



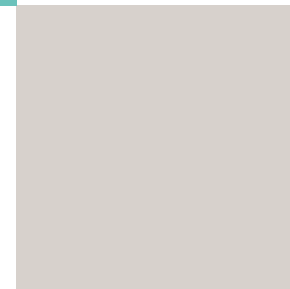
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Technical Training

Standards Alliance Conference

June, 2016
Ellen Roaldi
Instructor

www.astm.org



ASTM Training courses



- ▶ Training is offered in two (2) ways:
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Training for Your Industry

- Building & Construction
- Coal
- Corrosion
- Environment
- Light Sport Aircraft
- Metals
- Oxygen
- Petroleum
- Plastics
- Rubber
- Statistics
- Textiles

Training



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Textiles Training



In- Person Textile Courses (Available on-site only):

In-Person Textile Courses:

- ASTM Textile Standards for Yarns and Sewing Threads (Available on-site only)
- Flammability of Children's Sleepwear: Regulatory Compliance (Available on-site only)
- Flammability of Upholstered Furniture, Mattresses and Bedding Sold in the United States (Available on-site only)
- Flammability of Wearing Apparel: Regulatory Compliance (Available on-site only)
- Textiles: Quality and Performance Standards (Available on-site only)

Textile Training Example



▶ Textile Standards for Yarns and Sewing Threads

- When, why, and how these standards are used by the textile and apparel industry
- About good laboratory practices in the textile industry
- How to develop expertise and practical knowledge in laboratory techniques using selected and accepted fabric and component test methods
- How to calculate the test results and show reporting techniques
- Precision and bias procedures and applications
- Topics covered include:
 - Conditioning Textiles for Testing
 - Mechanical Test Methods
 - Development of Product Specifications and Writing Specifications for Textiles
 - ASTM Tolerances for Yarns (Multifilament Yarn; Yarn Spun on Cotton or Worsted Systems)

Textile Training Example



- ▶ Flammability of Children's Sleepwear: Regulatory Compliance
 - Introduction to course outline:
 - History of the Regulations
 - Recent Activity and Changes to the Regulations
 - Role of CPSC and Their Enforcement Options
 - Legal Responsibility Under the Law
 - What Products Are Covered Under the Regulations
 - Non-Tight Fitting and Tight Fitting Products
 - What Are the Requirements of the Materials Used in Sleepwear
 - Material Flammability Properties and Impact of Test Configuration on Burning Behavior
 - How to Conduct the Tests
 - Understanding the Sampling Plans Required for Testing
 - Record Keeping Requirements of the Regulations
 - Problem Solving Exercises
 - Practices for Marketing Sleepwear Products
 - Business Practices

Good Laboratory Practices



Overview:

Accreditation: Example: ISO 17025 and A2LA: Applicable to Testing and Calibration Organizations

– *Covers technical competency requirements not covered by ISO 9001*

– The Lab must be a legal entity that can be held responsible.

– *To address issues of liability / accountability, uniqueness & independence of operation.*

How is this done?

Good Laboratory Practices



1) Document policies & procedures necessary to assure quality of test results. Documents must be:

- Communicated
- Available
- Understood
- Implemented

2) Proper resources and performance of methods

- Internal audits
- Management review
- Quality analysis
- Proficiency testing
- Participation in management review

Good Laboratory Practices



3) Company should have good document control

- Most recent version accessible to staff
- Document of modifications to procedures
- Control and communication of changes made to procedures

4) Proper equipment and consumables

- Procedures for selection & purchase, reception & storage of reagents & lab consumables
- Verified before use – records maintained
- Purchasing documents contain data describing services & supplies
- Evaluate suppliers

Good Laboratory Practices



5) Records

- Including but not limited to:
 - Calibrations
 - Verifications
 - Training records
 - Maintenance
- All laboratory equipment and reference standards must be under a calibration program
- Calibration is the determination of the output of a testing instrument and the relationship with a standard unit of measurement
- Verification is the periodic confirmation that the testing instrument is still in calibration
- It is recommended that all testing equipment and reference be calibrated by an accredited laboratory

Good Laboratory Practices



6) Equipment

- A calibration program established for quantities / values of instrument where these properties have a significant impact on results
- All Equipment must be verified prior to use
- Dates, results, reports, Certificates of calibration, adjustments, acceptance criteria, due date of next calibration
- Maintenance plan, maintenance carried out to date
- Any damage, malfunction, repair to equipment

**Note the above does not cover all the details of ISO 17025 / A2LA but serves as a guide to laboratories to ensure integrity of the testing they do.



Good Laboratory Practices

▶ Why is this so important?

- Daily the information we deliver assist the customer to make good buying decisions and to verify the products they have contracted. Methods are impacted by conditions, equipment, methods and consumables and proper trainings, calibrations, verifications, etc.
- Repeatability inter-laboratory and between labs is important, thus laboratory procedures are necessary.
- With this in mind, lets look at some common test methods that used for textile testing including:
 - ✓ ASTM D1776
Standard Practice for Conditioning and Testing Textiles
 - ✓ ASTM D3775
TEST METHOD FOR WARP (END) COUNT AND FILLING (PICK) COUNT OF WOVEN FABRIC
 - ✓ ASTM D3776
MASS/UNIT AREA (WEIGHT) OF FABRIC



ASTM D1776

Standard Practice for Conditioning and Testing Textiles

Scope and Terminology



- Why do we condition Textiles?
- What is the Standard Conditions for Textiles
- When is Standard Conditions needed?

