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THE INVESTIGATION OF PHYSICAL AND MECHANICAL PROPERTIES OF COMBINED KNITWEAR WEAVING

ИССЛЕДОВАНИЕ ФИЗИКО-МЕХАНИЧЕСКИХ СВОЙСТВ ТРИКОТАЖА КОМБИНИРОВАННЫХ ПЕРЕПЛЕТЕНИЙ

K.T. MAKHANBETALIEVA, A.T. ONLABEKOVA, D.T. SARZHANOVA
К.Т. МАХАНБЕТАЛИЕВА, А.Т. ОНЛАБЕКОВА, Д.Т. САРЖАНОВА

(M.Kh. Dulaty Taraz State University, Republic of Kazakhstan)
(Таразский государственный университет им. М.Х. Дулаты, Республика Казахстан)
E-mail: kama_mt_77@mail.ru

The parameters of combined knitwear weaving were defined and its physical and mechanical propertieswere investigated in this paper. Five types of plush knitwear on the basis of press, which differ from each other in the number of press sketches in the weave rapport were developed and investigated. Also, for comparison, plush knitwear on the basis of a press which contains no pressing sketches was taken and analyzed.

В работе определены параметры и исследованы физико-механические свойства трикотажа комбинированных переплетений. Были выработаны и исследованы опытным путем пять вариантов плюшевого трикотажа на базе прессового переплетения, которые отличаются друг от друга количеством прессовых набросков в раппорте переплетения. Также для сравнения был взят и исследован плюшевый трикотаж на базе глади, не содержащий прессовые наброски.

Keywords: knit fabric, combined weave, surface density, thickness, strength, extensibility.

Ключевые слова: трикотажные полотна, комбинированное переплетение, поверхностная плотность, толщина, прочность, растяжимость.

Among knitted fabrics, which are successfully used in the manufacture of the upper, warm underwear, children's products, as well as for technical purposes, certain interest falls into plush fabric which has improved heat-shielding properties.

From an economic point plush knitwear knitting is reasonable, as a raw material it has greater thickness than the other types of hosiery and, consequently, due to its improved heat-shielding properties. In addition, the plush knitted fabric structure allows the use of a combination of different types of thread, with different prices, without compromising the product quality.

The given work studies the influence of the number of press sketches in the weaving rapport on technological parameters and physical-mechanical properties of the plush knitwear.

In the laboratories of the "Textile technology and materials" department five types of plush knitwear on the basis of press, which differ from each other in the number of press sketches were developed and investigated. Also, for comparison, it was taken and analyzed plush knitwear on the basis of a press which contains no pressing sketches.

During the test, at first the parameters of the developed variants were defined. The parameters of the knitwear primarily include surface density, thickness of the knitted goods, bulk density and other webs.

The surface density of the fabric is one of the important characteristics of knitwear products. The surface density of the knitted fabric can be changed in the same class and weaving machines as a result of changes in density of knitting, variations in thread thickness and by finishing modes and other physico-mechanical properties.

Figure 1 shows he dependence of surface density of knitted goods on number of loops in the pressing, in weave rapport.

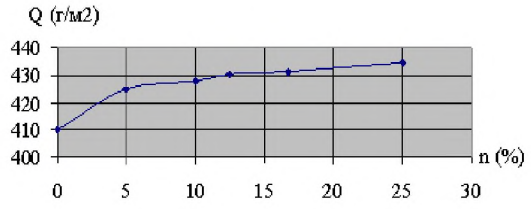

Fig. 1

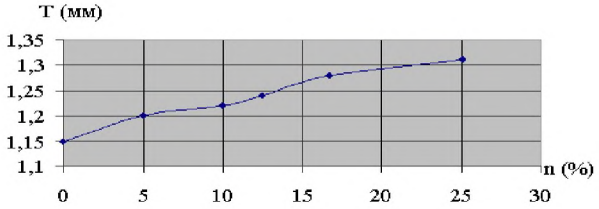

Fig. 2

The results of the analysis show that the increase in the number of loops in the pressing in the weave rapport increases the surface density of the plush knitwear. The intensity of this increase gradually decreases by increasing the number of loop in the pressing in weave rapport. It is necessary to define how the thickness of the plush knitwear changes by increasing the surface density. As it is well known, the thickness – is an important characteristic of knitted fabric, which determines the number of physical and mechanical properties: thermal barrier, permeability, rigidity, surface density [1]. The thickness depends on the thickness of thread which forms it's density, types of weave, density of knitting and finishing operations. The main factor affecting the thickness of the knitted fabric is a weave.

Figure 2 shows Dependence of the thickness on the number of loop in pressing in the weave rapport.

The graph shows that the thickness of plush knitwear goods increase by increasing in the of loops in the pressing in the weave rapport .

