WOVEN & KNIT RESIDENTIAL UPHOLSTERY FABRIC STANDARDS & GUIDELINES

JOINT INDUSTRY FABRICS STANDARDS COMMITTEE

INTRODUCTION

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

When the Joint Industry Fabric Standards and Guidelines Committee was formed in the mid-70's, it was agreed by all concerned that standards and guidelines were needed for woven and knit upholstery fabrics. In 1979, the Joint Industry Committee completed the original work on woven upholstery fabrics and in 1980 published the results in "Woven Upholstery Fabric Standards" by the Joint Industry Fabric Standards and Guidelines Committee. At that time, a Joint Industry Sub-Committee was formed to accomplish the same with knit upholstery fabrics. That objective was accomplished in 1983. Both the woven and knit standards and guidelines publications have been reviewed and updated since the original publication and were combined into a single publication for user convenience and easy reference.

The Joint Industry Fabric Standards and Guidelines Committee maintains organization and fairness to both users and producers of upholstery fabrics alike by establishing voluntary guidelines and standards, voted upon by all members. Only one voting ballot per member company is allowed. Negative ballots and criticisms are welcomed, with each negative ballot being brought before the Committee for reconciliation. A 75% majority is necessary to pass any issue, but the Committee makes every effort to obtain unanimity of all issues. Although balance of membership and voting has provided a basis for the standards and guidelines to reflect a fair and acceptable "state of the art and science" in both the furniture and textile industries, it is necessary to point out that the standards, guidelines, and practices presented herein are purely voluntary and in no manner are to be considered a legal document or contract.

The Committee, through its continuing reviews and refinements, strives to keep test methods and performance criteria updated to reflect field performance of fabrics. It is strongly recommended that because of the dynamics of rapidly changing technology and market requirements, the guidelines, standards, and industry practices presented herein should be completely reviewed and re-evaluated a minimum of every two years.

Finally, the chairman would like to thank and commend every member of the Joint Industry Standard Committee for their diligence and expertise in the following voluntary standards and guidelines, which will serve as a valuable base of reference for the furniture and textile industries alike.

THE JOINT INDUSTRY FABRIC STANDARDS AND GUIDELINES COMMITTEE

Participating Member Companies, Institutions, and Associations

3M Company
Action Industries
Alexvale Furniture
Ametex Fabrics
Amoco Fabrics & Fibers
Applied Textiles
Baker Furniture
Bench Craft
Berkline Corporation
Bernhardt Furniture
Broyhill Furniture
Burlington House Upholstery
Carolina Mills
Carson's
Collins and Aikman
Craftex
Culp
Diversified Testing
Douglas Furniture
Dow Chemical
Drexel Heritage
Dupont
Elizabeth Weaving
Ethan Allen
F. Schumacher
Fabric-Protection
Fiber-Shield
Flexsteel
General Latex & Chemical
Guardian Protection Products
Guardsman Products
Guilford Mills
Guilford of Maine
Hercules
Herman Miller
Hickory Hill Furniture
Hoffman Mills
Hugh Talley Co.
J. B. Martin
Joan Fabrics
LaFrance Industries
La-Z-Boy Chair Co.
Malden Mills
Mastercraft
Mayo Manufacturing
Merchandise Testing
Microfibres
Miles
Milliken & Co.
MS Forest Products Lab
Mohasco Upholstered Furniture
Monsanto
Mt. Hope Finishing
Norwalk Furniture
Para-Chem Southern
Pennsylvania House
Philips Weaving Mills
Quaker Fabric
Rapier Mills
Richloom Fabrics
River Oaks
Riverside Furniture
Rossville/Chromatex
Rowe Furniture
Schnadig Corporation
Schweiger Industries
Simmons Upholstered Furniture
Smith Brothers of Berne
Stainsafe Company
Stanton Industries
Steelcase
Sunbury Textile
Synthetic Finishing
Valdese Weavers
Vanguard Furniture
Vartest Labs
Wellington SearsWest Point Pepperell

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The characteristic or property given in the Table of Contents is expressed as being a Guideline or Standard. Each category is listed below with a definition for each.

STANDARDS

Standard -- The performance or characteristic of an upholstery fabric that can be measured using widely accepted test methods and test apparatus. Criteria established is necessary for predicting the performance of an upholstery fabric.

GUIDELINES

Guidelines -- That property or characteristic of an upholstery fabric that cannot be measured using widely accepted test methods and test apparatus. It shall be understood that if numerical values are used as guidelines herein, they shall be considered to be "recommendations only" as variations in the magnitude and/or accuracy of these numerical values may represent vagaries of the test method or test apparatus.

1.0. ABRASION

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1.1. Reference ASTM D4157 (Oscillatory Cylinder Method) for description of apparatus and preparation of specimens.

1.2. Test Procedure

Determine surface abrasion of upholstery fabrics in accordance with ASTM D4157 with the following modifications:

1. Use a clean wire screen abradant, stainless steel, 50 x 70 mesh (210 x 297mm), backed by a 14 mesh (1.4 x 1.4mm) to an 18 mesh (1.0 x 1.0mm) screen. It is recommended that the wire screen abradant be cleaned regularly with a solvent such as perchloroethylene.

2. The tension of the specimen shall be 4 lbf (18N) and the compression force shall be 3 lbf (13N).

3. Test at least two specimens in the warp direction and at least two in the filling direction. Note: When testing fabrics with high elongation characteristics, masking tape should be adhered to the back of the test samples to better stabilize them.

4. The specimen configuration should be of the modified layout per the attachment "A".

5. Woven specimens should be placed upon a foam substrate the same size as the fabric specimen. The foam should be 1.8-lbs/cubic foot conventional, combustible modified foam, ILD 28-35 with a thickness of 1/4 inch.

1.3. Evaluation

In evaluating the fabric specimen, the outside 1/4-inch of the specimen should be disregarded in the evaluation.

The test should be run for either 15,000 cycles, or a rating of category "1" (very obvious wear) is reached.

At the end of 3000, 6000, 9000, 12,000, and 15,000 cycles (double rubs), the fabric specimen should be examined for loose threads and wear (slight discoloration from the stainless steel screen on light colored fabrics is disregarded). The fabric should be rated according to the following scale at each cycle level of 3000, 6000, 9000, 12,000, and 15,000.

Rating of Pile Upholstery Fabrics

1 = Very obvious wear - backing easily visible
2 = Obvious wear - slight evidence of backing showing
3 = Noticeable wear - may or may not be objectionable
4 = Very slight wear - not objectionable
5 = No apparent wear

Rating of Flat Woven Upholstery Fabrics

1 = Very obvious wear - 10 or more yarn breaks
2 = Obvious wear - 5 to 9 yarn breaks, severe appearance change
3 = Noticeable wear - 1 to 4 yarn breaks, medium appearance change
4 = Very slight wear - no yarn breaks, slight appearance change
5 = No apparent wear

The rating levels are to be used as definitions only. Each manufacturer is responsible for setting acceptance levels at the rating and cycle level appropriate for their company.

1.4. Discussion

Realizing the varying factors involved with the available test methods for abrasion, the Oscillatory Cylinder Method shall be the recommended method for information purposes rather than acceptance testing.

All of the test methods and equipment presently available are not necessarily accurate in indicating how certain fabrics will perform in actual use. The abrasion resistance is affected by many factors, some of which are fiber types, yarn structure, fabric construction, and the type and amount of finishing material added to the fibers or yarns of the fabric.

Because of the conditions mentioned above, inter-laboratory evaluations have demonstrated that although the appearance of tested samples may be very similar, the interpretation of the results by technicians from each lab may vary greatly. It should be noted that the judgment of "appreciable wear" is a very subjective judgment; however, operators can become proficient with experience, especially if this "experience" also relates to: (1) a close working relationship with one's vendors' lab technicians running the same test, and (2) long term field experience related to laboratory data.

It should also be noted that pile fabrics could exhibit a condition during an abrasion test called "matting". Generally, matting should not be construed as "appreciable wear". However, matting can be construed as appreciable wear when most of the pile cannot be re-erected using a comb or brush.

Shedding or pilling for the test samples shall not be construed as appreciable wear unless the circumstance is unquestionably obvious.

1.5. The following options may be used if agreed upon by buyer and seller:

1. Rating Scale
   1 = Very obvious wear
   2 = Noticeable wear
   3 = No apparent wear

2. The foam pad can be used up to three times.

3. The specimen configuration can be of other shapes and sizes.

1.6. Sources For Foam For Modified Wyzenbeek Abrasion Test

Description: 1.8 lbs./cu.ft. conventional combustible modified foam, ILD 28-35 with a thickness of 1/4 inch.

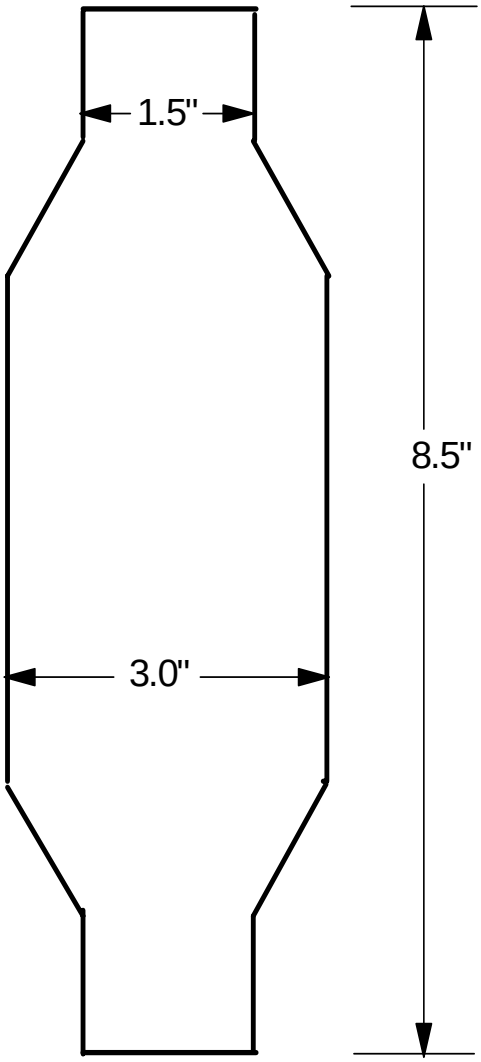
E.R. Carpenter Company (704) 464-9470
P.O. Box 879
Conover, NC 28613

Welsh Paper (919) 758-6464
112 Franklin Park Avenue
Youngsville, NC 27596

Jimmy Puckett Foam (336) 788-7272
5197 Oxford Drive
Winston Salem, NC 27104

J & L Fabrics (252) 237-2294
Route 2, Box 463A
Wilson, NC 27893

Template for
Wyzenbeek Abrasion



NOT TO SCALE

2.0 BOW AND SKEW

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2.1 Discussion

It should be noted and understood that making aesthetically acceptable upholstered furniture using fabrics with more than the allowable levels of bow and skew is virtually impossible in stack cutting" and requires much more labor input in "single ply cutting". Also, the use of fabric in which bow and skew exceeds the Joint Industry Fabric Standards and Guidelines Committee's stated minimum requirements becomes a matter to be negotiated between buyer and seller.

With regard to upholstered furniture, bow and skew are properties which are evaluated visually with reference to some nearby straight line. Thus, the test method recommended herein uses a perpendicular straight line as a reference rather than a filling line or something else in the structure. Note that proper upholstery is essential in controlling bows and skew of the fabric on the furniture. The bow or skew seen on the upholstered furniture may or may not be due to bow or skew of the fabric.

It is generally accepted that certain fabrics can be produced to tighter tolerances than others. This capability can be related to the yarns used, type of construction, the presence of back coating, etc. These factors in turn are often dictated by trying to achieve the aesthetic properties and/or price points required. For the same reasons, certain fabrics are very difficult to produce even to the current Industry Standards. Some fabrics that do not undergo all the normal manufacturing processes or that undergo additional processes cannot be produced to meet the current standards (See 29.0 Relaxed Fabrics Standard).

In recognizing that markets exist for these many types of fabrics, it was decided to establish tiers that could indicate different tolerances for bow/skew. These "TIERS" will be assigned by the fabric supplier to each fabric pattern(s) they produce. The TIER to which the fabric supplier is specifying each fabric should be indicated on each color line when the new pattern is introduced. This is not a grading designation for individual rolls, but a designation on all rolls that will be produced in that pattern(s).

Any change to the TIER to which a pattern(s) is specified would be a matter to be determined between buyer and seller. The intent would be to not change TIERS, but a situation may arise where a new pattern(s) is graded TIER 2 by the fabric manufacturer based on experience with a similar construction. When beginning to run production, it may be determined the new fabric simply cannot be produced to TIER 2 requirements, and this would have to be worked out through communication with the furniture manufacturer. Alternately, a fabric pattern(s) originally rated TIER 1 may be able to be improved to a TIER 2 based on production experience.

Presently, the following TIERS have been adopted.