Discussion:

- This practice covers the conditioning and testing textiles when conditioning is specified in a test method.

Significance and Use

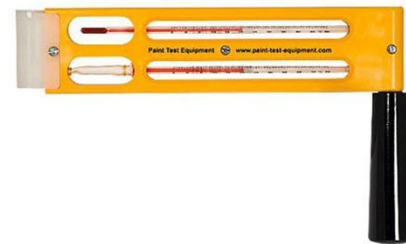


- Condition: to bring a material to moisture equilibrium with a specified atmosphere, the state of condition a textile reaches when it no longer takes up or gives off moisture from the surrounding atmosphere
- Moisture content or regain in a textile material is one of the contributing factors of testing uncertainty and difference in reproducible test results within or between laboratories
- To make reliable comparisons among different materials and laboratories, it is necessary to standardize the temperature and humidity conditions to which the products are subjected

Apparatus



- Conditioning room or chamber consisting of equipment for maintaining the standard atmosphere for testing textiles as specified by the test method or customer specification
- Equipment for maintaining and recording the accurate temperature and relative humidity within the room or chamber.
- Psychrometer for periodically verifying conditions
- Equipment shall be under calibration control



Procedure



- Condition and test the materials as described by test method or customer specification
- Expose the materials in the conditioning atmosphere so that the air will have free access to all surfaces
- Allow materials to reach equilibrium before testing
- If materials are conditioned in a chamber or room other than the testing area, the materials shall be tested within 4 min. after being removed from the conditioned area



Procedure



Examples of Temperature / Humidity Monitoring Devices





ASTM D3775

Test Method for Warp (End) Count and Filling
(Pick) Count of Woven Fabric

Scope and Terminology



- Scope - This test method covers the determination of warp end count and filling pick count of woven fabric
- Warp end count - the number of INDIVIDUAL warp direction yarns per inch in a woven fabric regardless of whether they are single or multiple plied yarns
- Filling pick count - the number of INDIVIDUAL filling direction yarns per inch in a woven fabric regardless of whether they are single or multiple plied yarns

Summary and Significance of Use

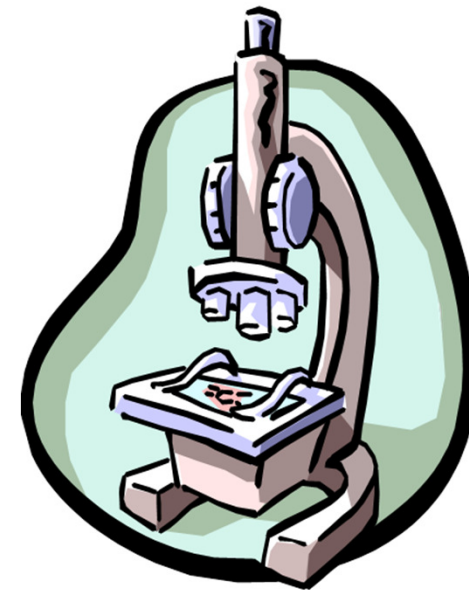


- Summary - the number of individual warp ends and filling picks per inch are counted using suitable magnifying devices or by revealing yarns from fabrics
- Significance of Use - this test method is suitable for acceptance testing and equipment set-up verification
- This test method may be used on all types of woven fabrics
- This method may be used on narrow fabrics when the count across the width is measured in the narrow direction and extrapolated to the count per inch

Apparatus



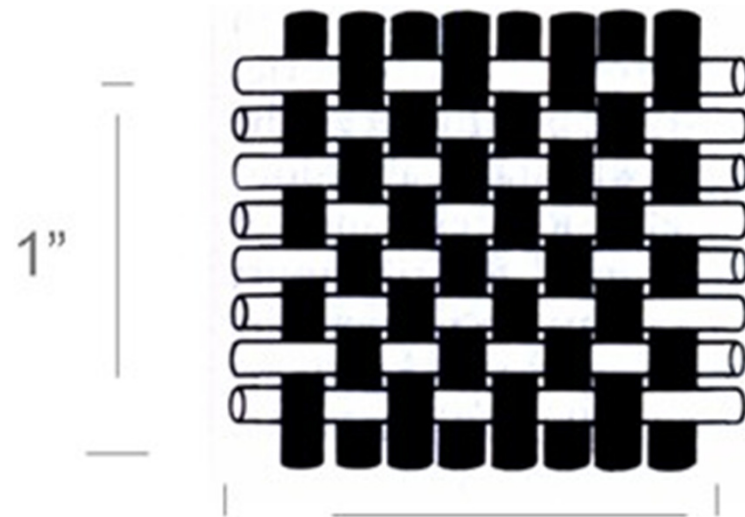
- For this test method, any suitable magnifying device may be used. This may be a pick glass, projection equipment or an optical sensing equipment available commercially
- Use measuring scale graduated in mm (1/16 in) to measure the count of the fabric
- Large needles or other devices may be used to separate the individual yarns to assist in counting



Sampling and Conditioning



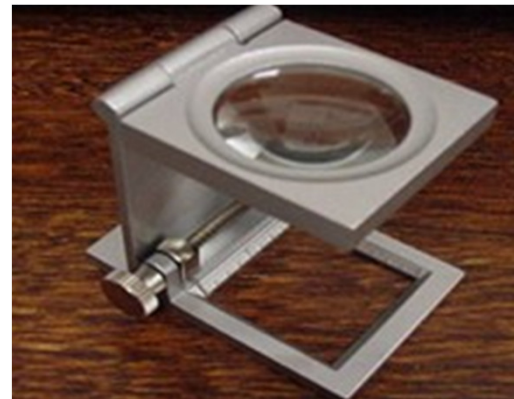
- Select the lot sample as agreed upon. From each element of the lot sample, select a full width specimen from each roll or cut parts
- Condition and test the lab sample or specimens in the environment as directed by the test method or customer specification





