



# Standard Test Methods for Felt<sup>1</sup>

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## 1. Scope

1.1 These test methods are applicable to all types of felt covered by Specification D 2475 and as defined in Section 3 herein.

1.2 The procedures appear in the following sections:

|                                                                              | Section |
|------------------------------------------------------------------------------|---------|
| Acid Content                                                                 | 27      |
| Air Permeability                                                             | 18      |
| Referenced Documents                                                         | 2       |
| Ash                                                                          | 26      |
| Bursting Strength                                                            | 13      |
| Conditioning                                                                 | 7       |
| Terminology                                                                  | 3       |
| Dimensional Changes (Relaxation Shrinkage) in Boiling Water—Length and Width | 15      |
| Fiber Identification                                                         | 24      |
| Flame Resistance                                                             | 20      |
| Length of Roll                                                               | 8       |
| Matter Extracted by 1,1,1-Trichloroethane                                    | 22      |
| Matter Extracted by Water                                                    | 23      |
| Oil Retention                                                                | 21      |
| Oil Wicking                                                                  | 29      |
| pH                                                                           | 28      |
| Sampling Lots and Test Specimens                                             | 6       |
| Splitting Resistance                                                         | 14      |
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| Thickness of Conditioned Specimens                                           | 10      |
| Thickness Change After Exposure to Boiling Water and Subsequent Drying       | 16      |
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| Water Retained                                                               | 17      |
| Weight per Unit Area                                                         | 11      |
| Width of Roll or Sheet                                                       | 9       |
| Wool Content (Matter Soluble in a Solution of Sodium Hydroxide)              | 25      |

1.3 The values stated in SI units are to be regarded as the standard.

1.4 *This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.*

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 warning statements are given in Note 9 and 25.4.*

NOTE 1—The word “weight” is used in these test methods because of common trade practice, in place of the technically correct word “mass.”

## 2. Referenced Documents

### 2.1 ASTM Standards:

- D 76 Specification for Tensile Testing Machines for Textiles<sup>2</sup>
  - D 123 Terminology Relating to Textiles<sup>2</sup>
  - D 276 Test Method for Identification of Fibers in Textiles<sup>2</sup>
  - D 629 Test Methods for Quantitative Analysis of Textiles<sup>2</sup>
  - D 737 Test Method for Air Permeability of Textile Fabrics<sup>2</sup>
  - D 774 Test Method for Bursting Strength of Paper<sup>3</sup>
  - D 1388 Test Methods for Stiffness of Fabrics<sup>2</sup>
  - D 1574 Test Method for Extractable Matter in Wool<sup>2</sup>
  - D 1776 Practice for Conditioning Textiles for Testing<sup>2</sup>
  - D 2165 Test Method for pH of Aqueous Extracts of Wool and Similar Animal Fibers<sup>2</sup>
  - D 2475 Specification for Wool Felt<sup>2</sup>
  - E 70 Test Method for pH of Aqueous Solutions with the Glass Electrode<sup>4</sup>
- ### 2.2 Other Standards:
- TT-I-563a Federal Specifications for Ink, Writing<sup>5</sup>
  - U. S. Military Standard MIL-105D Sampling Procedures and Tables for Inspection by Attributes<sup>5</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 *acid content, n—of felt*, the number of milliequivalents of acid present per unit weight of felt, measured under prescribed conditions.

3.1.2 *dimensional change in boiling water in felt, n—the change in length and width with any associated change in thickness produced by immersion in boiling water under specified conditions.*

<sup>2</sup> Annual Book of ASTM Standards, Vol 07.01.

<sup>3</sup> Annual Book of ASTM Standards, Vol 15.09.

<sup>4</sup> Annual Book of ASTM Standards, Vol 15.05.

<sup>5</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

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3.1.3 *extractable matter, n*—nonfibrous material in or on a textile, not including water, which is removable by a specified solvent or solvents, as directed in a specified procedure.

3.1.3.1 *Discussion*—Nonfibrous material is usually oily, waxy, resinous, or polymeric in nature, but may also include other material such as protein, particularly if ethyl alcohol is used as, or in, the extracting solvent.

3.1.4 *flame resistance, n*—the property of a material whereby flaming combustion is prevented, terminated, or inhibited following application of a flaming or nonflaming source of ignition, with or without subsequent removal of the ignition source.

3.1.5 *part wool felt, n*—a felt composed of any one of or a combination of new and recycled wool fibers mixed with one or more man-made fibers, vegetable fibers, or animal fibers other than wool.