TIER 1 (Current Joint Industry Standards as of 5/6/04)

TIER 2 (Tighter tolerances on skew variation than current Joint Industry Standards as of 5/6/04)

TIER R (See Relaxed Fabric Standards 29.0)

If a fabric pattern(s) is not specified as a certain TIER, it will be understood to be a TIER 1 fabric.

If there are no separate requirements specified under a Standard or Guideline for different fabric TIERS, the criteria under that Standard or Guideline is applicable to all fabric TIERS.

2.2 Definitions

Bow is defined as the greatest distance, measured parallel to the selvages, between a filling or course yarn, stripe, or dominant line and a straight line perpendicular to the selvages.

Skew (bias) is defined as the distance measured parallel to and along a selvage between the point at which a filling or course yarn, stripe, or dominant line meets this selvage and a perpendicular line to the selvage from the point at which the same filling yarn, stripe, or dominant line meets the other selvage.

2.3 Method of Measurement for Bow

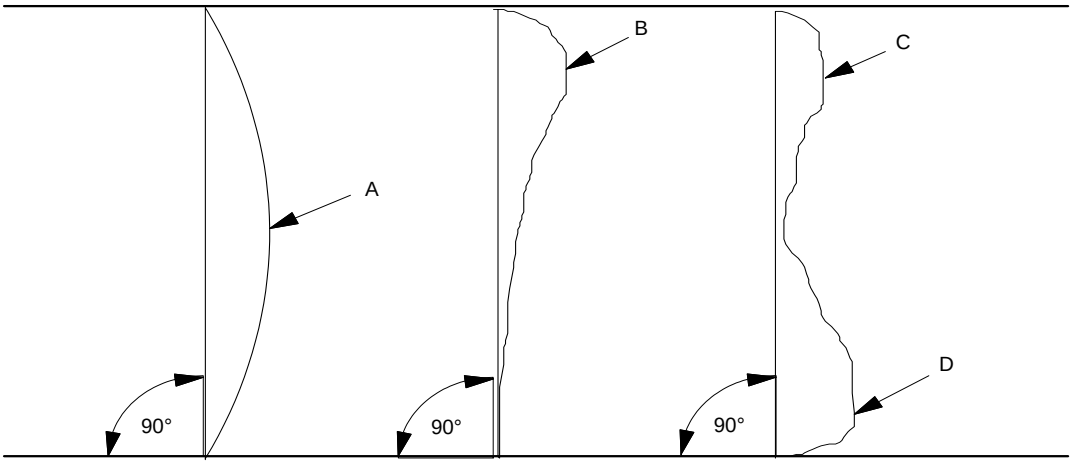
1. Lay at least three yards of fabric, without tension, on a horizontal surface.

2. Place a straight edge across the fabric perpendicular to the selvages at a point where a filling or course yarn, stripe, or dominant line intersects the edge of the usable width of the fabric.

3. Measure the greatest distance between the perpendicular line and the yarn, stripe, or dominant line at any point across the width of the fabric (See Figure 1).

4. Repeat this procedure at least three places along the length of the fabric and report the average maximum bow along with the location of the occurrence.

FIGURE 1. - METHOD OF MEASUREMENT FOR MAXIMUM DISTORTION DUE TO BOW



A - MAXIMUM DISTORTION OCCURS AT OR NEAR CENTER

B - MAXIMUM DISTORTION OCCURS AT OR NEAR QUARTER WIDTH

C & D - MAXIMUM DISTORTION ON EACH SIDE AT OR NEAR QUARTER WIDTHS

2.4 Method of Measurement for Skew (Bias)

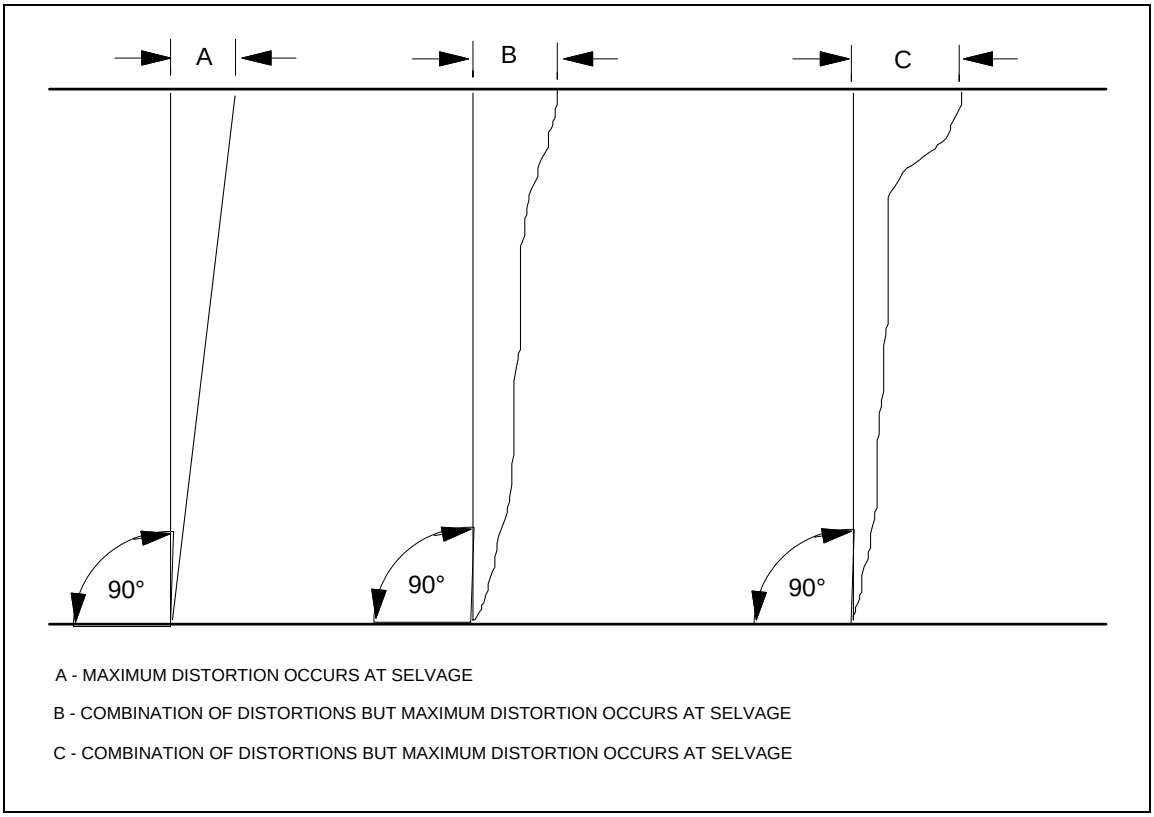
1. Lay the fabric, without tension, on a horizontal surface at least three yards long.

2. Place a straight edge across the fabric perpendicular to the selvages at a point where a filling or course yarn, stripe, or dominant line intersects the edge of the usable width of the fabric.

3. Measure the distance parallel to and along a selvage between the point at which the yarn, stripe, or dominant line meets this selvage and the perpendicular line to the selvage from the point at which the same yarn, stripe, or dominant line meets the opposite selvage (See Figure 2).

4. Repeat this procedure at least three places along the length of the fabric and report the average maximum bias.

FIGURE 2. - METHOD OF MEASUREMENT FOR MAXIMUM DISTORTION DUE TO SKEW (BIAS)



2.5 Tier Standards

1. ALL patterned WOVEN fabrics specified by the fabric manufacturer as TIER 1 shall not exceed more than 0.5” of bow or 1.0” of skew.

2. ALL patterned WOVEN fabrics specified by the fabric manufacturer as TIER 2 shall not exceed more than 0.5” of bow or 0.75” of skew.

3. ALL patterned WOVEN fabrics specified by the fabric manufacturer as TIER R (Relaxed see Standard 29.0) shall not exceed more than 1.0” bow or 2.0” skew.

4. All patterned KNIT fabrics shall not exceed more than 0.75” of bow or 1.0” of skew.

3.0. CATEGORIZATION OF FABRICS

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3.1. Woven Upholstery Fabrics

Category I: Flat fabrics except lightweight, printed cottons of less than eight ounces per square yard.

Category II: Woven, tufted, and flocked pile fabrics.

Category III: Lightweight printed cotton fabrics less than eight ounces per square yard.

3.2. Knitted Upholstery Fabrics

Coarse Gauge Knits - Weft Insertion and Raschel knits constructed with 15 or less wales and courses per inch.

Fine Gauge Knits - Weft Insertion and Raschel knits constructed with more than 15 wales and courses per inch

4.0. CLEANABILITY OF UPHOLSTERY FABRICS AND COLORFASTNESS TO WATER AND SOLVENTS

Joint Industry Fabric Standards and Guidelines
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4.1. The Joint Industry Fabric Standards and Guidelines Committee has adopted the Standard Reference Guide for professional Upholstery Cleaning, S300, published by the Institute of Inspection, Cleaning and Restoration Certification (IICRC). The Joint Industry Fabric Standards and Guidelines Committee has studied the problem involved with cleaning upholstery fabrics for many years. We have agreed that the so-called "Cleaning Codes" are valuable but do not provide manufacturers, retailers, consumers, or professional cleaners with adequate information regarding cleaning upholstery fabrics.

4.1.1 The Joint Industry Fabric Standards and Guidelines Committee participate din the development of the IICRC S300 Standard from the beginning and will continue to work with other professional groups who are interested in developing standards and guidelines.

4.1.2 The IICRC S300 standard may be ordered from the following address or phone number:

IICRC 2715 E. Mill Plain Boulevard
Vancouver, Washington 98661
Phone (360) 693-5675 Fax (360) 694-4858

4.2 Colorfastness to Water and Solvents

4.2.l All upholstered furniture manufacturers should clearly identify the appropriate method of cleaning by the prominent display of a colorfastness code either permanently attached to the upholstered piece or as a part of the hangtag.

4.2.2 Each manufacturer of upholstery fabric shall identify each style and color manufactured with a colorfastness code as follows:

W - Spot clean only with water based shampoo or foam upholstery cleaner. Pretest a small, inconspicuous area before proceeding. Do not over wet. Do not use solvents to spot clean. Pile fabrics may require brushing with a non-metallic, stiff bristle brush to restore appearance. Hot water extraction or steam cleaning is not a recommended cleaning method. Cushion covers should not be removed and laundered. To prevent overall soiling, frequent vacuuming or light brushing with a non-metallic, stiff bristle brush to remove dust and grime is recommended. When cleaning a spill, blot immediately to remove spilled material. Clean spots or stains from the outside to the middle of the affected area to prevent circling. Use a professional furniture cleaning service when an overall soiled condition has been reached.

S - Spot clean only with a water-free dry cleaning solvent. Pretest a small, inconspicuous area before proceeding. Do not saturate. DO NOT USE WATER. Pile fabrics may require brushing with a non-metallic, stiff bristle brush to restore appearance. Cushion covers should not be removed and dry-cleaned. To prevent overall soiling, frequent vacuuming or light brushing with a non-metallic, stiff bristle brush to remove dust and grime is recommended. When cleaning a spill, blot immediately to remove spilled material. Clean spots or stains from the outside to the middle of the affected area to prevent circling. Overall cleaning by a professional furniture cleaning service only is recommended.

WS - Spot clean with upholstery shampoo, foam from a mild detergent, or mild dry cleaning solvent. Pretest a small, inconspicuous area before proceeding. Do not saturate. Pile fabrics may require brushing with a non-metallic, stiff bristle brush to restore appearance. Hot water extraction or steam cleaning is not a recommended cleaning method. Cushion casings should not be removed and laundered or dry-cleaned. To prevent overall soiling, frequent vacuuming or light brushing with a non-metallic, stiff bristle brush to remove dust and grime is recommended. When cleaning a spill, blot immediately to remove spilled material. Clean spots or stains from the outside to the middle of affected area to prevent circling. Use a professional furniture cleaning service when an overall soiled condition has been reached.

X - Clean only by vacuuming or light brushing with a non-metallic, stiff bristle brush. DO NOT USE ANY WATER OR SOLVENT BASED CLEANER.

NOTE: The colorfastness code refers to the ability of the yarns in a particular fabric to remain colorfast to either water, solvent, or both and does not reflect the ability of that fabric to withstand specific cleaning methods. The above given methods are "guideline" procedures used to evaluate color changes within the cleaned areas under standardized conditions. The results are not necessarily directly related to consumer cleaning with water base cleaners or solvent base cleaners, but the codes will give reliable information on the fastness of the fabric coloration to water and solvent, the principal agents that cause color migration and bleeding.

4.2.3 Test Methods

Colorfastness to Water and Solvent - AATCC Method 107 (Reference: ASTM D3597)

4.2.4. Standard

Colorfastness to Water
The minimum standard for color change shall be Class 4.
The minimum standard for staining shall be Class 3.

Colorfastness to Solvent
The minimum standard for color change shall be Class 4.
The minimum standard for staining shall be Class 3.

4.2.5. Evaluation

In all cases, the AATCC Gray Scale is to be used for evaluation.