Procedure

- Lay the specimens onto a flat surface without folds
- Using the magnifying apparatus count the number of warp yarns (ends) and filling yarns (picks) in five randomly spaced areas diagonally across the width of the fabric or placed on different areas of a cut part. Count a 1 inch (25mm) space. If the construction is less than 25 yarn/inch, count a 3 in. space
- **COUNT INDIVIDUAL WARP ENDS AND FILLING PICKS SEPARATELY, AS A SINGLE UNIT, REGARDLESS OF WHETHER IT IS COMPOSED OF A SINGLE OR PLIED COMPONENT**
- If two or more yarns are laid together in a parallel, count each yarn separately

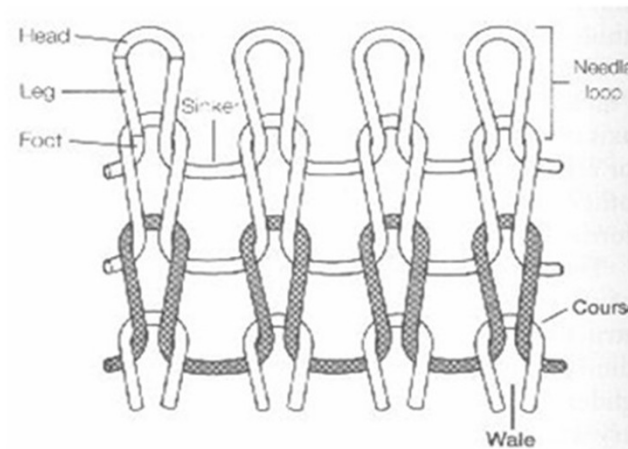
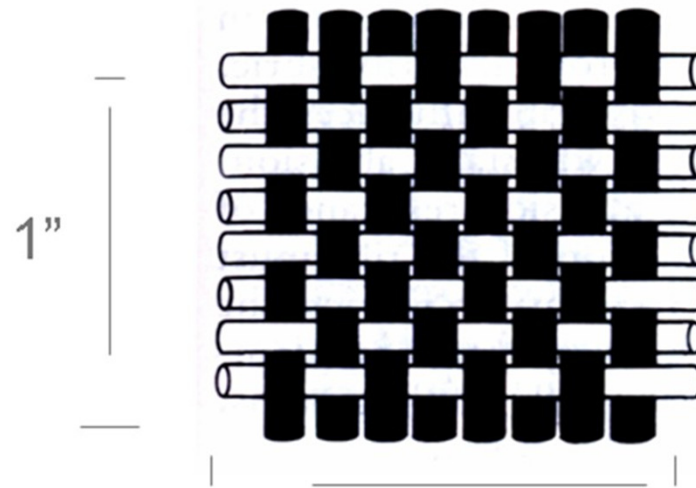
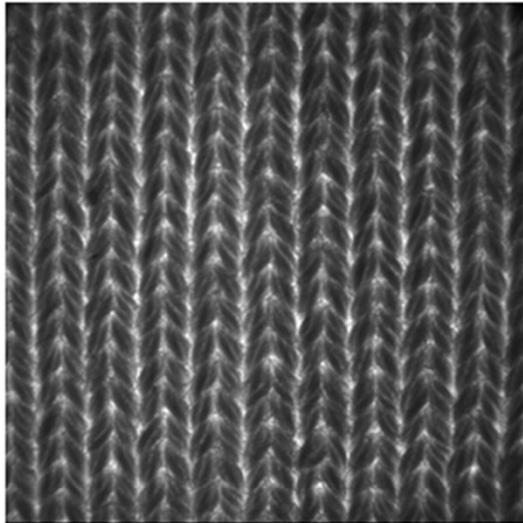


Calculation and Report



- Calculate the average number of warp ends and filling picks determined and report to the nearest individual yarn
- If requested, report the THREAD COUNT as the sum of the average warp ends and filling picks
- Report the average number of warp ends and filling picks in the fabric
- When reporting thread count, report the warp count first and the filling count next- Count 120X95, 215

ASTM D3775 TEST METHOD FOR WARP (END) COUNT AND FILLING (PICK) COUNT OF WOVEN FABRIC





ASTM D3776

Mass/Unit Area (Weight) of Fabric)

Summary of Method Apparatus



- Fabric mass/unit area or weight is determined from the mass of a specimen, the length of the specimen and width of the specimen which have been measured
- Apparatus: calibrated lab balance with the sensitivity to weigh the specimen to $\pm 0.1\%$ of mass
- Cutting die with predetermined size, at least 2in² verify dimensions

ASTM D3776

Mass/Unit Area (Weight) of Fabric



- SCOPE - This test method covers the determination of fabric mass/unit area (fabric weight)
- This method is used to determine fabric weight of specimens cut from rolls of fabric, full width swatches of fabric submitted to the lab, small swatches of fabric cut from products and narrow fabrics
- Fabric weight is expressed as oz/yd² or gm/m². From this information other units may be determined such as linear yards per lb or linear meters per kg

Sampling



- Select the lot sample as directed by the material specification. From the lot sample cut a full width of fabric or swatches from products
- Cut a predetermined size lab specimen from each unit
- The size of the lab specimen may vary between the size of the lab or lot material- full width samples or small swatches from garments or other products

