



## Designation: ~~D3474 – 90 (Reapproved 2012)~~ D3474 – 90 (Reapproved 2018)

# Standard Practice for Calibration and Use of Torque Meters Used in Packaging Applications<sup>1</sup>

This standard is issued under the fixed designation D3474; 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 This practice covers the calibration and use of torque meters of the type normally used in packaging applications.

1.2 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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:*<sup>2</sup>

**D3198 Test Method for Application and Removal Torque of Threaded or Lug-Style Closures** (Withdrawn 2016)<sup>3</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of *application torque* and *removal torque*, see Test Method **D3198**.

3.1.1 *stripping torque*—a force or system of forces acting in a tightening direction that causes overrunning of the threads or rotation of an overshell with respect to its supporting member.

## 4. Summary of Practice

4.1 *Calibration*—Reference torque values are obtained by means of vertically suspended dead weights acting at specific distances from the axis of the mounting platform of the tester.

4.2 *Use*—Torque values to apply or remove closures are obtained by mounting containers on the platform and either applying or removing the closures. In some applications, the closure is mounted on the platform and the container is rotated.

## 5. Significance and Use

5.1 This practice can be used to check devices used to measure the application and removal torques of continuous or intermittent thread and lug closures.

5.2 This practice can be used to determine the amount of torque to either apply or remove a closure.

## 6. Apparatus

6.1 *Adapter*—A circular plate that can be mounted concentrically on the platform of the tester. If the platform itself is suitable, an adapter is not necessary. The adapter should be of such diameter that its radius multiplied by appropriate weights will give torque values equal to  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and full-scale meter readings. (Typical devices for packaging applications have ranges from: 0 to 10, 0 to 25, 0 to 50, and 0 to 100 lbf-in. (0 to 1.13, 0 to 2.8, 0 to 5.7, and 0 to 11.3 N/m, respectively).

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee **F02** on Flexible Primary Barrier Packaging and is the direct responsibility of Subcommittee **F02.25** on Rigid Container Closure Systems.

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<sup>2</sup> 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.

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

6.2 *Connecting Means*—A very flexible, thin filament, such as a wire or fishing line that transmits the force of hanging weights to the circumference of the adapter.

6.3 *Pulley*, low friction, used to change the direction of the connecting means from horizontal to vertical.

6.4 *Appropriate Dead Weights*, for example: 2, 4, and 7-lb (0.9, 1.8, and 3.2-kg) for a torque meter with a 7 in. (178 mm) diameter plate or platform and a range of 0 to 25 in-lbs (0 to 2.8 N-m).

## 7. Conditioning

7.1 Prior to calibration, the torque meter and weights shall be allowed to come to ambient room conditions.

## 8. Calibration Procedures (see Fig. 1)

### 8.1 *Spring-Loaded Type Testers:*

8.1.1 Verify that the meter needle moves freely throughout its entire range and rests on zero when not loaded. Adjust if necessary.

8.1.2 If an adapter is used, fasten it securely and concentrically to the tester platform or spindle.

8.1.3 Secure the torque meter to a table or work surface.

8.1.4 Secure one end of the connecting means to a point on the circumference of the adapter or rotating platform and wrap it at least halfway around the circumference.

8.1.5 Run the connecting means over a low friction pulley located near the edge of a bench or table, and let it hang vertically for the attachment of weights.

8.1.6 Sequentially, attach dead weights appropriately to give torque values equal to  $\frac{1}{4}$ ,  $\frac{1}{2}$ , and full-scale meter readings. Make certain that the weights are hanging freely. Record the weight, radius and the meter reading at each test point, making certain that the needle returns to zero when the weights are removed.

8.1.7 If the difference between the measured and indicated readings differ from the manufacturers' specification (usually  $\pm 4\%$  of full scale), the user will need to generate a calibration chart or have the instrument repaired.

8.1.8 For torque meters that measure both clockwise and counterclockwise, repeat 8.1.6, but with the platform rotation in the opposite direction.

### 8.2 *Automatic Type Testers:*

8.2.1 Attach a small flexible string at least halfway around the circumference of the platform and over a low friction pulley so that calibration weights can be attached.

8.2.2 Run the calibration program on the computer.

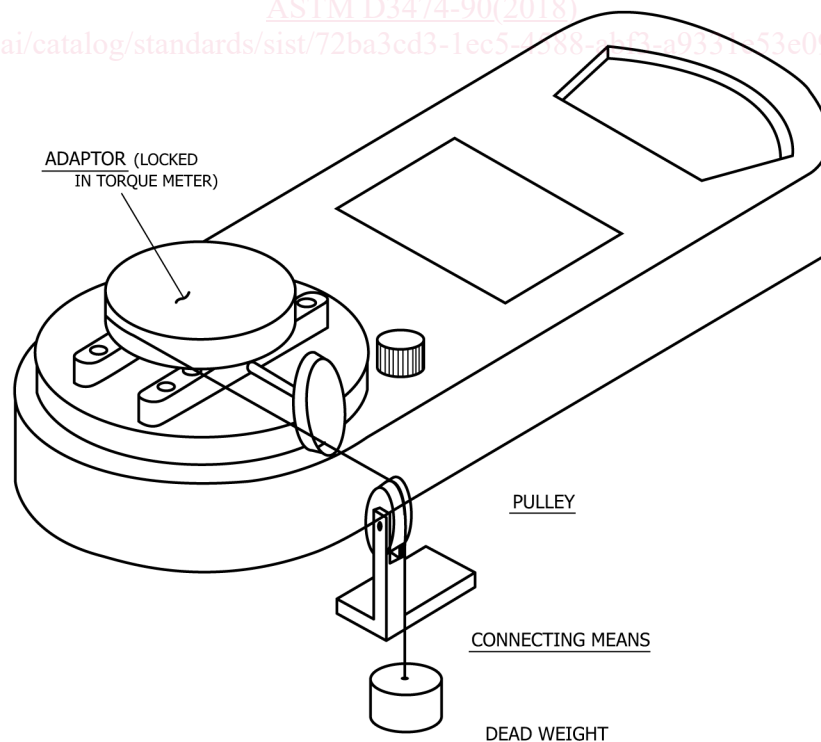


FIG. 1 Torque Meter Calibration Set Up