

ABSTRACT

Weft knitted fabrics are manufactured by interlacement of loops and the dimensions of these loops govern the fabric properties. The stable loop configuration governs the properties of the weft knitted fabrics, especially their dimensional stability and shape retention properties. Dimensional properties of weft knitted fabrics have been one of the most discussed areas in the textile industry as well as in research fields. The dimensional stability of single jersey knitted fabrics during various wetting and drying operations has been the subject of numerous studies during the last decade. During the process of relaxation, different weft knitted fabrics approach the minimum energy state in different ways.

Dimensional properties of weft knitted fabrics made from moisture absorbent fibres like cotton and wool has been extensively studied by a number of research workers and very useful information has been provided. The dimensional properties and relaxation behavior of weft knitted fabrics made from viscose fibres has been given little attention. Viscose rayon fibres are moisture absorbent, easy to dye, comfortable, drapes well, soft to the skin and have a silk like aesthetic. As viscose fibres are widely used in weft knitted garments, greater attention and information is needed to understand

the relaxation and shrinkage behavior of those fibres, which should be beneficial for their optimal use.

The research work mainly deals with the effect of fibre type, yarn twist, yarn shrinkage, fabric structure, stitch length, dimensional stabilization methods and relaxation treatments on dimensional properties, dimensional constants and dimensional changes of spun viscose single jersey knitted fabrics. The analysis of dimensional properties, dimensional constants and dimensional changes of spun viscose single jersey knitted fabrics helps to study the performance of spun viscose single jersey knitted fabrics in terms of dimensional stability and shape retention.

In order to study the effect of yarn shrinkage on the dimensional changes of spun viscose single jersey knitted fabrics, electronic wet yarn shrinkage tester has been designed. The effect of yarn twist and stitch length on dimensional properties of the spun viscose single jersey knitted fabrics were carried out with three levels of yarn twist and stitch length under dry, wet and fully relaxed states. Viscose ring spun yarns of 14.76 tex with 20.69, 23.27 and 25.72 turns per inch was made to study the effect of yarn twist on dimensional properties of the spun viscose single jersey knitted fabrics. It was found that there is significant contribution of yarn twist on dimensional properties and dimensional changes of the spun viscose single jersey knitted fabrics.

The performance of weft knitted fabrics depends on the combination of fibre properties, yarn properties and the fabric structure. In order to study the effect of fabric structure and stitch length on dimensional properties of the spun viscose single jersey knitted fabrics, three type of fabric structure such as plain, pique and lacoste have been studied under dry, wet and fully relaxed states. It was found that there is significant contribution of fabric structure on dimensional properties and dimensional changes of the spun viscose single jersey knitted fabrics. The lacoste structure has shown better dimensional properties made with similar count and stitch length than plain and pique fabrics.

The method for minimizing dimensional changes of single jersey knitted fabrics includes mechanical stabilizing methods, chemical treatments and ultrasonic waves. Dimensional stabilization methods such as compacting, resins and ultrasonic waves were used. The effect of dimensional stabilization methods and their effectiveness on the fabric dimensional properties of the spun viscose single jersey knitted structures were carried out with repeated washing cycles in steps of 1, 2, 5, 10, 15, 20 and 25. The study of repeated washing of spun viscose single jersey knitted fabrics was carried out, in order to achieve suitable dimensional stabilization method. The spun viscose single jersey knitted fabrics stabilized with compacting shows the lower variations in dimensional constants.

The influence of fibre type and stitch length on dimensional properties of single jersey knitted fabric were carried out with the three different fibres such as viscose, modal and lyocell with similar fineness (1.5 D) and fibre length (38 mm) under dry, wet and fully relaxed states. The variations in dimensional constants of the single jersey knitted fabrics were studied. The lyocell single jersey knitted fabric has shown greater advantages over viscose and modal single jersey knitted fabrics made with similar fineness and fibre length.