Procedure



- Condition the lab samples as directed by the material specification or test method
- Verify the dimensions of the lab specimens and record and calculate the area in in² or cm²
- Determine and record the mass (weight) of each lab specimen to the nearest 0.1% of its mass in oz or gm

Calculation and Report



- From the determined specimen area and mass, calculate and report the mass/unit area using the following formula:
Mass/Specimen Width X Specimen Length
- Example: Weight 25 g; Dimension 10X10 cm
 - $25\text{g}/10\text{X}10\text{ cm} = 0.25\text{ g/cm}^2$
 - Calculate $\text{g/m}^2 = \text{g/cm}^2 \times 100 = 25\text{ g/m}^2$

ASTM D3776

Mass/Unit Area (Weight) of Fabric

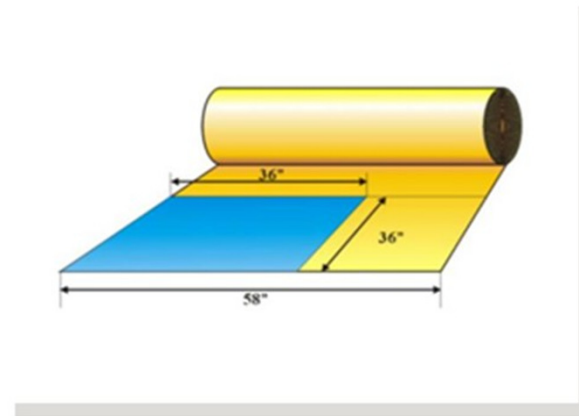


The measurement of mass per unit area of textile fabrics in garment or piece goods form. It is determined by the fabric count and the yarn size

$$\text{Ounce per square yard (oz / yd}^2\text{)} = \frac{\text{Weight in oz}}{\text{Unit area in sq yard (36'' x 36'')}}$$



Die Cutter





ASTM D737

Air Permeability

ASTM D737 Air Permeability



- This method covers the measurement of air permeability of most textile fabrics
- Air permeability is the rate of air flow through a known area under a prescribed air pressure
- This method may be used to determine the air permeability of most fabrics. Care must be taken when testing heavy layered or coated fabrics so as to not exceed the limits and damage the test equipment. Follow the equipment manufacturers' guide lines

Significance and Use



- Air permeability is an important variable of many types of fabrics: filters, automotive air bags, parachutes, clothing and recreational materials.
- It may also be used to determine the breathability of coated fabrics and weather resistant materials
- Fabric and end use products performance specifications will describe the air permeability requirements.
- Permeability is determined by fabric construction and finishing techniques.

Apparatus



Equipment for determining air permeability is commercially available and must consist of the following:

- Test head to provide a circular test area of 38 cmsq or other test areas described in the specification



Apparatus



- Clamping system to secure the test specimen with suitable means to minimize edge leakage
- Means of drawing the prescribed air flow with a pressure gage and flow meter

Equipment Set-up and Calibration



- Set up and perform routine verification as directed by the equipment manufacturer using the supplied calibration jig or internal reference material. The set up procedures and control limits will be provided by the manufacturer. Maintain a verification log for the instrument.
- Routine verification is an intermediate test between calibrations to insure that the apparatus is still within the calibration limits.

Procedure



- Condition and test the material in the standard atmosphere for testing textiles.
- Turn the test instrument on and allow to warm up for a minimum of 10 minutes. Adjust the pressure to specified requirement
- Place the test specimen on the test head area. If the material is coated place the coated side down
- Clamp the test specimen and initiate the procedure
- Read and record the air perm in SI or IN/LB units



ASTM D1424

Tearing Strength Elmendorf

ASTM D1424

Tearing Strength Elmendorf



- Scope: This method covers the determination of tearing strength of fabric by falling pendulum or Elmendorf apparatus
- Tearing strength is the resistance of a fabric to withstand a tearing force required to propagate a tear after its initiation

Significance and Use



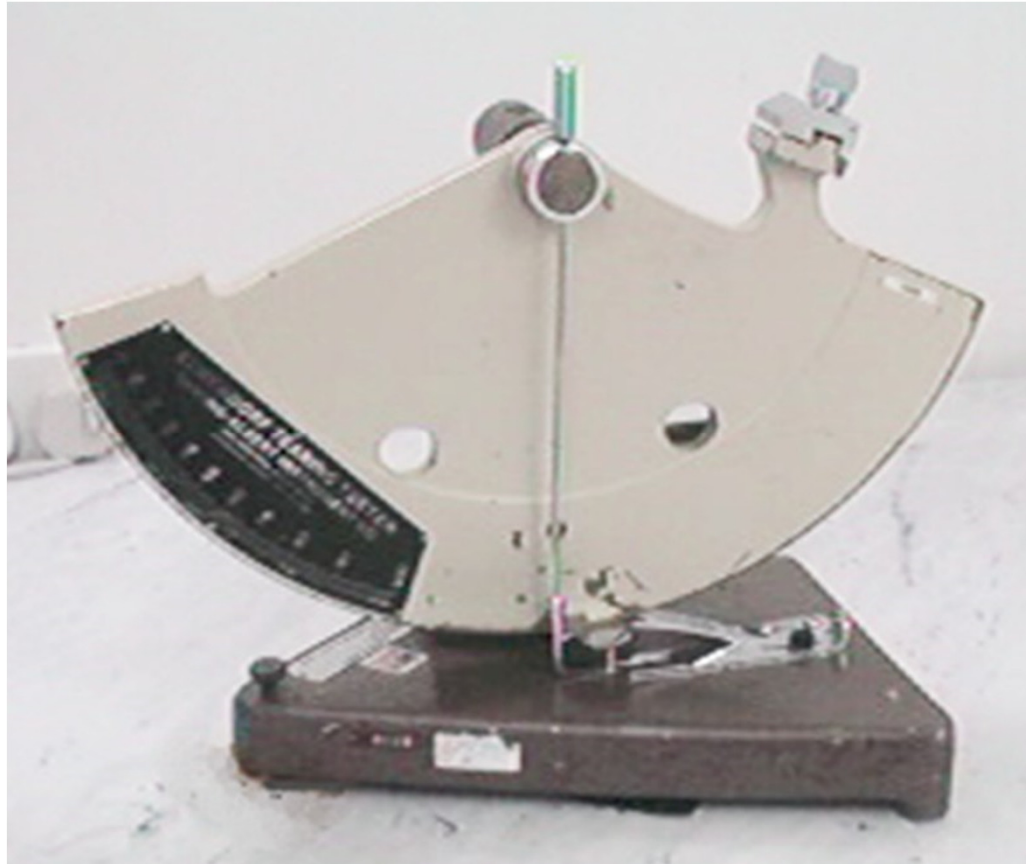
- This test for determination of tear strength is used extensively through the trade and applies to most fabric types. This test is suited for the machine direction of warp knit fabrics and not suited for either direction of other types of knit fabric.
- This test may be used for acceptance testing of commercial shipments of fabrics. By agreement, an interlaboratory study may need to be conducted to determine any bias between laboratories.



