



Designation: D 4109 – 95a

Standard Performance Specification for Men's and Boys' Woven Coverall, Dungaree, Overall, and Shop-Coat Fabrics¹

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1. Scope

1.1 This performance specification covers woven fabrics comprised of any textile fiber or mixture of fibers, to be used in men's and boys' coveralls, dungarees, overalls, and shop-coats.

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

1.3 This performance specification is not applicable to woven fabrics used for interlinings and industrial-protective clothing.

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:

- D 123 Terminology Relating to Textiles²
- D 434 Test Method for Resistance to Slippage of Yarns in Woven Fabrics Using a Standard Seam²
- D 1424 Test Method for Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus²
- D 2261 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Extension Tensile Testing Machine)²
- D 2262 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)²
- D 2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics²
- D 2905 Practice for Statements on Number of Specimens for Textiles²
- D 5034 Test Method for Breaking Force and Elongation of Textile Fabrics (Grab Test)³

2.2 AATCC Test Methods:⁴

- 8 Colorfastness to Crocking: AATCC Crockmeter Method
 - 15 Colorfastness to Perspiration
 - 16 Colorfastness to Light
 - 23 Colorfastness to Burnt Gas Fumes
 - 61 Colorfastness to Washing, Domestic, and Laundering, Commercial: Accelerated
 - 116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method
 - 124 Appearance of Durable Press Fabrics After Repeated Home Launderings
 - 132 Colorfastness to Drycleaning
 - 135 Dimensional Changes in Automatic Home Laundering of Woven or Knit Fabrics
 - Evaluation Procedure No. 1 Gray Scale for Color Change
 - Evaluation Procedure No. 2 Gray Scale for Staining
 - Evaluation Procedure No. 3 AATCC Chromatic Transference Scale
- #### 2.3 Federal Standard:⁵
- 16 CFR, Chapter II—Consumer Product Safety Commission, Subchapter D—Flammable Fabrics Act Regulations
- #### 2.4 Military Standard:⁶
- MIL-STD-105D Sampling Procedure and Tables for Inspection by Attributes

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 For definitions of textile terms used in this specification, refer to the individual ASTM and AATCC methods and to Terminology D 123.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *Type I Apparel*—apparel designed for general heavy work. It may be subjected to breaking and tearing stresses indoors or out.

3.2.2 *Type II Apparel*—apparel designed for light work or

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² *Annual Book of ASTM Standards*, Vol 07.01.

³ *Annual Book of ASTM Standards*, Vol 07.02.

⁴ Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

⁵ Available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

⁶ 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 for color change, color transfer, and DP rating is based on a numerical scale of 5 for negligible or no wrinkle, color change, or color transfer to 1 for severe wrinkle, color change, or color transfer.

Characteristics	Requirements		Section
<i>Breaking strength(load)(CRT):</i>			7.1
Type I	308 N (70 lbf), min		
Type II	178 N (40 lbf), min		
<i>Yarn slippage:</i>			7.2
Type I	6.3 mm (¼ in.) separation at 133 N (30 lbf), min		
Type II	6.3 mm (¼ in.) separation at 111 N (25 lbf), min		
<i>Tongue-tear strength (CRT):</i>			7.3
Type I	13 N (3.0 lbf), min		
Type II	11 N (2.5 lbf), min		
<i>Fabric Appearance (see 7.4.1.1)</i>	DP 3.5 ^A , min		7.4
<i>Colorfastness:</i>	Non-Indigo Dyed	Indigo Dyed	
Burnt gas fumes—2 cycles:			
Shade change, original fabric	Class 4 ^B , min	Class 4 ^B , min	7.5.1
Shade change, after one laundering or one drycleaning	Class 4 ^B , min	Class 4 ^B , min	
Laundering:			
Shade change	Class 4 ^B , min	Class 2 ^B , min	7.5.2
Staining	Class 3 ^C , min	Class 2 ^C , min	
Drycleaning:			
Shade change	Class 4 ^B , min	Class 3 ^B , min	7.5.3
Perspiration:			
Shade change	Class 4 ^B , min	Class 3 ^B , min	7.5.4
Staining	Class 3 ^C , min	Class 3 ^C , min	
Light (20 AATCC FU) (xenon-arc)	Step 4 ^B , min	Step 4 ^B , min	7.5.5
Crocking:			
Dry	Class 4 ^D , min	Class 3 ^D , min	7.5.6
Wet	Class 3 ^D , min	Class 2 ^D , min	
<i>Dimensional change:</i>			
Pressing and finishing (DP fabrics)	2 % max	2 % max	7.6.1
Laundering (DP fabrics)	2.5 % max	2.5 % max	
Laundering (non-DP fabrics)	3.0 % max	3.0 % max	
Drycleaning	2.5 % max	2.5 % max	7.6.3
<i>Flammability</i>	pass	pass	7.7

^A For durable press (DP) fabrics only.

^B AATCC Gray Scale for Color Change.

^C AATCC Gray Scale for Staining.

^D AATCC Chromatic Transference Scale.

leisure activities. It will not be expected to undergo severe physical stresses.

4. Specification Requirements

4.1 The properties of woven fabrics for men's and boys' woven coveralls, dungarees, overalls, and shop-coats shall conform to the specification requirements in Table 1.

5. Significance and Use

5.1 Upon agreement between the purchaser and the supplier, 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 upon agreement between the purchaser and the supplier.

5.2.1 In such cases, any references to the specification shall specify that: "This fabric meets ASTM Specification D 4109 except for the following characteristic(s)."

5.3 Where no prepurchase agreement has been reached between the purchaser and the supplier, 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.

6. Sampling

6.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of rolls as directed in an applicable specification or other agreement between the purchaser and the supplier, such as an agreement to use MIL-STD-105D.

6.2 *Laboratory Sample*—From each roll or piece in the lot sample, cut two laboratory samples the full width of the fabric and at least 375 mm (15 in.) along the selvage.

7. Test Methods (See Note 1)

7.1 *Breaking Force*—Determine the dry breaking force as directed in Test Method D 5034, using a constant rate of traverse (CRT) tensile-testing machine with the speed of the pulling clamp at 300 ± 10 mm (12 ± 0.5 in.)/min.

NOTE 2—If preferred, the use of the constant-rate-of-extension (CRE) testing machine is permitted. The crosshead speed should be as agreed upon between the purchaser and the supplier. There may be no overall correlation between the results obtained with the CRT machine and the CRE machine, consequently, these two breaking-load testers cannot be used interchangeably. In case of controversy, the CRT machine shall prevail.

7.2 *Resistance to Yarn Slippage*—Determine the resistance to yarn slippage as directed in Test Method D 434.

NOTE 3—The precision of Test Method D 434 is being established and