5.0. COLORFASTNESS TO CROCKING

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5.1. Purpose

The purpose of this test is to determine the degree of color that may be transferred from the surface of the upholstery fabric to other surfaces by rubbing.

5.2. Test Methods

AATCC Test Method 8 (Reference ASTM D3597) is to be used for solid shades. Reference AATCC Test Method 8 for description of apparatus, preparation of specimens, test procedure, and evaluation instructions.

AATCC Test Method 116 (Rotary Vertical Crock meter for Printed Goods) is to be used for printed fabrics. Reference Test Method 116 for description of apparatus, preparation of specimens, test procedure, and evaluation instructions.

5.3. Classification of Fabric for Crocking

Use the AATCC Gray Scale for Staining or the AATCC Chromatic Transference Scale for classification of fabrics for crocking.

Using the class definitions given in the AATCC test method, assign the appropriate class number for the amount of color transfer exhibited.

5.4. Standard

The minimum standard for dry crocking shall be Class 4.
The minimum standard for wet crocking shall be Class 3.

6.0. COLORFASTNESS TO LIGHT

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6.1. Test Methods

Reference AATCC Test Method 16 (Reference ASTM D3597) for description of appropriate apparatus and instructions for preparation of specimens, test procedure, and evaluation.

Test Series:

A - Carbon-Arc Lamp, Continuous Light
B - Sunlight (Discontinued)
C - Daylight
D - Carbon-Arc Lamp, Alternate Light and Dark
E - Water-Cooled Xenon-Arc Lamp, Continuous Light
F - Water-Cooled Xenon-Arc Lamp, Alternate Light and Dark
G - Colorfastness Above L-7 (Discontinued)

H - Air-Cooled Xenon-Arc Lamp, Continuous Light
I - Air-Cooled Xenon-Arc Lamp, Continuous Light
J - Air-Cooled Xenon-Arc Lamp, Alternate Light and Dark

The Xenon-Arc Lamp Method (16E or 16H) shall be the preferred method for testing colorfastness to light.

6.2. Report

In reporting lightfastness, always state the method used as results may vary depending upon test method.

6.3. Standard

The minimum standard for color change after 40 fading units (hours) shall be Class 4.

7.0. COLORFASTNESS TO BURNT GAS FUMES

Joint Industry Fabric Standards and Guidelines
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7.1. Purpose

The purpose of the test is to determine the resistance of the color of the upholstery fabric to color loss when exposed to burnt gas fumes.

7.2. Test Method (Reference ASTM D3597)

Reference AATCC Test Method 23 for description of apparatus, preparation of specimens, test procedure, and evaluation instructions.

7.3. Evaluation of Fabric for Colorfastness to Burnt Gas Fumes

Use the Gray Scale for Color Change to evaluate fabrics for color change to burnt gas fumes. Using the class definitions given in the AATCC test method, assign the appropriate class number for the amount of color change exhibited.

7.4. Standard

The minimum standard for color change after two cycles shall be 4.

8.0. SHADE VARIATION

Joint Industry Fabric Standards and Guidelines
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8.1 Shade Variation Within A Single Roll

The color and shade of any upholstery fabric shall not vary within a roll. Variation of color or shade from selvage to selvage is not permissible. Streaking, striation, or any other visual inconsistencies in color or shade are not acceptable or permissible. In some fabrics, however, such as denim and other washed styling, such strict requirements be waived by agreement between buyer and seller.

When a roll of upholstery fabric contains more than one piece, each piece within the roll shall come from the same dye lot or production lot.

8.2 Shade Variation from Roll to Roll

The color consistency from roll to roll will conform to tolerances previously decided between seller and buyer. Such tolerances do not imply a perfect match, but one that is based on the established production capability of the supplier coupled with the "fitness-for-use" of the buyer. Inordinate difficulties in shade control should be communicated to the fabric purchaser by the fabric manufacturer prior to the original agreement to purchase.

8.3 Shade Variation in Pile Fabrics

Since "direction of lay" of pile **and similar** fabrics can create apparent shading problems, finishing and handling procedures shall be such that the direction of lay of the pile is consistent within the roll and from roll to roll. Packaging, storing, shipping and handling of pile fabrics shall be such that pile distortion within a roll is at a minimum. No curling or wrinkling should occur in any direction when the fabric is spread, without distortion on the cutting table.

8.4 Visual Shade Evaluation

The following items are critical in Visual Shade Evaluation:

Observer* – It is strongly recommended that the person making shade judgments have a normal color vision. This can be determined by taking the Farnsworth/Munsell 100 Hue Test.** (1.) ***or the HVC test (4.).

***Light* – Although there are numerous light sources available, when comparing standards to production it is best that the light source be *consistent.* However, in resolving issues of color difference between buyer and seller, it is recommended that the same flight source be used by both parties. It is important that the quantity of light be sufficient. For instance, dark colors require more light to detect differences than light shades.**

***Viewing Area* – The viewing area and surround will influence the apparent color difference between standard and sample. The viewing area and surround needs to be painted a medium gray color to have the least influence on the fabric being reviewed. The undesirable effects of extraneous light and/or color from other fabrics or clothing should be avoided.**

***Standards and Specimens* –**

1. Standards – All standards should be kept in a controlled location free from contamination such as gas fumes, light and dust.
2. Specimens – The area of the specimen being compared should be representative of that same area in the standard.

In spite of the techniques above, the visual method is still very subjective. Many are using instrumental measurement of color difference to supplement the visual evaluation.
More detailed information about visual shade evaluation can be found in ASTM D 1729-89. ***(2).***
More detailed information about instrumental shade evaluation can be found in AATCC Instrumental Color Measurement Test Method EP6. ***(3)***

(1) Gretag Macbeth, 405 Litle Britain Road, New Windsor, NY 12553
(2) American Society for Testing Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428
(3) American Association of Textile Chemists and Colorists, P. O. Box 12215, Research Triangle Park, NC 27709
(4) Colorcurve Systems, 200 6th St., Fort Wayne, IN 46808

9.0. DIMENSIONAL STABILITY

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9.1. Reference ASTM D3597, Section 7.5 for both woven and knit upholstery fabrics.

9.2. Dimensional Stability to Water

Preparation of Specimens:

Cut three specimens 12" by 12" (305 by 305 mm) and mark them with 10" (254 mm) gauge distances both in the warp or wale and filling or course directions.

Test Method:

1. Place the marked specimens in a pan at least 14" by 14" by 6" (356 by 356 by 152 mm) containing a sufficient volume of 80° F +/- 5°F (26° C +/- 3° C) distilled or de-mineralized water to cover them completely in their fully opened flat state. The water should contain 0.05% nonionic wetting agent.

2. After being completely submerged in water for 10 minutes +/- 1 minute, remove the specimens and individually lay them out flat on horizontal, ventilated screens and allow them to dry in the prevailing room atmosphere (approximately 24 hours). Do not extract or wring out the specimens prior to drying.

3. After drying, measure the distance between the gauge marks in each fabric direction. Separately report the average dimensional change in each direction.

Evaluation and Reporting:

Calculate the shrinkage or gain as directed in Equations 1 and 2.

1. $S = [(A - B)/A] \times 100$
2. $G = [(B - A)/A] \times 100$

Where: A = distance between gauge marks before wet out, 10 inches (254 mm)
B = distance between gauge marks after wet out and drying
G = % gain (In reporting the gain, the percent change shall have the prefix "+"
S = % shrinkage

9.3. Dimensional Stability to Solvent

Dimensional stability to solvent may be determined in the same manner as described for dimensional stability to water, but by using a solvent such as 1-1-1 Trichloroethane instead of water. This alternate method is not recommended for use on fabrics unless indicated by cleanability code as "S" or "WS".

NOTE: 1-1-1-Trichloroethane is toxic and usual precautions for handling chlorinated solvents should be taken. It should be used only under ventilated conditions. The solvent is non-flammable.

10.0. ELONGATION

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10.1. Woven Upholstery

10.1.1 Test Methods

Discussion:

Due to equipment constraints, some labs are unable to perform Method UFS 1979-12. Consequently, variations of ASTM Method 5034 are being used as an alternate method. No correlation has been developed between the two methods.

Companies using other methods need to do their own correlation and calibration testing to have data which is meaningful for a buyer/seller agreement.

10.1.1.1.Reference ASTM D5034 for description of apparatus, sampling instructions, preparation of specimens, and test procedure.

10.1.1.2.UFS 1979-12

Preparation of Specimens:

Test specimens 3 inches in width and 16 inches in length shall be cut for this test method. Two sets of three specimens each are required, one set for warp elongation, having the longer dimension parallel to the warp yarns, and the other set for filling elongation, having the longer dimension parallel to the filling yarns. No two specimens for warp elongation shall contain the same warp yarns, nor for filling elongation, the same filling yarns. Specimens shall be representative of the roll or piece to be tested. They shall be cut no less than 4 inches from the selvage.

Testing Machines:

One of the following testing machines shall be used and conform to the specifications outlined under ASTM designation: D 76 - Specification for Tensile Testing Machines for Textiles.

Constant-Rate-of-Extension (CRE) - a testing machine in which the rate of increase of specimen length is uniform with time.

Constant-Rate-of-Traverse (CRT) - a testing machine in which the pulling clamp moves at a uniform rate and the force is applied through the other clamp, which moves appreciably to actuate a weighing mechanism, causing a rate of increase of force which is usually not constant and is dependent on the extension characteristics of the specimen at any applied force.

Test Parameters:

1. The machine shall be equipped with a suitable autographic recording device.
2. The crosshead speed shall be 6" +/- 1/4" per minute.
3. The distance between the clamps shall be 12 inches (in order to determine the inches stretch per foot of fabric).
4. The jaws of the clamps shall measure 1" by 3" with the longer dimension perpendicular to the direction of application of the load.

Test Procedure:

1. Clamp the specimen in the upper jaws of the testing machine.
2. Clamp a 6-ounce auxiliary weight to the lower end of the specimen so that the weight will hang below the lower jaws and swing freely to remove any slack in the specimen.
3. Clamp the specimen in the lower jaws.
4. Start the machine and run until a minimum force of 10 pounds has been applied.
5. The curve of inches in length vs. pounds of force is recorded on the chart by the autographic recording device.
6. Findings shall be recorded in accordance with the acceptance level.

Evaluation and Calculation:

1. Elongation is calculated by tracing the elongation curve of the test specimen to the 10 pound force line (abscissa). The corresponding reading along the ordinate denotes the elongation in inches per foot of fabric for a 3-inch width specimen under 10 pounds of force.
2. Elongation can be expressed in percent of stretch by using the following formula:
   P = (S x 100) / 12
   P = % Stretch
   S = Stretch of one foot of cloth measured in inches

   Example: P = (.18 x 100) / 12 = 1.5% stretch at 10 pounds pull over a 3 inch width.

Acceptance Level:

The minimum allowable elongation is 1.0% and the maximum allowable elongation is 5.0% for woven upholstery fabrics.

The minimum allowable elongation is 0.7% and the maximum allowable elongation is 5.0% for flocked upholstery fabrics.

10.2. Knit Upholstery

Elongation and Set Test Method:

Scope:

For knit upholstery fabrics, the test method herein described shall be used to determine elongation and set. This method has been successfully used to measure consistencies of elongation of knit fabrics from shipment to shipment. The method has also been found to be a reliable procedure for determining cutting patterns.

Purpose:

The purpose of this test is to provide a written procedure for determining the stretch characteristics of a fabric under stress and the amount of set that is taken after the stress is removed.

Equipment (See appendix):

1. One support base with support rod.
2. One support rod clamp.
3. One "C" clamp (3").
4. One 1/4" steel rod approximately 30" long.
5. Clamping mechanism (two pairs) 14" long by 1" high by 1-1/4" thick with wing nuts for securing specimen.

A. Top clamp - equipped with approximately 5/16" eyes on each end to be used in conjunction with 1/4" steel rod and support rod clamp.
B. Bottom clamp - equipped with approximately 20" of 1/8" steel cable and small pulley with an eye.
C. One weight (10-1/4 pounds) with hook.

NOTE: The combination of the weight and lower clamp shall equal 15 pounds.

Specimen Preparation:

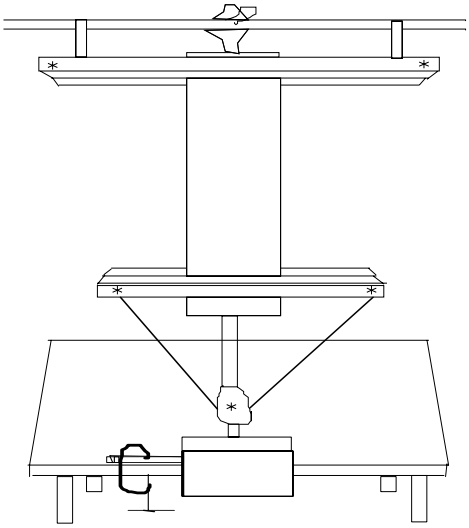
1. Cut one specimen in both the wale and course direction. The size of each specimen shall be 3” by 16”.
2 Lay out the specimen without tension on a flat surface, care being taken that the material is free from wrinkles or creases.
3. A distance of 12” is to be marked off on the specimen leaving approximately 2” on each end.

