PROFESSIONAL INSTITUTE OF SCIENCE & FASHION TECHNOLOGY

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Sampling of Fabric

Visual Inspection and Grading of Fabrics

In trade relationships between sellers of fabrics and their customers, a system of defect analysis or defect grading must be agreed upon and in use. At the core of any grading system is simplicity and accuracy. The system must be clearly stated and easy to execute. Of various systems used worldwide, the "4-poinr and "10-poinf' systems are the most common. The actual method used in any relationship must be agreed upon by all parties as the standard. This discussion will cover these grading methods in a very fundamental manner, and these discussions should not be automatically adopted as a standard method. Various world standards organizations such as ASTM should be referred to for an actual standard method.

Defect Classifications (Major/Minor Defects)

Defects depicted in this CD have been classified as "Major or Minor" defects and by category. These classifications are based upon the judgment and experience of fabric graders. It must be conceded that all "pointable" defects do not result in the determination of product {end item) seconds. Further, it must be understood that certain small or minor defects may be acceptable in certain areas of an end item (garment or home product) while being unacceptable in others, and that a large percent of small or minor defects are lost in the cutting and fabricating of end items. For these reasons, it seems logical that the quality of a fabric, represented by a point value, should be more reliable and correlative to end item quality and fabric utilization if these facts are taken into account.

It is known that across the industry almost all conditions exist, so that a minor defect to one end use may be a major to another and vice versa, but if the nature of the fabric and the demands of an end use are understood, there should be little problem relating quality determined by the major/minor concept. The definitions against which these defects have been classified are as follows:

Major/minor defects defined:

Major: A defect severe enough, if exposed, to place an end item in seconds.

Minor: An imperfection that may or may not cause a second, depending upon its location in the end item and/or its chance of being lost in fabrication.

In many agreements, a major defect may be severe enough that it carries a connotation of *"critica/H.* This means that this defect by itself would cause an entire roll to be rated as a second or worse. Where applicable, the purchaser and the supplier may agree upon the classification, location, maximum size of a fabric characteristic, and frequency of occurrence that shall not be counted as a defect. In any case, the purchaser and the supplier must agree on a list of defects to be used in grading fabric as well as their severity.

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

Defect Category Classification:

Defects depicted in this CD have been placed into categories based upon their similarity of appearance and effect upon visual quality, and general utilization of the fabric. For example, all defects that result in a fine vertical line are classified within a category. As a result of defect grouping, the use of these general classifications can serve to simplify inspection reports and still render useful information.

Definitions of categories are as follows:

A narrow or fine-lined length or warpwise defect of a continuous or lengthy nature.

I. A narrow or fine-lined width or fillingwise defect.
II. Isolated defects, such as general unevenness, neppy, fuzz balls, oil spots, color fly, knots, slubs, etc.
III. Pattern defects such as miss-selection of pattern, color misdraw, broken color pattern, improper cover, etc.
IV. Finishing defects.
V. Printing defects.

It is important to remember that the number of points assigned to a specific defect will tend to further establish its size and nature.

System of Visual Quality Evaluation for Woven and Knitted Fabrics

Part 1 - Domestic System of Measurement

A. Inspection:

Rolls or bolts of fabric are visually inspected and individually graded at an examination station using an agreed upon point system. Inspect and grade the total length of each roll or bolt sampled.

Fabrics shall be inspected full width and are passed longitudinally through the inspection area at a visual inspection speed. Fabric may be stopped to grade when necessary to affirm marginal defects and for defects flagging (marking).

All defects visible at normal inspection speed and distance of one yard or one meter shall be counted.

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.

Detect and assign points to defects observed as agreed upon by all parties. 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.

Apparatus:
It is recommended that a suitable fabric inspection machine that provides a flat viewing area and a variable speed controlled fabric rewind with forward and reverse.

Direct overhead lighting should be provided.

Lighting:
The overhead direct lighting source shall be mounted parallel to the viewing surface to illuminate with direct perpendicular impinging light rays. The illumination of the surface should have a standard value expressed in "lux" (100 foot candles).

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 other source by agreement between the purchaser and supplier.

Back lighting (transmitted) light may be used if agreed upon by the parties involved. Typically, backlighting would apply to only particular types of fabric.

