Colorfastness

- Textile colorfastness is an important factor in garment and product maintenance, use, and care.

- Color-related problems range from color loss from perspiration to fading from exposure to closet light. Since all groups of dyes do not have the same colorfastness properties, dye selection should be based on intended end use.

- Colorfastness tests are routinely done as part of quality assurance or performance requirements. The number of tests conducted and the acceptable level of performance depend on an item’s intended use.
  - For carpets, contract textiles, and automobile interiors, stringent requirements are specified by the industry and trade associations.
Colorfastness to Light

- Color loss may occur when fabrics are exposed to sunlight or lighting inside a building.
- Colorfastness to light is an important colorfastness characteristic, especially for outdoor applications.
- Exposure to light in a display case may result in color loss.

Note: Colorfastness tests are conducted for all colors in which the product is available, as there may be differences between dyes from the same dye class due to differences in dye chemistry. The top half of each sample serves as the control.
Tester to Measure Colorfastness to Light

Photographed with permission of JCPenney Product Research & Technology Laboratories
Colorfastness to Washing

- Fabrics with poor colorfastness to washing (or to other types of exposure to water) may bleed and stain other items when washed.

**Staining of White Cotton Garments Due to Bleeding of Red Cotton T-shirt During Washing**

*Note: Dye transfer is fiber specific. In this wash load, the other t-shirts were also 100% cotton. Garments that were in contact with the red garment stained more than others.*
Fabrics may have poor colorfastness to dry cleaning solvents, resulting in color change/loss after garments are cleaned.
Crocking is color loss that occurs when a fabric rubs against another surface. Fabrics with fair to poor resistance to crocking cause problems as they stain other materials.

Note: White garment stained by the rubbing of the red shirt worn over it. Color loss due to crocking was also observed in the crocking test.
AATCC Crockmeter to Measure Colorfastness to Crocking

Photographed with permission of JCPenney Product Research & Technology Laboratories
Color Change due to Frosting

- Frosting is localized color change due to mild or severe abrasive action when an item is worn or used.
- Frosting is often visible on cuffs, collars, and seams of garments and stitched edges of items such as table mats.

Note: Frosting is a color change that results from abrasion or differential wear. It is generally more noticeable in areas such as collars and lapels of garments made of cotton and other cellulosic fibers.
Colorfastness to Perspiration

- Perspiration may cause color change in garments, especially silks.
  - Color change may be reversed by neutralizing alkaline perspiration stains with a mild acid. Professional cleaning is required for restoring the fabric color.
  - In some cases color change is more prominent over time.

Note: This type of color change can often be reversed by using an acid.

Blouse, part of the International Fabricare Institute (IFI) collection, was photographed with permission.
Colorfastness to Perspiration – Appliqué stains certain stripes of the multifiber swatch

Note: The fabric specimen with simulated acid perspiration solution and a multifiber swatch are placed between plastic plates at a set pressure and heat. They are then evaluated for color change and staining.
# Comparison of Colorant Usage and Colorfastness