Test Procedure:

1. Insert specimen in the upper clamp so that the edge of the specimen is in line with the upper edge of the clamp.
2. Insert specimen in the lower clamp so that the edge of the specimen is in line with the lower edge of the clamp.
3. Slowly release lower clamp to cause tension on specimen.
4. Insert hook of weight into eye of small pulley and slowly release weight. **DO NOT ALLOW A SUDDEN DROP.**
5. Leave fifteen (15) pound load suspended for fifteen (15) minutes.
6. Measure distance between the marks on the specimen under stress. Convert to percent and report as "percent stretch".
7. Remove specimen from clamps and lay it on a flat surface for fifteen (15) minutes.
8. Measure distance between the marks on the specimen. Convert to percent and report as "percent set".

Acceptance Level:

There is not enough information on this method to set any standards or tolerances. For this reason the Joint Industry Standards Committee strongly endorses the use of this method for knit fabrics to generate data and "field history" to be used as a basis in the future development of standards and guidelines.



ELONGATION - SET TEST APPARATUS

11.0. FLAMMABILITY

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

11.1. Introduction

The commentary on furniture flammability in this publication is intended to be relatively general and will lack the specific details necessary to manufacture either furniture or furniture raw materials to meet specific flammability specifications. This is because the furniture flammability specifications and requirements are so detailed, complex, and all encompassing that separate, dedicated pieces of literature and information are required for each flammability specification. It is also recommended that before any efforts are made to make furniture or furniture components to comply with specific flammability specifications or requirements, involvement of legal counsel would be prudent. For more specific details on flammability issues, contact the agency involved in the legislation, the state involved in the legislation, and/or the UFAC Technical Director.

11.2. The UFAC Program

In 1978, the Upholstered Furniture Action Council (UFAC) implemented a voluntary program through the upholstery industry in the United States. The major thrust of the program was to provide the technology to make furniture that was less prone to ignite when exposed to lighted cigarettes and other smoking materials.

Prior to 1978, UFAC developed test methods for furniture raw materials, test criteria, and furniture construction methods using raw materials that met the UFAC test criteria. UFAC then developed methodology for raw material suppliers to use to certify that their raw materials met the UFAC criteria, developed a compliance cross check program for the furniture manufacturers, a plant visitation program to help with compliance, a technical committee and laboratory alliance to attack new problems as they might arise, and methodology to follow the changes in flammability requirements throughout the world.

The UFAC program also involves education of retailers and the general public to the necessity and viability of the UFAC program. There are many retailers who specify that all of their upholstery should meet the UFAC requirements.

11.3. The National Fire Protection Association (NFPA) Tests for Upholstered Furniture

The NFPA has adopted the UFAC test as NFPA-260. While the NFPA-260 test is a virtual clone of the UFAC test, there is no construction criteria included in the NFPA-260 test. However, since most of the furniture manufacturers in the United States already make UFAC compliant furniture, it is likely that the UFAC construction criteria will be used in virtually every circumstance when NFPA-260 is specified.

The NFPA has another furniture-related cigarette test, i.e., NFPA-261. NFPA-261 is a mockup test using a mockup cross-section that is said to describe the cross-section of the actual piece of furniture. NFPA-261 is similar to the test used by The Business and Institutional Furniture Manufacturers Association (BIFMA).

As a general rule, furniture made to the UFAC criteria using UFAC complying raw materials will pass the requirements of NFPA-261 and NFPA-260.

At this time, NFPA is developing a full-scale mockup test for upholstered furniture. This test will be similar to the oxygen depletion calorimeter test described in California Technical Bulletin 133. While the NFPA full-scale mockup test is not at this writing published as an approved test, approval and publication are forthcoming.

11.4. Underwriters Laboratories Furniture Related Tests

Underwriters Laboratories has a full-scale test for upholstered furniture. This test is similar to the oxygen depletion calorimeter test described in California Technical Bulletin 133, and U.L. has much experience in performing the test and interpreting the results. The Underwriters Laboratories test goes under the description of UL-1056. The UL test is also very similar to the upcoming NFPA full-scale mockup test.

11.5. The Boston Fire Code

Since the early 1980's, the city of Boston has required that all furniture for public buildings should meet the Boston Fire Department Specifications, i.e., The Boston Fire Code. The Boston Fire Code calls for testing individual components of upholstered furniture in an open flame test. However, since the inception of California Technical Bulletin 133, the city of Boston will accept furniture that passes California Technical Bulletin 133 provided test data from TB 133 is made available. To be certain, individual companies shipping into Boston should double check with the Boston Fire Code authorities.

11.6. California Technical Bulletin 133

Of all the flammability tests for upholstered furniture in the United States, California Technical Bulletin 133 (TB-133) is, by far, the most severe. TB-133 was developed in California for public occupancies such as jails, prisons, nursing homes, convalescent homes, and the public gathering places in hotels having ten or more seating units (but not the sleeping rooms in hotels).

TB-133 is not a component test; it is a test for full-scale furniture or a mockup of full-scale furniture. The furniture or mockup in question is placed in a room with the proper instrumentation and ignited with a rectangular gas burner radiating approximately 16 kilowatts of heat. The ignition source (burner) is placed over the seat of the test piece and allowed to burn for 80 seconds. After 80 seconds, the burner is removed from the test furniture, and the flammability events after removal of the burner are measured. Currently, there are two optional separate sets of requirement criteria to pass TB-133. The first option measures and specifies weight loss, smoke generated, carbon monoxide generated, and temperatures at the four-foot level from the burning chair and temperatures at the ceiling above the burning chair.

The second set of options utilizes a modern theory of heat measurement called oxygen depletion calorimeter. Oxygen depletion calorimeter theory states that the amount of heat released from any burning material is directly proportional to the oxygen consumed by that fire. In the oxygen depletion calorimeter option, only two criteria are specified: the total heat release in a 10 minute period, and the peak heat release value at any time during the duration of the test.

The American Furniture Manufacturers Association has adopted TB-133 for furniture manufactured for public occupancies. TB-133 became law in California in March of 1992, and several other states have already adopted TB-133. In all probability, all states will adopt TB-133 as their standard for public occupancies.

It should be carefully noted that stringent and difficult tests and requirements such as California Technical Bulletin 133 are strictly designed for public occupancies.

11.7. The Standard for the United Kingdom

In the late 1980's, the British Parliament passed legislation banning the use of conventional polyurethane foam in the manufacture of furniture for use in the entirety of the United Kingdom. This legislation mandated the use of an existing but unproven standard developed by The British Standards Institute (BSI), i.e. BS-5852. This standard utilizes a number of ignition sources depending on which component of the furniture is being tested. These ignition sources are cigarettes, a small propane flame, and various size wooden cribs.

While the BS-5852 test has not gained much acceptance in the European Common Market communities, some American furniture manufacturers have made furniture for export to the United Kingdom and thus must manufacture furniture that meets the BS-5852 requirements.

11.8. The European Common Market Requirements

The European Common Market countries studied the problem of furniture flammability and came up with the recommendation that only a cigarette ignition test similar to the cigarette test in BS-5852 should be recommended for use at this time (1991). The study strongly stated that the open flame tests were so complex that they did not believe a standard could or should be developed and proposed at this time (1991). It was the opinion of the international group studying the problem that it would take three to five years to develop a meaningful open flame test.

12.0. FLAWS & DEFECTS

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

12.1. Definitions

Face Flaws and Defects: Any visible condition in the fabric which deviates from the original standard sample on which the decision to purchase was made. In cases of question or referee, the visible condition (flaw or defect) must also be such that it produces an objectionable appearance in the final upholstered piece.

Back Flaws and Defects: Any irregularity or variation of backcoating which would adversely affect the durability or appearance of the fabric face.

Warp or Wale Direction Flaws and Defects: Flaws parallel to the selvages and greater than 6.0 inches in length.

Filling or Course Direction or Spot Flaws: Flaws that when measured parallel to the selvage are less than 6.0 inches in length.

12.2. Identification of Flaws and Defects

Warp or wale direction flaws shall to be flagged with a yellow marker at the beginning and end of the flaw. The markers shall be placed in the fabric selvage.

Two or more flaws or defects within the same lengthwise yard shall be considered a warp or wale direction flaw and flagged accordingly with yellow markers.

Filling or course direction flaws and spot flaws shall be flagged with a red marker placed in the selvage.

12.3. Standard

The change of standards for allowable defects approved by the Committee at the May 1993 meeting will be phased in over a one-year period. <u>For calendar year 1994</u>, the standards will be as follows:

Non-Pile Fabrics: First quality merchandise shall be merchandise in which the occurrence of flaws or defects is no more than an average of one flaw in every 8 linear yards, for a total of no more than 6 flaws in any 50-yard piece.

Pile Fabrics: First quality merchandise shall be merchandise in which the occurrence of flaws or defect is not more than an average of one flaw in every 6 linear yards, for a total of no more than 8 flaws in any 50-yard piece.

<u>Beginning January, 1995</u>, the standards for allowable defects will be as follows:

Non-Pile Fabrics: First quality merchandise shall be merchandise in which the occurrence of flaws or defects is no more than an average of one flaw in every 9 linear yards, for a total of no more than 5 flaws in any 50-yard piece.

Pile Fabrics: First quality merchandise shall be merchandise in which the occurrence of flaws or defect is not more than an average of one flaw in every 7 linear yards, for a total of no more than 7 flaws in any 50-yard piece.

No roll shall contain more than two separate pieces within the roll, and the minimum piece or cut length shall be five flawless yards of the same dye lot. The cut or seam within a two-piece roll shall be counted as a filling or course direction flaw.

12.4. Allowances for Flaws and Defects

Warp or Wale Direction Flaws: The exact yardage between all yellow flags shall be deducted from the gross yardage.

Filling or Course Direction and Spot Flaws: There will be no yardage deducted for flaws marked with red flags.

13.0 GENERAL ROLL CONDITION

Joint Industry Fabric Standards and Guidelines Supersedes: Published: 6/94

13.1 Since “direction of lay” of pile fabrics can create apparent shading problems, finishing procedures and handling shall be such that the direction of the lay pile is consistent within the roll and from roll to roll. Packaging, storage, shipping, and handling of pile fabrics shall be such that pile distortion within a roll is at a minimum. No Curling or wrinkling should occur in any direction when the fabric is spread, without distortion, on the cutting table.

13.2 All printing or marking on the fabric shall be on the back of the fabric or on the selvage. Strike-through or show-through of any degree is unacceptable under any condition of use. Dyes or inks used for printing or marking shall not bleed, migrate, or streak under any condition of fabric use.

13.30 The Fabric Standard & Guideline Committee adopted guideline for roll condition and direction at the November 2003 meeting.

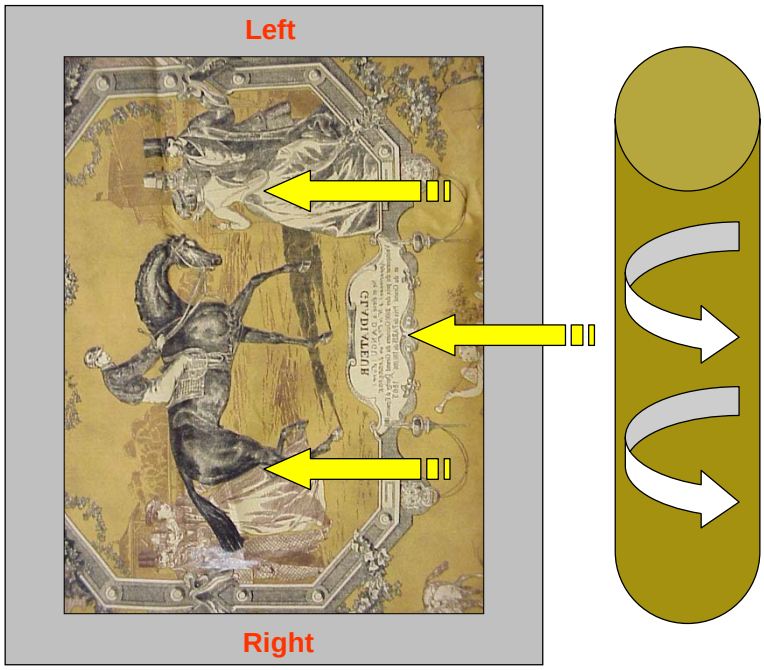
13.31 See Figure 3.0 for preferred method of spreading fabric

Figure 3.0
Standard Method of Spreading Cover

13.32 Roll up direction for “Up the Roll Pattern” with a defined design (ex: Horse or Tree) will be based upon design. The top of the horse or tree should pull off first. See Figure 3.5

Figure 3.5
“Up the Roll Pattern”

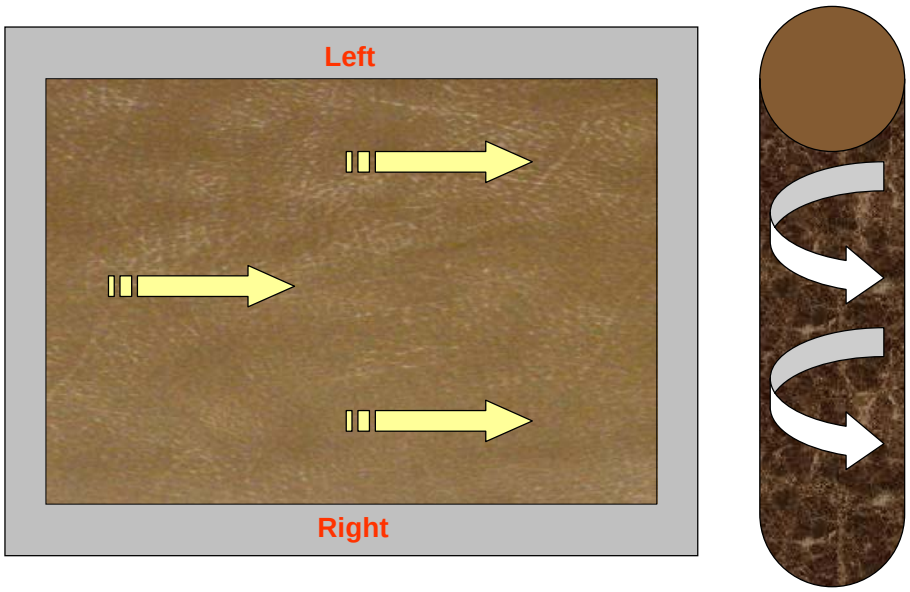
“Up the Roll” Patterns Pull Off Head-First.



