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STUDY OF TECHNOLOGICAL INDICATORS OF TWO-LAYER KNITTED FABRICS OBTAINED ON LONG XING LXA 252 KNITTING MACHINE

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Abstract: In this article, in order to expand the assortment of two-layer knitted fabrics, save raw material consumption, and determine their technological parameters, 3 samples were woven and their technological parameters were analyzed and recommended for production.

Keywords: Raw material, polyacrylonitrile, technological, Long Xing LXA 252, two-layer, analysis, top dressing, electrically conductive, technological, woven.

Introduction. In the world, reducing the consumption of raw materials, expanding the assortment of knitted fabrics, and improving the technology of knitting are of great importance. In this regard: carrying out scientific research in the directions of technological capabilities of double-needle circular knitting machines, increasing the productivity of the machine, increasing the efficiency of obtaining patterns, adding additional elements to the structure of knitted fabrics, and improving their quality indicators and characteristics is going.

Large-scale measures for the development of industry are being implemented in our Republic. In the "Uzbekistan-2030" strategy, "...effective use of local raw material base and development of industry based on advanced techniques..."1 is defined, in particular, significant results in the development of domestic knitted products by high-tech methods has been achieved, including the assortment of knitted products, enriched with new types of fabrics, lightweight and high porosity knitted fabrics made on double-needle circular knitting machines. Today, in the field of knitwear, it is required to produce competitive products that meet international standards to replace imports.

Literature review. Producing two-layer knitted fabrics, expanding the assortment of knitted products, researching technological and physical-mechanical properties of Uzbekistan, well-known scientists: M.M.Muqimov, N.R.Khankhadjayeva, Q.M.Kholikov, A.T.Zhoraboev, Sh.Sh.Shog'ofurovlar, S. A number of scientific studies such as Rahmatova have been conducted.

At the same time, many scientists are conducting research in the direction of increasing the indicators of knitted products by making changes to the structure of

[1] O'zbekiston Respublikasi Prezidentining 2023 yil 11-sentabrdagi "O'zbekiston-2030" strategiyasi to'g'risidagi PF-158-son Farmoni

knitted fabric. From the results of the analysis of the research and development works dedicated to the improvement and structure of the method of obtaining two-layer porous patterned knitted fabrics on double-needle circular knitting machines, it was found that in the enterprises of our Republic the problems of improving the production technology of two-layer porous knitted fabrics of a new structure with high quality indicators and low consumption of raw materials, making extensive use of the technological capabilities of the installed knitting machines, have not been sufficiently studied.

Analysis and results. Based on the results of scientific research, in order to expand the assortment of knitted fabric for outerwear, save raw material consumption and improve its quality, 3 variants of double-layer knitted fabric of a new structure were produced by the Chinese company Long Xing LXA 252 12 -class was knitted on a two-needle two-system knitting machine. Polyacrylonitrile thread with a linear density of 32*2 tex, electrical wire was used as raw material.

The effect of the method of obtaining knitted fabrics and the structure of the fabric on the technological indicators of knitting was studied.

A graphical record of the two-layer knitted fabric woven using a new type of electrically conductive yarn is presented in Fig. 1.

The technological parameters of the two-layer knitted fabrics of the new structure intended for outerwear were developed by the knitting production laboratory of the Namangan Institute of Textile Industry, Department of Knitting Technology, and tested by the standard method in the knitting testing laboratory, the obtained results are presented in Table 1 .

Based on the results of the analysis, technological indicators such as ring pitch, ring row height, density in horizontal and vertical direction, length of ring thread are determined.

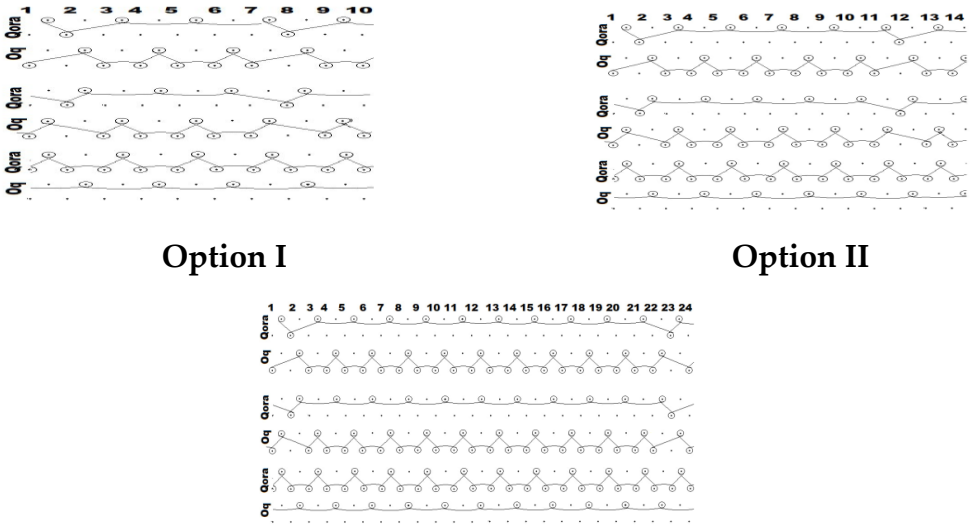

Figure 1. Graphic notation of two-layer knitted fabric.

Surface density depends on the type of thread used in the fabric, its linear density, and also the percentage of threads.

The loop thread length of the front layer of the two-layer knitted fabrics of the new structure intended for outerwear has changed from 7.2 mm to 7.5 mm, and the length of the loop thread of the back layer has changed from 6.8 mm to 7.3 mm. This is expressed by the fact that it consists of glad rings with a homogeneous shape when weaving the layers [1-2-3].

