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STUDY OF PHYSICAL AND MECHANICAL PROPERTIES OF SILK FABRICS AND THEIR ANALYSIS

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Abstract

Silk fabrics were selected to create new models of women's blouses, and their composition, physical and mechanical, as well as hygienic properties, were studied in the research laboratory and production facility of the Institute. The analysis of the results of experiments on the choice of fabric for the blouse showed that the physical, mechanical and hygienic characteristics of the selected materials fully meet the requirements of the consumer on all parameters.

Introduction

The mechanical properties of textile materials indicate their response to various forces. These forces are different, they can be large or small, they can act once or in a row. As a result, the materials are bent, stretched, twisted and deformed. Longitudinal deformation often occurs in sewing materials. Mechanical properties include tensile strength, elongation at elongation, work done at elongation, relative tensile strength, and more. These properties are used to indicate the maximum mechanical capacity and quality of the material [1-7]. To identify them, rectangular samples of materials, 50X200 mm, are made. For fabrics, these properties are determined separately in width and length in the front and back directions. The detection will be carried out on an RT-250 cutting machine. The distance between the machine clamps varies depending on the type of fabric and is 100 mm for wool fabrics. The tensile strength indicates the strength of the material. The strength of textile materials depends on the structure and linear density of the yarns they form in the fibre, the impact, density, type of finishing.

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The group of physical properties includes the properties of materials used in sewing, hygroscopicity, air and vapour permeability, dust absorption, electrical conductivity, optical and heat retention properties. Almost all of this is due to the fact that clothing can protect the human body from the sun and air, heat and cold, rain, dust and other environments, timely removal of excess moisture, steam and gases from the space under the clothes, and here describes the maintenance of the climate necessary for the movement of the human body, i.e. the hygiene of clothing [8-14].

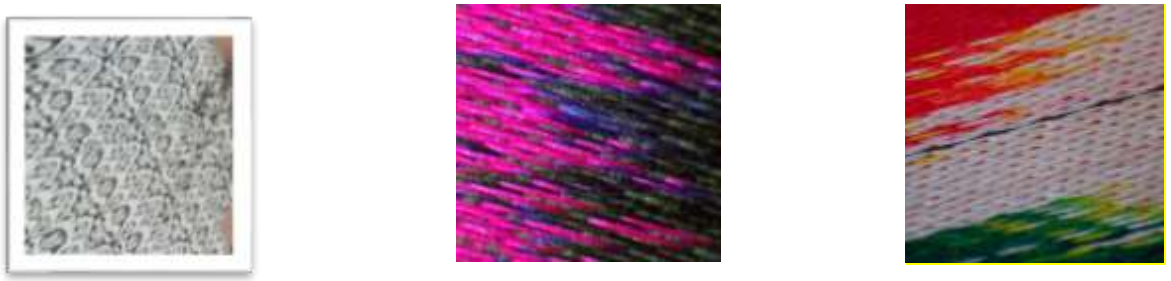
Physical properties can be divided into the following groups.

1. Properties related to the swelling ability of materials.
2. Properties of materials depending on their ability to conduct air, water, steam, etc.
3. Properties that characterize the response of materials to the effects of different temperatures.
4. Optical properties of materials.
5. Electrical conductivity of materials [3].

Mechanical and physical properties of sample fabrics.

Experiments show that the mechanical properties of the fabric include toughness, elongation, abrasion resistance, flexibility, stiffness and other properties.

Hygienic properties of the fabric. The hygienic properties of silk fabrics ensure that it is safe and harmless to human health. Accordingly, silk fabrics must have hygroscopicity, air permeability and vapour permeability properties. Three fabrics were selected for the experimental experiment, a-silk, b-adras, c-satin. Their appearance is shown in Figure 1.



A B C

Figure 1 Experimental samples (including A-silk, B-adras, C-atlas)

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Experimental samples of silk fabrics were tested at the Namangan Institute of Engineering and Technology, and their physical-mechanical, hygienic and other parameters were determined.

The thickness of the fabric. It was measured with a special device YG141D - thickness gauge [15-27]. The fabric sample was placed between two glossy plates; one of the plates was movable and attached to the needle of the instrument. The arrow indicates the thickness of the material in millimetres. The results are shown in Table 1.

Table 1. Sample thickness values

№	Indicators	Gazlamalar		
	Fabric composition%	Silk	Adras	Atlas
1	The thickness of the fabric	0,65	0,68	0,38

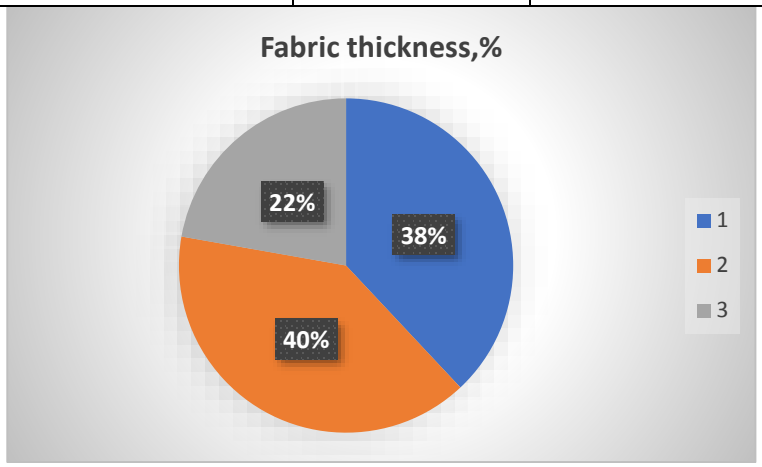

Figure 2. Diagram of fabric thickness results.