Conditioning:
Conditioning is not required.

Sampling:(recommendations)
With shipments which total 1000 yards (meters) or less, inspect and grade the total number of rolls or bolts.

For shipments exceeding 1000 yards (meters), select samples as agreed upon by the purchaser and supplier. Typically, 10% of the rolls or bolts are inspected. If there are less than the allowable points for each 100 yards inspected, then this is an acceptable level. If more then the allowable points are found, then the roll is unacceptable. If 20% of the rolls inspected are defective, then the entire lot of rolls should be inspected.

For example, a lot of 100 rolls of 100 yards each is inspected using a 4-point system. Ten rolls (10% of total) are selected for inspection. Of these 7 are found to have less than 40 points or less and 3 are found to have more than 40 points. Since 3 of the 10 rolls are found defective (30%) then the entire lot has to be inspected.

B. Defect Classification:

Defects shall be classified in accordance with the nomenclature of this defect manual.

Defects shall further be classified as Major or Minor.

1. Severity

Major: A defect severe enough if exposed to place an end item in seconds.

Minor: An imperfection that may or may not cause a second, depending upon its location in the end item and/or its chance of being lost in fabrication.

2. Point Value of Major and Minor

Major: One point for each increment of nine inches or part thereof.Minor- One-quarter point for each increment of nine inches or part thereof.

C. Designation of Major and Minor:

Major: Designated by an (X) on the inspection report- contiguous points grouped.

Example-	**1 point major**	**-X**
	3 point major	**-XXX**
	3 & 2 point major	**-XXX XX**

D.

Minor: Designated by a (1) on the inspection report.

Example-	**12 minors**	**;4--1-44 11**

E.

F. Maximum Penalty Per Yard:

Per linear yard - Determined by dividing the fabric width to the nearest whole increment of nine inches.

Per Square Yard -The nine inch increment assigned to a one-point defect establishes the maximum penalty at four points per square yard.

G. Computation of Inspection Results:

Minors:

Step 1	**Divide by four to convert to whole points**
Step 2	**Divide by hundreds-of-yards inspected to convert to points per 100 linear yards.**
Step 3	**Multiply by 36 over fabric width (to nearest 9 inches) to convert points per 100 square yards.**

H.

Majors: Use steps two and three.

Example - 16 major and 40 minor points in 200 yards of 60 inch fabric.

	Step 1	Step 2	Step 3
Minors	40 = 10 4	10 = 5 2	36 x 5 = 3.3 54
Majors		16 = a 2	36 x 8 = 5.3 54

I.

J. Reporting:

Results to be reported as:

Major + Minor = Total
Using the above example: 5.3 + 3.3 = 8.6 points per 100 square yards

K.

Part 1A - Metric System of Measurement

A. Adaptation:

To adapt the described point evaluation to the Metric System of measure:

1. **Determine the width of the fabric in centimeters.**
2. **Substitute 25 centimeters for the 9 inch increment of defect measure.**
3. **Calculate results in points per 100 square meters.**

B. Comparison of Results:

Theoretically, on a given fabric, the point values obtained from the Domestic and Metric Systems of measure should closely approximate each other; that is, 30 points per 100 square yards on the Domestic System should reflect the same quality level as 30 points on the Metric System.

C. Conversion Formulas:

When it is desirable to convert the point value obtained by one of the systems to that of the other, the following formulas should be used:

1. **Points per 100 square meters x 0.836 = points per 100 square yards.**
2. **Points per 100 square yards x 1.196 = points per 100 square meters.**

Part 2- Point Systems

Various point systems are in use worldwide. The most common are the "Four Point" and "Ten-Point" systems. The following are brief summaries of these systems.

The Four-Point System

Defect Length (minimum to maximum)

Points	Length greater than	Length less than
1 pt. 2 pts. 3 pts. 4 pts.	0 inches (0 mm) 3 ins. (75 mm) 6 ins. (150 mm) 9 ins. (230 mm)	 3 inches (75 mm) 6 inches (150 mm) 9 ins. (230 mm)

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

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

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

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

Calculate the total number of points expressed in points per 100 square yards or 100 square meters. Expressions for 100 linear yards or 100 linear meters can also be agreed upon. (See Part 1.)

