



## Standard Test Methods for Measurement of Torque Retention for Packages with Continuous Thread Closures<sup>1</sup>

This standard is issued under the fixed designation D 2063; 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 These test methods evaluate the torque retention of continuous thread closures on containers, with matching finishes, for predetermined environmental conditions over time.

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

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 996 Terminology of Packaging and Distribution Environments<sup>2</sup>
- D 3198 Test Method for Application and Removal Torque of Threaded or Lug-Style Closures<sup>2</sup>
- D 3474 Practice for the Calibration and Use of Torque Meters Used in Packaging Applications<sup>2</sup>
- D 4169 Practice for Performance Testing of Shipping Containers and Systems<sup>2</sup>
- D 4332 Practice for Conditioning Containers, Packages or Packaging Components for Testing<sup>2</sup>
- E 41 Terminology Relating to Conditioning<sup>3</sup>
- E 171 Specification for Standard Atmospheres for Conditioning and Testing Flexible Barrier Materials<sup>2</sup>
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 For definitions of general packaging and distribution terms, see Terminology D 996.

3.1.2 For definitions of application torque and removal torque, see Test Method D 3198.

3.1.3 For Definitions regarding conditioning, see Terminology E 41.

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

3.2.1 *immediate removal torque*—removal torque that is

measured at a stated interval, from 1 to 5 min after closure application.

3.2.2 *torque retention*—a comparison between removal torque at the end of a test period and a predetermined immediate removal torque.

### 4. Summary of Test Methods

4.1 *Test Method A: Static Evaluation*—At predetermined time intervals, the removal torques of representative samples of a container/continuous thread closure system, previously stored at various environmental conditions, are measured.

4.2 *Test Method B: Dynamic Evaluation*—Practice D 4169 is used to develop a uniform system of evaluating the ability of primary packages, in the shipping units, to withstand the distribution environment. At the end of predetermined distribution cycles, the removal torques of representative samples of a container/continuous thread closure system are measured.

### 5. Significance and Use

5.1 This test method allows for the measurement of the torque retention properties of container/continuous thread closure systems of various designs, materials, and manufacture, and is suitable for packaging development and engineering evaluation.

5.2 This test method can be used for the evaluation of container/continuous thread closure systems under controlled conditions (where the application torque is known and the applied downward force to the closure is zero).

### 6. Apparatus

6.1 *Torque Meter*, with an appropriate scale that accurately measures within the expected torque range for the particular container/continuous thread closure system to be evaluated.

6.1.1 A spring torque meter, if used, will have a scale where the anticipated torque readings are not less than one-third of the maximum range of the scale for the container/continuous thread closure system to be evaluated. Torque results will be available in a visual format.

6.1.2 A digital or automated torque instrument, if used, will have an appropriate design and scale capacity for the container/continuous thread closure system to be evaluated. Torque results will be available in either electronic display or printout formats.

6.1.3 A torque wrench, if used, will have an appropriate

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D-10 on Packaging and are the direct responsibility of Subcommittee D10.32 on Consumer Packages.

Current edition approved June 15, 1991. Published August 1991.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 15.09.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.