

## TEXTILE MATERIALS PRODUCTION AND PROPERTIES RESEARCH

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***Annotation:** This article talks about the important changes taking place in the textile industry, research, the introduction of innovative ideas and the application of scientific innovations in the field. Also, based on the requirements of the standard, it is stated that high-quality textile fire-resistant fabric was obtained in accordance with the technical conditions of the standard requirements, and the physical and mechanical properties of the fabric were studied.*

***Key words:** textile fabrics, cotton and chrysotile fibers, tandaipi, jute yarn, physical and mechanical properties created in fabrics.*

**INTRODUCTION** In our country, significant results have been achieved in the creation of improved technology for fire-resistant fabrics using various compositional lacquers and other types of composition, giving fire-resistant properties by apprating to finished textile fabrics during the final finishing process. to ensure domestic and foreign market competitiveness with fire-resistant fabrics obtained using fire-resistant fabrics, as well as to ensure fire safety in enterprises, based on the production of fire-resistant fabrics for special protective clothing, a finished product with high added value production is targeted forward. In this regard, by researching the changes in the fire resistance properties of textile fabrics, achieving the preservation of their properties, reducing the amount of toxic smoke released from the fabric during ignition, increasing the shelf life, and the apprating process using cotton and chrysotile fibers. creation of improved compositions and technologies for Law of the President of the Republic of Uzbekistan No. 226 dated September 30, 2009 "Law on Fire Safety, PF - No. 4947 of the President of the Republic of Uzbekistan dated February 7, 2017 "Strategy of Actions for Further Development of the Republic of Uzbekistan on" dated December 14, 2017 No. PF-5285 "Decree on measures for the rapid development of the textile and sewing-knitting industry", No. 2992 dated May 23, 2017 "Internal affairs bodies fire It serves to a certain extent the implementation of the tasks specified in the Decision "On measures to fundamentally improve the activity of security units" and other regulatory and legal documents related to this activity.

Our achievements in the field of export in recent years are, first of all, the fundamental structural change and diversification of our country's economy, the establishment of industries that will play the role of a locomotive for us in the short term, the modernization of production, and the implementation of technical and technological renewal programs. , is the result of our timely, well-thought-out and long-term work on the formation of modern market infrastructure. Comprehensive measures aimed at organizing the production of a wide range of high-quality textiles and sewing-knitting products (hereinafter referred to as textile products) in the republic , deepening the localization of its production, as well as increasing the export potential of local manufacturers are being implemented. . During the past period, the necessary legal framework

and favorable conditions for the development of the textile and sewing-knitting industry (hereinafter referred to as the textile industry) have been formed.

### **RESEARCH MATERIALS AND METHODOLOGY**

In accordance with the Decree of the President of the Republic of Uzbekistan No. PF-5997 dated May 19, 2020, in connection with the implementation of the Law of the Republic of Uzbekistan "On Fire Safety", in the work of preventing and extinguishing fires, engineer- in order to ensure the health and safety of technicians, workers and servants, "in order to increase the fire resistance of fabrics intended for special clothes", production of quality yarn and fabrics by mixing cotton fiber with chrysotile fiber, see a group of assortments increase, it is necessary to carry out serious work in order to fill the world market with ready-made products for export.

GOST 12.1.004-01 "Fire safety" is included in the standard, which includes fire prevention measures and the use of fire protection systems, as well as organizational and technical measures, as well as fire hazard. It is stated that facilities whose factors or secondary effects can cause mass injury to people should have fire safety systems that ensure the lowest level of fire probability. In our republic, when checking the flammability of textile materials, the standard of Uz Dst 2456:2012 "Fire safety of textile fabrics. Classification and flammability test method of decorative fabrics" is followed. [8]

It is known that fire-resistant fabrics have their own characteristics, and at the same time, they are valued for the protection of human health and safety of fiber materials and fire protection. Manufactured from flame retardant textile yarns and weaves with precise properties, the special firefighter clothing provides breathability and comfort in accordance with the rapid action of firefighter personnel. It is required to ensure that it has. According to the results of the study of the requirements for the special clothing of firefighters, in order to improve the above-mentioned properties, obtaining fire-resistant yarn and fabrics is not only by impregnating the surface of the fabric with chemical protective coatings, but also by mixing chrysotile fiber with cotton fiber. It is easy to reach in every way. The theoretical analysis of the quantitative part of the process of mixing the chrysotile fiber with the cotton fiber and saving the looped ends of the cotton fiber sticking out on the surface of the threads from the flame makes it possible to achieve the goal set in the scientific work.

