STUDY OF COLOUR FASTNESS - COMPARISON BETWEEN SDCE SINGLE FIBRE ADJACENT FABRICS AND SDCE MULTIFIBRE ADJACENT FABRICS
Introduction

When first introduced SDCE Multifibre DW (SDC DW) was developed to provide staining results on a broader range of substrates than could be achieved, in a single test, by using a combination of single fibre adjacent fabrics (SFA). The staining performance of SDC DW was carefully calibrated to offer the same level of staining as the corresponding individual SFA components.

Recently the ISO adjacent fabrics working group of the ISO Test for Coloured Textiles and Colorants, ISO TC38/SC1/WG5, has resolved to investigate if the individual stripes of a number of commercially available Multifibre fabrics conform to the staining characteristics of the international master standards for SFA. As an active member of TC38 SDCE decided to conduct our own investigation on SDC products, and to publish the results to support the ISO process. (Note The Society of Dyers and Colourists, our parent organisation, has been jointly responsible for providing the secretariat for the SC1 committee since 2000.)

The extensive testing programme involved in demonstrating the performance relationship between SDCE DW and SDCE SFA fabrics has been part of a much larger SFA project by SDCE aimed at guaranteeing the quality and UK manufacture of SDCE SFA.

Background and Developments in SDCE adjacent Fabrics

<table>
<thead>
<tr>
<th>Single Fibre Adjacents</th>
<th>Multifibre Adjacent Fabrics</th>
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<tbody>
<tr>
<td>• In the 1930’s the need for standard cloths was identified and single component adjacent fabrics were produced.</td>
<td>• In the 1970’s the first SDCE Multifibre fabrics were produced.</td>
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<td>• 1940’s – 1960’s ISO fastness tests were agreed and the range of standard fabrics increased.</td>
<td>• In 1986 SDC Multifibre revised, into Multifibre DW.</td>
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<td>• 2014, as part of SDCE’s commitment to guaranteeing and improving product quality all SFA fabric weaving is relocated to Yorkshire, UK.</td>
<td>• The dye injection staining test method was created by SDC, and subsequently adopted by ISO.</td>
</tr>
<tr>
<td>• SDCE directly commission all yarn buying, weaving, finishing and independent testing for SDCE SFA.</td>
<td>• 2005 To counter the regular passing off of inferior goods as being SDCE a security thread was introduced into selvedge of DW</td>
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<tr>
<td>• SDCE security thread introduced to all SDCE SFA.</td>
<td>• 2007 all SDCE Multifibre looms were relocated to a purpose designed factory in Bradford, UK.</td>
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<td>• Comparison with SDC Master Standard Multifibre DW included as part of the standard QC for SDCE SFA.</td>
<td>• 2013 SDCE develop a new Multifibre, SDCE Multifibre LyoW®, at the request of Marks &amp; Spencer Plc. This product will be exclusive to M&amp;S until May 2015.</td>
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<td>• New dye injection staining methods developed to improve the QC of SDCE DW and LyoW®.</td>
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Testing Methodology

The work that SDCE have undertaken is distinct from some of the ISO studies as we have taken SDCE Multifibre DW as the benchmark for staining. It therefore logically follows that we have concentrated on testing using the Dye Injection Staining test (DIST) methodology, as specified in ISO 105 F10 (in addition SDCE have developed further DIST to the overall staining assessment). The reasons for this are:

1. ISO cannot formally recognise that, for BS, ISO and many major retail standards, SDCE DW is the market leader by share, and the de facto benchmark for quality.
2. Multifibre DW is much more commonly used as the adjacent in ISO tests, than all the SFA combined.
3. Many of the master standards, and dyed master standards, for SFA fabrics are not readily available, or available in insufficient quantities to conduct extensive testing programmes. Whilst the registered holders of the masters claim they still exist very few were made available even for an official ISO working group study.
4. The DIST method was developed and accepted by ISO as a more accurate long-term assessment of staining performance on Multifibre. Relying on the even treatment and long-term durability of dyed masters, was seen as less reliable.

For the DIST tests the SDCE Multifibre DW Master standard was used as the control (staining results on this master standard provide continuous and traceable results back until 1986). The concentration of dye necessary to give the required level of staining, on the component under assessment, as specified in F10 was used – where new DIST were used a grey scale staining of 3-4 on the master was achieved.

The samples under assessment were SDCE master standard SFA, and a current batch of SDCE DW.

Following best practise all stained fabrics were graded against an unstained blank of the equivalent fabric. Grading was by trained observer and electronically (DigiEye). Comparisons were then made between the SDCE DW master standard and fabrics under assessment. In future SDCE SFA certificates of conformity will note how they compare against SDCE DW master standard.
Results

(The photographs are to illustrate some of the work conducted. Due to the limits on colour reproduction during the transfer and storage of the images not all colours adequately represent the original physical sample used for grading.)

ACETATE

SDCE do not offer an Acetate SFA.

COTTON

Both samples under assessment gave identical levels of staining to Master Standard SDCE DW, and the change in colour grade meets the ISO standard.