13.33 Roll up direction for “Velvet, Suede, & Flocked” patterns will be based on nap direction. Nap should brush smooth toward the roll. See Figure 4.0

Figure 4.0
“Velvet – Suede - Flocked” Fabrics

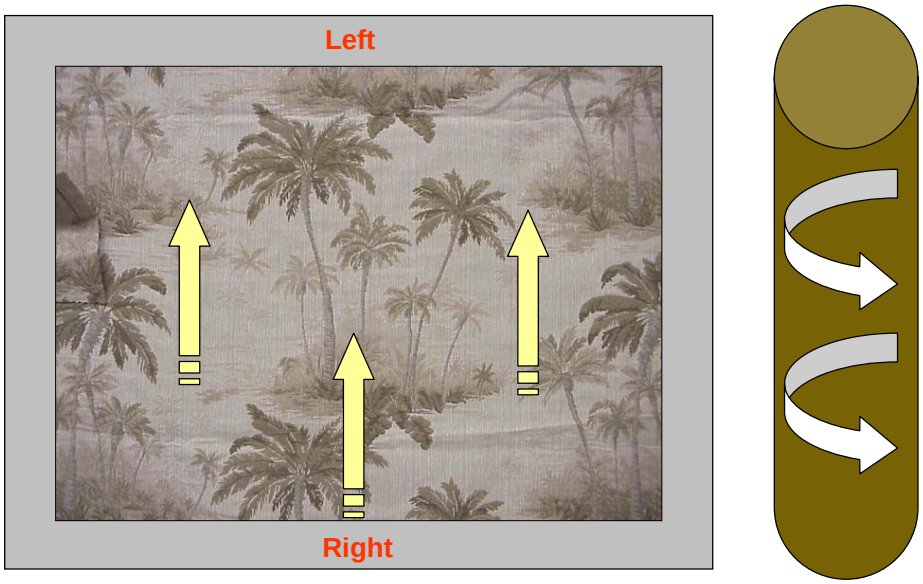
“Velvet, Suede And Flocked Naps Brush Smooth Toward the Roll.



13.34 Roll up direction for “Railroad Pattern” with a defined design (ex: Tree) will be based on design. The top of the tree should grow toward the left selvage. See Figure 4.5

Figure 4.5
“Railroad Pattern”

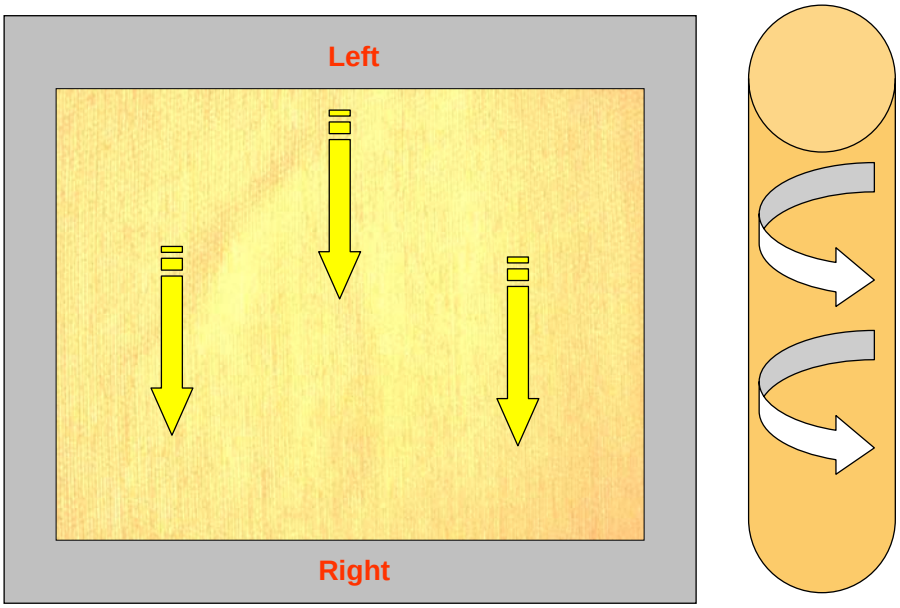
“Railroad” Patterns Pull Off With Top of Design On The Left Side.



13.35 Roll up direction for “Chenille Pattern” without a defined design will be based upon nap direction. Nap should brush smooth toward the right selvage. See Figure 5.0

Figure 5.0
"Chenille Fabric Without Defined Design"

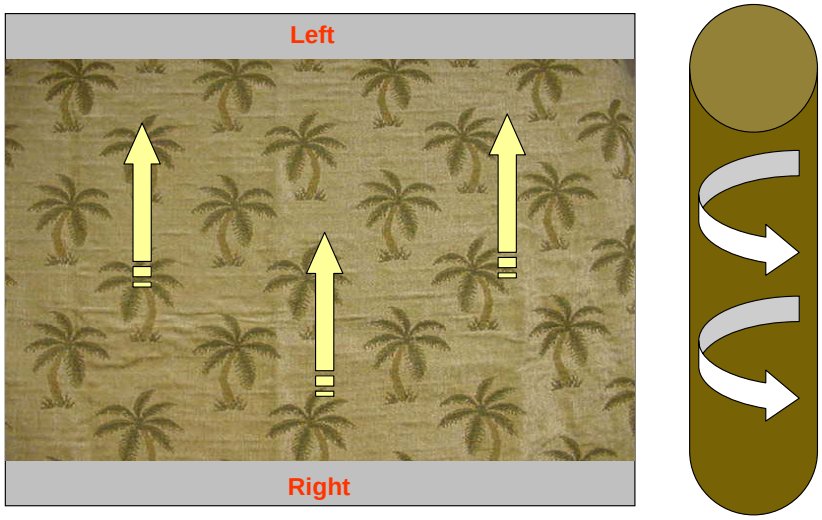
"Chenille" Nap Brushes Smooth Toward The Right Side



13.36 Roll up direction for Chenille fabric with a defined design (example: Tree) will be based on design. The top of the design (Tree) should grow toward the left side of the roll. See Figure 5.5

Figure 5.5
"Chenille Fabric with Defined Design"

"Chenille with defined design Pull Off With Top of Design On The Left Side.



13.37 Minimum / Maximum (Usable) Roll Width Guideline.

- Minimum Roll Width – defined as the width of usable fabric between selvages - 54"
- Maximum Roll Width – defined as the width including the selvages – 60"

13.38 All issues are to be addressed in buyer/seller agreements.

14.0. PATTERN REPEAT

Joint Industry Fabric Standard and Guidelines
Published: 6/94 Supersedes: 11/87

14.1 Discussion

It is generally accepted that certain fabrics can be produced to tighter tolerances than others. This capability can be related to the yarns used, type of construction, the presence of back coating, etc. These factors in turn are often dictated by trying to achieve the aesthetic properties and/or price points required. For the same reasons, certain fabrics are very difficult to produce even to the current Industry Standards. Some fabrics that do not undergo all the normal manufacturing processes or that undergo additional processes cannot be produced to meet the current standards.

In recognizing that markets exist for these many types of fabrics, it was decided to establish tiers that could indicate different tolerances for pattern repeat. These "TIERS' will be assigned by the fabric supplier to each fabric pattern(s) they produce. The TIER to which the fabric supplier is specifying each fabric pattern(s) should be indicated on each color line when the new fabric is introduced. This is not a grading designation for individual rolls, but a designation on all rolls that will be produced in that pattern(s).

Any change in the TIER to which a pattern(s) is specified would be a matter to be determined between buyer and seller. The intent would be to not change TIERS, but a situation may arise where a new pattern(s) is graded TIER 2 by the fabric manufacturer based on experience with a similar construction. When beginning to run production, it may be determined that the new fabric simply cannot be produced to TIER 2 requirements, and this would have to be worked out through communication with the furniture manufacturer. Alternately, a fabric pattern(s) originally rated TIER 1 may be able to be improved to a TIER 2 based on production experience.

Presently, the following TIERS have been adopted.

TIER 1 (Current Joint Industry Standards as of 5/6/04)

TIER 2 (Tighter tolerances on pattern repeat variation than current Joint Industry Standards as of 5/6/04)

TIER R (See Relaxed Fabric Standards 29.0)

If a fabric pattern(s) is not specified as a certain TIER, it will be understood to be a TIER 1 fabric.

If there are no separate requirements specified under a Standard or Guideline for different fabric TIERS, the criteria under that Standard or Guideline is applicable to all fabric TIERS.

14.2 Method of Measurement

Lay the fabric without tension on a horizontal surface. Measure from center point to center point of any two contiguous pattern repeats to determine pattern length. A minimum of four measurements shall be made in a continuous length of 50 yards.

14.3 Standards

14.3.1 TIER 1

Variation From Roll to Roll

For woven fabrics having pattern repeats less than 13 inches, the variation from the specified repeat from roll-to-roll shall be no greater than + or – 0.25 inch, a total maximum variation of 0.50 inch.

For woven fabrics having pattern repeats of 13 inches to 27 inches, the variation from the specified repeat from roll-to-roll shall be no greater than + or - .50 inch, a total maximum variation of 1.0 inch.

For woven fabrics having pattern repeats greater than 27.0 inches, the maximum variation from roll-to-roll shall be agreed upon at the time of purchase.

Variation Within a Roll:

For woven fabrics having pattern repeats of less than 13 inches, the variation of actual measurements within a roll shall be no greater than 0.25 inch total variation.

For woven fabrics having pattern repeats from 13 inches to 27 inches, the variation of actual measurements within a roll shall be no greater than 0.50 inch total variation.

For woven fabric having pattern repeats greater than 27.0 inches, the maximum variation within a roll shall be agreed upon at the time of purchase.

14.3.2 TIER 2

Variation from Roll to Roll:

For woven fabrics having pattern repeats less than 13 inches, the variation from the specified repeat from roll-to-roll shall be no greater than + or – .125 inch, a total maximum variation of .25 inch.

For woven fabrics having pattern repeats of 13 inches to 27 inches, the variation from the specified repeat from roll-to-roll shall be no greater than + or - .25 inch, a total maximum variation of .50 inch.

For woven fabrics having pattern repeats greater than 27.0 inches, the maximum variation from roll-to-roll shall be agreed upon at the time of purchase.

Variation Within a Roll:

For woven fabrics having pattern repeats of less than 13 inches, the variation of actual measurements within a roll shall be no greater than .125 inch total variation.

For woven fabrics having pattern repeats from 13 inches to 27 inches, the variation of actual measurements within a roll shall be no greater than .25 inch total variation.

For woven fabric having pattern repeats greater than 27.0 inches, the maximum variation within a roll shall be agreed upon at the time of purchase.