Apparatus

- Falling pendulum (Elmendorf) type tear tester consisting of a stationary clamp, a clamp carried on a pendulum, and interchangeable weights
- A knife mounted centrally between the two clamps used for initial slitting of the specimen
- The tester may have a pointer and scale mounted on the same axis as the pendulum or a load cell with microprocessor to determine tear strength
- Gages from the manufacturer to set the cutting blade, jaw spacing and calibration weights

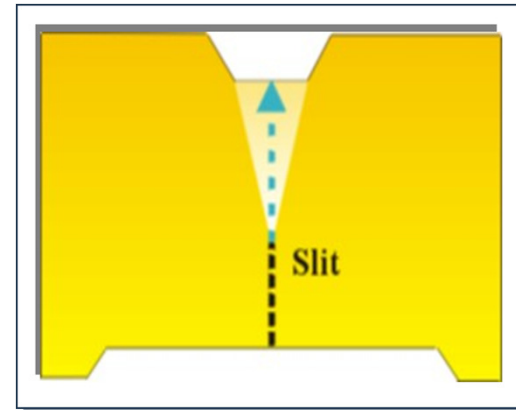
Apparatus



Summary of Test Method



- A 20mm slit is centrally cut in a test specimen held between two clamps and a force is applied which propagates the slit as a tear through the specimen.



- The resistance to tearing is either factored into the equipment scale using the pendulum capacity or read from a digital display computed by the microprocessor within the instrument. The resistance is recorded as the tearing strength of the specimen

Sampling and Equipment Preparation



- Select a lot and lab sample as described by the product specification. Condition the specimens in the specified atmosphere described by the specification
- Select a test force range such that the tear occurs between 20 and 80% of the instrument full scale load
- Verify the calibration of the selected pendulum load
- When using a microprocessor to gather data, set the stated test parameters as described by the manufacturer's instructions

Procedure



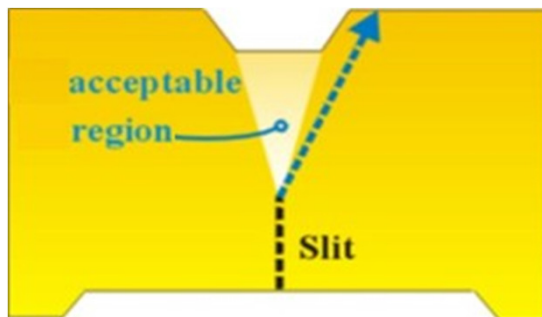
- Level the instrument and position the pendulum to the starting position and the force reading mechanism to the zero point
- Carefully position the specimen centrally in the clamps with the bottom edge set against the stops and the upper edge parallel to the top of the clamps.
- Close the clamps and using the tester slitting device initiate the cut.
- Depress the pendulum stops and allow the tear to be completed its forward swing
- Record the data from the scale or microprocessor

Calculation and Preparation

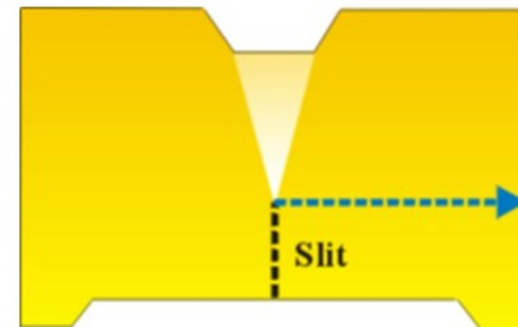


- Calculate the tearing strength of all specimens as directed by the manufacturing instructions
- Calculate the tearing strength in both the warp and filling directions as an average of all determinations
- Reject any test determination in which the specimen slips in the clamps or the tear deviates more than 6mm from the projection of the original slit

Acceptable



NOT Acceptable



- Report the calculated values of warp and filling direction tear strength in either SI or IN/LB units



