

## RESEARCH OF THE PHYSICAL MECHANICAL PROPERTIES OF TWO-LAYER KNITTED FABRICS

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***Annotatsiya.** Maqolada ikki qatlamli trikotaj mahsulotlarining ishlab chiqarish bo'yicha ilmiy ish olib borgan bir qator olimlarning ishlari o'rganib chiqilgan. Namunalarning fizik-mexanik xususiyatlari tahlili keltirib o'tilgan. Olingan namunalar tahlil qilinib eng samarali bo'lgan trikotaj to'qimasining tuzilishi, grafik yozuvi va to'qima ko'rinishi tasvirlari berilgan.*

***Kalit so'zlar:** Ip, hosilali glad, interlok.*

***Abstract:** The article examines the work of a number of scientists who conducted scientific work on the production of two-layer knitted products. The analysis of the physical and mechanical properties of the samples is given. The obtained samples were analyzed and the most effective knitted fabric structure, graphic writing and fabric appearance images were given.*

***Key words:** Thread, derivative glad, interlock.*

***Аннотация:** В статье рассмотрены работы ряда ученых, проводивших научную работу по производству двухслойных трикотажных изделий. Дан анализ физико-механических свойств образцов. Полученные образцы были проанализированы и даны наиболее эффективные изображения структуры трикотажа, графического письма и внешнего вида ткани.*

***Ключевые слова:** Ip, производный рад, блокировка.*

The volume of production of knitted products in the world and in our republic is increasing year by year. The product range of knitted fabrics is also increasing. The problems of creating and producing new types of knitted fabrics, using new types of raw materials and processing methods, reducing the consumption of raw materials, and improving the quality of knitted products are being solved. In this regard, in developed countries, special attention is being paid to filling the domestic market with 75-85%

domestic products at the expense of the textile industry and clothing production. To date, it is not possible to provide 100% of the world's population with clothing products made of natural fibers. In the world, the volume of yarn products spun from natural fibers is decreasing year by year, while yarns spun from chemical fibers are being produced in large numbers. One of the important tasks is to learn the structure of the fabric through the effective use of raw materials in obtaining knitted fabrics from these thread products, to create a technology for the production of knitted products with high shape retention and hygienic properties, at a reduced cost, and to prepare and deliver affordable products for the people has been one.[1]

In this regard, we can see that the sewing and knitting industry is developing as a result of the works and reforms carried out in our country. Decree of the President of the Republic of Uzbekistan dated January 21, 2022 No. PF-53 "Measures to stimulate the production of deep processing and high added value finished products and their export at textile and sewing and knitting enterprises" on", Resolution No. PQ-4186 of February 12, 2019 "On measures to further deepen the reform of the textile and sewing-knitting industry and expand its export potential", dated February 10, 2023 Additional 300 mln. was allocated to textile projects in connection with the meeting of the video selector dedicated to "Ensuring the rate of growth of production in the industry, measures to mobilize existing opportunities and new reserves" in January. it is planned to direct the dollar.[2]

A number of scientists in improving the production technology of knitted products, researching the structure and physical- mechanical properties of fabrics: M.Savadzaki, E.Harima, S.Erisue, A.Mazjorie Taylor, L.Walter, M.Walker, Ch.Phillips, we can see in the works of A. Wilkes, A. Wynne, David, J. Spencer and other scientists.

In this field of knowledge, prof. A.S. Dalidovich, I.I. Shalov, L.A. Kudryavin, V.P. Sherbakov, V.N. Garbaruk, V.M. Lazerenko, V.A. Zinovyeva, L.P. Rovinskaya, I.G. Sitovich, B.B. Stroganov, E.I. We know the fundamental works of a number of scientists such as Bitus, B.A.Zavaruyev, A.V.Truevtsev, M.M.Muqimov, N.R.Khankhadjayeva, Q.M.Kholikov. Many of our young scientists and scientists are conducting scientific work on the research of these features and the production of knitted products with a new structure and raw material content based on the requirements of international state standards. They have been applying useful model and invention patents to large production enterprises based on their scientific work.[3]

Currently, the use of two-layer knitted fabrics in autumn and winter outerwear products is effective. As we achieve an increase in the density of the knitted fabric, the heat retention property of the fabric is increasing. As the heat storage property

increases, the air permeability of the fabrics decreases. We can find the following types of two-layer knitted fabrics:

