



# Standard Practice for Calibration and Verification of Torque Transducers<sup>1</sup>

This standard is issued under the fixed designation E2428; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 The purpose of this practice is to specify the procedure for the calibration of torque transducers.

NOTE 1—Verification by deadweight and a lever arm is an acceptable method of verifying the torque indication of a testing machine. Tolerances for weights used are tabulated in Practice E2624; methods for calibration of the weights are given in NIST Technical Note 577, Methods of Calibrating Weights for Piston Gages.<sup>2</sup>

1.2 The values stated in SI units are to be regarded as standard. Other metric and inch-pound values are regarded as equivalent when required.

1.3 This practice is intended for the calibration of static torque measuring instruments. The practice is not applicable for dynamic or high-speed torque calibrations or measurements, nor can the results of calibrations performed in accordance with this practice be assumed valid for dynamic or high speed torque measurements.

1.4 *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:<sup>3</sup>

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E2624 Practice for Torque Calibration of Testing Machines and Devices

### 2.2 ASME Standard:

B46.1 Surface Texture<sup>4</sup>

### 2.3 BIPM Standard<sup>5</sup>

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

## 3. Terminology

### 3.1 Definitions:

3.1.1 *primary torque standard*—a deadweight force applied through a lever arm or wheel, all displaying metrological traceability to the International System of Units (SI).

3.1.1.1 *Discussion*—for further definition of the term metrological traceability, refer to the latest revision of JCGM:200.

3.1.2 *secondary torque standard*—an instrument or mechanism, the calibration of which has been established by a comparison with a primary torque standard(s).

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *calibration equation*—a mathematical relationship between deflection and torque established from the calibration data for use with the torque transducer in service, sometimes called the calibration curve.

3.2.1.1 *Discussion*—Torque transducers have torque-to-deflection relationships that can be fitted to polynomial equations.

3.2.2 *continuous-reading device*—a class of instruments whose characteristics permit interpolation of torque values between calibrated torque values.

3.2.2.1 *Discussion*—Such instruments usually have torque-to-deflection relationships that can be fitted to polynomial equations. Departures from the fitted curve are reflected in the uncertainty (see 8.5).

3.2.3 *creep*—The change in deflection of the torque transducer under constant applied torque.

3.2.3.1 *Discussion*—Creep is expressed as a percentage of the output change at a constant applied torque from an initial

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<sup>2</sup> Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>4</sup> Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

<sup>5</sup> BIPM, Pavillon de Breteuil, F-92312 Sèvres Cedex. <http://www.bipm.org>