



Standard Practice for Torque Calibration of Testing Machines ¹

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1. Scope

1.1 This practice covers procedures and requirements for the calibration of torque for static and quasi-static torque capable testing machines. These may, or may not, have torque indicating systems and include those devices used for the calibration of hand torque tools. Testing machines may be calibrated by one of the three following methods or combination thereof:

- 1.1.1 Use of standard weights and lever arms.
- 1.1.2 Use of elastic torque measuring devices.
- 1.1.3 Use of elastic force measuring devices and lever arms.
- 1.1.4 Any of the methods require a specific uncertainty of measurement, displaying metrological traceability to The International System of Units (SI).

NOTE 1— for further definition of the term metrological traceability, refer to the latest revision of JCGM 200: International vocabulary of metrology — Basic and general concepts and associated terms (VIM).

1.2 The procedures of 1.1.1, 1.1.2, and 1.1.3 apply to the calibration of the torque-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 torque-indicating system(s) to be calibrated and included in the report.

1.3 Since conversion factors are not required in this practice, either english units, metric units, or SI units can be used as the standard.

1.4 Torque values indicated on displays/printouts of testing machine data systems—be they instantaneous, delayed, stored, or retransmitted—which are calibrated with provisions of 1.1.1, 1.1.2 or 1.1.3 or a combination thereof, and are within the $\pm 1\%$ of reading accuracy requirement, comply with this practice.

1.5 The following applies to all specified limits in this standard: For purposes of determining conformance with these specifications, an observed value or a calculated value shall be rounded “to the nearest unit” in the last right-hand digit used in

expressing the specification limit, in accordance with the rounding method of Practice E29, for Using Significant Digits in Test Data to Determine Conformance with Specifications.

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:*²

E6 Terminology Relating to Methods of Mechanical Testing
E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E74 Practice of Calibration of Force-Measuring Instruments for Verifying the Force Indication of Testing Machines

E2428 Practice for Calibration and Verification of Torque Transducers

2.2 *NIST Technical Notes:*

NIST Technical Note 1297 Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results³

2.3 *BIPM Standard:*⁴

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

3. Terminology

3.1 *Definitions:* In addition to the terms listed, see Terminology E6.

3.1.1 *accuracy*—the permissible variation from the correct value.

3.1.1.1 *Discussion*—A testing machine is said to be accurate if the indicated torque is within the specified permissible variation from the actual torque. In this practice the word “accurate” applied to a testing machine is used without numerical values. For example, “An accurate testing machine

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 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 Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

⁴ Available from BIPM (Bureau International des Poids et Mesures)- Pavillon de Breteuil F-92312 Sèvres Cedex FRANCE <http://www.bipm.org>