- Obtaining new types of two-layer knitted fabrics with a new structure due to the inclusion of yarn and glad ring rows in the composition of knitting;
- Two-layer knitted fabric obtained using the press connection method with low consumption of raw materials;
- Press connection method with low consumption of raw materials;
- New types of two-layer knitted fabrics with high shape-keeping properties obtained by pressing and interlocking method of joining the base thread;
- Two-layer knitted fabric due to the insertion of arka yarn between the resulting glad fabric;
- New two-layer knitted fabrics, in which the effect on the physical and mechanical properties of the fabric has been studied due to the extension of the loop protectors of the derivative knitted fabrics and the introduction of the warp thread;
- Obtaining patterned two-layer knitted fabrics using the press connection method based on interlock knitted fabric;
- Obtaining textures with different raw material composition due to changing the yarns of the front and back layers in two-layer knitted fabrics;
- Obtaining tissues with different physical and mechanical properties due to the formation of pattern cells on the front side of the two-layer knitted fabric;
- Obtaining a thick one-layer knitted fabric by increasing the number of warp threads in glad knitted fabric;
- Obtaining derivative knitted fabrics with a rational structure with an increased rapport along the row of rings and the rings do not move along the vertical axis;

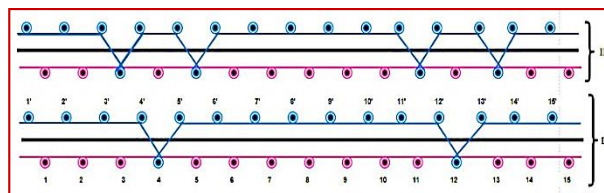
In the future, the possibilities of improving knitting machines and all technological processes of knitwear production are huge. In order to successfully work in this direction, first of all, it is necessary to create new knitting machines and to perfect the theories of knitting production, and to train specialists who can thoroughly master these theories and apply them in practice.[4,5]

In order to expand the assortment of knitted fabrics and reduce the consumption of raw materials, 4 options of knitted fabrics that differ from each other in structure have been developed. The knitted fabric samples were produced on the Long Xing LXA 252 SC type 14 double flat needle knitting machine. Polyacrylonitrile yarn with a density of 20 tex x 2 lines was used as raw material. Glad fabric (I-variant) was produced to compare the technological indicators and physical-mechanical properties of the presented knitting options.[,6,7,8]

Table 1

Indicators	Options					Standards	
	I	II	III	IV	V		
Raw material type and linear density	PAN 20 x 2 tex						
Surface density $M_s, g/m^2$	192,6	278,5	278,9	394,9	388,5		
Thickness T, mm	0,6	1,18	1,2	1,21	1,23		
Bulk density $\Delta \delta, mg/sm^3$	321	403,7	403,7	406,9	400,6		
Air permeability B, $sm^3/sm^2 \cdot c$	96,5	35,47	34,860	35,47	38,94	ГОСТ 12088-77	
Breaking strength, P,H	By heigh	461N	591 N	473 N	638 N	572 N	ГОСТ 28554 At least 80 H
	By widt	462N	342 N	348 N	321 N	325 N	
Uzilishdagi uzayish L, %	By heigh	72	93,1	90,3	107,3	90,5	ГОСТ 28554 0 to100%
	By widt	68	136,9	152,3	138,6	111,4	
Qaytmas deformatsiya $\epsilon_H (10 sm)$	By heigh	15 %	21,2%	30 %	40 %	15,4 %	ГОСТ 28882-90
	By widt	20 %	44,4%	42 %	43 %	46,05%	
Qaytar deformatsiya $\epsilon_H (10 sm)$	By heigh	85 %	78,8 %	70 %	60 %	84,6%	ГОСТ 28882-90
	By widt	80 %	55,1%	58 %	57 %	54,9%	

Based on the analysis of the physical and mechanical properties of the four presented knitted fabrics, it was found that our V-variant fabric has high heat retention properties, and the return deformation of the fabric is high. It can be used in outerwear. We can also see it in the scientific works of G.Sh. Allaniyazov, doctor of philosophy, on the production of knitted products. The technological indicators and physical-mechanical properties of the presented knitting options were tested in the NamMTI laboratory according to the standard method.



**Figure 1. Graphic inscription of two-layer backed knitted fabric**

1-two-layer backed knitwear 1 / 1

Research work is being carried out in the world to develop new scientific and technical solutions for high-efficiency and resource-saving technologies and equipment for the production of knitwear. In this regard, including the development of a new range of knitted fabrics, the study of their technological parameters, physical and mechanical properties and theoretical substantiation of their laws of change, the development of mathematical models and forecasting methods, the development of technological modes of production of knitted fabrics from new raw materials. Special attention is paid to scientific research aimed at improving existing equipment and technologies for the production of new knitted fabrics, expanding the technological capabilities of machines, automatic control of technological processes.

By producing knitted products from backed fabrics, it is possible to reduce the consumption of raw materials and increase the heat storage properties of knitted fabrics. The back yarns included in the knitwear reduce the elasticity, elongation, twisting properties of the fabric. In back yarn knitting fabrics: back yarn stretches less longitudinally if it is longitudinally and less transversely if it is transversely [4].

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