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Standard Specification for Performance of Bonded, Fused, and Laminated Apparel Fabrics[1]

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1. Scope

1.1 This specification covers requirements for performance properties of bonded, fused, and laminated apparel fabrics.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D123 Terminology Relating to Textiles

D2724 Test Methods for Bonded, Fused, and Laminated Apparel Fabrics

D3512 Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester

D7022 Terminology Relating to Apparel

2.2 *AATCC Standards:*

AATCC Evaluation Procedure 1 (1954), Gray Scale for Color Change[3]

AATCC Test Method 124, Appearance of Durable-Press Fabrics After Repeated Home Launderings[3]

3. Terminology

3.1 For all terminology related to Apparel, see Terminology D7022.

3.2 The following terms are relevant to this standard: blister, bonded fabric, bond strength, buble, closed face fabric, crack mark, foam tear, fused fabric, fusible fabric, interlining, laminated fabric, open face fabric, puckering.

3.3 For definitions of all other textile terms, refer to Terminology D123.

4. Delamination

4.1 *After Drycleaning*—When the front and the back of the bonded, fused, or laminated fabric are mounted without tensioning or stretching and viewed separately as directed in Sections 7.2 and 7.3 on Evaluation in AATCC Method 124, there shall be no visible evidence of separation of the component layers after three cycles in a coin-operated drycleaning machine, without steam pressing.

4.2 *After Laundering*—When the front and the back of the bonded, fused, or laminated fabric are mounted without tensioning or stretching and viewed separately as directed in Sections 7.2 and 7.3 on Evaluation in AATCC Method 124, there shall be no visible evidence of separation of the component layers after five cycles of laundering and five cycles of drying.

5. Shrinkage (or Growth)

5.1 *After Drycleaning:*

5.1.1 The average shrinkage of four test specimens after three cycles in a coin-operated drycleaning machine, followed by one steam pressing, shall be used to assign the observed fabric shrinkage to Class I, Class II, or Class III, which have the following shrinkage limits:

Class	Average Fabric Shrinkage Limits,%	
	Length	Width
I	3.0 or less	3.0 or less
II	3.1 to 6.0	3.1 to 6.0
III	6.1 or more	6.1 or more

5.1.1.1 If the shrinkage of a fabric falls within the allowable limits for width for a specific class but does not meet the limits for length or vice versa, the fabric shall be assigned to the drycleaning class in which the higher shrinkage occurs.

5.1.2 Growth of the fabric shall not exceed 2.5 % in the length direction or 2.5 % in the width direction after three cycles in a coin-operated drycleaning machine, followed by one steam pressing.

5.1.2.1 If a fabric shrinks in drycleaning, for example, less than 3.0 % in length but at the same time grows less than 2.5 % in width or vice versa, it shall be assigned to Class I.

[1] This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.61 on Apparel.

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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] *Technical Manual of the American Association of Textile Chemists and Colorists*, available from the AATCC, P. O. Box 12215, Research Triangle Park, NC 27709.

5.1.2.2 If the fabric grows in drycleaning more than 2.5 % in either length or width, it shall be considered unacceptable, regardless of the shrinkage or growth in the other direction.

5.2 *After Laundering:*

5.2.1 The average shrinkage of four test specimens after five cycles of laundering without hand ironing if the fabric is intended for use in a garment which does not require ironing or after hand ironing following the fifth laundering cycle only if the fabric is intended for use in a garment which requires ironing, shall be used to assign the observed fabric shrinkage to Class I, Class II, or Class III as listed in 5.1.1.

5.2.1.1 If the shrinkage of a fabric falls within the allowable limits for width for a specific class but does not meet the limits for length or vice versa, the fabric shall be assigned to the laundering shrinkage class in which the higher shrinkage occurs.

5.2.2 Growth of the fabric shall not exceed 2.5 % in the length direction and 2.5 % in the width direction after five cycles of laundering without hand ironing if the fabric is intended for use in a garment that does not require ironing or after hand ironing following the fifth laundering cycle only if the fabric is intended for use in a garment that requires ironing.

5.2.2.1 If a fabric shrinks in laundering, for example, less than 3.0 % in length but at the same time grows less than 2.5 % in width or vice versa, it shall be assigned to Class I.

5.2.2.2 If the fabric grows in laundering more than 2.5 % in either length or width, it shall be considered unacceptable, regardless of the shrinkage or growth in the other direction.

NOTE 1—Normally, the dimensional stability of a garment is better in laundering or drycleaning than the principal fabric from which it was made due to the stabilizing effect of sewing and seaming and to the preshrinkage obtained in garment pressing.

NOTE 2—Class shrinkage limits are provided because fabrics intended for various end uses do not all require the same shrinkage control to perform in a satisfactory manner after refurbishment.

NOTE 3—If the fabric is intended for over-the-counter sales for home sewing, the fabric should be accompanied by instructions to prestabilize the fabric by using one cycle of the appropriate refurbishment described in 9.1 or 9.2 before converting the fabric into a garment.

6. Appearance and Aesthetics

6.1 *After Drycleaning:*

6.1.1 *Puckering, Crack Marks, Bubbles, or Blisters*—When the front and the back of the bonded, fused, or laminated fabric are mounted without tensioning or stretching and viewed separately as directed in Sections 7.2 and 7.3 on Evaluation in AATCC Method 124, there shall be no visible evidence of puckering, crack marks, bubbles, or blisters of the component layers after three cycles in a coin-operated drycleaning machine, followed by one steam pressing.

NOTE 4—The acceptable change in stiffness shall be determined by agreement between the purchaser and the seller.