The Ten-Point System

A. Defect Length-Warp

Defect Length (minimum to maximum)

Points	Length greater than	Length less than
1 pt. 2 pts. 5 pts. 10 pts.	0 inches (0 mm) 1 inch (25 mm) 5 ins. (125 mm) 10 ins. (250 mm)	1 inch (25 mm) 5 inches (125 mm) 10 ins. (250 mm) 36 ins. (900 mm)

B.

C. Defect Length - Filling

Defect Length (minimum to maximum)

Points	Length greater than	Length less than
1 pt. 3 pts. 5 pts. 10 pts.	0 inches (0 mm) 1 inch (25 mm) 5 ins. (125 mm) Y. fabric width	1 inch (25 mm) 5 inches (125 mm) up to Y. fabric width to full fabric width

D.

Defect Length (minimum to maximum)

Points	Length greater than	Length less than
1 pt.	0 inches (0 mm)	1 inch (25 mm)
2 pts.	1 inch (25 mm)	5 inches (125 mm)
5 pts.	5 ins. (125 mm)	10 ins. (250 mm)
10 pts.	10 ins. (250 mm)	36 ins. (900 mm)

E.

Calculate the total number of points expressed in points per 100 square yards or 100 square meters. Expressions for 100 linear yards or 100 linear meters can also be agreed upon. (See Part 1.)

F. AQL Chart For the Fashion Industry : Acceptable Quality Levels (or Assured Quality Level)

Quality Testing Inspections 2.5 AQL Chart 4.0 AQL Chart AQL Glossary Fabric Testing Methods

First of all, let me start by saying that I am NOT a mathematician. I have absolutely no clue how to develop statistical analysis calculations. The fact of the matt association originally developed the AQL standards. Over the past numerous years, I have seen many charts floating around the fashion industry explaining hov production. What I have attempted to do is take the previously existing charts, and compile the date in a slightly different format to make the chart easier to re much of the table that I believe is not necessarily directly relevant to the apparel industry. Note: Please use this chart and method illustrated at your own risk. This is simply a guide that you may wish to follow. If you are doing inspections for a specific company, we suggest you contact them for the exact requirements

How to Use This AQL Chart

Acceptable Quality Levels AQL Chart

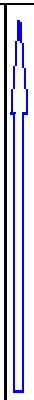
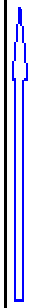
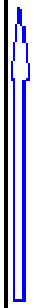
Single Sampling Plans for Normal Inspection

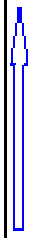
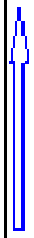
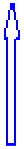
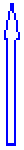
Apparel Search 2008 : ApparelSearch.com

	AQL's in Percent Nonconforming Items and Nonconformities per 100 items (normal inspection)											
Sample Size Code Letter	Sample Size (number of samples)	1.5 AQL			2.5 AQL			4.0 AQL			6.5 AQL	
		Acceptable	Rejected		Acceptable	Rejected		Acceptable	Rejected		Acceptable	
A	2										0	

B	3							0	1		
C	5				0	1					
D	8	0	1								1
E	13							1	2		2

F	20				1	2		2	3		3
G	32	1	2		2	3		3	4		5
H	50	2	3		3	4		5	6		7
J	80	3	4		5	6		7	8		10
K	125	5	6		7	8		10	11		14
L	200	7	8		10	11		14	15		21

M	315	10	11		14	15		21	22		
N	500	14	15		21	22					

P	800	21	22								
Q	1250										

R	2000										
⇧											
	This up arrow means, use the first sampling plan BELOW the arrow. If sample size equals, or exceeds, lot size, carry out 100% inspection.										
⇩											
	This down arrow means, use the first sampling plan ABOVE the arrow.										

