

## Effect of 3-Dimensional Knitted Spacer Fabrics Characteristics on Its Thermal and Compression Properties

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**Abstract :** The thermo-physiological comfort and compression properties of knitted spacer fabrics have been evaluated by varying the different spacer fabric parameters. Air permeability and water vapor transmission of the fabrics were measured using the Textest FX-3300 air permeability tester and PERMETEST. Then thermal behavior of fabrics was obtained by Thermal conductivity analyzer and overall moisture management capacity was evaluated by moisture management tester. Spacer Fabrics compression properties were also tested using Kawabata Evaluation System (KES-FB3). In the KES testing, the compression resilience, work of compression, linearity of compression and other parameters were calculated from the pressure-thickness curves. Analysis of Variance (ANOVA) was performed using new statistical software named QC expert trilobite and Darwin in order to compare the influence of different fabric parameters on thermo-physiological and compression behavior of samples. This study established that the raw materials, type of spacer yarn, density, thickness and tightness of surface layer have significant influence on both thermal conductivity and work of compression in spacer fabrics. The parameter which mainly influence on the water vapor permeability of these fabrics is the properties of raw material i.e. the wetting and wicking properties of fibers. The Pearson correlation between moisture capacity of the fabrics and water vapour permeability was found using statistical software named QC expert trilobite and Darwin. These findings are important requirements for the further designing of clothing for extreme environmental conditions.

**Keywords :** 3D spacer fabrics, thermal conductivity, moisture management, work of compression (WC), resilience of compression (RC)

**Conference Title :** ICTF 2016 : International Conference on Textiles and Fashion

**Conference Location :** Singapore, Singapore

**Conference Dates :** March 03-04, 2016