



Designation: D7842/D7842M – 12

# Standard Test Method for Holding Strength of Tack and Prong Fastener Attached Buttons<sup>1</sup>

This standard is issued under the fixed designation D7842/D7842M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of the holding strength of a tack and prong fastener attached button using a tensile testing machine.

1.2 This test method is applicable to attached buttons in garments or to be attached to fabrics intended for use in apparel (see [Annex A1](#)).

1.3 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the 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*:<sup>2</sup>
  - D76 Specification for Tensile Testing Machines for Textiles
  - D123 Terminology Relating to Textiles
  - D1776 Practice for Conditioning and Testing Textiles
- 2.2 *Federal Document*:<sup>3</sup>
  - 16 CFR Parts 1500.48-1500.53 and 1501.4 Engineering Test Manual for Children's Toys

## 3. Terminology

3.1 *Definitions*:

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.54 on Subassemblies.

Current edition approved Dec. 1, 2012. Published December 2012. DOI: 10.1520/D7842-12.

<sup>2</sup> 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.

<sup>3</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

3.1.1 *force, n*—a physical influence exerted by one body on another which produces acceleration of bodies that are free to move and deformation of bodies that are not free to move.

3.1.2 *holding strength, n—in buttons*, the force required to separate the button from its attached mating part or separate from the fabric it is attached to, whichever shall fail first.

3.1.3 *tack attached button, n*—any button that is attached by a single post product (most commonly used to attach a non metal colleted button). (See [Fig. 1](#).)

3.1.4 *prong fastener attached button, n*—any button that is attached by a product with 2 or more prongs (most commonly used to attach a metal colleted button). (See [Fig. 2](#).)

3.1.5 For definitions of other textile terms used in this standard, refer to Terminology [D123](#).

## 4. Summary of Test Method

4.1 A specimen, consisting of a button and tack or prong fastener attached to a fabric, is mounted in a special test fixture on a tensile testing machine. A force is applied perpendicularly until the button separates from the tack or prong fastener, or the fabric is torn. The peak force at separation is reported as the holding strength. If the fabric tears, the peak force at fabric failure is recorded and the data is reported and considered as a different category to be reported separately from the holding strength of the fasteners.

## 5. Significance and Use

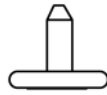
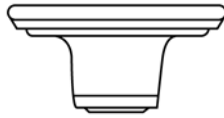
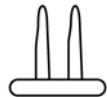
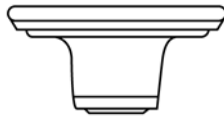
5.1 This test method may be used for acceptance testing of commercial shipments of garments with attached buttons.

5.2 This test method may be used to determine the compatibility of tack attached buttons or prong fastener attached buttons to fabrics used in apparel. In which case, the buttons are attached to the fabric in the manner in which they will be used and the combined units tested.

## 6. Apparatus

6.1 *Tensile Testing Machine*, CRE type, meeting Specification [D76](#). (See [Fig. 3](#).)

6.1.1 *Upper Test Fixture*, [Fig. 4](#), designed as not to malform the button specimen with interchangeable bottom plates to test a multitude of sizes of buttons.


**FIG. 1 Tack Attached**

**FIG. 2 Prong Fastener Attached**

## 9. Calibration and Standardization

9.1 Testing equipment should be calibrated on a regular basis as recommended by manufacturer's instructions.

## 10. Conditioning

10.1 Condition the specimens by bringing them from the dry side to approximate moisture equilibrium for testing in the standard atmosphere for testing textiles as directed in Practice D1776.

## 11. Procedure

11.1 The attached button is placed in the test fixture. The test fixture is clamped to the top jaws of the Tensile Testing machine and the fabric is clamped to the bottom jaws. (See Fig. 5.)

11.2 Initiate the test by applying force to the machine until the button disengages from the fastener or the fabric tears.

11.3 Record the force to disengage the button from the fastener as the holding force to the nearest 0.1 N [0.5 lbf].

## 12. Calculation or Interpretation of Results

12.1 If the fabric tears before the fastener and button disengage, record the specimen as failing. The value of the fabric failure specimen is recorded separate from the recording of the values of the fastener holding strength.

## 13. Report

13.1 State that the tests were made as directed in Test Method D7842. Describe the material or product being sampled and the method of sampling used. Describe the material and end product.

13.2 Report the following information:

13.2.1 Type of testing machine and load range used.

13.2.2 Individual and average results.

13.2.3 Note of any fabric or tack/fastener failure beside results with *FF* for fabric and *T/F* for tack/fastener. Disregard fabric failures. Use photos if needed to show the difference between fabric failure and tack/fastener failure.

13.2.4 Report the units of force in newtons (N) or pounds force [lbf].

13.2.5 Report thickness of fabric using compressed foundation thickness.

## 14. Precision and Bias

14.1 The value for holding strength of a button, either tack attached or prong attached, in garments can only be defined by a test method. Within this limitation, Test Method D7842 has no known biases.

## 15. Keywords

15.1 button; prong fastener; strength; tack

## 7. Sampling, Test Specimens, and Test Units

### 7.1 Lot Sample:

7.1.1 For acceptance testing, randomly select the number of shipping cartons or other containers of garments as directed in an applicable material specification, contract or other agreement between the purchaser and the supplier. Consider the cartons or containers to be the primary sampling units.

### 7.2 Laboratory Sample:

7.2.1 For acceptance testing, take necessary number of garments to obtain ten attachments. Button fly attachments should be tested separately from waste band attached buttons.

### 7.3 Test Specimens:

7.3.1 Test ten specimens from each garment. A test specimen consists of the button, fabric, and product (tack or prong fastener) used to attach button to fabric. The locations of the specimens must allow for secure clamping in the fixtures. Extra tests may need to be performed if fabric fails before reaching either the force specification agreed upon by the purchaser and supplier or 69 N [15.5 lb]. If the fabric fails before reaching 69 N, it is recommended to try a thicker application (more layers of fabric) if possible, until ten tested specimens have no fabric failures.

## 8. Preparation of Apparatus

### 8.1 Preparation:

8.1.1 Set up and verify the tensile testing machine according to the manufacturer's instructions and 8.1.2 – 8.1.4.

8.1.2 Attach the upper fixture to the testing machine and check the alignment.

8.1.3 Select a force range for separation to occur between 10 and 90 % of full scale force.

8.1.4 Set the loading rate for  $300 \pm 10$  mm/min [ $12.0 \pm 0.5$  in./min].