14.3.3 Knit Upholstery

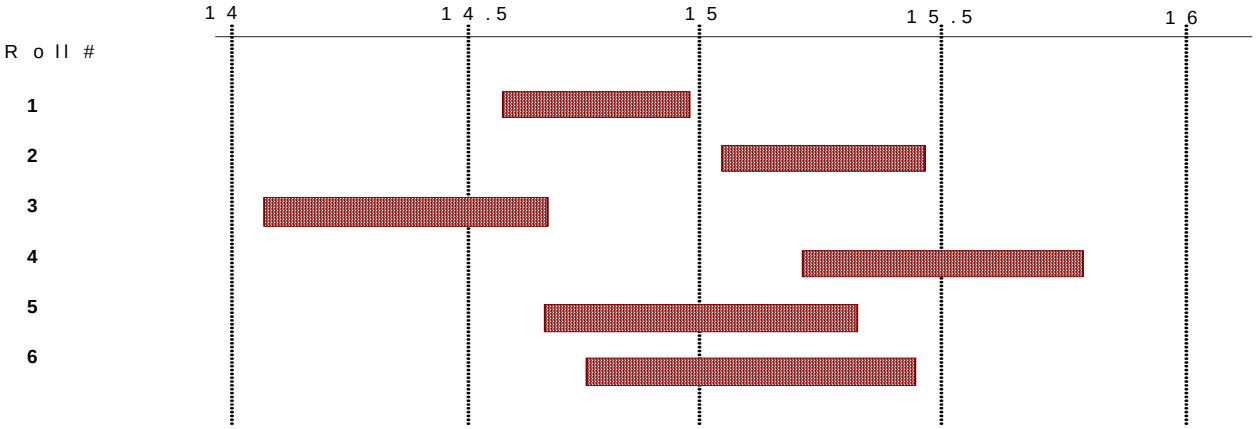
Variation From Roll to Roll and Within a Roll:

For knit fabrics having pattern repeats of 10 inches or less, the variation within a roll or from roll-to-roll shall be no greater than + or - 5.0%.

For knit fabrics having pattern repeats greater than 10 inches, the allowable variation shall be agreed upon at the time of purchase.

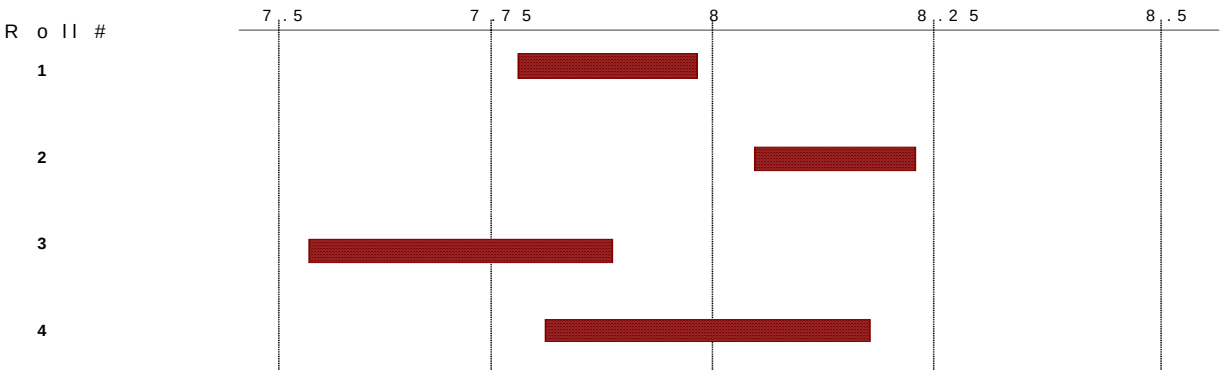
14.3.4 Examples are Shown for TIER 1 Standards

Examples:
In the following illustrations, the shaded bar represents the range of actual pattern repeat measurements within each roll.



Example 1:

For a fabric having a specified pattern repeat of 15 inches the following would be true:
Rolls 1 and 2 meet the standard for roll-to-roll variation. Rolls 3 and 4 do not meet the standard since some measurements fall outside the acceptable range for roll-to-roll variation. Rolls 5 and 6 do not meet the standard because the difference between the longest repeat measured and the shortest repeat measured exceed the acceptable range for variation within a roll.



Example 2:

For a fabric having a specified pattern repeat of 8 inches, the following would be true:
Rolls 1 and 2 would meet the standard for roll-to-roll and within roll variation. Roll 3 would not meet the standard since some measurements fall out the acceptable range for roll-to-roll variation. Roll 4 would not meet the standard because the difference between the longest repeat measured and the shortest repeat measured exceeds the acceptable range of variation within a roll.

15.0. YARN COUNT

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

15.1. Yarn Count In Woven Fabric

In patterned woven fabrics, the pick count shall be controlled to maintain the pattern repeat variation limits (see PATTERN REPEAT).

Picks per inch on most upholstery fabrics can be determined by counting one inch with a pick glass. Count in several places to insure consistency. Reference ASTM D3775 for description of apparatus, sampling and conditioning instructions, and test procedure.

Inconsistent ends or picks per inch can also affect shade, fabric integrity, overall appearance, and field performance.

15.2. Yarn Count In Knitted Fabric

In knit fabrics, the allowable variance of courses per inch shall be 10%. There is no specification for the allowable variance of wales per inch.

The method for counting wales and courses per inch shall be through the use of a pick glass or similar device. Count the number of wales or courses in six contiguous inches and then average to report the average number per inch.

Inconsistent wales or courses per inch can also affect shade, fabric integrity, overall appearance, and field performance.

16.0. PILLING

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

There is no acceptable test method for pilling of **woven and knit** upholstery fabrics that is suitable for direct comparison to actual use. Excessive in-use pilling is nonetheless undesirable.

17.0. RETAILER APPLIED FABRIC TREATMENTS (RAFT)

Joint Industry Fabric Standards and Guidelines
Published: 12/93 Supersedes: 11/87

In cooperative effort to eliminate possible problems, suppliers of RAFT products, furniture manufacturers, fabric manufacturers, and other members of the JIFSC developed resolutions regarding the use of RAFT treatments on upholstered furniture. These resolutions were presented to the American Furniture Manufacturers Association's (AFMA) Board of Directors. The AFMA Board of Directors approved the following resolutions:

RESOLUTION 1: Spot test in a hidden area for bleeding or color change prior to RAFT treating the entire piece of furniture.

RESOLUTION 2: Request from your RAFT supplier proper application techniques and disclose such to personnel responsible for application.

RESOLUTION 3: Over application can cause damage to fabrics, therefore, the RAFT manufacturer's recommendations should be followed.

RESOLUTION 4: Allow treated furniture to thoroughly dry before repackaging or consumer use.

A fifth resolution was adopted for furniture manufacturers.

RESOLUTION 5: We highly recommend that the furniture manufacturers include the proper colorfastness code letter(s) on each piece of furniture, which could, to eliminate costs, be included on the work order ticket.

18.0. ROLL LENGTH

Joint Industry Fabric Standards and Guidelines
Published: 1/01 Supersedes: 6/94

18.1. Scope

The recommended methods for the measurement of fabric length are applicable to rolls or bolts of fabric.

18.2. Test Methods

ASTM D3773, Option A - Hand Method is the referee method.

ASTM D3773, Option C - Clock Method.

18.3. Conditioning

Condition the specimens as directed in Practice D1776. When full rolls or bolts of fabric cannot be properly conditioned in a reasonable time, perform the tests without conditioning and report the actual conditions prevailing at the time of the test.

18.4. Sampling

Sample as directed in the material specification or as agreed upon by the purchaser and seller.

18.5. Calibration

Measure a known length of canvas or other stable, low elongation (less than 2% in either direction) fabric through the measuring device. Replace as needed.

A certified portable measuring counter* should be periodically used to verify the accuracy of the production counter. The same device should be used for cross-calibration of company-to-company devices. Re-calibrate yearly.

*A certified portable yardage counter can be obtained through many sources including WAK Industries in Charlotte, NC.

18.6. Standard

The average roll length should be no less than 30 yards. The roll shall contain two pieces maximum with the smallest piece no less than five flawless yards of fabric of the same dye lot. The minimum roll length acceptable will be 15 yards, and each manufacturer shall attempt to keep the short rolls to a minimum. The maximum roll length is governed by attempts to achieve the best cutting efficiencies of the fabric taking into consideration manufacturing, handling, and storage limitations. Below is a reference guide of maximum roll lengths as required of various weight fabrics to achieve an average of 80 pounds.

Fabric weight per linear yard	Maximum roll length
16.0 oz. or less	80 yards
16.1 oz. - 20.0 oz.	60 yards
20.1 oz. - 28.0 oz.	50 yards
28.1 oz. or more	40 yards

Maximum roll lengths for sliver knits or similar bulky constructions.

Fabric weight per linear yard	Maximum roll length
16.0 oz. or less	50 yards
16.1 oz. - 28.0 oz.	40 yards
28.1 oz. or more	30 yards

The difference between the manufacturer's stated gross yardage and the user's measured gross yardage shall not exceed +/- 2%.

18.7. The Joint Industry Fabric Standards Committee has observed and studied in detail the problems involved in accurate and reproducible measurement of the length of upholstery fabrics.

The extremely wide range of constructions, yarns, basic fibers, and fiber blends compound measurement problems significantly. In addition, temperature and humidity add to the plethora of factors that make accurate and reproducible fabric measurement more difficult. Inter-laboratory experiments were conducted in 1996 whereby sixteen (16) rolls of various fabrics were measured two times each (2x) by eighteen (18) different companies. The fabrics were representative of current constructions available and the locations were divided between fabric mills and upholstery manufacturers. Statistical evaluation of the 576 total measurements yielded a plus/minus of 2.26% around the average. This validates the +/-2% standard.

Additional analysis of the data showed that each measuring location appeared to be consistently on the high side, low side, or average. The data shows that since certain locations could differ by as much as 4.52% total, an effort should be made for cross calibration of machinery to close the gap. Use of the pre-measured roll and certified portable counter is encouraged to this end.

It should be noted also that under some specific predetermined circumstances, measurement tolerances of plus or minus 1.0% can be attained. This situation can only be attained by careful statistical correlation of measurement equipment and philosophies between user and manufacturer.

The Joint Industry Fabric Standards Committee is also recommending the use of an inspection form for the uniform documentation of measurements of fabrics. (This form also contains adequate space for 1 listing of and measurement of flaws and defects.)

19.0. ROLL TAG INFORMATION

Joint Industry Fabric Standards and Guidelines
Published 6/94 Supersedes: 11/87

On each roll of fabric there shall be a tag attached containing the following information:

1. Mill pattern
2. Mill color
3. Roll identification number
4. Lot number
5. Inspector identification (optional)
6. Gross yards (optional)
7. Allowance (in yards)
8. Net yards
9. Surface treatment (Scotchgard™, Teflon™, etc.)

20.0. ROLL WIDTH

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

20.1. Scope

This method for the measurement of fabric width is applicable to rolls and bolts of fabric and to short specimens removed from a roll or bolt.

20.2. **Reference ASTM D3774** for definitions, conditioning instructions, and summary of test method.

20.3. Method of Measurement

The width shall be measured by first laying the fabric out flat on a table with no tension or elongation. The width shall then be measured with a good quality measuring tape, measuring the usable fabric width between the selvages.

20.4. Standard

The fabric shall contain no less than 54 inches of usable fabric width or no more than 60 inches of total fabric width (including selvages) when measured in accordance with the recommended test method.

21.0. SEAM BREAKING STRENGTH

Joint Industry Fabric Standards and Guidelines
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21.1. Introduction

Since much of the manufacturing of a piece of upholstered furniture involves sewing the fabric parts together, any particular fabric is only as strong as its seam breaking strength. Therefore, a minimum specification for this characteristic is of benefit to the consumer in assuring that their furniture will not rupture at the sewn seams.

21.2. Factors Affecting Seam Breaking Strength

Seam breaking strength depends upon the factors in fabric design and manufacturing including:

(1) Use of yarns with low individual tensile strength.
(2) Low yarn counts, i.e. picks and ends.
(3) Types of weaves.
(4) Type and amount of backcoating.
(5) Amount of needle punch.

Seam breaking strength can be affected by the variables in the furniture manufacturing operation including:

(1) Patterning, cutting, and sewing to allow sufficient seam allowance.
(2) Sewing machine adjustment, maintenance, and operation to insure sufficient stitches per inch and proper thread tension.

(3) Selection and use of proper thread.
(4) Selection and use of appropriate needle for the fabric construction being sewn.

Sewing with a damaged needle can drastically reduce seam integrity. Therefore the condition of needles should be closely monitored and a program for routine replacement should be in place.

21.3. Test Method

Reference ASTM D4034 for description of apparatus, sampling instructions, and test procedure.

ASTM D4034 –2001 (no replacement listed) Resistance to yarn slippage at the sewn Seam in the Woven Upholstery Fabrics Plain, Tufted, or Flocked. When tested in accordance with ASTM D4034, the minimum standard is 25 pounds.

21.4. Standard

The minimum seam breaking strength of all **woven and knit** fabrics shall be 50 pounds.

22.0. SEAM INTEGRITY

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

22.1. Introduction

Seam integrity, especially with regard to seat cushions, is one of the most important physical characteristics of an upholstered fabric. Many parts of a piece of upholstered furniture are held together by sewn seams. Historically, seat cushion seam failures have accounted for a considerable percentage of furniture manufacturers' field returns. To a lesser degree, seam failures may also occur in back pillow, attached backs, or even in other sewn parts. Therefore, testing and minimum specifications for this characteristic are important to the consumer so that they can be assured their furniture will not suffer seam failures.

