



Standard Practices for Force Verification of Testing Machines¹

This standard is issued under the fixed designation E4; 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 These practices cover procedures for the force verification, by means of standard calibration devices, of tension or compression, or both, static or quasi-static testing machines (which may, or may not, have force-indicating systems). These practices are not intended to be complete purchase specifications for testing machines. Testing machines may be verified by one of the three following methods or combination thereof:

- 1.1.1 Use of standard weights,
- 1.1.2 Use of equal-arm balances and standard weights, or
- 1.1.3 Use of elastic calibration devices.

NOTE 1—These practices do not cover the verification of all types of testing machines designed to measure forces, for example, the constant-rate-of-loading type which operates on the inclined-plane principle. This type of machine may be verified as directed in the applicable appendix of Specification [D76/D76M](#).

1.2 The procedures of [1.1.1 – 1.1.3](#) apply to the verification of the force-indicating systems associated with the testing machine, such as a scale, dial, marked or unmarked recorder chart, digital display, etc. *In all cases the buyer/owner/user must designate the force-indicating system(s) to be verified and included in the report.*

1.3 **Units**—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3.1 Other customary force units may be used with this standard such as the kilogram-force (kgf) which is often used with hardness testing machines

1.4 Forces indicated on displays/printouts of testing machine data systems—be they instantaneous, delayed, stored, or

retransmitted—which are verified with provisions of [1.1.1](#), [1.1.2](#), or [1.1.3](#), and are within the ± 1 % accuracy requirement, comply with Practices E4.

1.5 *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:*²
 - [D76/D76M Specification for Tensile Testing Machines for Textiles](#)
 - [E6 Terminology Relating to Methods of Mechanical Testing](#)
 - [E74 Practice of Calibration of Force-Measuring Instruments for Verifying the Force Indication of Testing Machines](#)
 - [E467 Practice for Verification of Constant Amplitude Dynamic Forces in an Axial Fatigue Testing System](#)

3. Terminology

3.1 For definitions of terms used in this practice, refer to Terminology [E6](#).

3.2 Definitions:

3.2.1 *elastic calibration device, n*—a device for use in verifying the force readings of a testing machine consisting of an elastic member(s) to which forces may be applied, combined with a mechanism or device for indicating the magnitude (or a quantity proportional to the magnitude) of deformation under force.

3.2.2 *portable testing machine (force-measuring type), n*—a device specifically designed to be moved from place to place and for applying a force (load) to a specimen.

3.2.3 *testing machine (force-measuring type), n*—a mechanical device for applying a force to a specimen.

3.3 Definitions of Terms Specific to This Standard:

¹ These practices are 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 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.