



Designation: **D3996—14 D3996 – 23**

Standard Performance Specification for Knit Swimwear Fabrics¹

This standard is issued under the fixed designation D3996; 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 performance specification covers circular and warp knitted fabrics for use in knit swimwear, composed of any textile fiber or mixture of textile fibers.

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

1.3 The following precautionary statement pertains only to the test methods portion, Section 7, of 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, safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

[D123 Terminology Relating to Textiles](#)

[D2905 Practice for Statements on Number of Specimens for Textiles \(Withdrawn 2008\)](#)³

[D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method](#)

[D3787 Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traverse \(CRT\) Ball Burst Test](#)

[D6797 Test Method for Bursting Strength of Fabrics Constant-Rate-of-Extension \(CRE\) Ball Burst Test](#)

[D7022 Terminology Relating to Apparel](#)³ (Withdrawn 2022)³

2.2 AATCC Methods:⁴

[8TM8 Colorfastness to Crocking: Crockmeter Method](#)

[15TM15 Colorfastness to Perspiration](#)

[16.3TM16.3 Colorfastness to Light](#)

[23TM23 Colorfastness to Burnt Gas Fumes](#)

[64TM61 Colorfastness to Laundering: Accelerated](#)

[106TM106 Colorfastness to Water: Sea](#)

[107TM107 Colorfastness to Water](#)

[116TM116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method](#)

¹ 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 March 15, 2014; Jan. 1, 2023. Published April 2014; August 2023. Originally approved in 1981. Last previous edition approved in 2013; 2014 as D3996 – 13. DOI: 10.1520/D3996-14.14. DOI: 10.1520/D3996-23.

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.

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

~~129TM129~~ Colorfastness to Ozone in the Atmosphere Under High Humidities
~~135TM135~~ Dimensional Changes of Fabrics After Home Laundering
~~Evaluation Procedure No. 1~~ Gray Scale for Color Change
~~Evaluation Procedure No. 2~~ Gray Scale for Staining
~~Evaluation Procedure No. 8~~ AATCC 9-Step Chromatic Transference Scale
~~162TM162~~ Colorfastness to Water Chlorinated Pool
~~172TM172~~ Colorfastness to Powdered Non-Chlorine Bleach in Home Laundering
~~188TM188~~ Colorfastness to Sodium Hypochlorite Bleach in Home Laundering
~~EP1~~ Gray Scale for Color Change
~~EP2~~ Gray Scale for Staining
~~EP8~~ AATCC 9-Step Chromatic Transference Scale
2.3 *Federal Standard*.⁵
16 CFR 1610 Standard for Flammability of Clothing Textiles

NOTE 1—Reference to test methods in this specification 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 For all terminology related to D13.61, Apparel, see Terminology [D7022](#).

3.1.1 The following terms are relevant to this standard: swimwear.

3.2 For definitions of all other textile terms, see Terminology [D123](#).

3.3 For terms relating to chemical or colorfastness testing, refer to specific AATCC methods.

4. Specification Requirements

4.1 The properties of fabrics for knitted swimwear shall conform to the specification requirements in [Table 1](#).

5. Significance and Use

5.1 Upon mutual agreement between the purchaser and the seller, fabrics intended for this end use should meet all of the requirements listed in [Table 1](#) of this specification.

5.2 It is recognized that for purposes of fashion or aesthetics the ultimate consumer of articles made from these fabrics may find acceptable fabrics that do not conform to all of the requirements in [Table 1](#). Therefore, one or more of the requirements listed in [Table 1](#) may be modified by mutual agreement between the purchaser and the seller.

5.2.1 In such cases, any references to the specification shall specify that: “This fabric meets ASTM Specification D3996 except for the following characteristic(s).”

5.3 Where no prepurchase agreement has been reached between the purchaser and the seller, and in case of controversy, the requirements listed in [Table 1](#) are intended to be used as a guide only. As noted in [5.2](#), ultimate consumer demands dictate varying performance parameters for any particular style of fabric.

5.4 The significance and use of particular properties and test methods are discussed in the appropriate sections of the specified test methods.

6. Sampling

6.1 *Acceptance Testing Lot*—Unless there is prior agreement consider as a lot for acceptance testing all material of a single item received as a single shipment.

⁵ Available from Superintendent of Documents, Government Printing Office, Washington, DC 20407.

TABLE 1 Specification Requirements

NOTE 1—The grades of colorfastness and SA rating are based on a numerical scale of 5 for negligible or no color change, color transfer, or wrinkle to 1 for very severe color change, color transfer, or wrinkle.

Characteristic	Requirements	Section
Bursting strength (ball burst)	30 lbf (133 N), min	7.1
Dimensional change:		
Laundering:		7.2.1
Nonstretch fabrics	5.0 % max in each direction	
Stretch fabrics	7.5 % max in each direction	
Wet relaxation or growth:		
Stretch fabrics	10.0 % max in each direction	
Dry relaxation or growth	5.0 % max in each direction	
Colorfastness:		
Burnt Gas Fumes—1 cycle:		7.3.1
Shade change, original fabric and after 1 laundering	Grade 4 min ^A	
Sodium Hypochlorite Bleach	Grade 4 min ^A	7.3.10
Powdered Non-Chlorine Bleach	Grade 4 min ^A	7.3.11
Laundering: ^E	7.3.2	
Shade change	Grade 4 min ^A	
Staining	Grade 3 min ^B	
Crocking: ^E		7.3.3
Dry	Grade 4 min ^C	
Wet	Grade 3 min ^C	
Water: ^E	7.3.4	
Shade change	Grade 4, min ^A	
Staining	Grade 3 min ^B	
Perspiration: ^E		7.3.5
Shade change	Grade 4 min ^A	
Staining	Grade 3 min ^B	
Chlorinated pool water ^D	...	7.3.6
Sea water: ^E	7.3.7	
Shade change	Grade 4 min ^A	
Staining	Grade 3, min ^B	
Ozone:		7.3.8
Shade change	Grade 3–4 min ^A	
Light (40 AATCC Fading Units) (non-are)	Grade 4 min ^A	7.3.9
Light (40 AFUs)	Grade 4 min ^A	7.3.9
Flammability	pass	7.4
Flammability	Class 1	7.4

^A AATCC Gray Scale for Color Change.

^B AATCC Gray Scale for Staining.

^C AATCC 9-Step Chromatic Transference Scale.

^D See Note 76.

^E See Note 65.

6.2 *Lot Samples and Laboratory Samples*— For acceptance testing, take lot samples and laboratory samples as directed in each of the applicable test methods.

6.3 *Test Specimens*—Take the number of specimens directed in each of the applicable test methods. Perform the tests on the fabric as it will reach the customer. Any “partially finished” or “post-finished” fabrics should be processed in accordance with the fabric manufacturer’s instructions.

6.4 If the applicable test method does not specify the number of specimens, use the procedures in Practice D2905 to determine the number of specimens per laboratory sampling unit. Use (1) a reliable estimate of the variability of individual observations on similar materials in the user’s laboratory, (2) a 95 % probability level, and (3) an allowable difference of 5 % of the average between the test results on laboratory sampling units and the average for the laboratory sampling unit. The average for a laboratory sampling unit is the average that would be obtained by applying the test method to all of the potential specimens from that laboratory sampling unit.

7. Test Methods

7.1 *Bursting Strength*—Determine the bursting strength, in the standard atmosphere for testing textiles, as directed in Test Method