22.2. Types and In-Use Causes of Seam Failure

The predominant types of failure occurring at seams include:
(1) Yarn movement or slippage without complete seam opening.
(2) Complete seam opening with intact stitch line.

The above-mentioned types of seam failures are caused by:
(1) Needle cutting yarns in the upholstery fabric itself.
(2) Breakage of the thread forming the stitch line.
(3) Yarns in the upholstery fabric rupturing at the stitch line.
(4) Raveling which allows the yarns in the upholstery fabric to pull free of the stitch line.

Forces contributing to seam failures in furniture are listed below:
(1) Static stress caused by cushion "squeeze" related to the overstuffing ratio.
(2) Dynamic stress exerted during "quiet" sitting.
(3) Dynamic impact stresses caused when a person drops onto the cushion.
(4) Dynamic stress caused by movement and shifting during sitting.

In knits, needle cutting is by far the most prevalent cause for seam failures. Factors contributing to needle cutting are listed below:

(1) Incorrect sewing needlepoint. (**Only** a light ballpoint needle should be used to sew knit fabrics.)
(2) Incorrect sewing needle size. (A size 22 needle will successfully sew most knitted Upholstery fabrics.)
(3) Damaged sewing needle.
(4) Excessive "hammering" of sewing machine presser foot can damage the yarns with which the upholstery fabric is constructed.

Factors involving upholstery fabric design and construction affect seam integrity. They include:
(1) Inadequate backcoating.
(2) Variability in yarn sizes causing difficulty in sewing a seam of uniform tension.
(3) Excessive float yarns or "pockets" in fabric construction.
(4) Low yarn count, i.e. number of picks or ends.
(5) Excessive raveling due to low yarn count or inadequate backcoating.
(6) Extremely low elongation of fabric construction.
(7) Constructions containing a substantial quantity of small continuous filament yarns with a "slick" surface, to which backcoating does not adhere well.

Within a furniture manufacturing operation there are factors that can affect seam integrity, even in those fabrics that would not otherwise exhibit problems. The items listed below are those for which the furniture manufacturer has the ultimate responsibility to insure acceptable seam integrity:
(1) Patterning, cutting, and sewing to allow a seam allowance of no less than 0.5 inches.
(2) Sewing machine adjustment, maintenance, and operation to insure seven stitches per inch and proper thread tension.
(3) Selection and use of proper thread.
(4) Selection and use of appropriate needle for the fabric construction being sewn.
(5) Monitoring of needle condition and replacement of damaged needles.
(6) Proper stuffing of cushions to prevent excessive force on cushion seams due to pressure from overstuffing.
(7) Proper application of any in-house seam reinforcement techniques.

22.3. Test Methods

ASTM D4033 - Determining Yarn Slippage in Sewn Seams Made from Upholstery Fabrics (Dynamic Fatigue Method) will be used for acceptance testing with the following modifications:

Test Procedure

1. Fabric Sample Size. Cut samples shall measure 9" X 11", instead of 7.5" X 10". The increase in size eases sample mounting. The sewn 11"dimension is most critical to maintain proper mounting alignment. The objective is to have the sample length dimension the same as the foam composite dimension (11”). This will allow the sample to completely cover the mounting box, which will help insure the impact point of the dropped wheel be a constant distance from the edge of the fabric.

2. Polyurethane Foam. A solid block of polyurethane foam will replace the convoluted/block composite formerly used in ASTM D4033. The general specifications for the block of polyurethane foam are:

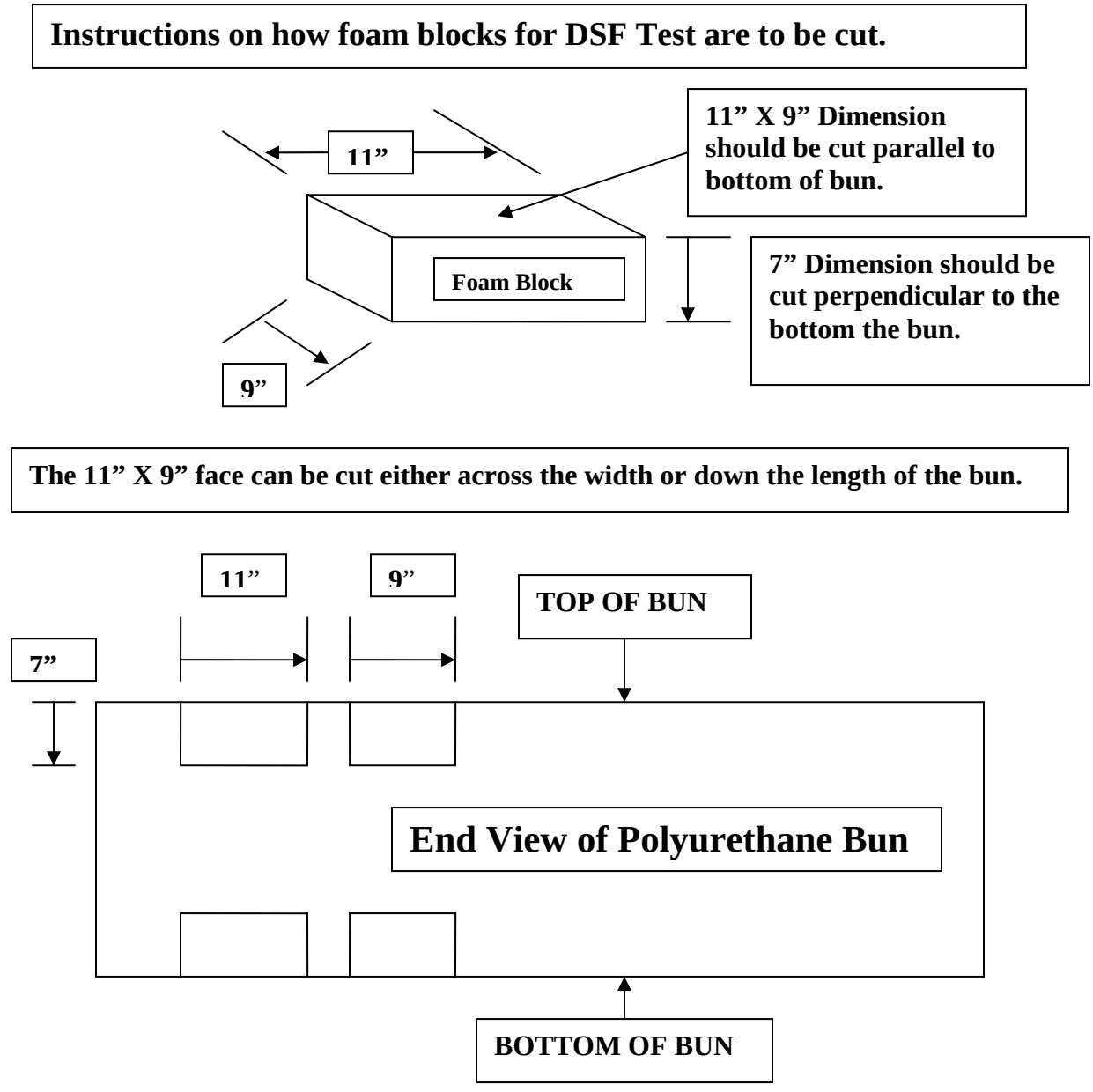
Dimensions 9” X 11” X 7” (The 9” x 11” surfaces are to be cut parallel to the bottom of the bun)

Density 1.20 Minimum

25% (IFD) Indentation 14 to 18 lb

Foam is to be tested according to “ASTM D3574 (most current edition),” IFD of test blocks should be verified by testing 15”(W) x 15”(L) x 4”(D) cores cut from same area of the bun that the test blocks are to be cut from.)

DRAWING OF HOW FOAM SAMPLE IS TO BE CUT FROM THE BUN.



Specimen Preparation. All seams shall be sewn with a seam allowance of 13 to 16 mm (0.5 to 0.6 inch) All seams shall be sewn with a stitch count (density) of 7 + or – 1 stitch per 25 mm (1 inch). Align the edges and sew a seam across the entire 11” dimension. Back tack the seam for 25 + or – 8 mm (1.0 + or – 3/8 inch) on each end. At least one warp to warp, one warp to fill, and one fill to fill specimen will be constructed. And the samples will be representative of any yarn, construction, or pattern variations of the specific fabric being tested. One specimen shall be tested for each combination (W/W, F/F, W/F), unless otherwise agreed upon by the Supplier and Purchaser. It is recommended for referee purposes that three sets of each combination be performed.

3. **Foam Block Preparation.**
    - **Check the polyurethane foam block to be sure it does not need rotation, turning over, or replacement.**
    - **Use the following Criteria: A polyurethane foam block is used for a maximum 20,000 cycles. After 5,000, cycles rotate the polyurethane composite 180 degrees and use for another 5,000 cycles. Turn the polyurethane block over and use for 5,000 cycles and again rotate the polyurethane block composite 180 degree. Replace the polyurethane block with a new one after completing 20,000 cycles.**

4. **Specimen Mounting:**

- **Place the seamed specimen on the top of the polyurethane foam block in the specimen-mounting box. Align the center of the seam such that it is parallel to and 1 ± .125 inches from the edge of the wheel closest to the seam.**
- **On the underside of the test specimen, the sewn seam allowance flaps (flanges) are to be opened and spread (butter flied) such that both flaps (flanges) lie flat against the polyurethane foam block. Place the compression plate on top of the test specimen and foam. Press the compression plate (depressing the foam) until it touches the top edges of the specimen mounting box and lock in place.**
- **Clamp the specimen in the mounting box. Securely lock the specimen sides across the entire length. This is done to avoid slippage of the specimen in the clamps that is known to affect testing results. Secure clamping can be achieved by adding extra toggle clamps to the mounting box, or adding extra layers of fabric or thinly sliced polyurethane, or securing the specimen with duct tape which creates extra pressure and minimizes specimen slippage.**

Machine Setup

Prior to Testing: The following areas should be carefully checked:

- **Wheel Impact Alignment to the Specimen Mounting Box. The impact wheel/lever assembly and the specimen-mounting box shall be parallel in each position.**
- **Side-to-Side movement of the lever assembly is undesirable. The arm assembly shall have a snug fit (maximum 1° side-to-side movement) against the upright (vertical) mounting post. Replace the bushings (bearing) as necessary.**
- **Wheel Movement. Wheels shall be mounted to spin freely to produce a random strike point of the wheel surface to the fabric.**

Machine Maintenance Schedule

- **Maintenance shall occur at regularly scheduled intervals determined on the basis of stability, purpose and usage, or sooner if there is some reason to believe that the equipment is not operating correctly or test results are questionable.**
- **The recommended interval is after 1,000,000 cycles or every six months, whichever comes first. The areas to check, measure, adjust, or replace are described below:**

1. Weight. Accuracy of the weight (8.25 lb + / – 1/8 lb or 2 oz) at the impact area shall be verified. The weight can be confirmed by using a spring scale or load cell for measuring when the wheel/lever assembly is in a horizontal state. Reposition adjustable weight as necessary.

2. Height of the Drop. The minimum drop height is 6.0 inches. Accuracy of the six-inch drop shall be verified. Drop height can be confirmed by measuring the distance between the maximum heights from the bottom of the wheel in the free falling position to the surface of the mounted compression plate.

3. Radius on Outside Wheel Edge. A (3/32 ± 1/32") radius shall be maintained on the wheel edge used for the 1 ± .125 inch specimen positioning. Radius gages are the recommended measuring tools for verification. Wheels not having the correct edge radius should be replaced.

22.4. Standard

When tested in accordance with ASTM D4033-2001 (no replacement listed), fabrics shall not exhibit more than 3 mm opening or Yarn slippage on either side of the seam for the duration of the test (5000 cycles). This measurement will be determined with the sample removed from the mounting box. The specimen will be secured on top and bottom with fixture capable of applying constant tension across the entire 11" length of the specimen and have a lighted background. The total weight of the bottom fixture that is applying the constant tension to the sample is 3 lbs. + or – 1/8 lb or 2 oz. The slippage will be measured from the center of the seam to the end of the largest opening or gap on either side of the seam.

22.5. Annex

See the accompanying Table 1 for suggested fabric uses based on various degrees of seam failure.

See the accompanying Table 2 for descriptions on in-use application terms.

TABLE A1

SUGGESTED USES FOR VARIOUS DEGREES OF FAILURE

DEGREE OF FAILURE	SUGGESTED USE
1000 cycles or less	Do not use in upholstered furniture.
1001 to 1500 cycles	Use only with reinforced seams (as defined in 3.9 and then only in "light" in use, household applications (as described in Table A2).
1501 to 2500 cycles	Use only with reinforced seams and then only in "moderate" in-use, household applications (as described in Table A2).
2501 to 4000 cycles	Use only with reinforced seams and then only in "medium-duty", household applications (as described in Table A2).
4001 to 5000 cycles	It is advisable to reinforce the seams. Fabric can then be used in "normal" in use, household applications (as described in Table A2).
Above 5000 cycles	Seam reinforcement is not needed and the fabric can be used for "normal" in use, household applications (as described in Table A2).