Table 1. Technological indicators of knitted fabrics.

Indicators		Options		
		I	II	III
Thread type and linear density	Front layer	Polyacrylonitrile 55%	Polyacrylonitrile 58%	Polyacrylonitrile 62%
	Back layer	Conductive thread 45%	Conductive thread 42%	Conductive thread 38%
Ring step A, mm	Front layer	2	2	2
	Back layer	1.8	1.8	1.8
The height of the ring row is V, mm	Front layer	2	2	2
	Back layer	1.9	1.9	1.9
Horizontal ring density, Rg, ring	Front layer	25	25	25
	Back layer	26	26	26
Vertical ring density Rv, ring	Old qatlam	25	25	25
	Orqa qatlam	26	26	26
Loop thread length L, mm	Front layer	7.2	7.3	7.5
	Back layer	6.8	7	7.3
Surface density of knitted fabric Ms, g/m2		362	389	413
Thickness T, mm		2,146	2,21	2,313
Volumetric density of knitted fabric δ, mg/sm3		168,7	176,01	178,5
Absolute dimensional relief Δδ, mg/sm3		-	-7,31	-9,8
Relative lightness θ, %		-	-4	-5,4

This formula mainly plays an important role in determining the volume density index of knitted fabric:

$$\delta = Ms / T \quad (2)$$

δ - volume density of knitted fabric, mg/sm3;

Ms - surface density of knitted fabric, g/m2;

T - thickness of knitted fabric, mm.

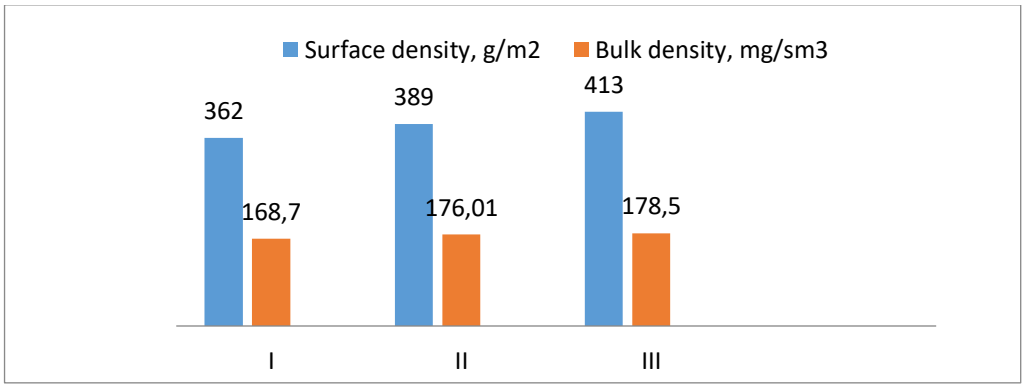

Figure 2. Histogram of indicators of surface and volume densities of samples.

The volumetric and relative lightness indicators of the two-layer knitted fabrics of the new structure intended for outerwear were compared to the I option, and the volumetric and relative lightness indicators of the II option are determined by the following formulas:

$$\Delta\delta = \delta_I - \delta_{II} \quad (3)$$

here: Δδ - true volume relief, mg/sm3;

δI - basic tissue volume density, mg/sm3;

δII - bulk density of experimental knitted fabric, mg/sm3 [4-5].

Relative lightness is defined as:

$$\theta = (1 - \frac{\delta_{II}}{\delta_I}) \cdot 100\% \quad (4)$$

here: θ - relative lightness of the tissue, %.

The values of changes in absolute and relative lightness indicators for the next options of knitted fabrics are presented below (Fig. 3).

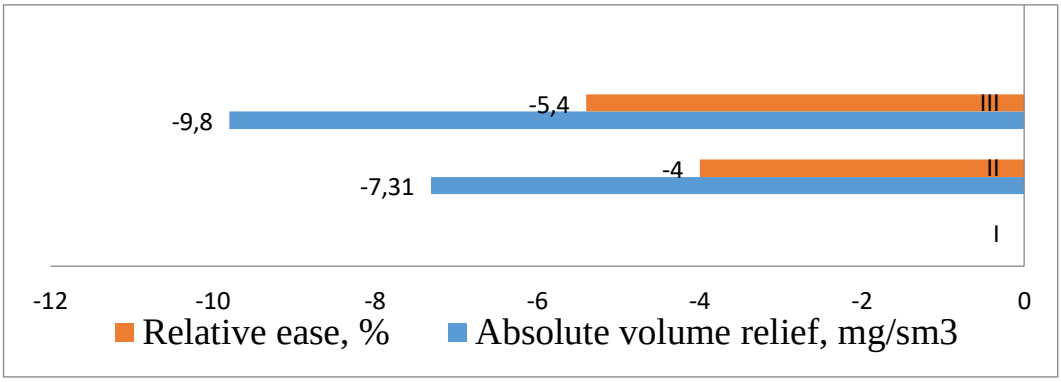

Figure 3. Indicators of relative lightness and absolute volumetric lightness of the samples.

Another important parameter in knitted fabrics is the thickness index, and it is one of the factors affecting the volume density of knitted fabric [6-7]. During the research, the thickness indicators of knitted fabrics were determined using thickness measuring devices (Table 1).

From the above, we can see that the change in the fabric structure of the knitted fabric samples, the change in the composition of the raw materials, significantly affected the technological parameters of the knitted fabric [8]. It can be seen from the conducted research that with the increase of rings in the tirot fabric, the consumption of raw materials was reduced compared to the remaining samples in the base fabric of the I option. It was recommended to produce a sample of option I.

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