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RELATIONS BETWEEN FIBRE, YARN AND FABRIC MECHANICAL PROPERTIES AND SUBJECTIVE SENSORY RESPONSES IN WEAR TRIALS

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Eight kinds of knitted fabrics, made from wool, polyester, cotton, acrylic, porous acrylic, polypropylene, viscose, and a polyester/cotton blend, were studied using both objective mechanical measurements and subjective wear trials. Tensile properties of the fabrics, yarns and fibres were measured on an Lnstron tester. Bending, plate compression, compression cage, surface friction and roughness of the fabrics were also measured on Instron tester with new added components. Over thirty criteria for the mechanical properties of fabrics, yarns and fibres were obtained. Significant differences were observed in all the mechanical criteria measured between the 8 kinds of fabrics. The psychological sensory responses of human subjects to the 8 kinds of fabrics were obtained in a series of psycho-physiological wear trials, in which subjective responses from thirty-eight subjects to 15 clothing comfort or discomfort sensations were recorded and overall preference votes for the 8 kinds of garments made from the fabrics were obtained under two environmental conditions: hot (T = 32°C, RH = 45%) and cold (T = 14°C, RH = 32%).

The relations between the mechanical properties and the psychological sensory responses were also investigated by correlation analysis. The overall preference votes after wearing under both cold and hot conditions showed close correlation with tensile properties, surface roughness and plate compression properties of fabrics and tensile properties of fibres. Handling votes were mainly correlated wich surface friction and bending properties of fabrics and diameters of fibres. Tactile, tactile-fit and thermal-wet sensations were all correlaxed with tensile properties, surface roughness and plate compression properties of fabrics, and wich tensile properties and diameters of fibres. Besides, tactile-fit sensations were correlated wich bending and compression cage properties of fabrics, and thermal-wet sensations were related to tensile properties and diameters of yarns.