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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Shipping Containers in Revolving Hexagonal Drum[1]

This standard is issued under the fixed designation D 782; 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.

ε1 NOTE—The title was changed and Section 14 added editorially in May 1993.

1. Scope

1.1 This test method covers a procedure for performing tests on loaded shipping containers by means of the revolving drum tester to determine the relative ability of a shipping container to withstand rough handling.

1.2 This test method is used to give an indication of the ability of a shipping container to withstand a variety of shocks and impact stresses, usually for permitting a comparison of different designs of containers of the same size and carrying the same load. This test method permits an observation of the progressive destruction or failure of the package, through which means of improving the design may be determined. The drum test is not intended to simulate any specific environmental hazard.

1.3 *This standard does not purport to address all of the safety problems, 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 685 Practice for Conditioning Paper and Paper Products for Testing[2]

D 775 Test Method for Drop Test for Loaded Boxes[2]

D 880 Test Method for Impact Testing for Shipping Containers and Systems[2]

D 996 Terminology of Packaging and Distribution Environments[2]

D 2956 Practice for Conducting Controlled Shock Input Tests for Shipping Containers[3]

E 122 Practice for Choice of Sample Size to Estimate a Measure of Quality for a Lot or Process[4]

2.2 *ASTM Adjunct:*

Adjunct No. 12-407820-10 (14-ft drum)[5]

Adjunct No. 12-407820-20 (7-ft drum)[5]

3. Terminology

3.1 *Definitions:*

3.1.1 Definitions of packaging terms used in this standard may be found in Terminology D 996.

3.2 *Description of Terms Specific to This Standard:*

3.2.1 *crotch of the hazard*—the downward facing corner formed by the intersection of two sides of the baffle on one of the drum faces.

3.2.2 *drum baffles*—boards fixed within the drum in a prescribed manner to form baffles designed to cause the container to fall on different corners, edges, and faces, and to present various impact hazards.

3.2.3 *drum hazards*—same as drum baffles.

4. Summary of Test Method

4.1 A container and its contents are subjected to a series of random falls onto the inner faces or against the baffles arranged on the inner periphery of a revolving drum. The baffles are designed to cause the box to fall on different faces, edges, and corners, and they present various impact hazards to the container.

5. Significance and Use

5.1 The drum test is usually made to compare various container designs. This test is used primarily when it is desired to simulate an unpredictable, uncontrolled type of rough handling as, for example, in handling and shipment of mixed sizes and masses of packages. This series of falls is unpredictable, and probably no two containers tested will receive exactly the same cycle of abuse. For this reason, drum test results may be expected to vary more than results in a test that does not contain this random characteristic (see Section 13).

NOTE 1—As alternatives to the drum test, potential users are asked to consider using the drop test (Test Method D 775), the incline impact test (Test Method D 880), or other procedures (Practice D 2956).

6. Apparatus

6.1 The testing machine shall consist of a revolving drum which shall be in the form of a prism whose bases are regular hexagons and whose lateral faces are rectangles. See Fig. 1 for a 7-ft (2.13-m) drum and Fig. 2 for a 14-ft (4.26-m) drum. The axis of revolution shall be horizontal. Baffles or hazards shall be fixed on the inside faces of the drum. Location and construction of hazards and faces and rigidity of structural members shall conform in all respects to the ASTM ap-

[1] This test method is under the jurisdiction of ASTM Committee D-10 on Packaging and is the direct responsibility of Subcommittee D10.22 on Handling and Transportation.

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[2] *Annual Book of ASTM Standards*, Vol 15.09.

[3] Discontinued, see 1984 *Annual Book of ASTM Standards*, Vol 15.09. Replaced by Test Methods D 4003 – 92.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

[5] Prints of detailed drawings for the construction of the 7-ft (2.13-m) and 14-ft (4.26-m) diameter hexagonal drums shown in Figs. 1 and 2 are available at a nominal cost from the American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa. 19103. Request Adjunct No. 12-407820-10 (14-ft drum) or 12-407820-20 (7-ft drum).

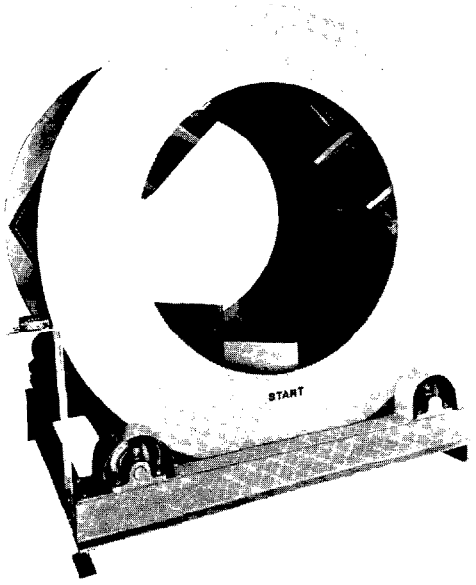

FIG. 1 Box Testing Drum 7 ft (2.13 m) in Diameter

proved drawings and specifications.[5] When prescribed in the specifications for the shipping container being tested, a conical projection shall be positioned on face No. 4 to simulate a puncture hazard. The drum shall be equipped with an automatic counting device that will record each individual fall as the corresponding drum face passes the counter. The inner faces and hazards of the drum shall be clean, smooth, polished, and in good repair. Faces shall be of such condition that an ordinary No. 2½ food can ("packers" 401 by 411) filled with water, or the equivalent to give a gross mass of 2.1 ± 0.1 lb (950 ± 45 g) resting on its bottom on the face will just slide when the face of the drum is at an angle of 15 ± 2° from the horizontal.

