n*—for strain gages, a group of strain gages of the same type and lot, manufactured as a set (made at the same time and under the same conditions). (E28.01)

bearing area [L²], *n*—the product of the pin diameter and specimen thickness. (E28.04)

bearing force [F], *n*—a compressive force on an interface. (E28.04)

bearing strain, *n*—the ratio of the bearing deformation of the bearing hole, in the direction of the applied force, to the pin diameter. (E28.04)

bearing strength [FL⁻²], *n*—the maximum bearing stress which a material is capable of sustaining. (E28.04)

bearing stress [FL⁻²], *n*—the force per unit of bearing area. (E28.04)

bearing yield strength [FL⁻²], *n*—the bearing stress at which a material exhibits a specified limiting deviation from the proportionality of bearing stress to bearing strain. (E28.04)

bend test, *n*—a test for ductility performed by bending or folding a specimen, usually by steadily applied forces but in some instances by blows.

DISCUSSION—The bending may be interrupted to examine the bent surface for cracks.

DISCUSSION—The ductility is usually judged by whether or not the specimen cracks under the specified conditions of the test.

DISCUSSION—There are four general types of bend tests according to the manner in which the forces are applied to the specimen to make the bend. These are as follows:

1. Free Bend
2. Guided Bend
3. Semi-Guided Bend
4. Wrap-Around Bend

DISCUSSION—The specimen has a substantially uniform cross-section and a length several times as great as the largest dimension of the cross-section. (E28.02)

biaxial stretching, *n*—a mode of sheet metal forming in which positive strains are observed in all directions at a given location. (E28.02)

breaking force [F], *n*—the force at which fracture occurs.

DISCUSSION—When used in connection with tension tests of thin materials or materials of small diameter for which it is often difficult to distinguish between the breaking force and the maximum force developed, the latter is considered to be the breaking force. (E28.04)

Brinell hardness number, *n*—a number, which is proportional to the quotient obtained by dividing the test force by the curved surface area of the indentation which is assumed to be spherical and of the diameter of the ball. (E28.06)

Brinell hardness scale, *n*—a designation that identifies the specific combination of ball diameter and applied force used to perform the Brinell hardness test. (E28.06)

Brinell hardness standardizing machine—a Brinell hardness machine used for the standardization of Brinell hardness test blocks. The standardizing machine differs from a regular Brinell hardness testing machine by having tighter tolerances on certain parameters. (E28.06)

Brinell hardness test, *n*—an indentation hardness test using a verified machine to force an indenter (tungsten carbide ball with diameter *D*), under specified conditions, into the surface of the material under test.

DISCUSSION—The diameter of the resulting indentation *d* is measured after removal of the force. (E28.06)

Brinell hardness testing machine—a Brinell hardness machine used for general testing purposes. (E28.06)

movable Brinell hardness testing machine—a Brinell hardness testing machine that is designed to be moved to different locations on a moveable frame, table or similar support that is integral to the testing machine (for example, securely fixed to a rolling table), or a Brinell hardness testing machine that is designed to move into the testing position prior to a test, (for example, securely fixed to a moving support arm), and has been previously verified to ensure that such moves will not affect the hardness result.