ASTM D 2261

Tearing Strength of Fabric by Single Leg,
Tongue Procedure

Significance and Use



- This test method is satisfactory for acceptance testing
- The force registered in a tear test is irregular and empirical methods have been developed to obtain tear strength. The reported values reflect comparative performance of similar fabrics tested in the same way. No known procedure is available that can be used with all fabrics to determine the minimum breaking strength
- Depending on the nature of the fabric, the data recording device will show the tear force in the form of a peak or peaks referred to as a “saw-tooth” diagram. The high peaks appear to reflect the strength of yarn components either individually or in combination needed to stop a tear in the fabric

ASTM D 2261 Tearing Strength of Fabric by Single Leg, Tongue Procedure



- Scope - this test method describes the determination of the tearing strength of fabrics by the single leg rip procedure
- This test method applies to most types of woven, non-woven and knit fabrics
- Tear strength as determined in this test method requires that the tear be initiated before testing
- Tear strength may be reported either as the single-peak force or the average of the five highest peaks

Summary of Test Method



- A rectangular specimen is cut in the middle of the short edge forming a trouser shaped specimen
- One leg is placed in the upper clamp jaw of a tensile testing machine and the other leg is placed in the lower clamp jaw.
- The test is initiated and the separation of the jaws, propagating the tear
- At the same time the tear force is developed
- The test is continued through a determined distance

Apparatus



- Tensile testing machine, preferably CRE type with automatic recording device



- Clamps having all gripping surfaces flat and parallel capable of preventing slipping of the specimen
- Clamp jaws measuring at least 25X75mm with the longer dimension perpendicular to the direction of application of force. The jaw surfaces may be coated or serrated to minimize slippage

Sampling and Test Specimens



- Select the number of items from the lot as stated in the material specification. From the lot sample, take a 1 meter swatch or garments as the lab sample
- From each lab sample unit take five specimens from each of the warp and filling directions
- Cut rectangular specimens 75X200mm with the warp direction parallel to the filling yarns and the filling direction parallel to the warp yarns
- Make a preliminary cut 75mm long in the center of the long direction

Preparation of Test Equipment



- Verify the calibration of the test instrument as directed by the equipment manufacturer
- Set the distance between the clamps at 75 ± 1 mm
- Set the force range of the tester so that the maximum force occurs between 10 & 90% of full scale
- Set the test speed as agreed on between the two parties, usually 50 ± 2 mm/m or 300 ± 10 mm/min. Other speeds may be used by agreement

Procedure

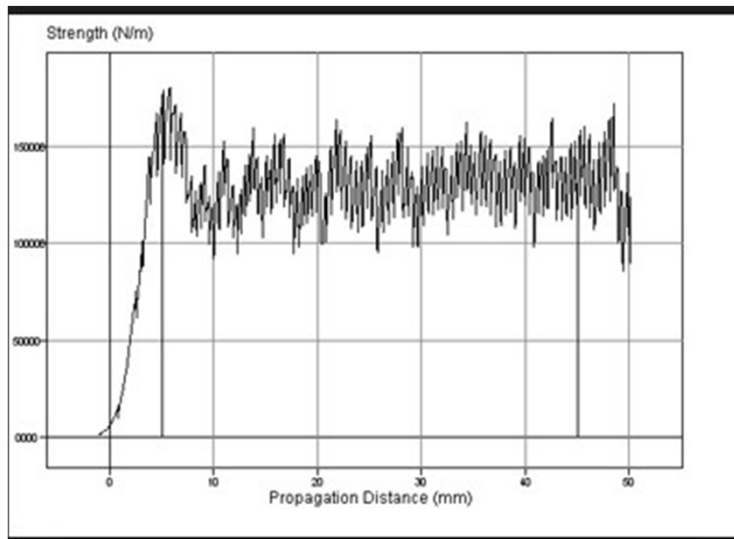


- Condition the specimens and test in the standard conditions
- Place one leg of the cut specimen between the top clamp jaws and one leg between the bottom clamp jaws so that the cut edges of the legs are centered in the clamp jaws. Close the clamp jaws
- Start the test and record the tearing force as the tear moves for 75 mm through the specimen
- The tear force may show as a single maxima or show several maxima

Calculation and Report



- For specimens exhibiting five peaks or more, after the initial peak, average the five highest peaks unless otherwise stated in the specification as the tearing force
- For specimens exhibiting less than five peaks, record the highest peak as the tearing force



- Report the tearing force for each direction of the specimens



ASTM D1683

Failure of Seams

ASTM D1683 Failure of Seam



- Scope: this method determines the sewn seam strength in woven fabrics by applying a force perpendicular to the direction of sewn seam
- This method is applicable to seams sewn in lab specimens or seams removed from sewn articles
- This method may be used to determine seam slippage
- Force is applied to the sewn seam until the seam ruptures either by ASTM D5034 or ASTM D5035

Significance and Use



- This test method may be used to determine the sewn strength in fabric or finished assemblies and to compare different types of seam/stitch constructions. Seam efficiency may be determined as a % of the seam strength divided by fabric strength.
- Due to the differences in fabric constructions, seam types, sewing threads and end use applications, the seam construction must be determined by regulatory or specification requirements, and contract review.

