Designation: D 5430 – 93 (Reapproved 2000)

Standard Test Methods for Visually Inspecting and Grading Fabrics[1]

This standard is issued under the fixed designation D 5430; 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 These test methods describe a procedure to establish a numerical designation for grading of fabrics from a visual inspection.

1.2 These test methods may be used for the delivery and acceptance of fabrics with requirements mutually agreed upon by the purchaser and the supplier.

1.3 *This standard does not purport to address all of the safety problems, 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 Textiles[2]

D 2905 Practice for Statements on Number of Specimens for Textiles[2]

D 3990 Definition of Terms Relating to Fabric Defects[3,4]

2.2 *ANSI Standards:*[5]

ANSI/ASQC Standard A1-1978 Definitions, Symbols, Formulas, and Tables for Control Charts

ANSI/ASQC Standard Z1.4-1981 Sampling Procedures and Tables for Inspection by Attributes.

2.3 *MIL Standard:*[6]

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes

3. Terminology

3.1 *Definitions:*

3.1.1 *critical defect, n*—a serious defect that judgment and experience indicate is likely to prevent the usability or proper performance of a product from its intended purpose.

3.1.2 *defect, in inspection and grading, n*—the departure or non-conformance of some characteristic from its intended level or state.

3.1.2.1 *Discussion*—In inspection and grading the characteristic is a visual one.

3.1.3 *grade, v*—to assign a numerical value based on the number, size, and severity of defects seen during a visual inspection.

3.1.4 *inspection, n*—the process of measuring, examining, testing, gaging, or otherwise comparing a characteristic or property of a material with applicable requirements. In this case only by visual examination.

3.1.5 *major defect, n*—a defect other than critical, that judgment and experience indicate is likely to materially reduce the usability of a product for its intended purpose.

3.1.6 *minor defect, n*—a defect that is not likely to materially reduce the usability of the product from its intended purpose, or is a departure from established standards having little bearing on the effective use of operation of a product.

3.1.7 For definitions of other textile terms used in this test method, refer to Terminology D 123 and D 3990.

4. Summary of Test Method

4.1 Rolls or bolts of fabric are visually inspected and individually graded at an examination station using an agreed upon point system.

4.2 Fabric is normally inspected and graded on one side only. Certain types of end use fabrics may be inspected and graded on both sides as agreed upon between the purchaser and supplier.

5. Significance and Use

5.1 Test Method D 5430 is considered satisfactory for acceptance testing a commercial shipments since the method has been used extensively in the trade for grading of fabric and fabric acceptance determination.

5.2 The penalty points obtained in grading the same rolls or bolts of fabric may vary considerably when using each of the three options listed herein. For this reason, the same point assignment option should be used in cases of disagreement arising from differences of values reported by the purchaser and the supplier.

6. Apparatus

6.1 A suitable fabric inspection machine providing a flat

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[1] These test methods are under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.59 on Fabric Test Methods, General.

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

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

[4] American Apparel Manufacturers Association, 1611 N. Kent Street, Arlington, Virginia 22209.

[5] American Society for Quality Control, 310 W. Wisconsin Ave., Milwaukee, WS 53203.

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

viewing area and an interruptible speed controlled fabric rewind. Examination and grading are usually done with overhead direct lighting. The inspection machine may be equipped with the option of back lighting (transmitted) light providing the choice by prior agreement depending on the fabric end use. The overhead direct lighting source shall be mounted parallel to the viewing surface so as to illuminate with direct perpendicular impinging light rays. The surface illumination level shall be a minimum of 1075 lux (100 foot candles).

6.2 The lighting source should be cool white preheat rapid start fluorescent lamps having a correlated color temperature of 4100 to 4500 K with white reflectors and without baffles or glues, or by agreement between the purchaser and supplier.

7. Sampling

7.1 With shipments which total 1000 m or yd or less, inspect and grade the total number of rolls or bolts.

7.2 For shipments exceeding 1000 m or yd, select samples as agreed upon by the purchaser and supplier. In the absence of such a specification, a reliable statistical sampling plan such as Practice D 2903 or MIL-STD 105E may be used.