	Sample Size Code Letters								
		Special Inspection Levels					General Inspection Levels		
Lot or Batch Size		S-1	S-2	S-3	S-4		I	II	
2 to 8		A	A	A	A	A		A	
9 to 15		A	A	A	A	A		B	
16 to 25		A	A	B	B	B		C	
26 to 50		A	B	B	C	C		D	
51 to 90		B	B	C	C	C		E	
91 to 150		B	B	C	D	D		F	
151 to 280		B	C	D	E	E		G	

281 to 500	B	C	D	E	F	H
501 to 1,200	C	C	E	F	G	J
1,201 to 3,200	C	D	E	G	H	K
3,201 to 10,000	C	D	F	G	J	L
10,001 to 35,000	C	D	F	H	K	M
35,001 to 150,000	D	E	G	J	L	N
150,001 to 500,000	D	E	G	J	M	P
500,001 and over	D	E	H	K	N	Q

Example:

If an order is 10,500 units. When using General Inspection Level II, the factory learns from the second chart that this quantity order equates to "M". The factory then goes to the first chart and sees that for "M" they should inspect 315 garments. If they want a 2.5 AQL they can have 14 defective units or less from the 315 that they inspect. If they have 15 defective units or more they are rejected. If they want a 4.0 AQL they can have 21 defect units or less to pass and they have 22 defects they will be rejection.

The defects are based on defective units (defective garment). It is not based on each actual defect on the garment. For example, a shirt may have 3 different defects on the shirt, but this is only registered as "one" defective garment.

For your reference, we typically use General Inspection Level II

Note: Please use this chart and method illustrated at your own risk. Industry standards may have changed. This is simply a guide that you may wish to follow. specific company, we suggest you contact them for the exact requirements.

Fabric Testing Methods - Fabric Terms of Interest to the Fashion Industry

Fashion Terms Fashion Terms Directory Fashion Terms by Category Fashion Fashion Blogs Fabric

Fabric testing methods are designed as standard testing procedures with a purpose to help the textile industry and apparel indu testing methods allow clothing manufacturers to follow uniformed test procedures to evaluate fabric, textiles, and apparel in a c determined testing methods for conducting tests, is the only way to maintain a consistent and level playing field in regard to the properly measure quality, specific standards must be set and specific testing methods (testing procedures), must be followed. F method allows for testing to be consistent in multiple locations.
Fabric can be tested in a factories own internal lab or with an independent testing laboratory. Typically, a retailer will require th third party laboratory so that factories are not tempted to manipulate the testing results. In addition to avoiding test altering, u will help insure that the "proper" fabric testing method are used.
If an inexperience person or lab conducts the testing, it is possible that they would not use the proper fabric testing method. Th testing report. It is important to use a qualified textile lab.
Fabric testing is conducted so that apparel manufacturers, clothing retailers, and fashion wholesalers can evaluate the quality of This issue is important to members of the fashion industry as well as consumers of fashion. The apparel industry wants to mak

they manufacturer and sell meet international quality standards. Textile testing standards are set and the fabric testing method the standards developed are maintained. Testing can be performed both to improve product quality and achieve compliance to retailer specific standards

It is important for the fashion industry to learn about fabric testing methods in order to stay compliant in regard to quality. In a testing methods, it is important to also understand the specific testing result requirements set forth by retailers. If a clothing co retailers testing standard requirements, that company may run into problems such as receiving a charge back or returned merch Fabric Testing Labs are vital for the fashion industry and textile industry. Learn more about fabric testing labs, fabric testing me standards...

- ◇ Learn about **fabric testing methods**.
- ◇ Find **fabric testing labs**.

Apparel Industry fabric test methods help laboratories review various types of fabric conditions including crocking, color fast pro torque, fabric chemical testing, fabric composition etc. Statistical analysis from testing can help industry standard development Clearly fabric testing is extremely important to the fashion industry.

You may also want to check out our **apparel quality testing** section.

Learn about the following:
AQL Inspections Chart Quality Control Managers Piece Good Inspection Cutting Room Quality Control Fabric Defects In-Process Assurance

ML73009 - Fabric Testing Methods

1. Scope

1.1 This terminology covers definitions of technical terms used in the industry related to textile fabrics. Terms that are generally understood or adequately defined in other readily available sources are not included. Other terminology standards that have terms related to textile fabrics are shown in 2.1

