

First-ever printing of multifunctional flame-retardant wovens by Trans-Textil



High-colour designs and motifs now possible: First-ever printing of flame-resistant wovens by Trans-Textil

Photo: Trans-Textil GmbH

Trans-Textil GmbH has developed a new generation of printable laminates that combine the characteristics of multifunctional flame-retardant textiles with the advantages of transfer printing. The products offer optimum protection against a wide range of hazards and can be printed in a wide variety of colours and patterns.

These days the wearers of multifunctional safety apparel not only expect reliable protection from heat, flames, electric arcs, injury, perspiration, adverse weather and wind; they also call for optimum visibility by day and night, high wear comfort and the same kind of visually attractive look as in leisure wear.

Textile manufacturers working in the leisure clothing industry are able to deploy practically all available filament yarns in pure or blended form. Manufacturers of textiles for protective apparel, on the other hand, are largely restricted to a limited choice of so-called high-performance fibres. These admittedly provide a high degree of

protection but often entail disadvantages in terms of dyeability, looks and comfort. Some raw materials are not even dyeable at all, requiring the resulting fibres to be spinneret-dyed in a laborious process.

The situation so far

At present suitable dyestuffs that fulfil the requirements of EN ISO 20471 do not exist for flame-retardant fibres, particularly in the area of high-visibility, flame-retardant wovens in fluorescent orange and fluorescent red. Instead use is made of special weaving techniques to produce a two-ply fabric made up of polyester on the outside and other flame-retardant yarns on the reverse side. However, this approach does not really simplify colouration, as piece dyeing the combination is not efficient in process technology terms and can even partially destroy the fibres. In most cases the polyester constituents are thus dyed already at the sliver (fibre) stage or at the cross-wound package stage. This can add high storage and process to the price of the woven.

Synergistic effects of textile technologies

For greater freedom in colouration and patterning, the development team at Trans-Textil GmbH accordingly sought to combine a woven fabric for flame-resistant personal protective equipment (PPE) with the possibilities of the company's proprietary transfer printing process. A flame-resistant two-ply woven with a PES upper side and the riverside side in aramid, modacrylic and FR viscose was printed in the sublimation heat transfer process. Further tests showed that 100% modacrylic fibre textiles and blends of the same yarn with PES could also be successfully printed in this way.

New horizons in designs and patterning

From the very start, tests results were proving that transfer printing the above laminate types does not affect their protective characteristics in any way. Tests pursuant to EN ISO 15025 did not reveal any differences in this respect between the printed wovens and unprinted fabrics, and breathability, handle, comfort or thermophysiological properties were not at all affected either. The results of tests conducted using the RET skin model according to ISO 11092 to determine resistance to moisture vapour transmission showed the same RET value as unprinted fabrics.

Transfer printing is a very sustainable means of colouration and does not involve water consumption as in dyeing. Plus it enables varied surface designs ranging from solid colours through logos to full-colour camouflage patterns for both functional and fashion uses, even at short runs. The new development reduces fabric production costs and the resulting printed wovens offer excellent wash and dye fastness in use along with high UV, weather and abrasion resistance.

In conjunction with Trans-Textil's technical resources and expertise in the areas of lamination, membrane technology, bonding, finishing and coating, printable flame-resistant textiles open up further applications. These can take on the form of single-ply or two- or three-ply laminates for jackets, trousers, coats, shirts, polo shirts, pullovers, waistcoats, sweatshirts, T-shirts, socks, aprons, gloves, headwear and any other items of apparel that can be worn to provide protection from heat, flames, electric arcs, molten metal and similar hazards.