

STUDYING THE CHARACTERISTICS OF A NEW COMPOSITE FABRIC FOR WORKWEAR

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Annotation. The article is devoted to the creation of a new range of special-purpose fabrics with improved hygienic properties. The developed new composite fabrics belong to mixed inhomogeneous fabrics made of cotton thread, and for their intended purpose – clothing fabrics of special purpose.

Keyword: fabric, hygienic property, hygroscopicity, breathability, perspiration, moisture absorption, cotton, modal, viscose.

To improve the working activity of workers and increase labor productivity, the development of special clothing design taking into account hygiene requirements is an urgent problem.

Choosing a material for sewing workwear, you need to look not only at its appearance, but also take into account various properties, because they largely depend on whether the clothing is comfortable and how long it will last. An important indicator that should be taken into account is the hygroscopicity of the tissue [1].

When designing workwear for hot climate conditions, it is of great interest to quantify the intensity of perspiration. As noted, a person in the summer under the same conditions sweats much easier and more profusely than in winter, in addition, the intensity of sweating depends on the adaptation of the human body to certain climatic conditions.

It is known that in a closed building, the relative humidity is always lower than in an open space, so the moisture absorption of clothing, that is, the hygroscopicity is also lower. In the production, which is located in closed rooms, you should pay attention to the relative humidity of the air and prepare special clothing for workers from fabrics with high hygienic properties.

The passage of moisture (sweat) through the fabric of workwear is a complex process consisting of the diffusion of water vapor through the pores, sorption-desorption by fibers and threads of steam (or drop-liquid sweat) and capillary condensation, especially for materials of dense structures.

The hygienic properties of clothing depend on a combination of a number of factors, the main of them-the type of fabric, the nature of its dressing, the cut of clothing. Various fibers are used for fabric production – natural, chemical, artificial and synthetic. In recent years, chemical fibers that are obtained by chemical processing of cellulose and other raw materials of natural origin have become increasingly important [2].

Currently, special clothing for workers in production is made mainly from fabrics imported from China, and its operational, hygienic and technological characteristics can not be said to fully meet the climatic conditions of Uzbekistan.

As is known from the literature [3], the moisture-absorbing properties of textile fibers are different. To improve the performance and protective properties of workwear, we recommend a mixed fabric made of natural fiber-cotton and artificial fiber-viscose and modal. Unlike most artificial fibers, viscose and modal is an environmentally friendly fiber, since the fiber is entirely made from wood cellulose. The composition is completely free of toxic substances and any other harmful impurities [6]. In addition, viscose and modal has a number of advantages compared to natural fabrics: a high degree of hygroscopicity; breathability; lightness; durability; comfort.

Taking into account the above, and in order to develop and use fabrics with hygroscopic properties for workwear, the laboratory of the Tashkent Institute of textile and light industry has developed a technology for preparing raw materials for the production of a new type of mixed fabrics from viscose and modal. When developing a new range of fabrics, special attention was paid to improving the fabric's hygroscopicity. Hygroscopicity is one of the most important properties that apply to fabrics and textiles. Tissue hygroscopicity changes with changes in air humidity and temperature [4].

As raw materials for the preparation of warp threads, cotton – 100% linear density of 15,4x2 tex, and weft cotton-modal 50/50% (1-option) linear density of 20 tex, viscose-100% (2-option) and polyester-modal 80/20% (3-option) [5].

The physical and mechanical characteristics of a thread made of mixed fibers are shown in table 1.

Physical and mechanical characteristics of a mixed fiber thread

Table 1

Name of indicators	Method and device	Option		
		I	II	III
Type of thread (fiber)	Visual on a stereoscope	Cotton-modal	Viscose	Polyester-modal
Linear density, tex	Scales «SK-60 H»	20,0	20,0	20,0
The twist value, tw/m	DIN 53831	150	150	150
Breaking load, H	STATIMAT C	1302	1269	1365
Breaking elongation, %	STATIMAT C	12,1	11,9	13,5

A material with a new structure is made from the obtained threads. The structural characteristics of the new material are shown in table 2. Structural characteristics of the new material

Table 2

№	The name of the fabric	The fiber composition, %		The thickness of the fabric, mm	Weave	Fabric width, mm	Surface density, g/m ²
		Warp	Weft				
1	Fabric for workwear	C-100	C-50 M-50	0,4	twill	150	230
2	Fabric for workwear	C-100	V-100	0,35	twill	150	200
3	Fabric for workwear	C-100	P-80 M-20	0,4	twill	150	220

At the next stage, experimental studies of the physical and mechanical properties of a new material developed for the manufacture of special-purpose clothing were conducted.

The physical and mechanical properties of the new composite material are shown in table 3.

Physical and mechanical properties of the new material

Table 3

Sample	Sample code	Fabric thickness, mm	Surface density, g/m ²	Breathability, cm ³ /cm ² *s	Hygroscopicity, %	Tensile strength, H	
						Warp	Weft
Projected	1-A	0,45	230	14,71	12,0	624	502
	1-B	0,45	235	14,75	14,5	635	505
	1-C	0,44	225	14, 73	13,5	630	504
	average	0,45	230	14,73	13,3	630	504
	2-A	0,42	220	17,43	10,9	486	365
	2-B	0,43	220	17,34	9,2	492	375
	2-C	0,43	225	17,8	9,5	483	368
	average	0,43	222	17,5	9,9	487	369
	3-A	0,44	220	9,92	7,5	590	368
	3-B	0,45	220	9,93	7,8	592	376
	3-C	0,45	225	9,95	8,2	595	382
	average	0,45	220	9,93	7,8	592	375
Existing	4-A	0,45	230	9,4	8,01	626	413
	4-B	0,40	220	7,4	7,64	601	230
	4-C	0,40	210	8,2	7,94	595	327
	average	0,40	200	7,5	8,20	605	396

Note: 1-sample (projected) – “cotton+cotton/modal” fiber fabric; 2-sample (projected) – “cotton+viscose” fiber fabric; 3-sample (projected) – “cotton+polyester/modal” fiber fabric; 4-sample (existing) – 100% “cotton” fiber fabric.

A comparative analysis of the results of the research shows that the sample of fabric with the addition of “cotton+modal” and “cotton+viscose” fibers has achieved good results in terms of hygienic properties, that is, the relatively loose and irregular structure of modal and viscose fibers showed a high ability to absorb moisture. As for the strength index, the fabric with the addition of “cotton+modal” fiber gives a positive result. The “cotton+polyester/modal” fabric sample is less hygienic than the “cotton+modal” sample.

According to the above conclusions, the studied samples of fabric with the addition of “cotton+modal” fibers increase the hygienic properties and are recommended for designing a new model of special clothing for industrial workers.

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