Carrying out the tasks set to achieve the set goal in the work expands the capabilities of the removable fireproof thread and fabric. Therefore, determining the speed of the thread passing through the yarn for the fabric intended for the production of special clothes of firemen, produced by mixing chrysotile fiber with cotton fiber, determined the index of complete absorption of the yarn into the yarn. . Chrysotile fiber and cotton fiber, yarn spinning equipment were chosen as research objects. Modern equipment was used to determine the quality indicators of the manufactured threads. It consists in improving the quality of fire-resistant yarn obtained from chrysotile (rock cotton) fiber by mixing it with cotton fiber . In order to achieve the desired goal, it was possible to obtain threads with a mixture of chrysotile and cotton fibers in different percentages , the physical and mechanical properties of the produced threads were improved, and the range of threads was increased. Effective use of chrysotile and cotton fibers depends on the season of collection of the fibers, its processing, and the produced threads allow the production of fire-resistant fabric with a mixed composition and are suitable for special clothing of firemen. and provides safety and breathability for the employee above all. Much

research and research has been carried out on chrysotile and cotton fiber processing and yarn production, but the work carried out to date shows that the research carried out has not been sufficiently substantiated in theory and practice. For the production of chrysotile and cotton mixed fabrics, its hardness and low permeability to water, air permeability, and hygienic properties are considered important. In the process of using the fabric, it is necessary to embody the above-mentioned features. In the analysis of the physical and mechanical properties of the mixed yarns, the data of their formation parameters are based on the methods of mathematical statistics. Experimental studies were carried out in the modern equipment of the CentexUz test laboratory under TTESI and the test laboratory under UzFVVYoX ITI.

In order to extend the flame-resistant properties of the fabric, it is planned to carry out several studies. In order to ensure the complete penetration (joining) of the composition of "axor" to the recommended material, the materials were cleaned of lubricants, and of the abrasives used in the spinning process.

It is known that in the course of cleaning the fabric, the fabric is cleaned from the additional substances that are not soluble in water in the cotton, in addition to the iplprgp applied fabric. If the dye is soluble, then the fabric can be washed in hot water to remove the dye. If there are water-insoluble substances (for example, starch) in the composition of the starch, then it is necessary to break down these substances and make them soluble in water. Acid, alkali, oxidizing agents and enzymes are used in the cleaning process. The tissue prepared for research was boiled in a mixture of 2% soda and 3% laundry soap in 1 liter of water.

### **RESEARCH RESULTS**

According to the results of the research, it was studied that the mixture should be treated with appropriate natural and chemical substances in the process of impregnating the tissue. When the composition is soaked in the substances treated with surfactant and sodium sulfate, that is, when the tissue is treated with 0.5%, 1% and 2% sodium sulfate salt, it was studied that the tissue does not burn for 20 seconds. The cross-linking process between the threads of the textile fabric and the composition increases the strength of the bond in an alkaline environment. Calculations for fire-resistant threads with a mixture of chrysotile and cotton fiber in different percentages were performed;

- the physical-mechanical properties of the yarns mixed with chrysotile and cotton fiber in different percentages were analyzed and an alternative option was selected for comparison;
- sample yarns were taken and flame retardant fabric was woven for production application.
- Chrysotile and cotton fiber mixtures in different percentages were selected and yarns obtained from the mixtures were calculated;
- physical-mechanical properties of chrysotile and cotton fiber mixed yarns in different percentages were analyzed and an alternative option was chosen for comparison; - sample threads were taken for production application.
- It was found that the fire resistance level of chrysotile and cotton fiber mixture yarns increased by 70%;
- improvement of the quality of the manufactured yarns with a mixture of Khrizoti and cotton fibers, increasing the demand of consumers for them;

- The tensile strength of chrysotile and cotton fiber mixed yarns increased by 37% compared to cotton and lavash mixed yarns.



**Figure 1. Equipment for determining the fire resistance of fabric.**

**1 - holder - frame of the sample; 2 – base; 3 – vertical columns; 4 – burner retainer; 5 – burner**

Researching physical-mechanical fire-technical properties of fire-resistant textile materials based on natural chrysotile fiber and cotton fiber, conducting experimental tests on their improvement has its own complexity. The main thing is that there are many factors affecting the fire resistance of textile materials, their interdependence, and the fact that the limits of change are not clear. Therefore, the influencer in most cases is carried out in sequence. Experiments were performed in three replicates. The results of the experiment were processed mathematically in the following order.

Exclusion of sharply different values in the results of the experiment;

- Quantitative characterization of random variables: mean, variance or mean square limit, and regression equations and their coefficients: determination and analysis of the adequacy of the resulting equation.