Terminology and Definitions



- Seam Failure- the point at which an external force causes: rupture of sewing thread; ruptures the fabric; causes seam slippage; or a combination

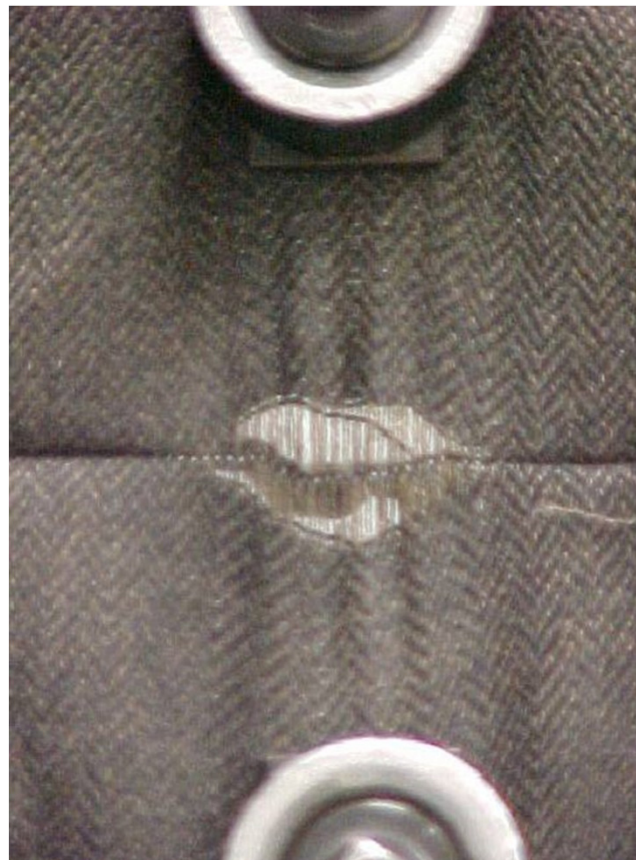


- Needle Damage- the severance of a yarn or fusing caused by the needle passing through the fabric during sewing

Terminology and Definitions



Slippage - the displacement of one or more yarns in the fabric specimen from their original position in the construction



Apparatus and Materials



- Tensile testing machine as directed by ASTM D5034 or ASTM D5035
- Sewing machine with necessary accessories capable of constructing the seam and stitch construction described in the specification and/or contract. In the absence of a contract follow directions in ASTM D1638 Table 1
- Sewing thread as directed by the specification and/or contract

Specimen Preparation and Testing



- Determine the number of lab specimens to be tested as described by the specification. If specimens are taken from assemblies, follow specification
- Prepare the test specimens as described in the specification. The seams may be prepared by sewing the warp to warp direction, filling to filling to filling direction or warp to filling direction. Seams from finished assemblies may be radial or straight seams
- Test the sewn seam as directed by ASTM D5034 with the seam placed centrally between the upper and lower clamps

Calculation and Reporting



- Seam strength is calculated and reported by averaging the 5 determinations for each direction
- Seam efficiency is calculated and reported as % by dividing the seam strength by fabric strength X100
- If seam slippage is determined, follow directions in ASTM D1683



ASTM D5489

Care Label Symbols










































ASTM D5489 Care Label Symbols



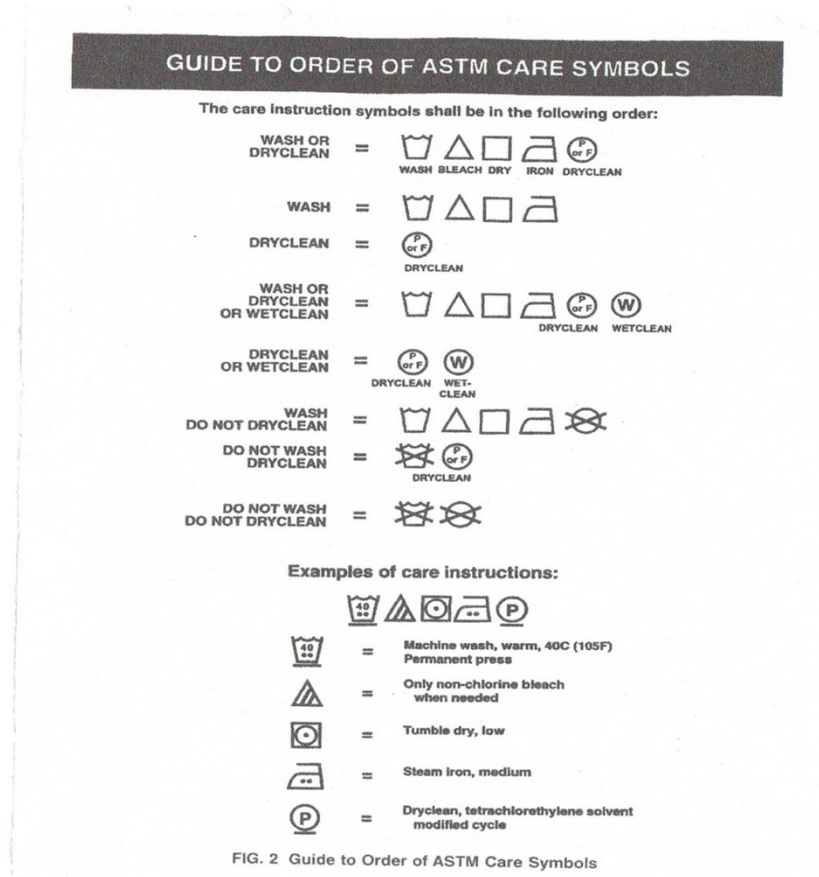
- This guide provides uniform system of symbols shown on the care label of textile articles is in harmony with 16 CFR 423, US Federal Trade Commission Care Labeling Rule and industry practice
- The five basic care label symbols are concurrent with ISO 3785 which are: washing, bleaching, drying, ironing and professional care by dry cleaning or wet cleaning
- This guide provides a comprehensive system of care label symbols reducing language-dependent care instructions
- This guide provides care label symbols for their use conveyed in simple, space-saving and easily understood pictorial format



