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Standard Practice for Performance Testing of Packaged Laboratory Apparatus for United States Government Procurements¹

This standard is issued under the fixed designation E 1133; 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—Section 8 on Keywords was added editorially in June 1996.

1. Scope

1.1 This practice describes the procedures for testing loaded shipping containers that would be sold to the United States government. The following tests are performed to measure the ability of the shipping container to protect the contents from the environment, shock, and vibration during wartime conditions. This practice is not intended to supplant material specifications or existing pre-shipment test procedures. The suitability of this practice for use with hazardous materials has not been determined.

1.2 The procedures covered in this practice are suitable for all types of laboratory apparatus including reusable and disposable macro and micro products.

1.3 The values stated in inch-pound units shall be regarded standard.

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:

D 685 Method for Conditioning Paper and Paper Products for Testing²

D 951 Test Method for Water Resistance of Shipping Containers by Spray Method²

D 1083 Methods of Testing the Mechanical Handling of Utilized Loads and Large Shipping Cases and Crates²

D 4169 Practice for Performance Testing of Shipping Containers and Systems²

D 4332 Practice for Conditioning Containers, Packages or Package Components for Testing²

2.2 Military Standard:

MIL-STD-810D Environmental Test Method³

3. Significance and Use

3.1 The test procedure in this practice is proposed as a package performance test to be met for items shipped for United States government procurements. This practice will apply only when requested by the buyer.

4. Requirements

4.1 Three individual shipping containers, or one unit consisting of two or more overpackaged individual units are required. Each specimen shall be run through the sequence of tests, in the order given.

4.2 Condition the test specimens in accordance with Method D 685 for 72 h at 50 ± 2 % relative humidity and $23 \pm 1^\circ\text{C}$.

5. Procedure

5.1 Expose the specimens to a salt spray for 2 h in accordance with Test Method D 951.

5.2 Drop Test Procedures:

5.2.1 Items less than 100 lb shall be drop tested in accordance with Practice D 4169 Element A, Assurance Level I, (see Table 1). The drop sequence shall be conducted as follows: bottom at twice specified height; bottom long edge at specified height; bottom adjacent short edge at specified height; bottom corner at specified height; bottom diagonal opposite corner at specified height; and top at specified height.

5.2.2 Items more than 100 lb (see Methods D 1083) shall be drop tested in accordance with Practice D 4169 Element B, Assurance Level I, (see Table 2). The drop sequence shall be conducted as follows: one drop on each bottom edge; and the total number of drops shall be four.

5.3 *Compression Test Level*—Conduct the compression test in accordance with Practice D 4169 using the following equation.

$$L = W \frac{(H - h)}{(h)} \times 8.0 \quad (1)$$

where:

L = load,

W = weight of one shipping container, lb, and

h = height of one shipping container, in.

H = 120 in.

5.4 *Storage Test*—Subject the package to three cycles in

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

³ Available from Naval Publications and Forms Center, 5801 Tabor Ave., Phila., PA 19120.

TABLE 1 Drop Test Conditions for Items Less Than 100 lb

Gross Weight, lb (Kg)	Drop Height, in. (mm)
0 to 20 (0 to 9.1)	24 (610)
20 to 40 (9.1 to 18.2)	21 (533)
40 to 60 (18.2 to 27.3)	18 (457)
60 to 80 (27.3 to 36.4)	15 (381)
80 to 100 (36.4 to 45.5)	12 (305)

TABLE 2 Drop Test Conditions for Items Over 100 lb

Gross Weight, lb (Kg)	Drop Height, in. (mm)
100 to 500 (45.5 to 227.5)	12 (305)
500 and over (227.5 and over)	9 (228)

accordance with Practice D 4332. Each cycle shall consist of one week under each of the following environments in sequence, desert, tropical, and cryogenic. Drop test as outlined in 5.2.

5.5 *Vibration Test*—Conduct the vibration test in accordance with Practice D 4169 Element E, Assurance Level I.

5.6 *Bounce, Loose Cargo Test*—Conduct the bounce, loose cargo test in accordance with MIL-STD-810D Method 5.6.12, Procedure XI, Part 2. Drop test as outlined in 5.2.

6. Inspection

6.1 The packages shall be considered successful in passing the tests if, upon inspection, the following condition(s) are met:

6.1.1 *Disposable Glass*—Completion of testing without breakage occurring in any of the three units tested or in the case of bulk packed items with more than fifty in a shipping container, less than 3 % breakage in each of the three units tested.

6.1.2 *All Others*—Completion of testing without breakage occurring and the packaged item remaining 100 % functional.

6.2 Outer package must contain product and provide a degree of protection to contents.

7. Certification

7.1 Each supplier shall maintain on file laboratory test reports verifying successful testing as outlined in this practice and, if required, issue a written certification that the packaging complies with this practice.

8. Keywords

8.1 apparatus; government; packaging; procurement

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