

## General considerations regarding processing and safety

### 1. Tolerances

All textiles, and in particular knitted fabrics, are subject to certain production deviations with regard to weight, colour, width and other properties. In order to keep such deviations to a minimum, efforts should always be made to use fabrics from only one production batch in a particular process.

### 2. Transport and storage

In order to prevent damage (e.g. through pressure points, buckling, etc.), rolls should be transported and stored in a fully horizontal position. Excessive humidity or dryness can seriously affect coating properties, particularly in the case of fabrics coated for digital direct printing. Under changing climatic conditions (such as temperature/humidity) sulphuring of the coating may happen, especially for textiles with a flame retardant treatment. The printing characteristics are not influenced by that, however there may be residues on the rollers which need to be removed regularly. Should such a sulphuring be noticed on one roll it can be reduced by precalendering.

### 3. Defect tolerances

Certain defects are unfortunately unavoidable in the context of textile production. Small stains, stitch abnormalities and stopmarks are inherent in these textiles and must therefore be accepted. The printing process should always be closely monitored in order to prevent damage to the printer or the print head.

### 4. a) Shrinkage due to washing or heat

Synthetic fabrics can shrink when washed or exposed to heat. The degree of shrinkage varies according to the material, the structure and the process in question (washing at 40 °C, steaming, calendering). Minimized shrinkage is always an important parameter in our production processes. We heat-set all of our fabrics at 210 – 215 °C. After this heat-setting, the dimensions of the fabric are fixed and no longer change. However, the sublimation process once again requires heat, which may affect our previous heat-setting. Normally, shrinkage of 1 – 3 % in length and width can result. This residual shrinkage cannot be avoided and the deviation of 1 to 3 % of the original measurements is within normal textile tolerance. The shrinkage is a direct result of calendering/heat fusing and no further changes occur thereafter.

### 4. b) Elongation

Additional problems can arise when the fabric must be held under tension during the fusing process (for example in order to prevent wrinkling). In this case the fabric does not shrink during fusing but rather is 'elongated'. This process cannot be influenced via the fabric and becomes increasingly pronounced the thinner and lighter the knitted fabric is. The situation is further complicated by the fact that the tension associated with calendering can vary (the roll becomes lighter). This elongation is, however, not permanent; it relaxes over the following hours and days if the fabric is stored without being under tension (i.e. off the roll).

### The following steps can be taken to minimize this effect:

- calendering without tension or stretching
- storing lengths of fabric without tension or stretching for approx. 24 hours before further processing
- using heavier/stronger fabrics

Due to the many factors involved this effect is not always observed and is particularly difficult to monitor.

### 4. c) Size accuracy with changing environmental conditions

Just like all materials also a textile, especially with coating for digital printing, is reacting to the surrounding temperature. Thus, for example tailored textile can shrink during decreasing temperatures. At dryness and cold also the tearing strength of the textile can be influenced. Climatisation, resp. humidification usually normalizes the values again. These effects appear in various intensity, depending on the finishing and coating.

### 5. Flame-retardant fabrics

Flame-retardant fabrics are either manufactured using flame-retardant yarns (such as TREVIRA CS®) or are treated for flame retardancy during finishing. Assessments and certificates are provided for the state of the fabrics at the time of dispatch. Due to the variety of possible treatments to follow (laminating, washing, steaming, calendering, etc.) and the many different printing techniques and inks available (screen printing, transfer printing, direct printing with dispersion inks, UV-curable inks, etc.), we are not in a position to indicate the degree of flame retardancy of the finished products. In general it can be said that fabrics made of flame-retardant yarns have permanent flame-retardant properties (which cannot be washed out) while fabrics which have been subsequently treated for flame retardancy should not be washed so as to retain the flame-retardant properties. In case of doubt, we recommend testing the fabrics after processing.