8. Conditioning

8.1 No conditioning is required.

9. Defects and Tolerances

9.1 The purchaser and the supplier shall agree on a list of defects to be used in grading fabric. See 2.1 and 2.2 and Refs. **1-7** for publications of various lists of fabric defects which may be used.

9.1.1 The fabric defects listed shall be classified as either a critical defect, major defect, or minor defect.

9.2 Where applicable, the purchaser and the supplier may agree upon the location, maximum size of a fabric characteristic and frequency of occurrence that shall not be counted as a defect.

9.3 The point count permissible frequency of any defect type may be further qualified by agreement of the purchaser and the supplier.

9.4 Defects not visible on the face of the fabric shall not be counted unless agreement to the contrary has been made between the purchaser and the supplier.

9.5 Each individual roll or bolt in 7.1 or 7.2 shall be rejected if inspection and grading results in a total number of defect points exceeding the maximum acceptable level mutually agreed upon by the purchaser and supplier.

9.6 The total shipment shall be rejected if the sample inspected exceeds the maximum acceptable defect level mutually agreed upon by the purchaser and supplier.

10. Procedure

10.1 Pass the fabric longitudinally through the inspection area at a visual inspection speed, agreed upon between the purchaser and supplier.

10.2 Visually inspect and grade from a viewing distance of one metre or yard while the fabric is in motion. Fabric may be stopped to grade when necessary to affirm marginal defects and defects may be flagged.

10.3 Inspect and grade the total length of each roll or bolt sampled.

10.4 Detect and assign points to defects observed as agreed upon in 9.1-9.4 using options A (10.6), B (10.7), or C (10.8).

10.5 Assign points to the defects based upon their length within the plane of the fabric according to one of the following options of assigning points, as agreed upon between the purchaser and the supplier.

10.6 *Point Assignment Option A*:

Defect Length				
Greater Than		Up to and Including		Assigned
SI Units	English Units	SI Units	English Units	Points
0 mm	0 in.	75 mm	3 in.	1
75 mm	3 in.	150 mm	6 in.	2
150 mm	6 in.	230 mm	9 in.	3
230 mm	9 in.			4

10.6.1 Assign no more than a total of 4 points to any one linear metre or yard of fabric, regardless of the number or size of the detected individual defects.

10.6.2 Assign 4 points to each consecutive linear metre or yard in which a continuous running defect exceeds 230 millimetres or 9 inches.

10.6.3 Assign 4 points to each linear metre or yard of fabric where the useable width is less than the minimum specified.

10.6.4 Assign 4 points to each seam or other full width defect or seam if applicable.

10.7 *Point Assignment Option B*:

Defect Length				
Greater Than		Up to and Including		Assigned
SI Units	English Units	SI Units	English Units	Points
0 mm	0 in.	230 mm	9 in.	1
230 mm	9 in.	460 mm	18 in.	2
460 mm	18 in.	690 mm	27 in.	3
690 mm	27 in.	920 mm	36 in.	4
920 mm	36 in.	1150 mm	45 in.	5
1150 mm	45 in.	1380 mm	54 in.	6
1380 mm	54 in.	1610 mm	63 in.	7

NOTE 1—For every additional 230 mm or 9 in., add one to the assigned points for the previous increment.

10.7.1 Assign demerit points for defects in increments of 230 mm or 9 in. or parts thereof.

10.7.2 Determine the maximum number of points per linear metre or yard by dividing the fabric width by 230 mm or 9 in. as applicable in mm or in.

10.7.2.1 Examples Per Linear Metre:

- 1220 mm fabric width/230 mm = 5 points
- 1530 mm fabric width/230 mm = 7 points

10.7.2.2 Examples Per Linear Yard:

- 48 in. fabric width/9 in. = 6 points:
- 60 in. fabric width/9 in. = 7 points

10.7.3 Assign no more than 4 points per square metre or yard regardless of the number or size of the detected individual defect.