SDCE Master Standard Cotton, SFA product code 1305

SDCE Master Standard Multifibre DW

SDCE Multifibre DW current batch.

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Cotton</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Acrylic</th>
<th>Wool</th>
<th>Security Thread</th>
</tr>
</thead>
</table>

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NYLON

The base construction and colour of the Polyamide SFA is sufficiently different for the staining results to appear visually different. If best practise, in respect of comparing to a blank of the same fabric, is followed the Nylon SFA is within the tolerance, set out in F10. The batch of DW under assessment gave an identical level of staining to Master Standard SDCE DW, and the change in colour grade met the ISO standard.

SDCE Master Standard Nylon, SFA product code 1605

SDCE Master Standard Multifibre DW

SDCE Multifibre DW current batch.

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Cotton</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Acrylic</th>
<th>Wool</th>
<th>Security Thread</th>
</tr>
</thead>
</table>
POLYESTER

Both samples under assessment gave identical levels of staining to Master Standard SDCE DW, and the change in colour grade meets the ISO standard.

SDCE Master Standard Polyester, SFA product code 1705

SDCE Master Standard Multifibre DW

SDCE Multifibre DW current batch.

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Cotton</th>
<th>Nylon</th>
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<th>Security Thread</th>
</tr>
</thead>
</table>
ACRYLIC

The optimum dye for the DIST test on Acrylic provides the correct level of staining but this staining begins to fade within a few hours. All grading is conducted immediately after the test.

Both samples under assessment gave identical levels of staining to Master Standard SDCE DW, and the change in colour grade meets the ISO standard.

SDCE Master Standard Acrylic, SFA product code for Acrylic is 1105

SDCE Master Standard Multifibre DW

SDCE Multifibre DW current batch.

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Cotton</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Acrylic</th>
<th>Wool</th>
<th>Security Thread</th>
</tr>
</thead>
</table>
WOOL

Both samples under assessment gave identical levels of staining to Master Standard SDCE DW, and the change in colour grade meets the ISO standard.

SDCE Master Standard Wool, SFA product code 1930

SDCE Master Standard Multifibre DW

SDCE Multifibre DW current batch.

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Cotton</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Acrylic</th>
<th>Wool</th>
<th>Security Thread</th>
</tr>
</thead>
</table>
VISCOSE

Viscose SFA: SDCE do not produce a TV type Multifibre containing Viscose. For standardisation purposes the Viscose SFA was compared versus the regenerated cellulose stripe of the master standard of SDCE Multifibre LyoW®.

Both samples under assessment gave identical levels of staining to Master Standard SDCE, LyoW® and the change in colour grade meets the ISO standard.

As the staining of the Viscose matched that on LyoW® this master standard will be used for additional QC of the Viscose in future.

SDCE Master Standard Viscose, SFA product code 1805

SDCE Master Standard Multifibre LyoW®

SDCE Multifibre LyoW® current batch.

<table>
<thead>
<tr>
<th>Security thread</th>
<th>Regenerated Cellulose</th>
<th>Cotton</th>
<th>Nylon</th>
<th>Polyester</th>
<th>Acrylic</th>
<th>Wool</th>
</tr>
</thead>
</table>
Conclusions

The results clearly demonstrate that all SDCE SFA closely correlate to the staining results achieved on the corresponding stripe of SDCE Multifibre fabrics. By the way the standard for F10 was set to give equivalent results to the SFA master standards, it can be demonstrated, even where international master standards are not readily available, that SDC SFA conform to the relevant ISO standard.

Provided genuine SDCE materials are used customers can have confidence that single fibre and Multifibre adjacent fabrics give equivalent staining results – continuity overtime will be assessed and guaranteed by the use of SDCE Multifibre master standards.

It can also be seen, from the new DIST and LyoW®, that SDCE continue to innovate and lead the way in production and quality control of colour fastness testing consumables.

Appendix 1 SDCE Multifibre LyoW®

Results for LyoW® clearly demonstrate that for the five stripes common with SDCE DW there is no change in staining performance caused by the replacement of the Acetate. This DIST work confirms the results of the development testing where more than 16 different fabrics, representing a broad range of colours, constructions and dye classes were used for assessment.

The new DIST also clearly show that the Regenerated Cellulose does not simply repeat the same level of staining as the Cotton. The key to the performance of LyoW® is that, when using DIST method or control fabrics, the staining of the Regenerated Cellulose stripe does not alter the level of staining observed on the cotton stripe.

SDCE Multifibre LyoW® is exclusively for the use of M&S suppliers until May 2015. From June 2015 LyoW® will be made available to any retailer or customer who may benefit from the replacement of the Acetate.

NB there are no plans to withdraw SDCE DW, this will continue to be available whilst it is required by customers or the ISO 105 F10 standard.
Contact:
SDC Enterprises Limited
Unit 29 Pitcliffe Way
Upper Castle Street
Bradford
BD5 7SG
Tel: +44 (0)1274 750160
E-mail: sales@stdcenterprises.co.uk
Web: www.sdcenterprises.co.uk