2. Referenced Documents *(purchase separately)*

ASTM Standards

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

D2594 Test Method for Stretch Properties of Knitted Fabrics Having Low Power

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

D3107 Test Methods for Stretch Properties of Fabrics Woven from Stretch Yarns

D3773 Test Methods for Length of Woven Fabric

D3776 Test Methods for Mass Per Unit Area (Weight) of Fabric

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

Fabrics - Test Method - Testing Methods

ICS Code

ICS Number Code 01.040.59 (Textile and leather technology (Vocabularies)); 59.080.30 (Textile fabrics)

UNSPSC Code

UNSPSC Code 11161800(Synthetic fabrics)

ASTM D4850-13, Standard Terminology Relating to Fabrics and Fabric Test Methods, ASTM International, West Conshohocken, PA, 2013, www.astm.org

Abrasion:

Significance and Use

5.1 The measurement of the resistance to abrasion of textile and other materials is very complex. The resistance to abrasion is affected by many factors, such as the inherent mechanical properties of the fibers; the dimensions of the fibers; the structure of the yarns; the construction of the fabrics; and the type, kind, and amount of finishing material added to the fibers, yarns, or fabric.

5.2 The resistance to abrasion is also greatly affected by the conditions of the tests, such as the nature of abradant; variable action of the abradant over the area of specimen abraded, the tension of the specimen, the pressure between the specimen and abradant, and the dimensional changes in the specimen.

5.3 Abrasion tests are all subject to variation due to changes in the abradant during specific tests. The abradant must accordingly be changed at frequent intervals or checked periodically against a standard. With disposable abradants, the abradant is used only once or changed after limited use. With permanent abradants that use hardened metal or equivalent surfaces, it is assumed that the

abradant will not change appreciably in a specific series of tests, but obviously similar abradants used in different laboratories will not likely change at the same rate due to differences in usage. Permanent abradants may also change due to pick up of finishing or other material from test fabrics and must accordingly be cleaned at frequent intervals. The measurement of the relative amount of abrasion may also be affected by the method of evaluation and may be influenced by the judgment of the operator.

5.4 The resistance of textile materials to abrasion as measured on a testing machine in the laboratory is generally only one of several factors contributing to wear performance or durability as experienced in the actual use of the material. While “abrasion resistance” (often stated in terms of the number of cycles on a specified machine, using a specified technique to produce a specified degree or amount of abrasion) and “durability” (defined as the ability to withstand deterioration or wearing out in use, including the effects of abrasion) are frequently related, the relationship varies with different end uses, and different factors may be necessary in any calculation of predicted durability from specific abrasion data. Laboratory tests may be reliable as an indication of relative end-use performance in cases where the difference in abrasion resistance of various materials is large, but they should not be relied upon where differences in laboratory test findings are small. In general, they should not be relied upon for prediction of actual wear-life in specific end uses unless there are data showing the specific relationship between laboratory abrasion tests and actual wear in the intended end-use.

5.5 These general observations apply to all types of fabrics, including woven, nonwoven, and knit apparel fabrics, household fabrics, industrial fabrics, and floor coverings. It is not surprising, therefore, to find that there are many different types of abrasion testing machines, abradants, testing conditions, testing procedures, methods of evaluation of abrasion resistance, and interpretation of results.

5.6 All the test methods and instruments so far developed for abrasion resistance may show a high degree of variability in results obtained by different operators and in different laboratories; however, they represent the methods now most widely in use. This test method provides a comparative measurement of the resistance of woven textile fabrics to abrasion, and may not necessarily predict the actyal performance of fabrics in actual use.

5.7 If there are differences of practical significance between reported test results for two or more laboratories, comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, test samples that are as homogeneous as possible, drawn from the material from which the disparate test results were obtained, and randomly assigned in equal numbers to each laboratory for testing. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If bias is found, either its cause must be found and corrected, or future test results must be adjusted in consideration of the known bias.

1. Scope

1.1 This test method covers the determination of the abrasion resistance of woven textile fabrics using the oscillatory cylinder tester. This test method may not be usable for some fabric constructions.

NOTE 1—Other procedures for measuring the abrasion resistance of textile fabrics are given in: Guides D3884 and D4158, and Test Methods D3885, D3886, and AATCC 93.

1.2 The values stated in SI units are to be regarded as standard; the values in English units are provided as information only and are not exact equivalents.

1.3 *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.*