Increasing of the plush knitwear goods thickness is primarily due to an increase in the surface density. The higher surface density of knitted fabrics, the more its thickness. The

highest surface density, and hence the thickness, with the least consumption of raw material, is shown in the 1 variant (25%).

The mechanical properties are determined by the ratio of the knitted fabric to the action of various forces applied to it, causing tensile strain, bending, compression, torsion [2]. The most important for knitted fabrics is the characteristics of extensibility and elastic properties, which depend on the conditions of use of knitwear for certain types of products and the ability of stretched canvases instantly or with time to recover their original size and shape.

Figure 3 shows a graph the dependence of strength of the plush knitwear along the length on the number of press sketches in the weave rapport.

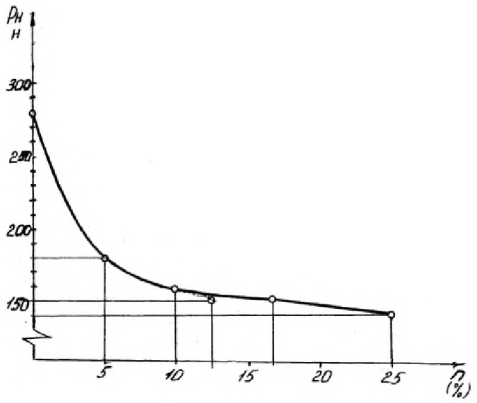

Fig. 3

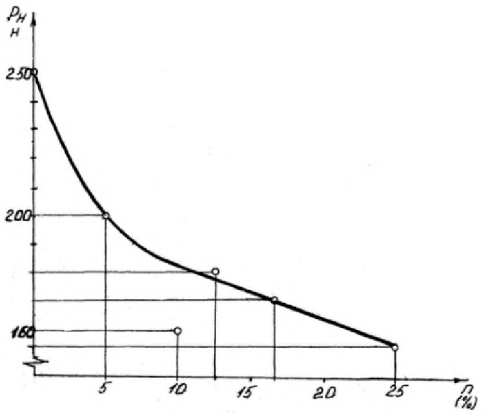

Fig. 4

As can be seen from the graph, with the increase in the number of press sketches in the weave rappport the strength in the plush knitwear along the length decreases.

Plush knitwear has the highest tenacity in length based on ironing due to the lack of press sketches. Under the effect of increasing the load in the length in the first place, a tensile force resists wales with press sketches. The more pressing sketches in the structure, the greater their destruction under the load. When you break the press sketches, the whole structure of knitwear collapses. It should be noted that, the strength in the direction of wales depends on their number per unit length, i.e density in horizontal and number of thread in each row.

If we consider the graph of the strength dependence of the plush knitwear in width on the number of press sketches in weave rapport (Figure 4), we can also note that, the strength of the plush knitwear in width decreases by increasing the number of press sketches in the weave rapport as well as it's strength of the length.

The graph shows that plush knitwear goods have the greatest strength -based on ironing which has no press sketches.

In figure 5,6 the graphs of dependence of plush knitwear goods extensibility according to the length and width on the number of press sketches in the weave rapport.

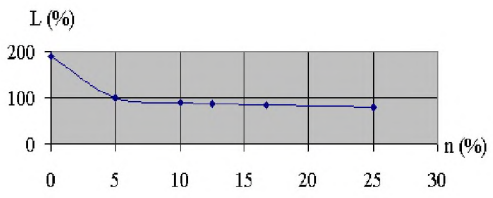

Fig. 5

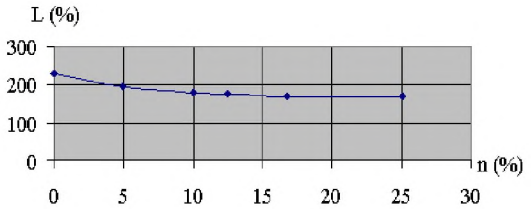

Fig. 6

When stretched in length, the sample of length is increased by increasing the height of the loop and reducing the number of steps the loop. The more pressing sketches in the weave rapport, the smaller the height of the loop series in extensility and less than the limit values. The plush knitwear goods based on ironing, which doesn't contain press sketches have the greatest extensility in length . By increasing press sketches in the weave rapport the extensibility in length decreases. By stretching in width, the width of the sample increases due to the increase in the loop steps and reducing the height of the loop series. With the increase of press sketches in the weave rapport the limits in the loop step in stretching decreases.

The graphs show that the highest tenacity and elongation at break, respectively, in length and width has the 5-variant.

Based on the analysis of the above considered plush knitwear properties, it can be concluded that the most important properties are dimensional stability and heat-shielding properties of knitted fabrics. The most dimensional stability have 1 and 2 variants.

These knitwear weaves can be recommended for the production of knitwear products. The best heat-shielding properties have 4 and 5 variants.

This can be apllied in the manufacture of children's assortment, as well as warm clothing.

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