Designation: D5446 – 08

StandardPractice for Determining Physical Properties of Fabrics, Yarns, and Sewing Thread Used in Inflatable Restraints[1]

This standard is issued under the fixed designation D5446; 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 practice is a listing of the test methods commonly employed in determining the physical properties of fabrics and yarns used in the manufacture of inflatable restraints.

1.2 Fabrics used in the manufacture of inflatable restraints may be coated or uncoated, and may be comprised of spun yarns, continuous filament yarns, or a combination thereof.

1.3 Fabrics used in the manufacturer of inflatable restraints may be either flat or one piece woven. For the one-piece woven, follow the sampling section of D5446 and the individual test method.

1.4 In Section 9, this practice lists is alphabetical order the procedures associated with conducting physical testing of the following fabric or yarn properties of concern to the design and manufacture of inflatable restraints.

Yarn	Section
Denier (Yarn Number)	9.3.1
Fiber Content	9.3.2
Finish (Extractable Material)	9.3.3
Strength and Elongation	9.3.4
Twist	9.3.5
Fabric	
Air Permeability	9.3.6
Abrasion Resistance	9.3.7
Blocking	9.3.8
Bow and Skew	9.3.9
Breaking Force & Elongation	9.3.10
Burst Strength	9.3.11
Coating Adhesion	9.3.12
Coating Weight	9.3.13
Count of Woven Fabric	9.3.14
Dynamic Air Permeability	9.3.28
Edgecomb Resistance	9.3.29
Flammability	9.3.15
Fogging (Volatility)	9.3.16
Length	9.3.17
Mass per Unit Area	9.3.18
Non-Fibrous Material	9.3.19
Odor	9.3.20
Packability	9.3.30
pH	9.3.21
Stiffness	9.3.22
Tear Strength	9.3.23
Thickness	9.3.24
Warp Size Content & Residual Sizing	9.3.25
Width	9.3.26
Sewing Thread	9.3.27

1.5 This practice may be used in conjunction with Practice D5427 which prescribes standard practices for the accelerated aging of inflatable restraint fabrics when comparative results of physical properties before and after accelerated aging are required.

1.6 Procedures and apparatus other than those stated in this practice may be used by agreement of purchaser and supplier with the specific deviations from the standard practice acknowledged in the report.

1.7 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system must be used independent of the other.

1.8 *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.* See Note 3.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D123 Terminology Relating to Textiles
D204 Test Methods for Sewing Threads
D276 Test Methods for Identification of Fibers in Textiles
D737 Test Method for Air Permeability of Textile Fabrics
D751 Test Methods for Coated Fabrics
D1059 Test Method for Yarn Number Based on Short-Length Specimens (Withdrawn 2010)[3]
D1388 Test Method for Stiffness of Fabrics
D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum (Elmendorf-Type) Apparatus

[1] This practice is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.20 on Inflatable Restraints.

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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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

D1423 Test Method for Twist in Yarns by Direct-Counting
D1777 Test Method for Thickness of Textile Materials
D1907 Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method
D2256 Test Method for Tensile Properties of Yarns by the Single-Strand Method
D2257 Test Method for Extractable Matter in Textiles
D2261 Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine)
D3773 Test Methods for Length of Woven Fabric
D3774 Test Method for Width of Textile Fabric
D3775 Test Method for Warp (End) and Filling (Pick) Count of Woven Fabrics
D3776 Test Methods for Mass Per Unit Area (Weight) of Fabric
D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method
D3882 Test Method for Bow and Skew in Woven and Knitted Fabrics
D3990 Terminology Relating to Fabric Defects
D4032 Test Method for Stiffness of Fabric by the Circular Bend Procedure
D4157 Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)
D4851 Test Methods for Coated and Laminated Fabrics for Architectural Use
D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
D5427 Practice for Accelerated Aging of Inflatable Restraint Fabrics
D5587 Test Method for Tearing Strength of Fabrics by Trapezoid Procedure
D6476 Test Method for Determining Dynamic Air Permeability of Inflatable Restraint Fabrics
D6478 Test Method for Determining Specific Packability of Fabrics Used in Inflatable Restraints
D6479 Test Method for Determining the Edgecomb Resistance of Woven Fabrics Used in Inflatable Restraints
D6613 Practice for Determining the Presence of Sizing in Nylon or Polyester Fabric
D6799 Terminology Relating to Inflatable Restraints
F778 Methods for Gas Flow Resistance Testing of Filtration Media

2.2 *Federal Standards:*[4]
Motor Vehicle Safety Standard 302—Flammability

2.3 *SAE Standards:*[5]
J912-A Resistance to Blocking
J1351 Determination of Odor

2.4 *Ford Motor Company Standards:*[6]
FLTM BO116-03 Fogging Standard
FLTM BN13-1 Coating Adhesion

2.5 *AATCC Methods:*[7]
Method 81 pH of Water—Extract from Wet Processed Textiles

3. Terminology

3.1 *Definitions:*

3.2 For all terminology relating to D13.20, Inflatable restraints, refer to Terminologies D3990 and D6799.

3.2.1 The following terms are relevant to this standard: coated fabric, inflatable restraint.

3.3 For all other terms related to textiles, see Terminology D123.

4. Summary of Test Method

4.1 Test specimens are taken from sample rolls of fabric and tested using prescribed laboratory procedures, conditions and equipment by the supplier to determine the physical properties of the fabric in accordance with the requirements of the purchaser.

5. Significance and Use

5.1 Every ASTM test method listed in 2.1 contains a section describing its particular significance and use. Other test methods listed in 2.1 of this practice may contain sections pertaining to their particular significance and use.

5.2 The physical testing procedures in this practice can be used in conjunction with lot sampling procedures as a basis for acceptance testing of commercial shipments of inflatable restraint fabrics. They may be used to establish the criteria by which inflatable restraint fabrics will be tested by the supplier to determine whether a lot of material is acceptable for shipment to the purchaser.

5.3 This practice addresses all the physical properties that describe inflatable restraint fabrics and their commonly used test methods. Unless otherwise specified by agreement of purchaser and supplier, these standard test methods shall constitute the test conditions, procedures, and equipment used to determine the physical properties of fabrics used in inflatable restraints. It is intended to be used as a guideline in establishing a written material specification. The specification or agreement of purchaser and supplier may deviate from the practices described herein when (based on experience) considerations of fabric properties, material handling equipment, or inflatable restraint system design dictate otherwise.

6. Apparatus

6.1 Periodic laboratory certification of test equipment used in accordance with this practice is required to reduce test variability due to precision and bias.

6.2 For inflatable restraints, all test equipment used in accordance with the procedures referenced in this practice shall be certified for calibration annually by an independent agency or equipment manufacturer whose results are traceable to National Institute of Science and Technology (NIST) or other

[4] Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20525.
[5] Available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.
[6] Available from Ford Motor Company, Engineering Department, Body Engineering Building, Room 1145, 21500 Oakwood Boulevard, Dearborn, MI 48124.
[7] Available from American Association of Textiles Chemists and Colorists, PO Box 12215, Research Triangle Park, NC 27709.