Designation: D3470 – 97 (Reapproved 2007)

Standard Test Method for Measurement of Removal Lug Strippage of Type IIA Child-Resistant Closures[1]

This standard is issued under the fixed designation D3470; 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.

1. Scope

1.1 This test method covers the determination of the force required to cause a downward-force-while-turning lug-finish closure to be rotated across the container finish lugs (strippage) without downward force being applied to the closure (Type IIA closures).

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:*[2]

D3474 Practice for Calibration and Use of Torque Meters Used in Packaging Applications

D3475 Classification of Child-Resistant Packages

3. Terminology

3.1 *Definitions:*

3.1.1 *type IIA child-resistant closure*—a lug finish closure requiring a random push down while turning. (See Classification D3475.)

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *strippage torque*—the moment of force which is required to produce rotation of the closure over the container lugs while exerting no downward force.

4. Summary of Test Method

4.1 This test method consists of securing a capped container (after suitable preconditioning) in a torque-measuring device and rotating the closure, using mechanical or nonmechanical aid, to determine the torque needed to rotate the closure across the container lugs. No downward force is applied.

4.2 Using sufficient sampling, the average strippage force and the range are determined for a given lot of samples. Torque measurements are in units of pound-force-inch or newton-metre.

5. Significance and Use

5.1 This test method may be used as a standard test in the comparison of a given size and design lug-style child-resistant closure to manufacturer specifications, and in the comparison of similar closures of differing materials for determining strippage.

5.2 This test method may be used as a standard test to evaluate the continued effectiveness of the closure for child resistance and adult opening and reclosing throughout the expected use and shelf life of the package.

6. Apparatus

6.1 *Torque-Measuring Device,* (see Note 1) having a measurement range consistent with the torque values to be measured, that will securely hold the capped container.

NOTE 1—A digital or automated torque instrument, if used, will have an appropriate design and scale capacity for the container/closure system to be evaluated. Torque results will be available in either electronic display or printout formats.

6.2 *Gripping Device (Optional),* that will effectively grip the closure perpendicular to the vertical axis of the container without the use of vertical or radial forces, and that will not contact any portion of the container (Fig. 1).

7. Sampling

7.1 Randomly select sufficient samples to ensure reproducibility of results from the lot being inspected.

8. Test Specimens

8.1 Examine closure samples and containers, to be vehicles for this test, to determine compliance with the manufacturer's dimensional and material specifications.

8.2 Prepare test specimens by assembling the closure to the appropriate container by pressing downward and turning the closure so as to reduce or eliminate initial closure lug wear.

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[1] This test method is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.32 on Consumer, Pharmaceutical, Medical, and Child Resistant Packaging.

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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.