Exclusion of values of incoming and outgoing factors that are sharply different in the results of the experiment is carried out in the following order.

mean value  $\{ \bar{V} \}$  and variance  $S^2 \{y\}$

$$\bar{V} = \frac{1}{m} \sum_{i=1}^m V_i \quad (1.)$$

$$S_{\{V\}}^2 = \frac{1}{m-1} \sum_{i=1}^m (V_i - \bar{V})^2 \quad (2)$$

Here, m is the repeatability of the experiment,  $V_i$  is the experimentally determined value of the input factor,  $\bar{V}$  – Average value. Then, the experimental value of the maximum value  $V_{i \max}$  according to the calculated value of the Smirnova-Grabs criterion is determined by the following formula.

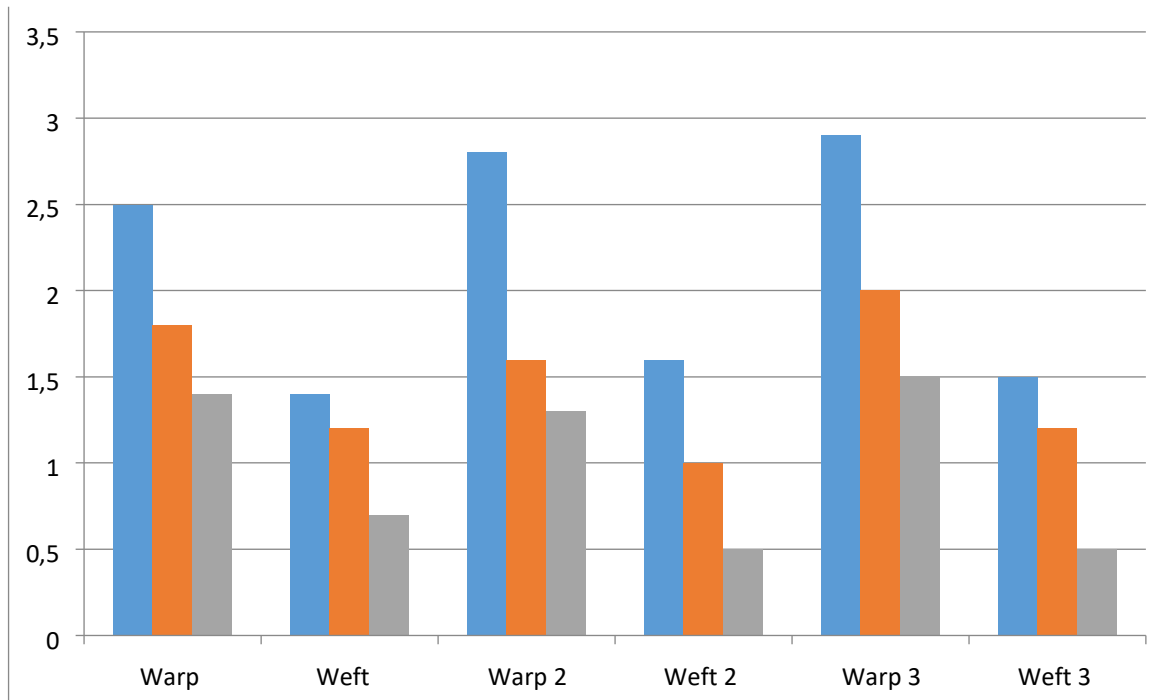
$$V_{rmax} = \frac{\bar{V}_{rmax} - \bar{V}}{S_{\{V\}}} \sqrt{\frac{m}{m-1}} \quad (3)$$

$V_{r \min}$  with which the results obtained in the experiment differ sharply was determined.

$$V_{rmin} = \frac{\bar{V} - \bar{V}_{rmin}}{S_{\{V\}}} \sqrt{\frac{m}{m-1}} \quad (4)$$

Then the determined  $V_{r\max}$  and  $V_{r\min}$  values were compared with the critical value of the criterion. A graph  $V = f(x)$  was built to determine the type of regression equation. (V- output parameter) x-influencing factors.

The method of least squares is used to determine the coefficients of the regression equation. The coefficients of linear equations ( $y = \alpha_0 + \alpha_1 x$ ) and the coefficients of nonlinear equations ( $y = \alpha_0 + \alpha_1 x + \alpha_2 x^2$ ) were determined.



**Figure 2. The results obtained from the experiment were recommended in graphical form**

According to the test results of the yarns prepared for the flame-resistant fabric shown above, a diagram was constructed for tanda and linden yarns. In this constructed diagram, it can be seen that the burning time of 30% cotton 70% chrysotile fiber blend yarn is 33.3% compared to 25% cotton. The burning time of the 75% chrysotile fiber blend yarn was reduced by 48.2%. According to the results of the analysis of argoq yarns, the burning time of 30% cotton 70% chrysotile fiber mixture of 35% cotton and 70% chrysotile fiber mixture of 35% cotton and 75% chrysotile fiber mixture of 25% cotton and 75% chrysotile fiber mixture of 25% cotton and 75% chrysotile fiber mixture. It was found that it decreased by 62.5%.

