



# Guidelines for Legwear, Hosiery, and Sock Testing

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*Developed in collaboration with the Manufacturing Solutions Center*



## Preface

The Guidelines for Legwear, Hosiery, and Sock Testing establishes testing standards for the industry and its lab partners. This document covers a range of legwear, hosiery, and sock testing issues, including product safety, labeling, and physical attributes. The standards were developed in partnership with the Manufacturing Solutions Center.

# Guidelines for Legwear, Hosiery, and Sock Testing

## Version 1.0

### 1. Scope

- 1.1. This document covers all types of knitted hosiery material produced on hosiery knitting machines.

### 2. Referenced Documents

#### 2.1. AATCC Standards<sup>1</sup>

- 20: Fiber Analysis: Qualitative
- 20A: Fiber Analysis: Quantitative
- 8: Colorfastness to Crocking: Crockmeter Method
- 15: Colorfastness to Perspiration
- 61: Colorfastness to Laundering: Accelerated
- 116: Colorfastness to Crocking: Rotary Vertical Crockmeter Method
- AATCC/ASTM TS-001: Quick Methods for Colorfastness to Chlorine and Non Chlorine Bleach
- AATCC/ASTM TS-007: Procedure for Colorfastness to Home Launderings
- Monograph M6: Standardization of Home Laundry Test Conditions
- Evaluation Procedure No. 1: Gray Scale for Color Change
- Evaluation Procedure No. 2: Gray Scale for Staining
- Evaluation Procedure No. 8: AATCC 9-Step Chromatic Transference Scale

#### 2.2. Legwear Standards<sup>2</sup>

- MSC111: Fiber Analysis Test Method for Socks – De-knitting Method
- MSC114: Hosiery Fit Consortium Standard Fit & Sizing Methods
- MSC115: Hosiery Fit Consortium Use of NAHM Foot Forms
- MSC116: Hosiery Fit Consortium Sock Sizing Procedures for HIFOMACO LCS 4800
- Fit Consortium Sock Sizing Procedures for HIFOMACO Model HT-36L
- Fit Consortium Sock Sizing Procedures for Dinema DSC
- Fit Consortium Sock Sizing Procedures for Dinema DSC Version 3
- Shoe Size vs. Sock Size Chart

[http://www.legsource.com/Hosiery\\_Consortium\\_Testing/shoe-size-vs-sock-size.html](http://www.legsource.com/Hosiery_Consortium_Testing/shoe-size-vs-sock-size.html)

#### 2.3. Federal Standards<sup>3</sup>

- 16 CFR 1501: Method for Identifying Toys and Other Articles Intended for Use by Children Under 3 Years of Age Which Present Choking, Aspiration, or Ingestion Hazards Because of Small Parts
- 16 CFR 1610: Standard for the Flammability of Clothing Textiles

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<sup>1</sup> For referenced AATCC standards, contact the American Association of Textile Chemists and Colorists, PO Box 12215, Research Triangle Park, NC 27709.

<sup>2</sup> For referenced Legwear standards, visit

[http://www.legsource.com/Hosiery\\_Consortium\\_Testing/sock\\_testing\\_methodology.htm](http://www.legsource.com/Hosiery_Consortium_Testing/sock_testing_methodology.htm)

<sup>3</sup> For referenced Federal Standards, contact the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

CPSC-CH-E1002-08.3: Standard Operating Procedure for Determining Total Lead (Pb) in Nonmetal Children’s Products

CPSC-CH-E1003-09.1: Standard Operating Procedure for Determining Lead (Pb) in Paint and Other Similar Surface Coatings

Unless otherwise indicated the latest version of the test methods should be followed.

### 3. Terminology

- 3.1. Sock type garments include but are not limited to:
  - 3.1.1. Garments below 300 needle
- 3.2. Pantyhose type garments include but are not limited to:
  - 3.2.1. Garments 300 needle and above
- 3.3. Leg Warmers, Knee Warmers, Leggings, Footless Tights
- 3.4. For definitions of hosiery terms used in this performance specification, refer to <http://www.legsource.com/hosiery-glossary.htm#.UOLHVLfQfnY>

