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STUDY OF PHYSICAL-MECHANICAL INDICATORS OF NEW PATTERN KNITTED FABRICS

ИССЛЕДОВАНИЕ ФИЗИКО-МЕХАНИЧЕСКИХ ПОКАЗАТЕЛЕЙ НОВЫХ РИСУНЧАТЫХ ТРИКОТАЖНЫХ ПОЛОТЕН

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Ключевые слова: физико-механические свойства, прочность на разрыв, удлинение, воздухопроницаемость, деформация.

Abstract. Today, the textile, clothing and knitting industry is one of the strategically important and rapidly developing sectors of the national economy. Using the technological capabilities of modern double-loop needle knitting machines, the physical and mechanical properties of the newly constructed cotton-silk knitted fabric on the basis of local raw materials were studied. As a result of research work, the range of cotton-silk knitted fabrics and products with high quality and low consumption of raw materials has been expanded.
Аннотация. Сегодня текстильная, швейная и трикотажная промышленности являются одними из стратегически важных и динамично развивающихся отраслей народного хозяйства. С использованием технологических возможностей современных двухфонтурных вязальных машин исследованы физико-механические свойства хлопково-шелкового трикотажа на основе местного сырья. В результате научно-исследовательской работы расширен ассортимент хлопково-шелкового трикотажа и изделий с высоким качеством и низким расходом сырья.

Expanding the range of knitted fabrics, making full use of the technological capabilities of knitting machines, improving the quality of knitted fabrics without

increasing of raw materials is one of the most pressing issues facing scientists in the textile industry today. Efficient production of knitted fabrics from local raw materials has led to the production of knitted fabrics with low consumption of raw materials, as well as air permeability, hygroscopicity, permeability, as well as low elongation, high shape retention properties.

As a result, in order to expand the range of knitted products in the future, the importance of producing cotton-silk knitted fabrics that can meet consumer requirements, low consumption of raw materials, high hygienic, durability and shape retention properties were increased. The structure of a new structured cotton-silk knitted fabric is presented in Fig. 1 [1–3].

Cotton-silk knitwear was produced on a modern double-needle knitting machine. Cotton-silk knitted fabric samples were used as raw materials for cotton yarn with a linear density of 25 tex, as well as spun silk yarn with a linear density of 14.3 tex [4–6].

The effect of the rapport on the new structure of cotton-silk knitted fabrics, as well as changes in the proportions of cotton and spun silk yarn in the fabric, its physical and mechanical properties. According to the conditions and function of targeted use of knitted fabrics, the structure of knitted fabrics is carried out by describing their physical and mechanical properties.

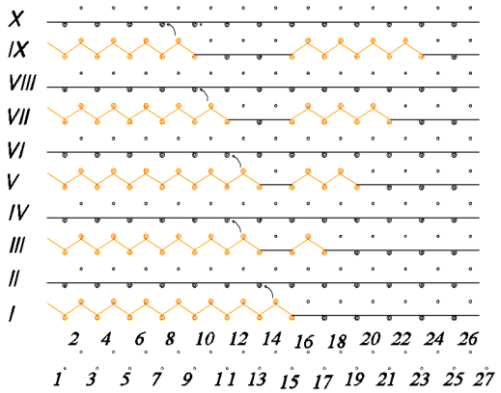

Figure 1 – Graphic record cotton-silk knitted fabric

The physical and mechanical properties of the produced cotton-silk knitted fabrics were tested on modern equipment available in the test laboratory "CentexUz" [7, 8].

The physical and mechanical properties of the newly structured cotton-silk knitted fabric samples were compared with the option I base fabric made from 100% raw cotton.

One of the characteristics of knitwear that creates a comfortable environment for consumers when using knitted products is air permeability.

The air permeability values of the cotton-silk knitted fabric samples were determined on the AR-360 SM air permeability detector at a pressure of 20C 1 atm per sm^3/sm^2 sec.