<table>
<thead>
<tr>
<th>Colorant</th>
<th>Used for</th>
<th>Colorfastness Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Dyes</td>
<td>wool, silk, nylon, acid dyeable acrylic and polyester, spandex</td>
<td>• Colorfastness properties are dependent on the sub-class</td>
</tr>
</tbody>
</table>
| Azoic Dyes        | cotton, rayon, flax, ramie, and other cellulosic fibers; limited use with protein and synthetic fibers | • Excellent colorfastness to light, washing, and bleach  
• May have poor colorfastness to crocking                                                                                                                                                                           |
| Basic/Cationic Dyes | acrylic, cationic dyeable polyester and nylon; limited use with protein and cellulosic fibers | • Poor colorfastness to bleach  
• Excellent colorfastness to washing (acrylic and cationic dyeable polyester and nylon)  
• Colorfastness to light varies; acrylics dyed with newer formulations have excellent colorfastness to light  
• Good colorfastness to crocking (acrylic and cationic dyeable polyester and nylon) |
| Direct Dyes       | cotton, rayon, flax, ramie, and other cellulosic fibers; limited use with protein and nylon fibers. | • Good colorfastness to light  
• Poor colorfastness to washing  
• Poor colorfastness to bleach                                                                                                                                                                                        |
| Disperse Dyes     | acetate, polyester, nylon; limited use with acrylic and modacrylic       | • Excellent colorfastness to washing  
• Good to excellent colorfastness to light, bleach, crocking, dry cleaning, crocking, and perspiration  
• Acetate dyed with a sub-class susceptible to fume fading                                                                                                                                                           |
| Reactive Dyes     | cotton, rayon, flax, ramie, and other cellulosic fibers; protein fibers and nylon dyed in an acidic dyebath | • Good to excellent colorfastness to light, washing, perspiration, and crocking  
• Poor colorfastness to chlorine                                                                                                                                                                                          |
| Sulfur Dyes       | cotton, flax, rayon, and other cellulosic fibers                         | • Good colorfastness to washing, light, and perspiration  
• Poor colorfastness to chlorine  
• Average colorfastness to crocking                                                                                                                                                                                     |
| Vat Dyes          | cotton, flax, rayon, and other cellulosic fibers                         | • Good to excellent colorfastness to washing, light, perspiration, and bleach.                                                                                                                                               |
| Pigments          | all fibers                                                               | • Excellent colorfastness to light and bleach  
• Colorfastness to crocking and washing varies                                                                                                                                                                             |
Colorfastness Requirements

- The number of tests conducted and their acceptable level of performance depends on an item’s intended use. For carpets, contract textiles, and automobile interiors, stringent requirements are specified by the industry and trade associations.
  - The Association for Contract Textiles (ACT) voluntary performance guidelines for commercial interior materials include minimum requirements for colorfastness to light and crocking.
  - Performance standards for fabrics used in the casual furniture industry also include minimum requirements for colorfastness to light and crocking.

- Colorfastness tests are conducted for all colors in which the product is available.
# Fabric Performance Standards for Fabrics Used in the Casual Furniture Industry

**Performance Standards**

For fabrics used in the casual furniture industry

For more information contact:

**TCFFA**
1801 County Road B West, Roseville MN 55113
Phone: +1 651 222 2505 or 800 225 4324
(US and Canada only)
Fax: +1 651 631 9334
Email: tcffaf@lfai.com
Web Site: www.lfai.com

**Fabric Performance Standards**

for Prints on Acrylic, Prints on Polyester, Solid Color Polyester Cloths

<table>
<thead>
<tr>
<th>Performance Standard</th>
<th>Test Method</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>ASTM D 5034</td>
<td>PVC Cushion (open mesh) 300lbs. Warp/200lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC Slingshot 350lbs. Warp/225 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC Wicker 450 lbs. Warp/450 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC/Olefin (Slingable) 300 lbs. Warp/225 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC/Acrylic 350 lbs Warp/225 lbs Fill</td>
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<tr>
<td></td>
<td></td>
<td>Acrylic (Cushion) 225 lbs Warp/100 lbs Fill</td>
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<tr>
<td></td>
<td></td>
<td>Olefin (Cushion) 225 lbs Warp/100 lbs Fill</td>
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<tr>
<td>Tear Strength - Trapezoid</td>
<td>ASTM D 5587</td>
<td>PVC Cushion (open mesh) 20 lbs. Warp/40 lbs. Fill</td>
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<td></td>
<td></td>
<td>PVC Wicker 50 lbs. Warp/70 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC/ Olefin (Slingable) 100 lbs. Warp/90 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>PVC/Olefin (Slingable) 60 lbs. Warp/70 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>Acrylic (Cushion) 14 lbs. Warp/10 lbs. Fill</td>
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<tr>
<td></td>
<td></td>
<td>Olefin (Cushion) 14 lbs. Warp/10 lbs. Fill</td>
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<td>Seam Slippage</td>
<td>ASTM D 4034</td>
<td>PVC (in revision at this printing, 9/04)</td>
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<td>Abraison - Taber</td>
<td>ASTM D 3884</td>
<td>PVC (in revision at this printing, 9/04)</td>
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<td>Olefin (in revision at this printing, 9/04)</td>
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<td>using w/ 10 abrasives 1000 cycles/1 KG</td>
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<td>Establised September 2001</td>
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