### 4. Significance and Use

- 4.1. Hosiery products should be tested according to the methods listed in the tables below.
  - 4.1.1. Table 1 lists standards that require “MANDATORY” third party testing by a CPSC approved lab for products sold in the U.S.
  - 4.1.2. All other tables list standards that do not require “mandatory” third party testing for products sold in the U.S. The standards are recommended or optional.
  - 4.1.3. This guide does not address state level or packaging requirements.
    - 4.1.3.1. For information on restricted substances, please see AAFA’s Restricted Substances List. <https://www.wewear.org/industry-resources/restricted-substances-list/>
    - 4.1.3.2. For information on toxics in packaging, reference TIPC. <http://toxicsinpackaging.org/>
- 4.2. Hosiery can be produced with almost endless construction variations. Function, fashion, price point, etc. dictate the end use of a hosiery product. Therefore, not all hosiery products will conform to all the requirements of Table 1.
- 4.3. These are recommended test methods, and are not limited to the test methods listed.
- 4.4. These recommendations are not intended for hosiery compression garments.

**Table 1**

<b>CPSIA MANDATORY TESTING:</b>	<b>Test Method:</b>
<u>Flammability</u> <ul style="list-style-type: none"><li>• Test flammability as directed in 16 CFR 1610.</li><li>• Socks and hosiery are within the scope of 16 CFR 1610 and must be tested for flammability, unless exempted based on fabric weight or fiber content, as specified in the regulation.</li><li>• Socks, where pile or raised surfaces are marketed as exposed, must be tested, unless exempt by fiber content.</li></ul>	16 CFR 1610

<ul style="list-style-type: none"> <li>Based on the statement from 16 CFR 1610.34 (a) only uncovered or exposed parts of wearing apparel shall be tested. Therefore, socks with pile on the inside should not be tested.</li> <li>Testing of the internal surface, even when it is raised (example: terry), must be considered ONLY if the internal surface is marketed to be exposed to the outside during regular wear (design features such as a rolled cuff, etc.).</li> <li>Floats and yarn ends from toe seams on the inside of socks are not intentionally raised fibers. Therefore, they do not need to be tested and it is not expected that a customer would wear this type of sock inside out during normal use.</li> </ul>	
<p><u>Phthalates</u></p> <ul style="list-style-type: none"> <li>Should not be tested on socks as they are not considered to be children’s toys or child care articles.</li> </ul>	
<p><u>Lead Testing</u></p> <ul style="list-style-type: none"> <li>Lead testing of non-textile substrates and surface coatings: <ul style="list-style-type: none"> <li>To be tested on kids socks only.</li> </ul> </li> </ul>	CPSC-CH- E1002-08.3 CPSC-CH- E1003-09.1
<p><u>Applied Decorations</u> (when there is a decoration/attachment)</p> <ul style="list-style-type: none"> <li>Test only on sock type garments intended for children 3 years and under.</li> </ul>	16 CFR 1501

**Table 2**

<b>LABELING TESTING:</b>	<b>Test Method:</b>
<p><u>Fiber Content</u></p> <p>Sock type garments:</p> <ul style="list-style-type: none"> <li>Option 1 – De-knit method: <ul style="list-style-type: none"> <li>Must be completely de-knit starting at the toe or top per manufacturing techniques. Punch outs are not acceptable for socks due to the potential complexity of sock manufacturing.</li> <li>Separate out all different areas – toe, foot arch support, heel, boot, leg, top, etc.</li> <li>Weigh each section and determine the content.</li> </ul> </li> </ul> <p>For pantyhose type garments:</p> <ul style="list-style-type: none"> <li>Cut each area of the sheer/tight into sections – panty, run guard, leg, etc.</li> <li>Weigh each section.</li> <li>Take representative areas from each section and determine the content.</li> </ul>	MSC-111 AATCC 20 AATCC 20A 16 CFR 300 16 CFR 303
<b>PHYSICAL/DURABILITY PROPERTIES TESTING:</b>	<b>Test Method:</b>
<p><u>Fit Properties</u></p> <p>For sock type garments:</p> <ul style="list-style-type: none"> <li>Test following the test method for using NAHM Foot Forms: <ul style="list-style-type: none"> <li><a href="http://www.legsource.com/Hosiery_Consortium_Testing/nahm_foot_form.htm">http://www.legsource.com/Hosiery_Consortium_Testing/nahm_foot_form.htm</a></li> </ul> </li> </ul>	Hosiery Fit Consortium Testing Method

