



Designation: **D3994 – 02 (Reapproved 2008) D3994 – 13**

## Standard Performance Specification for Woven Swimwear Fabrics<sup>1</sup>

This standard is issued under the fixed designation D3994; 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 performance specification covers woven fabrics for use in men's, women's and children's swimwear, composed of any textile fiber or mixture of textile fibers.

1.2 These requirements apply to the length and width directions for those properties where fabric direction is pertinent.

1.3 The following safety hazards caveat pertains only to the test method described in this specification: *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>

[D123 Terminology Relating to Textiles](#)

[D434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam \(Withdrawn 2003\)](#)<sup>3</sup>

[D1424 Test Method for Tearing Strength of Fabrics by Falling-Pendulum \(Elmendorf-Type\) Apparatus](#)

[D2261 Test Method for Tearing Strength of Fabrics by the Tongue \(Single Rip\) Procedure \(Constant-Rate-of-Extension Tensile Testing Machine\)](#)

[D2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry](#)

[D2905 Practice for Statements on Number of Specimens for Textiles \(Withdrawn 2008\)](#)<sup>3</sup>

[D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics \(Grab Test\)](#)

[D7022 Terminology Relating to Apparel](#)<sup>3</sup>

2.2 *AATCC Test Methods:*<sup>4</sup>

[8 Colorfastness to Crocking: AATCC-Crockmeter Method](#)

[15 Colorfastness to Perspiration](#)

[16.3 Colorfastness to Light](#)

[23 Colorfastness to Burnt Gas Fumes](#)

[61 Colorfastness to Washing, Domestic, and Laundering, Commercial Laundering: Accelerated](#)

[106 Colorfastness to Water: Sea](#)

[107 Colorfastness to Water](#)

[116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method](#)

[129 Colorfastness to Ozone in the Atmosphere Under High Humidities](#)

[135 Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabrics](#)  
[Dimensional Changes of Fabrics After Home Laundering](#)

[162 Colorfastness to Water: Chlorinated Pool](#)

[172 Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering](#)

[188 Colorfastness to Chlorine Bleach in Home Laundering](#)

[Evaluation Procedure No. 1 Gray Scale for Color Change](#)

[Evaluation Procedure No. 2 Gray Scale for Staining](#)

[Evaluation Procedure No. 38 AATCC 9-Step Chromatic Transference Scale](#)

<sup>1</sup> This performance specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.61 on Apparel. Current edition approved Aug. 1, 2008; July 1, 2013. Published October 2008; August 2013. Originally approved in 1981. Last previous edition approved in 2002 as D3994 – 02: D3994 – 02(2008). DOI: 10.1520/D3994-02R08; 10.1520/D3994-13.

<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> The last approved version of this historical standard is referenced on www.astm.org.

<sup>4</sup> Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709, http://www.aatcc.org.

2.3 Federal Standard:

16 CFR 1610 Standard for Flammability of Clothing Textiles<sup>5</sup>

16 CFR, Chapter II—Consumer Product Safety Commission, Subchapter D—Flammable Fabrics Act Regulations<sup>5</sup>

2.4 Military Standard:

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes<sup>6</sup>

NOTE 1—Reference to test methods in this standard give only the permanent part of the designation of ASTM, AATCC, or other test methods. The current editions of each test method cited shall prevail.

3. Terminology

3.1 Definitions:

3.1.1 swimwear, *n*—textile garments intended for wear in fresh, chlorinated, or salt water.

3.1 For definitions of textile terms used in this specification, refer to the individual Terminologies D123 ASTM and AATCC test methods and to Terminology and D123D7022. Definitions found in a dictionary of common terms are suitable for terms used in this specification. For terms relating to chemical or colorfastness testing, refer to specific AATCC methods.

4. Specification Requirements

4.1 The properties of fabrics for woven swimwear shall conform to the specification requirements in Table 1.

<sup>5</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

<sup>6</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

TABLE 1 Specification Requirements

NOTE 1—Class in a, b, and c is based on a numerical scale of 5 for negligible or no color change or color transfer to 1 for very severe color change or color transfer.

Characteristic	Requirements	Section
Breaking strength (load) <sup>A</sup> (CRT):		7.1
Nonstretch fabrics	133 N (30 lbf), min	
Stretch fabrics	89 N (20 lbf), min @ 40 % or greater elongation	
Yarn slippage <sup>1/4</sup> -in. (6-mm) separation	89 N (20 lbf), min	7.2
Tear strength (nonstretch direction)	6.7 N (1.5 lbf), min	7.3
Dimensional change:		
Laundering	3 %, max	7.4.1
Colorfastness:		
Burnt gas fumes—1 cycle		7.5.1
Shade change, original fabric and after 1 laundering	Class 4 <sup>B</sup> , min	
Chlorine Bleach	Class 4 <sup>B</sup> , min	7.5.10
Sodium Hypochlorite Bleach	Class 4 <sup>B</sup> , min	7.5.10
Non-Chlorine Bleach	Class 4 <sup>B</sup> , min	7.5.11
Powdered Non-Chlorine Bleach	Class 4 <sup>B</sup> , min	7.5.11
Laundering		7.5.2
Shade change	Class 4 <sup>B</sup> , min	
Staining	Class 4 <sup>C</sup> , min	
Crocking		7.5.3
Dry	Class 4 <sup>D</sup> , min	
Wet	Class 4 <sup>D</sup> , min	
Water		7.5.4
Shade change	Class 4 <sup>B</sup> , min	
Staining	Class 4 <sup>C</sup> , min	
Chlorinated Pool	Class 4 <sup>B</sup>	7.5.5
Perspiration		7.5.6
Shade change	Class 4 <sup>B</sup>	
Staining	Class 4 <sup>C</sup>	
Sea water		7.5.7
Shade change	Class 4 <sup>B</sup> , min	
Staining	Class 4 <sup>C</sup> , min	
Ozone		
Shade change	Class 3–4 <sup>B</sup> , min	
Light (20 AATCC FU) (xenon-arc)	Step 4 <sup>B</sup> , min	7.5.9
Flammability	Class 1 or Class 2	7.6

<sup>A</sup> See Note 2.

<sup>B</sup> AATCC Gray Scale for Color Change.

<sup>C</sup> AATCC Gray Scale for Staining.

<sup>D</sup> AATCC 9-Step Chromatic Transference Scale.