### 6. Calanders

Calanders used in transfer printing or the fusing of dispersion inks should generally be equipped with air suction equipment. Finishing and ink residue and also residual moisture in the fabric or the finish can lead to evaporation and increased humidity. In order to prevent soiling of the calander mat, sufficiently thick protective paper should accompany the run and the fusing temperature should not exceed 195 °C. Regular maintenance and cleaning of the calander helps to prevent soiling.

### 7. Subsequent cutting (dividing of rolls)

Any subsequent cutting of large-width rolls (e.g. 310 cm into three 103-cm sections) is done at extra cost and at the risk of the customer. The cuts are made on the finished roll and can vary slightly in either direction. The repetition of the variation per rotation of the roll leads to a wavy edge which must always be recut or sewn during further processing. Divided rolls must be accepted; cannot be claimed.

### 8. The colour "natural white"

The colour "natural white" is equivalent to the original colour of the yarn, i.e. the

fabric is not dyed in order to achieve a particular colour. If the original colour of the yarn changes, the colour "natural white" also changes for this article.

### 9. Environmental and health impact assessment for printed materials coated with "FL, NLXXX, GFS, BBFN and others"

#### Contact between skin and textiles

It should be noted that the finishing conforms to the requirements of the respective currently valid German Consumer Goods Ordinance. Only those textile auxiliaries, dye preparations and chemicals are used that have been approved according to the relevant statutory chemical regulations, such as the Foodstuffs and Commodities Act or the Chemicals Prohibition Ordinance, and as well in accordance with special regulations such as the End of Life Vehicle (ELV) Directive. Thus it can be assumed that, given appropriate processing, no health risk is involved.

#### Vapors posing a potential health risk

Providing that appropriate care is taken during processing, no health risks are posed in this context. The following specifications must, however, be met: No fabric shall be subjected to treatment at a temperature of over 210 °C, as decomposition and the formation of possible corrosive or otherwise damaging vapors cannot be ruled out under such severe thermal stress. Air suction equipment is absolutely essential for any fusing or calendering processes and hot cutting (laser etc.) as the finishes and dyes themselves also contain additives. Please refer to the safety data sheet provided by the ink manufacturer which should include information on potential hazards and preventive measures.

#### Residue on calanders, etc.

Residues on the processing machines cannot be ruled out in the case of fabrics with a coating directly on the fibres that is designed to improve printability (such as FL, GFS, FLBS, etc.), especially when large quantities are being processed. The use of sufficiently thick protective paper along with regular and thorough cleaning is therefore always required. It should be noted that the dye itself also leaves a residue during fusing.

#### Sustainable environmental protection

As a forward-looking company, we have a philosophy based on responsibility for the environment. This means not only limiting the use of raw materials and energy in our production facilities to a minimum, but also choosing an environmentally responsible textile finisher. The finisher we work with sets the standard in the European market for choosing environmentally friendly and non-toxic chemicals, not only with respect to their direct environmental effects but also in conjunction with the finished textiles. If you request any further information, please contact us.

### 10. Printing results, colourfastness, moiré

Printing results and colourfastness (friction resistance, light fastness, washability, bleeding) are always the combined result of all the components that are involved (printer, ink type, ink manufacturer, drying, fusing, transport, storage, environmental factors [humidity, etc.]) and cannot be generally guaranteed. For this reason it is imperative that every new combination and every change in a component is tested by the user.

Moiré can result with direct inkjet printing the screen structure and the fabric structure coincides. No changes to the fabric are possible in order to influence this effect, thus no liability can be accepted for moiré. Steps that can be of help include changing the printing resolution, and/or printing on the other side of the fabric.

### 11. Migration/Color transfer

When printing with sublimation inks there is a risk of migration of the dye or "colour transfer" (transferring of the ink when folded/stored) also after fixation. Both – the migration and the "colour transfer" – can be increased or reduced by combining different finishes (coatings)/inks. This process cannot be influenced by the material alone and must therefore be tested for each combination. As the migration/the "colour transfer" is mainly due to unfixed ink, good fixation and subsequent washing of the fabric will reduce these effects.

### 12. Further handling instructions

For special items, there are separate processing instructions.

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