<ul style="list-style-type: none"> <li>○ <a href="http://www.legsource.com/Hosiery_Consortium_Testing/sock_sizing_method.htm">http://www.legsource.com/Hosiery_Consortium_Testing/sock_sizing_method.htm</a></li> <li>○ Using 1990 NAHM forms before and after home laundering 3 times following customer provided laundering instructions with 1993 AATCC Standard Reference Detergent with or without Optical Brightener.</li> <li>● For determining Shoe Size vs. Sock Size in the U.S.: <ul style="list-style-type: none"> <li>○ <a href="http://www.legsource.com/Hosiery_Consortium_Testing/shoe-size-vs-sock-size.html">http://www.legsource.com/Hosiery_Consortium_Testing/shoe-size-vs-sock-size.html</a></li> </ul> </li> <li>● Optional Testing: Follow test method for cross &amp; length stretch: <ul style="list-style-type: none"> <li>○ <a href="http://www.legsource.com/Hosiery_Consortium_Testing/fit_home.htm">http://www.legsource.com/Hosiery_Consortium_Testing/fit_home.htm</a></li> <li>○ Using an approved stretch device before and after home laundering 3 times with 1993 AATCC Standard Reference Detergent with or without Optical Brightener.</li> </ul> </li> </ul>	
<p><u>Dimensional Change/Stability/Shrinkage</u></p> <ul style="list-style-type: none"> <li>● Do not perform the traditional Dimensional Change (AATCC 150) on legwear products due to the boarding process during manufacturing.</li> <li>● Test fit properties before and after laundering as stated above.</li> <li>● Optional Testing: Follow test method for cross &amp; length stretch: <ul style="list-style-type: none"> <li>○ <a href="http://www.legsource.com/Hosiery_Consortium_Testing/fit_home.htm">http://www.legsource.com/Hosiery_Consortium_Testing/fit_home.htm</a></li> <li>○ Using an approved stretch device before and after home laundering 3 times with 1993 AATCC Standard Reference Detergent with or without Optical Brightener.</li> </ul> </li> </ul>	
<b>COLORFASTNESS PROPERTIES TESTING:</b>	<b>Test Method:</b>
<p><u>Crocking</u> Determine the colorfastness to crocking as directed in AATCC Test Method 8 or AATCC Test Method 116 for localized high patterns/prints.</p>	AATCC 8 AATCC 116
<p><u>Perspiration</u> Determine the colorfastness to perspiration as directed in AATCC Test Method 15.</p>	AATCC 15
<p><u>Laundering</u> Determine the colorfastness to laundering as directed in the applicable procedure of AATCC Test Method 61.</p> <ul style="list-style-type: none"> <li>● Test using 1993 AATCC Standard Reference Detergent without Optical Brightener.</li> <li>● Test sample according to laundering instructions: <ul style="list-style-type: none"> <li>○ For “Machine Wash Cold” use Option 2A at 80°F.</li> </ul> </li> <li>● If sample does not perform well for staining, evaluate using laundering instructions following AATCC/ASTM TS-007.</li> </ul>	AATCC 61

<p><u>Sodium Hypochlorite (Chlorine) Bleach</u> Determine the colorfastness to Chlorine Bleach as directed in AATCC/ASTM TS001.</p> <ul style="list-style-type: none"> <li>• If the care instructions state “only non-chlorine bleach when needed,” check fiber content for presence of spandex and/or wool. If spandex or wool are present, do not test for colorfastness to chlorine bleach as it will break down these fibers.</li> <li>• If the fiber content does not contain “Spandex” and/or wool, test for Chlorine Bleach.</li> </ul>	AATCC/ ASTM TS-001
<p><u>Non-Chlorine Bleach</u> Determine the colorfastness to Liquid Non-Chlorine Bleach as directed in AATCC/ASTM TS001.</p>	AATCC/ ASTM TS-001

## 5. Referenced Documents for Special Testing/Optional Testing

### 5.1. ASTM Standards:<sup>4</sup>

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

E2149 Standard Test Method for Determining the Antimicrobial Activity of Immobilized Antimicrobial Agents under Dynamic Contact Conditions

