



Designation: ~~D5171-09~~ Designation: D 5171 – 09a

Standard Test Method for Impact Resistance of Plastic Sew-Through Buttons¹

This standard is issued under the fixed designation D 5171; 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 impact resistance of plastic sew-through buttons.

1.2 The values stated in either acceptable metric units or other units shall be regarded separately as standard. The values expressed in each system may or may not be exact equivalents: therefore, each system must be used independently of the other, without combining values in any way.

1.3 *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

D 123 [Terminology Relating to Textiles](#)

D 618 [Practice for Conditioning Plastics for Testing](#)

D 5497 [Terminology Relating to Buttons](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *button, n*—a knob, disc, or similar object which when forced through a narrow opening or buttonhole, fastens one part of a garment or other flexible substrate to another (See also sew-through button)

3.1.1.1 *Discussion*—Although the primary purpose of buttons is to serve as fasteners, buttons can also be used as decoration.

3.1.2 *face, n*—in buttons, that portion which will be exposed after attaching to the substrate.

3.1.3 *impact resistance, n*—resistance to fracture under the sudden application of an external force.

3.1.4 *ligne size, n*—an English unit, used to measure buttons, one ligne equals 0.635 mm (0.025in).

3.1.5 *sew-through buttons, n*—a button that has two or more holes on its face for passage of a needle and thread or possibly other material in order to attach it to a flexible substrate.

3.1.6 For other textile terminology used in this method, refer to Terminology D 123.

3.1.7 For definitions of button terms used in this method, refer to Terminology D 5497.

4. Summary of Test Method

4.1 Individual buttons are placed on a surface centered under a tube through which a preselected mass falls from a preselected height. After the mass impacts the button the impacted button is removed and visually examined using a 5X magnifying glass for breakage, cracking, or chipping.

5. Significance and Use

5.1 This test method may be used to determine the ability of a button to resist breaking under impact, for example in pressing the end item, which could cause the button to fail.

NOTE 1—In the development of this test method it was found that the following factors influenced the ability of a button to resist failure under impact conditions: resin formulation, shape ligne size, thickness, number and spacing of holes. Buttons may also pass this test but fail during the pressing of a garment due to the presence of heat during pressing.

5.1.1 If there are differences of practical significance between the reported test results for two laboratories (or more),

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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.

comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, test samples should be used that are as homogeneous as possible, that are drawn from the material from which the disparate test results were obtained, and that are randomly assigned in equal numbers to each laboratory for testing. Other materials with established test values may be used for this purpose. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If a bias is found, either its cause must be found and corrected, or future test results must be adjusted in consideration of the known bias.

5.2 Test Method D 5171 for the determination of the impact resistance of buttons may be used for acceptance testing of commercial shipments of buttons but caution is advisable since information is lacking on precision.

6. Apparatus

6.1 *Impact Resistance Testing Machine*—The impact resistance tester consists of a tube through which a plunger of standard mass drops onto the button from a predetermined height. The button is centrally positioned based on ligne size, by means of a locating jig, on a flat metal surface. The energy of impact is determined by the mass of the plunger and the height of the drop.

6.2 *Magnifying Glass*— a 5X magnifying glass is used to visually examine the buttons after impact.

6.3 *Measuring Device*— measuring calipers or micrometer, to determine the ligne size of buttons.

7. Sampling

7.1 *Laboratory Sample*—As a laboratory sample, randomly select a quantity of buttons, approximately 100 to 200, from a carton and from contained boxes, that adequately represents the material, from which test specimens may be selected.

7.2 *Test Specimens*— Randomly select 15 buttons from the laboratory sample for testing. If test specimens are submitted for preproduction approval, testing 1 dozen buttons is acceptable.

8. Conditioning

8.1 Condition the specimens as directed in Practice D 618 using procedure E. Following conditioning, prepare the specimens for testing as instructed in 9.4 of practice D 618. Preconditioning is not required.



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FIG. 2 Button Gauge

<https://standards.iteh.ai/catalog/standards/sist/447-a273-046dc29b11dc/astm-d5171-09a>

9. Procedure

9.1 *Determine Button Ligne Size* —Using a set of calipers or a micrometer slowly bring the instrument faces or anvils into contact with the button to obtain the button diameter. Divide the measured diameter in mm (in) by the constant 0.635 mm (0.025 in.) and record to the nearest whole number as the ligne size.

9.2—Use a button gauge (Fig. 2), a set of calipers or micrometer to measure the outside width of the button at the widest point. If your measuring tool is in MM, divide the diameter by 0.635, then record the ligne size in the nearest whole number.

9.2 Standard button sizes are: 12L, 14L 16L 18L 20L 22L 24L 28L 30L 32L 34L 36L 40L 42L 44L 48L 54L 60L 70L; other sizes can be achieved by cutting them to specific specifications.

9.3 *Determine Impact Resistance* —Place specimen in centering device for ligne size of button so it lies at the center of the vertical tube. Allow the mass to fall from a predetermined and reproducible height onto the button. Lift the mass and remove the specimen from the metal base.

10. Evaluation

10.1 Visually examine the tested specimens with a 5X magnifying glass for cracking, chipping, and breakage, any of which constitutes damage. Test the remaining specimens.

11. Report

11.1 State that the specimens were tested as directed in Test Method D 5171. Describe the material or product sampled.

11.1.1 Total number of specimens,

11.1.2 Button ligne size,

11.1.3 Height of fall and mass of plunger, if the standard conditions are not used.

11.1.4 Number of specimens damaged due to (1) cracking, (2) chipping (3) breakage.