6.1.2 *Pilling Due to Drycleaning*—After three cycles in a coin-operated drycleaning machine, followed by one steam pressing, the pilling rating of the fabric shall be at least 4 when rated as directed in Test Method D3512.

6.1.3 *Color Change*—After three cycles in a coin-operated drycleaning machine, followed by one steam pressing, the depth of shade change from the original color of the face fabric, the backing fabric, and the foam, if present and visible, shall not be less than a rating of 4 to 5 when evaluated by AATCC Evaluation Procedure 1, Gray Scale for Color Change.

NOTE 5—Color change should be reported only when fabrics of the same color and lot with or without a white dummy load are used in a washload or drycleaning load.

6.2 *After Laundering:*

6.2.1 *Puckering, Crack Marks, Bubbles, or Blisters*—When the front and the back of the bonded, fused, or laminated fabric are mounted without tensioning or stretching and viewed separately as directed in Sections 6.2 and 7.3 on Evaluation in AATCC Method 124, there shall be no visible evidence of puckering, crack marks, bubbles, or blisters of the component layers after five cycles of laundering and five cycles of drying (Note 4).

6.2.2 *Pilling Due to Laundering and Drying*—After five cycles of laundering and five cycles of drying, the pilling rating of the fabric shall be at least 4 when rated as directed in Test Method D3512.

6.2.3 *Color Change:*

6.2.3.1 *Face Fabric*—After five cycles of laundering and five cycles of drying, the depth of shade change from the original color of the face side of the fabric shall not be less than a rating of 3 to 4 when evaluated by AATCC Evaluation Procedure 1, Gray Scale for Color Change (Note 5).

6.2.3.2 *Backing Fabric*—After five cycles of laundering and five cycles of drying, the depth of shade change from the original color of the backing fabric shall not be less than a rating of 3 when evaluated by AATCC Evaluation Procedure 1, Gray Scale for Color Change (Note 5).

6.2.4 *Wrinkles*—If the fabric is designated as "durable press," the unpressed fabric shall have a minimum smoothness rating of 4 after five cycles of laundering and five cycles of drying without ironing when rated as directed in Section 6 on Evaluation and Table II in AATCC Method 124.

7. Strength of Bond

7.1 *Types of Fabric*—Strength of bond shall be specified only on closed face fabrics. Fabrics with open-face areas, such as laces or open-face knitted fabrics designed specifically to show the substrate, may not have enough fabric area available for bonding to give a useful indication of bond durability.

7.2 *After Drycleaning*—After three cycles in a coin-operated drycleaning machine, the minimum wet (in perchlorethylene) bond strength of the fabric shall be 1.5 ozf/in. (16 N/m) of width when tested as directed in Section 13.3 of Test Methods D2724.

7.3 *After Laundering*—After five cycles of laundering and five cycles of drying, the minimum wet (in water) bond strength of the fabric shall be 1.5 ozf/in. (16 N/m) of width when tested as directed in Section 13.3 of Test Methods D2724.

8. Test Method

8.1 Test all specimens as directed in Test Methods D2724.

9. General Requirements

9.1 *Drycleanable Fabrics*—For bonded, fused, or laminated fabrics designated as drycleanable only, determine conformance to this specification after three cycles in a coin-operated drycleaning machine, followed by one steam pressing after the third cycle only.

NOTE 6—This specification requires the use of a coin-operated type of drycleaning machine, because available evidence shows that the action of this type of drycleaning machine is more severe than commercial drycleaning machines or various small-scale laboratory-type drycleaning machines.

9.2 *Launderable Fabrics*—For bonded, fused, or laminated fabrics designated as launderable, determine conformance to this specification after (*1*) five cycles of laundering and five cycles of drying by methods selected from the alternative procedures included in Section 11 in Test Methods D2724; and (*2*) three cycles in a coin-operated drycleaning machine, followed by one steam pressing after the third cycle only, unless the fabric is designated expressly as unsuitable for drycleaning.

10. Report

10.1 State that the fabric was evaluated as directed in ASTM Specification D3135. Describe the material or product sampled, and state the method of sampling used.

10.2 State that the fabric was tested as directed in ASTM Test Methods D2724.

10.3 Report the following information:

10.3.1 State whether the fabric was tested as drycleanable or as launderable and drycleanable, including the laundering and the drying procedures used.

10.3.2 State whether all parameters specified in ASTM Specification D3135 were evaluated.

10.3.3 State whether the fabric passed or failed each of the parameters evaluated in ASTM Specification D3135.

11. Conformance

11.1 If the fabric passed each of the parameters evaluated, consider the lot a valid delivery.

11.2 Laminated fabrics show a relatively wide variation in bond strength and shrinkage (in Methods D2724, see Note 9 and the data presented in Table 1 through Table 4). These data show that it is possible for two laboratories to report shrinkage of separate samples of the same fabric ranging from Shrinkage Class I to Shrinkage Class III. Similarly, wet bond strength on borderline fabrics may be classed as acceptable or unacceptable by different laboratories or even within a laboratory when retesting.

11.3 In view of the inherent variability characteristically present within a piece of a bonded, fused, or laminated fabric, if test results for one or more characteristics do not conform to the specifications, the purchaser and the seller should give consideration to taking for a retest a new laboratory sample from either the original lot or a new lot sample. Under these circumstances, the purchaser and the seller must also decide at the same time whether the lot shall be evaluated on the combined test results from both samples or solely on the test results from the second sample, to be considered a valid delivery.

NOTE 7—Levels of performance for specific parameters other than those covered in this specification may be acceptable when agreed upon by the purchaser and the seller. When such fabrics are acceptable to both the purchaser and the seller, state in the report which properties conformed to this specification.

12. Keywords

12.1 apparel; appearance; bonded fabric; delamination strength; dimensional change