3.1.6 *pH, n*—in common usage, a measure of acidity or alkalinity of a solution, on a logarithmic scale, with neutrality represented by a value of 7, with increasing acidity represented by decreasingly smaller values, and with increasing alkalinity represented by increasingly larger values.

3.1.7 *shrinkage, n*—a decrease in one or more dimensions of an object or material.

3.1.8 *splitting resistance, n*—of felt, the force required to overcome the interfacial strength of a material and specifically to separate a felt into two layers (of approximately equal thickness).

3.1.9 *supported needled felt, n*—a needled felt that is composed entirely of fibers physically interlocked and reoriented in combination with interlay, scrim, or foundation of knitted, stitched, bonded, or extruded structure.

3.1.10 *unsupported needled felt, n*—a needled felt that is composed entirely of fibers physically interlocked and reoriented with, and of themselves without an interlay, scrim, or foundation of knitted, stitched, bonded, or extruded structure.

3.1.11 *water retained, n*—in textiles, the amount of water absorbed by the fibers, adsorbed on the surface of the fibers, and held within the voids of the fabric after immersion, measured under specified conditions.

3.1.12 *wool felt, n*—a felt composed wholly of any one of or a combination of new or recycled wool fibers.

3.1.13 For definitions of other textile terms used in these test methods, refer to Terminology D 123.

## 4. Summary of Test Methods

4.1 These test methods include a number of specific test procedures designed to measure specific properties. Individual summaries are included in specific sections where pertinent (see, for example, 20.2).

## 5. Significance and Use

5.1 Except where specifically noted, these test methods cannot be formally recommended for acceptance testing of commercial shipments, because reliable data on the between-laboratory precision has not been established. The test methods

are nevertheless used extensively in the trade to rate materials with respect to their conformance with Specification D 2475. In cases of dispute, the statistical bias, if any, between the laboratory of the purchaser and the laboratory of the seller should be determined with each comparison based on testing randomized specimens from one sample of material.

5.2 Unless otherwise specified, no justifiable statements on the bias of the procedures in these test methods can be made since the true values of the properties cannot be established by accepted referee methods.

## 6. Sampling Lots and Test Specimens

6.1 Take a lot sample as directed in an applicable material specification, or as agreed upon by the purchaser and the seller. In the absence of a material specification or other agreement, take a lot sample and laboratory samples as follows:

| Lot Size in Yards or Sheets <sup>A</sup> | Sample size in |                |
|------------------------------------------|----------------|----------------|
|                                          | Rolls<br>/lot  | Sheets<br>/lot |
| Up to 1200                               | 3              | 7              |
| 1201 up to and including 3200            | 5              | 10             |
| 3201 up to and including 10 000          | 7              | 15             |
| 10 001 up to and including 35 000        | 10             | 25             |
| 35 001 up to and including 150 000       | 15             | 35             |
| 150 001 and over                         | 25             | 50             |

<sup>A</sup> If a lot contains fewer than the required number of rolls or sheets, sample each role or sheet in the lot.

6.2 Take three samples, mark them “edge No. 1,” “center,” and “edge No. 2,” but do not take samples from areas within 6 in. (150 mm) from the edges of the roll, piece, or sheet; in the case of roll felt, omit the area within a distance from the end of the roll equal to the width of the roll. Mark the sampling areas with indelible ink, or by other means, to indicate the lengthwise direction of the original piece. The size and number of specimens cut will be determined by the number of tests to be run.

NOTE 2—In some cases the same specimens may be used for more than one test. For example, the specimens tested for thickness may also be used for weight, air permeability, wool content, or ash tests.

## 7. Conditioning

7.1 Bring the samples or specimens from the prevailing atmosphere to moisture equilibrium for testing in the standard atmosphere for testing textiles as defined in Practice D 1776, for tests made as directed in the following sections:

|                                                                        | Sections |
|------------------------------------------------------------------------|----------|
| Bursting Strength                                                      | 13       |
| Fire Retardance                                                        | 20       |
| Oil Retention                                                          | 21       |
| Splitting Resistance                                                   | 14       |
| Stiffness                                                              | 19       |
| Tensile Strength, “Breaking Load,” and “Specific Strength”             | 12       |
| Thickness Change After Exposure to Boiling Water and Subsequent Drying | 16       |
| Thickness of Conditioned Specimens                                     | 10       |
| Water Retained                                                         | 17       |
| Weight per Unit Area                                                   | 11       |