### 5.2. AATCC Standards:

81: pH of the Water-Extract from Wet Processed Textiles

100: Antibacterial Finishes on Textile Materials: Assessment of

107: Colorfastness to Water

112: Formaldehyde Release from Fabric, Determination of: Sealed Jar Method

147: Antibacterial Activity Assessment of Textile Materials: Parallel Streak Method

### 5.3. Legwear Standards:

Sock Consortium Martindale Abrasion Test Method

Measuring Float Loop Length and Pattern Yarn Strings on Socks

### 5.4. Other Standards Referenced:

DIN V 53160-1<sup>5</sup>: Colorfastness to Saliva; Determination of the colorfastness of articles in common use Part 1: Resistance to artificial saliva

JIS L 1041<sup>6</sup>: Test methods for resin finished textiles

### 5.5. Unless otherwise indicated the latest version of the test methods should be followed.

**Table 3**

<b>SPECIAL CLAIMS (As necessary to substantiate claims on packaging):</b>	<b>Test Method:</b>
<p><u>Antimicrobial/Antibacterial</u> (when a claim is made): Depending on the treatment and market:</p>	<p>ASTM E2149 AATCC 100 AATCC 147</p>

<sup>4</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org)

<sup>5</sup> For referenced DIN standards, visit the DIN website, <http://www.din.de/en>

<sup>6</sup> For referenced JIS standards, visit the JIS website, <https://www.jisc.go.jp/eng/>

<ul style="list-style-type: none"> <li>• Articles which make or imply a health claim need to be registered with the EPA in accordance with 40 CFR 152.</li> <li>• Articles that only make non-public health claims can be exempt under FIFRA if specific conditions are met. The EPA considers the terms “antimicrobial,” “fungistatic,” “mildew-resistant,” and “preservative” as being acceptable for exempted treated articles.</li> <li>• Proof of efficacy is needed for registered as well as exempted articles. Depending on the treatment the following test methods are recommended: <ul style="list-style-type: none"> <li>○ ASTM E2149</li> <li>○ AATCC 100</li> <li>○ AATCC 147</li> </ul> </li> </ul>	
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**Table 4**

<b>OTHER/ADDITIONAL LEGWEAR TESTING (As Necessary):</b>	<b>Test Method:</b>
<u>Colorfastness to Water</u> Determine the colorfastness to water as directed in AATCC Test Method 107.	AATCC 107
<u>Colorfastness to Saliva</u> (Test for infant legwear only). Determine the colorfastness to Saliva as directed in DIN V 53160-1.	DIN V 53160-1
<u>Float Length</u> (Test only on sock type garments intended for sale to children). Determine the Float Length as directed in Measuring Float Loop Length and Pattern Yarn Strings on Socks.	Hosiery Consortium Float Length Testing Method
<p><u>pH</u></p>	AATCC 81
<u>Formaldehyde</u> <ul style="list-style-type: none"> <li>• Spot method.</li> <li>• For hydrolyzed testing use JIS L 1041.</li> <li>• For free formaldehyde testing use AATCC 112.</li> </ul>	JIS L 1041 AATCC 112
<u>Abrasion</u> – Tested on sock type garments only. Determine the Abrasion Resistance as directed in Sock Consortium Martindale Abrasion Test Method. <ul style="list-style-type: none"> <li>• Test sample after home laundering 3 times with 1993 AATCC Standard Reference Detergent with or without Optical Brightener.</li> </ul>	Hosiery Consortium Abrasion Testing Method
<u>Needle Count</u> <u>Course Count</u> <ul style="list-style-type: none"> <li>• Traditionally legwear products utilize needle count and course count vs. Picks per Inch/Courses and Wales.</li> </ul>	



<u>Product Weight</u> <ul style="list-style-type: none"> <li>To determine fabric weight legwear products are weighed as whole garments in oz/dozen (12 pair).</li> </ul>	ASTM D3776
<b>CHEMICAL/ANALYTICAL:</b>	<b>Test Method:</b>
<u>AZO dyes</u> <ul style="list-style-type: none"> <li>AZO dyes should not be tested on legwear. Reference AAFA's RSL or the manufacturer should provide purchaser with proof of AZO dye exemption.</li> </ul>	

**As required, technical updates will occur to this guideline.**

## THE AMERICAN APPAREL & FOOTWEAR ASSOCIATION LEGWEAR TESTING TASK GROUP

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