According to the results of the research, the following conclusion was made. Since the basis of the fabric is chrysotile fiber, the fiber is not resistant to acid, but it did not deteriorate even under the influence of diluted acids. the hardness of the gauze decreases to such an extent that it tears like paper. Therefore, in order to increase the fire resistance of the fabric, after boiling and drying, the textile fabric is treated with 3% sodium hydroxide, that is, it is subjected to a mercerization process. For this, a chain mercerization unit is used. The total length of the unit is 69 m and the maximum speed of the fabric is -150 m/min.

### The ignition time of the mixed composition thread

Table 1.

№	Indicator name	Percentage of mixed fiber content in yarn								
		35% cotton 65% chrysotile fiber			30% cotton 70% chrysotile fiber			25% cotton 75% chrysotile fiber		
		Warp	Weft	Fabric	Warp	Weft	Fabric	Warp	Weft	Fabric
1	Burning time, seconds	2.5	1.6	Smoke is generated but does not burn	1.8	1.2	It darkens, does not burn	1.4	0.7	Does not burn
2	Burning time, seconds	2.8	1.4		1.6	1.3		1.3	0.5	
3	Burning time, seconds	2.9	1.6		1.8	1.0		1.4	0.5	
4	Burning time, seconds	2.6	1.7		2.0	1.2		1.5	0.6	
5	Burning time, seconds	2.6	1.5		1.8	1.0		1.4	0.6	
	Average	2.7	1.6		1.8	1.1		1.4	0.6	

In addition to special fire extinguishing from the recommended fire-resistant fabrics, special clothes are also prepared in order to ensure the safety of workers. required.

### DISCUSSION

In the world, the creation of fire-resistant textile fabrics required for the production of special clothing, technical fabric, insulating covering materials for the services of fire safety, emergency situations, metallurgy and other fields is of particular importance. In addition to the use of heat-stable, low-flammability, low-flammability fibers and threads in the production of such fabrics, the special treatment of fabrics made of cotton, cotton and chrysotile fibers with antiperine substances has its place and importance. Depending on the industry, the fabrics intended for the special clothes being made should be selected. If fire-resistant fabrics are obtained, knitting, needle-punched non-woven, fabric and materials and similar fabrics can be used for other industries. The results of the research that gave fire resistance properties to such fabrics were studied.

It allows to obtain high-performance, long-term stable fire-resistant material by impregnating the chrysotile and cotton fiber mixed tan and linoleum threads, polyacrylamide, acrylic emulsion, adhesives and anti-mold chrysotile powder.

Processing of warp and weft textile threads, followed by weaving technology, further extends the service life of the fire-resistant material, by increasing its physical and mechanical properties, primarily air permeability, for the special clothing of fire service personnel. ensures the production of quality material.

Through mathematical modeling of the natural composition, structure, technological parameters of production and the physical-mechanical and fire-technical properties of the fire-resistant textile material, the system "material - structural composition - technology - property - field of application" was developed. optimization in terms of economic indicators is achieved.

According to the results of the research, it was found that the chrysotile fiber-combined yarns and yarns meet the requirements of the fabrics produced for firemen's clothing, and have high fire resistance and air permeability properties, and reduced relative tensile strength.

In the review of the literature, it was introduced to the stage of weaving, the technology of weaving, the composition of weaving, weaving machines, and the research conducted by scientists in weaving.

According to the results of scientific research, chrysotile powder is recommended as a fire retardant in textile enterprises for dyeing tando and linoleum yarn.

**CONCLUSION:** The fire-technical properties of fire-resistant materials and the fire-technical classification of textile fabrics according to the fire hazard were studied based on the special finishing of the textile yarn with a mixture of chrysotile fibers and cotton fibers. fire technical indicators of textile materials and coefficients of smoke generation during burning were used by the device "Determining the coefficient of smoke generation in solid substances and materials" certified by the UzDavStandart agency. According to the results of the research, it was found that the tanned and thin yarns with a mixture of chrysotile fibers meet the requirements of the fabric produced for firemen's clothing, and have high fire resistance and air permeability properties, and reduced relative tensile strength.

A fabric proposed as a fire-resistant fabric; When the air permeability was studied, it was found that the air passing through it corresponds to the coefficient of air permeability applied to the fabrics used for special protective clothing. It is intended for use as a fire-resistant fabric used for insulation in a fire place. For example, fire resistance (the treated textile material can extinguish the fire freely and be able to maintain its structure after partial combustion), the selected antiprene must be cheap, treated with antiprene the textile material should serve for a long time (up to 5-7 years or more), the fabric treated with antiprene should have a good appearance (in terms of the color of the textile material and the quality of the product should not have any restrictions), the material treated with antiprene should have a high tolerance to the contents of cleaning agents during cleaning and easy cleaning from household dirt.

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