TABLE A2

DESCRIPTIONS OF IN-USE APPLICATION TERMS

APPLICATION	DESCRIPTION
"Light", In-Use, Household Applications:	**Applications where the upholstered furniture is used mainly for decorative rather than functional purposes; for example, several times a month.**
"Moderate", In-Use, Household Applications:	**Applications where the upholstered furniture is used infrequently, such as, for example, once or twice a week in a "formal" living room.**
"Medium Duty", In-Use, Household Applications:	**Applications where the upholstered furniture is used occasionally, every day, for example, one or two hours daily.**
"Normal", In-Use, Household Applications:	**Applications where the upholstered furniture is used constantly for several hours or more daily, such as a TV chair or sofa.**

NOTE: No household furniture fabrics are designed or intended for abusive applications.

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NOTE: No household furniture fabrics are designed or intended for abusive applications.

23.0. SHEDDING

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

There is not an acceptance test method for shedding of woven and knit upholstery fabrics that is suitable for direct comparison to actual use. Excessive in-use shedding is nonetheless undesirable.

24.0. STAIN REPELLENCY

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

24.1. Test Procedure

Reference the 3M Water Repellency Test IV and 3M Oil Repellency Test IV for test purpose, definitions, and description of apparatus, materials, and test and evaluation procedures.

24.2. Standard

All **woven and knit** upholstery fabrics having a mill-applied, fluorocarbon-based treatment shall meet the "PASS" criteria of the 3M Scotchgard™ tests.

25.0. TEAR STRENGTH

Joint Industry Fabric Standards and Guidelines
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25.1. Woven Upholstery

Test Methods for Woven Upholstery Fabrics:

ASTM D2262 Tongue Tear Test Method (Referee Test Method)
ASTM D1424 Elmendorf Test Method

Classification of Fabrics When Tested in Accordance Referee Test Method:

Category I fabrics shall have a minimum tear strength of 6.0 pounds.
Category II fabrics shall have a minimum tear strength of 4.5 pounds.
Category III fabrics shall have a minimum tear strength of 4.0 pounds.

Discussion:

It shall be understood that lightweight fabrics (Category III) are generally rated "Delicate" duty. Thus, these fabrics should not be buttoned excessively nor should furniture covered with these fabrics be placed in areas of heavy use.

Due to its limited use, no minimum specification is presented for the Elmendorf Test Method. Companies using this method need to do their own correlation and calibration testing to develop data for an acceptable buyer/seller agreement.

25.2. Knit Upholstery

Test Methods for Knitted Upholstery:

ASTM D2262 Tongue Tear Test Method (Referee Test Method)
ASTM D1117, Section 14 Trapezoid Tear Method

Standards for Knit Upholstery:

When tested in accordance with the referee test method, the minimum tear strength shall be 4.5 pounds.

The minimum tear strength for tricot knit constructions tested by the Trapezoid Test Method shall be 10 pounds.

26.0. TENSILE STRENGTH

Joint Industry Fabric Standards and Guidelines
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26.1. Definition

Tensile strength represents the maximum amount of resistance required for the deformation and rupture of a fabric. This is normally expressed in pounds per square inch (PSI).

The tensile strength of a fabric is determined by the amount of force it takes to cause the fabric to rupture. This is called the breaking load.

26.2. Importance of Tensile Strength to Upholstered Furniture Manufacturers and Consumers

Adequate tensile strength is required by the furniture manufacturer to insure no fabric ruptures during the upholstery process. Adequate tensile strength is also needed to withstand stress caused by filling materials in cushions, arms, and backs. Higher compression polyurethane foams can exert a tremendous amount of pressure on fabrics, especially in tight-fitting "clean" styles. This pressure is magnified when a person sits on the cushion.

Adequate tensile strength insures that the consumer, under normal use, will not have a problem with the upholstery fabric rupturing.

26.3. Importance of Tensile Strength to Fabric Manufacturers

In the warp beaming operation, adequate yarn tensile strength reduces the number of yarn breaks and thus the number of knots or yarn splices, allowing more continuous runs and consequently better efficiencies.

During the weaving process, adequate tensile strength insures fewer start-ups, less broken picks, etc.all of which can contribute to the number of defects in a piece of fabric.

26.4. Test Method

Reference ASTM D5034, Section 16, Grab Method for description of test method.

26.5. Standard

The minimum tensile strength of all woven and knit fabrics shall be 50 pounds per square inch.

27.0. FIBER MIGRATION

Joint Industry Fabric Standards and Guidelines
Published: 6/94 Supersedes: 11/87

27.1. Scope

This test method is intended to provide a common procedure for furniture manufacturers and textile mills for identifying potential fiber migration problems. This procedure will help predict which fabrics will develop problems with fiber migration.

27.2. Equipment

1. A typical household clothes dryer (Maximum drum size 26" diameter) with the lint trap and heat disconnected.
2. Six (6) beanbags with the total weight of about 2 pounds.
3. Two (2) tennis balls.

27.3. Test Procedure

The following test procedure shall be used:

1. Cut the fabric sample 8" X 15 1/2".
2. Fold the fabric sample in half so that the face of each half is touching.
3. Sew three sides of the fabric sample with 7 stitches per inch and 1/2" seam allowance, leaving one side of the sample open to allow stuffing.
4. Turn the sample so the fabric is face out.
5. Stuff the sample with 25 grams of fiberfill.
6. Sew the final seam and place the pillow in the dryer with 2 tennis balls, 6 bean bags, and 9 additional test pillows.
7. Tumble the samples in the dryer for one hour.
8. Remove the sample from the dryer and place the sample against a dark background.
9. Count the total fibers protruding through the surface of the sample and record the results.

27.4. Grading Criteria

Zero Migration = no ends of fiber migrated through to the surface of the test pillow
Slight Migration = 1 to 2 ends of fiber migrated through to the surface of the test pillow
Medium Migration = 3 to 4 ends of fiber migrated through to the surface of the test pillow
Heavy Migration = 5 or more ends of fiber migrated through to the surface of the test pillow

The grading criteria should not be used for acceptance testing, but rather as an indicator of potential fiber migration in tested fabrics.

If the test indicates the likelihood of fiber migration, agreements can be made between purchaser and supplier as to whether a lining, additional backcoating, or a different fiber is necessary in order that the fabric may perform satisfactorily in the end use.

28. TEST METHOD FOR NAP LOSS OF PILE FABRICS

Joint Industry Fabric Standards and Guidelines
Published: 1/96

28.1 Scope and Purpose

28.1.1 This test method is intended for pile fabrics constructed by weaving or knitting techniques. This test method is not intended for flocked or chenille fabrics.

28.1.2 The purpose of this test is to determine the degree of tuftlock achieved on a pile fabric in development, production, and end use. Inasmuch as the nap loss may be related to the properties of the backcoating used on the fabric, this test also measures the ability of backcoating to "lock and/or hold" the individual pile yarns in the fabric construction. The method involves rubbing the back of pile fabrics using controlled levels of pressure and tension

28.2 Apparatus and Equipment

28.2.1 Modified A.A.T.C.C. crock meter. The arm of the crock meter shall exert a downward force of 250 grams at the end of the eraser.

28.2.2 The eraser to be used is a Faber-Castel Corporation #1960 non-abrasive vinyl. The length of the eraser from the bottom edge of the crock meter rub arm is l-3/4". The eraser pencil must have a minimum overall length of 3-1/2" and the length of the eraser abradant shall be 1/4" ± 1/16" (measured from the tip of the eraser to the edge of the paper wrapped around the eraser). The eraser is held in the arm of the apparatus with an inside angle of 83 degrees.

28.2.3 A hanging weight of 315 ± 15 grams is used. (An alligator clip with a linked chain or wire strand attached to a lead weight works well.)

28.3 Specimens and Preparation

28.3.1 Cut three specimens from a full width sample of fabric representative of the roll to be tested. One specimen from each selvage area (not closer than 1-1/2" from the coated edge or more than 2-1/2" away from the coated edge) and one specimen from the center of the width. The specimens shall be 10" long in the fill direction and 3" minimum to 6" maximum in the warp direction.

28.4 Procedure

28.4.1 Calibrate the testing apparatus and make sure the eraser end is smooth and clean.

28.4.2 Mount the fabric specimen face down with the pile lay towards the pin plate.
Place the end on the pin plate in such a manner as to keep the warp yarns parallel to the pin plate and the fabric free from wrinkles.

28.4.3 Attach the hanging weight directly in line with the area that will be abraded.

28.4.4 Lower the arm of the apparatus and operate the machine. One full revolution of the crank is considered to be 2 rubs. The speed of the crank should be maintained at one full revolution per second. Each revolution is counted until the specimen nap pull out or a minimum of 50 revolutions (100 rubs) are counted.

28.5 Acceptance Level

28.5.1 Test results may vary from lab to lab; however, fabrics which have passed either of the following minimum criteria have historically performed satisfactorily in the field:

29.0 STANDARDS FOR RELAXED FABRICS

Joint Industry Fabric Standards and Guidelines
Published: 1/96

Due to the development of relaxed fabrics as a major type of upholstery finishing, it is necessary for the JIFSC to establish standards and guidelines for this specific type of fabric. This type of fabric does exhibit and possess characteristics different from regular woven residential upholstery fabric. These standards were established jointly as to the actual parameters of these types of fabric.

29.1 Definition

Relaxed Fabrics – Relaxed/softened fabrics are fabrics that are loom state, softened loom state, softened, relaxed washed, and/or non-straightened fabrics.

29.2 Bow and Skew – Standard – *TIER-R*

All patterned relaxed woven fabrics shall not exceed more than 1.0" of bow or 2.0" inches of skew.

29.3 Elongation – Woven Standard

Acceptance Level:
The minimum allowable elongation is 1.0% and the maximum allowable elongation is 12.0% for relaxed woven upholstery fabrics.

29.4 Repeat Variation – Standard – *TIER-R*

Variation from Roll to Roll

For relaxed woven fabrics having pattern repeats of 13 inches *to 27 inches,* the variation from the specified repeat from roll to roll shall be no greater than + or – 0.75 inch, a total maximum variation of 1.5 inches.

For relaxed woven fabric having pattern repeats less than 13 inches, the variation from the specified repeat from roll to roll shall be no greater than + or – 0.5 inch, a total maximum variation of 1.0 inch.

For relaxed woven fabrics having repeats greater than 27.0 inches, the maximum variation shall be agreed upon at the time of purchase.

Variation Within A Roll:

For relaxed woven fabrics having pattern repeats of 13 inches or more, the variation of actual measurements within a roll should be no greater than 1.0 inch.

For relaxed woven fabrics having pattern repeats of *less than 13 inches*, the variation of actual measurements within a roll shall be no greater than 0.50 inch total variation.

For relaxed woven fabrics having pattern repeats greater than 27.0 inch, the maximum variation shall be agreed upon at the time of purchase.

29.5 Roll Length

The difference between the manufacturer's stated gross yardage and the user's measured gross yardage shall not exceed +/- 3%.

29.6 Roll Width Standard

The relaxed woven fabric shall contain no less than 54 inches of usable fabric, unless initially specified by The fabric supplier and agreed upon by the buyer if less than 54 inched, or no more than 60 inches of total Fabric width (including the selvages) when measured in accordance with the recommended test method.

29.7 With the above exceptions, all other standards and guidelines for relaxed woven fabrics are the same as stated by the JIFSC Woven and Knit Residential Upholstery Standards and Guidelines.

30.0 GUIDELINE FOR FABRIC ROLL UP TUBES

Joint Industry Fabric Standards and Guidelines
Published: 1/01

30.1 Purpose and Scope

In light of the need to conserve resources, simplify material handling, and possibly eliminate landfill refuge, the following guideline was developed. This guideline relates to the physical description of the paper tube used to roll fabric onto. When considering additions or changes to an existing tube, please consider the following guidelines.

30.2 Tube Length in Inches

Inches	**# of Fabric Companies Using**
56	1
1	
57	2
57.25	1
58	5
59	2
60	2
63	1

30.3

Tube inside Diameter	**# of Fabric Companies Using**
1.875	1
2.0	6
2.250	1
2.500	3
2.875	1
3.0	1
4.5	1

30.4 FLAPPED TUBE IS GENERALLY PREFERRED OVER NON-FLAPPED

30.5 CONVOLUTE IS GENERALLY PREFERRED OVER SPIRAL

30.6 LARGE ROLL PUT UP (200 yds+):

* If the tube is to be used for large roll put ups (200 yds+) then the guideline should be 3.0 ID and ¼ wall thickness (for strength requirements). Length would be governed by fabric width and consideration for ease of access to load support mechanisms into the tube ends.