10.7.4 Assign 4 points to each consecutive linear metre or yard containing a continuous running defect.

10.7.5 No defect within 500 mm or 20 in. to either side of an extended or running defect shall be counted.

10.7.6 Assign no more than one defect point for multiple defects within a 250 mm or 10 in. square.

10.7.7 Assign the maximum number of points allowable per linear metre or yard where the usable width is less than the minimum specified.

10.7.8 Assign the maximum number of points allowable per

linear metre or yard to each splice or full width defect.

10.8 *Point Assignment Option C*:

Defect Length—Warp				
Greater Than		Up to and Including		Assigned
SI Units	English Units	SI Units	English Units	Points
0 mm	0 in.	25 mm	1 in.	1
25 mm	1 in.	125 mm	5 in.	2
125 mm	5 in.	250 mm	10 in.	5
25 mm	10 in.	900 mm	36 in.	10

Defect Length—Filling				
Greater Than		Up to and Including		Assigned
SI Units	English Units	SI Units	English Units	Points
0 mm	0 in.	25 mm	1 in.	1
25 mm	1 in.	125 mm	5 in.	3
125 mm	5 in.	½ Fabric Width		5
½ Fabric Width		Full Fabric Width		10

10.8.1 Assign no more than a total of 10 points to any one linear metre or yard of fabric regardless of the number or size of the detected individual defects.

10.8.2 Assign 10 points to each consecutive linear metre or yard containing a continuous running defect.

10.8.3 Assign 10 points to each linear metre or yard of fabric where the usable width is less than the minimum specified.

10.8.4 Assign 10 points to each splice or other full width defect.

11. Calculation

11.1 Total the number of points assigned for each roll or belt examined. Calculate the points per 100 sq. m or sq. yd or to points per 100 linear m or yd using Eq 1, Eq 2 or Eq 3 or Eq 4.

$$\text{Points/100 m}^2 = 100{,}000\ P/WL \quad (1)$$

$$\text{Points/100 yd}^2 = 3{,}600\ P/WL \quad (2)$$

$$\text{Points/100 Linear m} = 100\ P/WL \quad (3)$$

$$\text{Points/100 Linear yd} = 100\ P/WL \quad (4)$$

where:

P = total points assigned,
W = fabric width mm or in.,
L = fabric length examiner, m or yd.

12. Report

12.1 State that the fabric was inspected as directed in Test Methods D 5930. Identify and describe the fabric lot or shipment involved.

12.1.1 Report whether point assignment Option A, B or C was used in assigning points.

12.2 Report whether the unit of fabric passed or failed the criteria as agreed to by the purchaser and the supplier.

12.2.1 Report the number of metres or yards inspected.

12.2.2 Report the total number of points assigned based on roll or total yardage.

12.2.3 Report the number of points per 100 linear m or yd.

13. Precision and Bias

13.1 No justifiable statement can be made either on precision or on the bias of Test Methods D 5430 for visually inspecting and grading fabrics since the test results merely states whether there is conformance to the criteria for success specified in the procedure.

13.2 *Bias*—No justifiable statement on the accuracy of Test Methods D 5430 can be made since the true value of the inspection grade cannot be determined by an accepted referee method.

REFERENCES

(**1**) Apparel Quality Committee Report, "Guidelines for Purchasing by Specifications," 1978, Publication 660-43.
(**2**) Technical Advisory Committee Report, "Piece Goods Quality," June 1962, Publication 666-51.
(**3**) U.S. Army Matick Laboratories Technical Report 67-29 CM, "Point System for Evaluating Quality in Textiles," 1966 Publication AD-641496.
(**4**) Military Standard, "Sampling Procedures and Tables for Inspection by Attributes," MIL-STD 105E.
(**5**) Pictorial Presentation of Standard Fabric Defects by A. G. Blackmon, "Manual of Standard Fabric Defects in the Textile Industry," 1975, Revised 1978.
(**6**) Apparel Research Journal, June 1975, Volume III No. 1.
(**7**) Federal Standard Glossary of Fabric Imperfections, Federal Standard Number 4b, Sections I, II, and III, July 29, 1964.