NOTE 2—Wax is recommended to protect against rust when not in use.

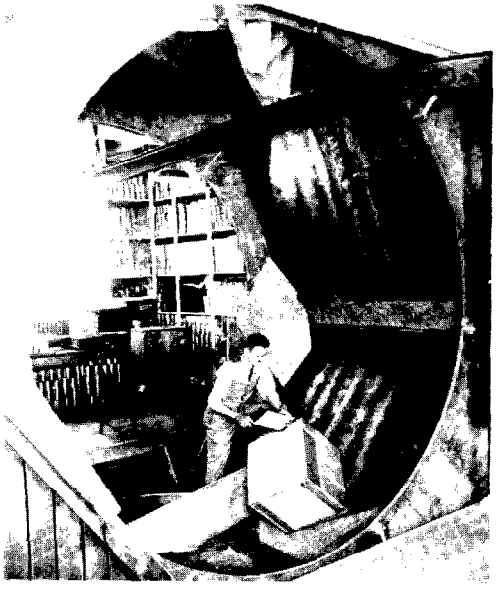

FIG. 2 Box Testing Drum 14 ft (4.26 m) in Diameter

6.2 The 7-ft (2.13-m) drum shall revolve at a speed of 2 ± 1/6 rpm. It may be used for testing containers whose gross mass does not exceed 250 lb (113 kg), and whose greatest dimension does not exceed 20 in. (508 mm).

6.3 The 14-ft (4.26-m) drum shall revolve at a speed of 1 ± 1/12 rpm. It may be used for testing containers whose mass does not exceed 600 lb (270 kg) and whose greatest dimension does not exceed 40 in. (1016 mm).

7. Test Specimen

7.1 The container to be tested shall be packed with either the actual contents for which it was designed, or a dummy load simulating such contents. In either instance, the container shall be closed and sealed in the same manner as will be used in actual shipment.

7.2 The procedure for identification of the faces, edges, and corners of rectangular containers shall be as follows:

7.2.1 Facing one end of the container (for fiberboard containers, the manufacturer's joint shall be on the right), the top of the container shall be designed as *1*, the right side as *2*, the bottom as *3*, the left side as *4*, the near end as *5*, and the far end as *6*.

7.2.2 The edges shall be identified by the numbers of the two faces that form that edge; for example, *1-2* identifies the edge where the top and right side meet and *2-5* the edge formed by the right side and the near end. (In a fiberboard container, this edge will have the manufacturer's joint.)

7.2.3 The corners shall be identified by the numbers of the three faces that meet to form that corner; for example, *1-2-6* identifies the corner where the top, the right side, and the far end meet. This identification is illustrated in Fig. 3.

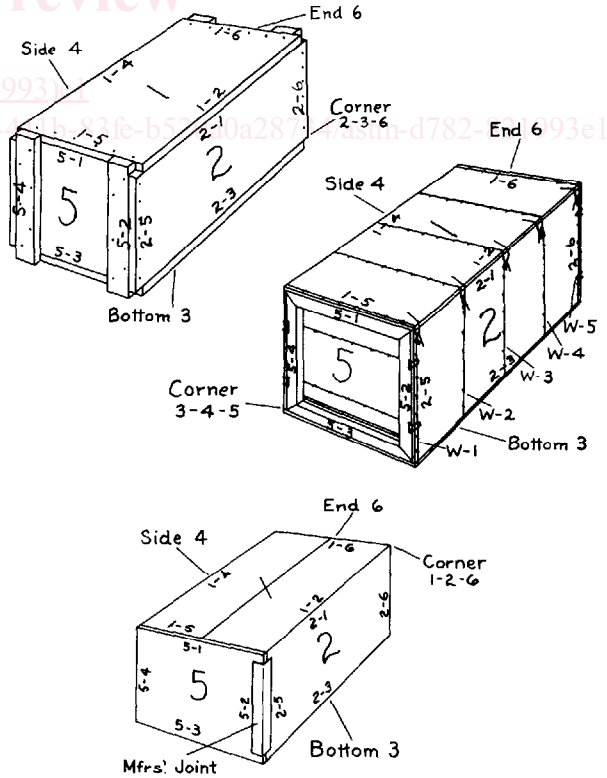

FIG. 3 Identification of the Faces, Edges, and Corners of Test Specimens