ASTM D5489 Care Label Symbols

ASTM GUIDE TO CARE SYMBOLS															
 Wash	Machine wash   	Cycles normal permanent press delicate / gentle	 hand wash	Warning symbols for laundering  do not wash  do not bleach  do not dry (used with do not wash)  do not iron											
	Water temperatures (maximum) symbol (s) dots & °C. <table border="1" data-bbox="945 657 1197 722"> <tr> <td>(200F)</td> <td>(166F)</td> <td>(140F)</td> <td>(120F)</td> <td>(105F)</td> <td>(85F-85F)</td> </tr> <tr> <td>95 ●●●●</td> <td>70 ●●●</td> <td>60 ●●</td> <td>50 ●●●</td> <td>40 ●●</td> <td>30 ●</td> </tr> </table>	(200F)	(166F)		(140F)	(120F)	(105F)	(85F-85F)	95 ●●●●	70 ●●●	60 ●●	50 ●●●	40 ●●	30 ●	
(200F)	(166F)	(140F)	(120F)	(105F)	(85F-85F)										
95 ●●●●	70 ●●●	60 ●●	50 ●●●	40 ●●	30 ●										
 Bleach	 	Bleach when needed any bleach only non-chlorine/oxygen bleach		Additional instructions (in symbols or words)  do not wring  do not tumble dry  dry flat  in the shade (added to line dry, drip dry, or dry flat)  no steam (added to iron)											
	 Dry	Tumble dry   	Cycles normal permanent press delicate / gentle		 line dry / hang to dry  drip dry  dry flat										
Heat settings     		any heat high medium low no heat/air													
 Iron	Iron when needed dry or steam   	Heat settings high medium low													
	 Professional Textile Care	Dryclean normal cycle mild cycle  		Do not dryclean 	Wetclean normal mild very mild   										
tetrachloroethylene or petroleum solvent		petroleum solvent only		Do not wetclean 											

Order of Care Label Symbols



Example of Care Labeling



Supplementary Information



- Additional care information may be written in brief appropriate national language to convey special instructions not covered by care label symbols. The symbol information and detailed written instructions shall be consistent
- It is the responsibility of the manufacturer or importer to provide correct information on the label
- The care label shall be visible and permanently attached for the life of the article



Safety Specifications for Children's Outerwear

ASTM F1816 Standard Safety Specification for Drawstring on Children Upper Outerwear

ASTM F1816 Standard Safety Specification for Drawstring on Children Upper Outerwear



- Rational For Specification:
 - Potential Strangulation Hazard- the US CPSC has documented reports, including deaths, in which hood and neck drawstrings have become caught on various external objects resulting in near or actual strangulation.
 - Vehicular Dragging Hazard- the US CPSC has received a number of reports in which waist or bottom drawstrings have become snagged on vehicle areas and before the child or driver realized this the child was dragged away. Or was run over.

Scope



- This specification covers in is intended to reduce strangulation and vehicular dragging hazards associated with drawstrings on children's upper outerwear
- Upper outerwear- clothing such as jackets and sweatshirts intended to we worn on the exterior of other clothing in sizes 2T to 16 for waist/bottom drawstrings



Performance Requirements



- There shall be no drawstring in the hood and neck area of children's upper outerwear size 2T to 12
- Drawstrings at the waist and bottom of children's upper outerwear size 2T to 12 shall: not exceed 3 in. (75mm) in length; have no knots, toggles or other attachments at the free end; be bartacked (the stitching through the drawstring and channel at the back center of the channel) if the drawstring is one continuous string





Infant Bedding Accessories

ASTM F1816

ASTM F1917

ASTM F1917 Consumer Safety Performance Specification for Infant Bedding and Accessories



- Rational: Non-mandatory Information
- The intent of this requirement is to limit the maximum thickness of infant crib bumpers. The CPSC has stated that pillows and bumper pillow like articles in an infant's sleeping environment should be regarded as potentially suffocation hazards
- Infant bedding accessories attached to bumper guards for the purpose of attachment shall have maximum allowable lengths

Performance Requirements



- Attachment means on bumper guards shall not exceed 9.0 inch (230mm); decorative components shall not exceed 7 in (180mm); bumper guards shall be capable of being secured at corners and midpoint
- Unsupported vinyl, flat sheet material, that is accessible to an infants shall be a minimum of 0.012in (0.30mm)
- Maximum bumper thickness for crib bumpers shall pass through the gage listed in ASTM F1917
- Tie strength follow specification and not detach

Test Methods



- Vinyl thickness- use a calibrated micrometer or suitable thickness gage and measure the thickness at 4 points over the article area, one at each end and two in the middle
- Bumper thickness- use the Bumper Thickness Test Fixture and attach a 5 lbs static weight. Keep the bumper positioned vertically and allow the weight to draw the bumper through the opening

Test Methods



- Bumper tie attachment strength- apply a 20 lb. tensile force on the attachment within 5 sec and maintain for additional 10sec. The attachment shall not detach

Product/Package Marking



- Each product shall have a permanent conspicuous label that identifies the manufacturer, distributor, or seller, or identifies the Registered Id Number or Wool Products labeling Act Number
- A permanent conspicuous label shall be on each infant bedding and related accessory shall be in ANSI format and comply with all regulatory requirements with the information and/or pictorial diagrams for crib bumpers, fabric wall hangings, mattress covers, flat covers, pillows, diaper stackers and fitted sheets