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Standard Test Method for Impact Testing for Shipping Containers and Systems¹

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1. Scope

1.1 This test method covers two procedures for conducting impact tests on loaded containers or shipping units (pallet loads), as follows:

1.1.1 *Procedure A*, to test the ability of a container or shipping unit to withstand impacts, and

1.1.2 *Procedure B*, to test the ability of a container or shipping unit or interior packing, or both, to provide protection to the contents, when subjected to impacts.

1.2 Either of these two procedures may be used to evaluate different designs of containers of the same size and carrying the same load. These procedures are suitable for testing various types of containers such as boxes, crates, barrels, drums, kegs, bags, sacks, or pails made of various materials or combinations of materials and for shipping units such as pallet loads or palletized units.

1.3 The procedures described in this test method are particularly suitable for testing large or heavily loaded containers.

1.4 The values stated in inch-pound units are to be regarded as the standard. The SI units given in parentheses are for information only.

1.5 *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.* Specific precautionary statements are given in Note 1 and Section 7.

2. Referenced Documents

2.1 ASTM Standards:

D 996 Terminology of Packaging and Distribution Environments²

D 4003 Test Method for Programmable Horizontal Impact Test for Shipping Containers and Systems²

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

D 5277 Test Methods for Performing Programmed Horizontal Impacts Using an Inclined Impact Tester²

E 122 Practice for Choice of Sample Size to Estimate a

Measure of Quality for a Lot or Process³

2.2 ISO Standard:

ISO 2244 Horizontal Impact Test (Horizontal or Incline Plane Test: Pendulum Test)⁴

3. Terminology

3.1 *Definitions*—For definitions of terms applicable to this test method see Terminology D 996.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *hazard*—removable solid object of any size or shape placed on an impact surface (backstop) so as to contact a test specimen at any desired location during the impact of the specimen into the impact surface (backstop).

4. Summary of Test Method

4.1 An apparatus having a guided carriage capable of holding a test container or shipping unit impacts into a rigid impact surface (backstop) with or without hazards at a predetermined impact velocity. When testing the ability of a container or shipping unit to withstand impact (Procedure A) multiple tests with the same impact velocity or increasing impact velocities may be conducted until failure occurs. When testing the ability of the container, shipping unit, or interior packing, or combination thereof, to provide protection to the contents (Procedure B), a predetermined number of impacts, at predetermined velocities, are applied and the container(s) and contents are then inspected.

5. Significance and Use

5.1 The impact test has been found useful in laboratory simulation of impacts such as those encountered in manual and mechanical handling and transportation. The impact test simulates some types of shocks that could occur in the handling of packages or shipping units and helps evaluate the ability of the package to protect the contents against these shocks. The test may also permit observation of progressive failure of a package and damage to the contents.

5.2 The test results within a given laboratory using this test method may be useful for evaluating and comparing packages. However, because of the variability of test machines that have been used in the past, especially the impact surface (backstop),

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 *Annual Book of ASTM Standards*, Vol 14.02.

⁴ Available from American National Standards Institute, 11 W. 42nd Street, 13th Floor, New York, NY 10036.