The air permeability of the new structured cotton-silk knitted fabric varied from 290.5 to 386.0 $sm^3/sm^2 \cdot sec$. Option I has a minimum air permeability of

290.5 $sm^3/sm^2 \cdot sec.$, while option VI has a maximum air permeability of 56 % cotton and 44% spun silk 386.0 $sm^3/sm^2 \cdot sec$. The air permeability of the newly tested cotton-silk knitted fabric samples tested meets the requirements of the international standard for lightweight top knitwear.

For all knitted fabrics and products, mechanical properties are recognized, including strength, toughness, elongation at break, abrasion resistance and shape retention.

The effect of changes in the amount of silk yarn spun as a raw material and raw material on its breaking strength and elongation at break was studied in the newly structured cotton-silk knitwear samples. The tensile strength and elongation at break were determined using the AG-1 dynamometer. The tensile strength index of the new structured cotton-silk knitted fabric samples ranged from 95N to 123N in height and from 86N to 105N in width (Fig. 2).

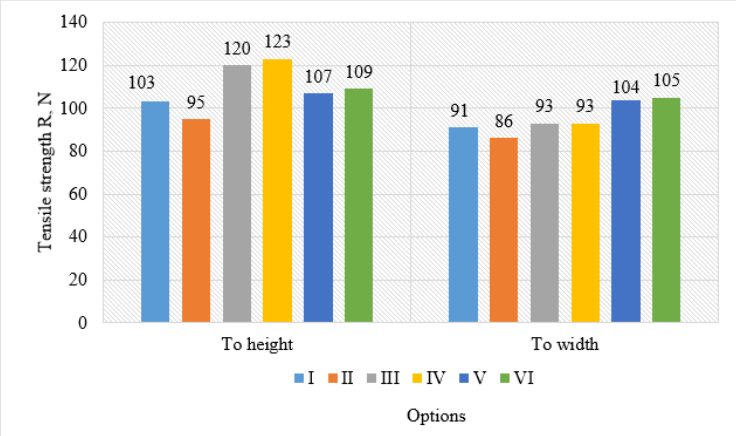

Figure 2 – Histogram of the tensile strength change in the width and height of the new structured cotton-silk knitted fabric samples

The breaking strength index along the height of option II was recorded as the lowest 95N value, and the maximum breaking strength value was recorded in option IV. The tensile strength index for the width of the knitted fabric was 86N in option II, and the maximum tensile strength value was recorded in option IV.

The cotton-silk knitted fabric samples produced meet the standard requirements based on the tensile strength indicators, as the standard requirement in all samples was not less than 80N. The shape retention feature is one of the important indicators for light top knitted fabrics and products. Shape preservation properties also include the elongation index of the tissue at rupture. During the effect of the tensile strength of the fabric, an increase in length, i.e. elongation, occurs, which represents the elongation at break and is expressed in millimeters.

The elongation at break ranged from 83 % to 99 % in height and from 99 % to 130 % in width in the samples.

The analysis of the elongation at break of the newly structured cotton-silk knitwear showed that an increase in the amount of silk yarn in the fabric, as well as a decrease in the number of rib loop in the fabric report, could reduce the elongation at break. The

cotton-silk knitted fabric samples produced have elongation at break, as well as elongation at 6N in accordance with the requirements of groups II and III.

The proportion of longitudinal deformation of the experimental cotton-silk knitted fabric samples ranged from 87% to 93 % along the length, and the proportion of backward deformation across the width varied from 90 % to 95 %.

The introduction represents a reduction in the size of the fabric under the influence of heat and moisture. As a result of the penetration of the fabric, the products may shrink, distorting the shape of clothing parts. The introductory values of the newly structured cotton-silk knitted fabric samples ranged from + 2 % to + 6 % in length and from + 2 % to + 5 % in width (Fig. 2).

From the results of the analysis of physical and mechanical properties of the proposed new structure of cotton-silk knitted fabric can be concluded that due to the use of spun silk yarn in the fabric, as well as changes in the structure of knitted fabric, the tensile strength, air permeability, re-deformation, abrasion resistance indicators increased. Also, the elongation, permeability, and hygroscopicity of the knitted fabric at rupture decreased compared to the basic fabric performance.

As a result of research work, the range of cotton-silk knitted fabrics and products with high quality and low consumption of raw materials has been expanded.

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