



## **Standard Test Method for Drop Testing of Glass Aerosol Bottles<sup>1</sup>**

This standard is issued under the fixed designation D 3071; 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 acceptability of a bottle design in a glass container for packaging a given aerosol formulation by drop testing.

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. Summary of Test Method**

2.1 The arithmetic mean height of a specific glass aerosol bottle design is determined by dropping the bottles, loaded with the given formulation.

2.2 Dropping an additional group of similarly filled bottles at the arithmetic mean height provides a means of evaluating any potential bursting hazard of the final package, incorporating factors of bottle design, formulation, loading techniques, etc.

### **3. Definition**

3.1 *break*—ruptured bottle no longer usable. In plastic-coated bottles, glass ruptures, even though the plastic coating remains intact.

### **4. Apparatus**

4.1 *Drop Surface*, consisting of a 12 by 12-in. (305 by 305-mm) square steel plate, ¼ in. (6.4 mm) thick, imbedded in an 18 by 18-in. (457 by 457-mm) square concrete pad, 2 in. (51 mm) thick.

4.2 *Dropping Mechanism*, consisting of a rubber stopper with a ½-in. (13-mm) hole, connected to a suitable vacuum system (for example, a vacuum pump, laboratory line vacuum, or water aspirator) to hold the bottles above the drop surface. The line connecting the stopper with the vacuum system shall be provided with a three-way stopcock to release the vacuum. The rubber stopper shall be fastened by any suitable means above the dropping surface in such a position that the falling bottle will land as near as possible to the center of the dropping surface.

4.2.1 Several rubber stoppers, with ½-in. (13-mm) hole, will be needed for the various shapes of the bottles to be tested. A stopper with a flat surface will be suitable for flat bottles, while stoppers with curved surfaces cut into them will be necessary to obtain a tight seal for bottles having other shapes.

4.2.2 Other mechanisms that give equivalent control of the drop positions may be substituted for the vacuum system.

4.3 *Air Ovens*, two, maintained at 70 and 100°F (21 and 38°C).

### **5. Sampling**

5.1 Samples shall be selected at random from the production batch.

### **6. Test Specimens**

6.1 A total of 75 bottles, maintained at either 70 or 100°F (21 or 38°C), shall be tested from one given drop position.

### **7. Conditioning**

7.1 Place the bottles to be tested in the air ovens for a minimum of 3 h prior to testing.

### **8. Procedure**

#### *8.1 During Development Stage:*

8.1.1 Place a bottle in position against the rubber stopper at the terminal of the vacuum system. Open the vacuum system to atmospheric pressure by means of the three-way stopcock, allowing the vacuum to be released and the bottle to fall to the drop surface from a height of 6 ft (1.8 m).

NOTE 1—Take care to position and release the bottles properly, to prevent twisting and rotation in the air as the bottle falls.

8.1.2 Repeat 8.1.1 with the remaining bottles, dropping each bottle only once, as follows:

8.1.2.1 If the first bottle breaks, drop the next bottle from a height of 4 ft (1.2 m). If this bottle breaks, drop the next bottle from 2 ft (0.6 m).

8.1.2.2 If the third bottle does not break, drop the next bottle from 4 ft (1.2 m). If the fourth bottle breaks, drop the next bottle from 2 ft (0.6 m).

8.1.2.3 Continue this pattern throughout the testing of the 75 bottles.

NOTE 2—The drop schedule is based on a statistical design known as

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