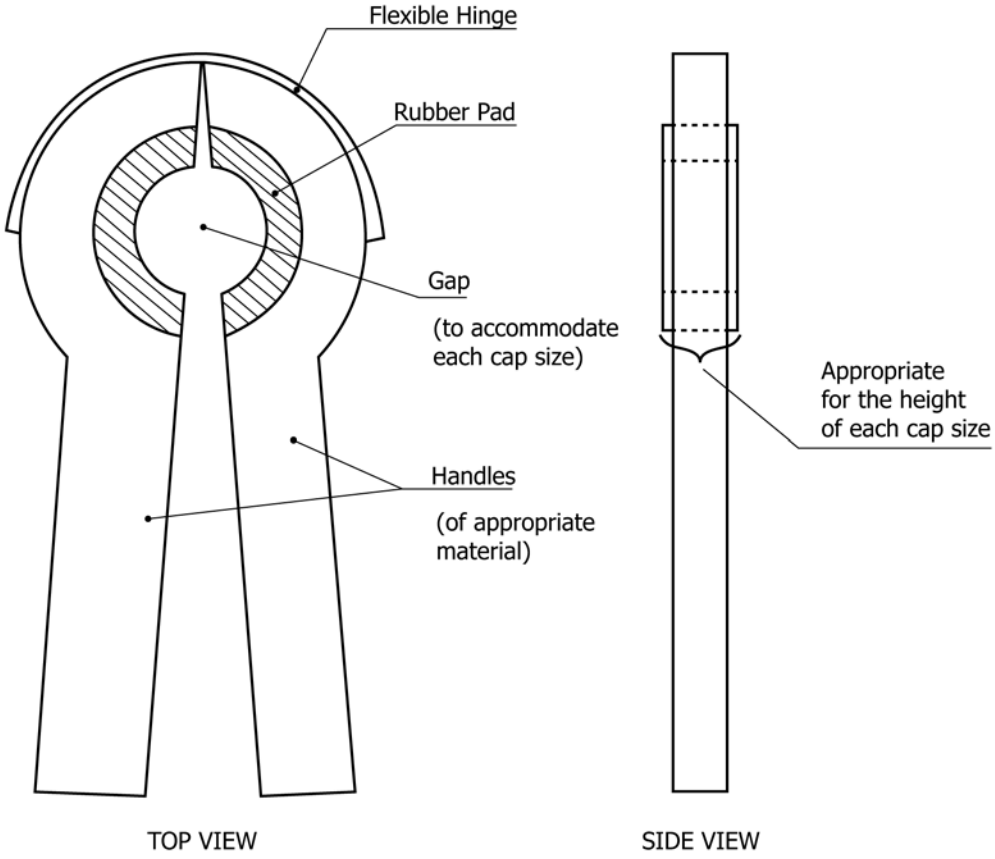

FIG. 1 Supported Cap Gripping Aid for Removal Strippage Determination

9. Calibration

9.1 Calibrate the torque meter in accordance with Practice D3474.

10. Conditioning

10.1 If special conditions are not required, store the unassembled specimens for a minimum of 24 h at 23 ± 2°C and at 50 ± 5 % relative humidity.

10.2 The atmosphere conditions in Table 1 may be used when special conditioning is appropriate. Other atmosphere conditions may also be used as appropriate.

10.3 The time of assembly and duration and range of conditioning will relate to the purpose of the test as outlined in Section 3.

TABLE 1 Special Atmospheres

Environment	Temperature	Relative Humidity
Cryogenic	–55± 3°C (–67 ± 6°F)	...
Frozen food storage	–18 ± 2°C (0 ± 4°F)	...
Refrigerated storage	5 ± 2°C (41 ± 4°F)	85 ± 5 %
Temperature high humidity	20 ± 2°C (68 ± 4°F)	85 ± 5 %
Tropical	40 ± 2°C (104 ± 6°F)	85 ± 5 %
Desert	60 ± 3°C (140± 6°F)	15 ± 2 %

11. Procedure

11.1 Position each closure-container specimen and clamp it in the torque-measuring device, ensuring that the rotational axis of the closure is superimposed on the rotational axis of the device.

11.2 *Finger-Grip Technique:*

11.2.1 Apply a firm grip to the closure using either 11.2.1.1 or 11.2.1.2, and ensure that the operator's fingers do not contact the container. Apply a slight upward pull on the closure container lugs. Rotate the closure counterclockwise smoothly and consistently and at a constant rate consistent with accurate reading of the gauge.

NOTE 2—It is recommended that one operator and a single torque instrument be used to evaluate all closures in any one test to reduce possible operator/instrument inconsistencies and variabilities.

11.2.1.1 Apply thumb and forefinger to the outer periphery of the closure with pressure between the closure lugs.

11.2.1.2 Apply the thumb and forefinger to the outer periphery of the closure with pressure directly over the closure lugs.

NOTE 3—The use of either 11.2.1.1 or 11.2.1.2 may be significant with relatively large (1.2 in. (33-mm) or greater) closures.

11.3 *Mechanical-Grip Technique (Optional)* —Adjust an appropriate gripping device perpendicular to the vertical axis of the container to accommodate the upper portion of the

closure and to ensure that the device does not contact the container (Fig. 1). Proceed in accordance with 11.2.

11.4 *Torque Measurement*—Using either of the closure-gripping techniques described in 11.2 or 11.3, record the minimum torque reading at which the closure is rotated across the container lugs.

12. Report

12.1 Report the following:

12.1.1 Gross package description and identification of specific lot tested,

12.1.2 Lot size and sampling technique,

12.1.3 Description of specific conditioning and time/duration of cycles, if used,

12.1.4 Description of torque measuring device used.

12.1.5 Description of closure-gripping technique used.

12.1.6 Torque measurement data in pound-force-inch or newton-metre,

12.1.7 Average and range of torque measurements,

12.1.8 Estimate of standard deviation, and

12.1.9 Statement that the test was done in accordance with ASTM Test Method D3470.

13. Precision and Bias

13.1 *Precision*—Based on information from a single laboratory, the repeatability coefficient of variation is about 5 to 7 %: the within-laboratory standard deviation is about 5 to 7 % of the average. An interlaboratory program is being conducted to determine the between-laboratory reproducibility.

13.2 *Bias*—No information can be made presented on the bias of the procedure in this test method because no reference material or method is available.

14. Keywords

14.1 lug finish closure; strippage torque