Figure 3 The process of checking the thickness of the fabric.

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Elongation strength of samples (kg s). The tensile strength of the fabric is one of the most important indicators of its quality. The tensile strength of a fabric is defined as its resistance to breaking forces. The tensile strength of the fabric is determined on an AG-1 machine using a special computer program [27-35]. Before starting work, the initial data required for the experiment is entered into the program. Samples are made in accordance with GOST in the size of 300 x 50 mm in the direction of the body and back. The finished samples are clamped (the distance between the clamps is 200mm). Then the START button is pressed and the top clamp starts to rise. After sampling, the experimental results were displayed graphically (Figure 4) and in Table 2. The process of testing the samples for rupture is shown in Figure 5.

Table 2. Elongation strength of samples (kg · s)

Indicators	Fabrics		
Tensile strength, kg · s	Silk	Adras	Atlas
Tanda			
Power (N)	463	458	677
Length (mm)	91,7	38,6	29,7
Percentage%	45,85	19,30	14,85
Energy (J)	12,7	3,6	5,8
Time (S)	27,56	11,60	8,93
Arqoq			
Power (N)	301	295	299
Length (mm)	89	26,2	29,8
Percentage%	44,50	13,10	14,90
Energy (J)	8,6	2,8	3,9
Time (S)	26,70	7,86	8,96

Figure 4. Diagram of elongation of samples (kg · s).

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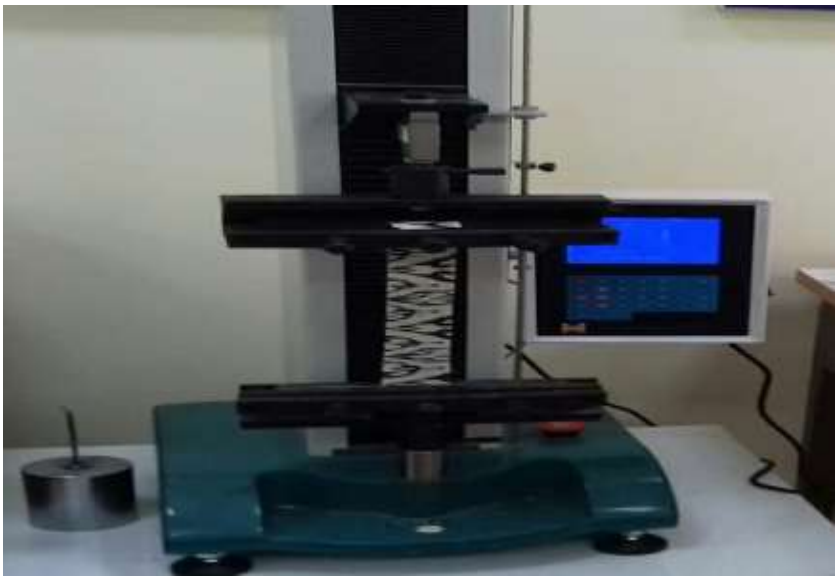

Figure 5. The process of testing samples for rupture.

Abrasion resistance of samples. In this case, the resistance of the fabric to various corrosive factors is called friction resistance. This is done in the laboratory using the M 235/3 machine [6,19,31]. The process of testing the friction resistance of the samples is shown in Figure 6. In this case, the samples are cut into circles using a special cutter and fastened in series to the desired location. When the machine is started, the samples are rubbed against a special solid and rotated. The perforated sample stops moving and the result is displayed on the screen.

Figure 6. The process of checking the abrasion resistance of samples.

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Air permeability of samples. The samples themselves have air permeability, which is different in each material. The air permeability of the materials was determined using a tester YG861E [7,9,18], the detection process is shown in Figure 8, and the results obtained are shown in Table 3.

Table 3. Air permeability of samples

Indicators	*Fabrics*		
Air permeability	Silk	Adras	Atlas
(sm^3/sm^2 sek).	32,750	34,980	22,2

Figure 7. Air permeability diagram.

Figure 8. The process of testing air permeability

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Elongation at break of the fabric. The elongation at break is "YG026A-III", 2019, checked using the following special device [8,16,23].The inspection process is shown in Figure 9. The proportions of the total elongation of the specimens in terms of composition are given in Table 4 below.

Table 4. Results of elongation at break of the fabric in the sample

№	Indicators	*Fabrics*		
1	Elongation at break of the fabric	Silk	Adras	Atlas
	Tanda			
1	Load (kg)			
2	Time (minute)	30	30	30
3	Initial position (mm)	20	20	20
4	Stretching (mm)	21,6	20,9	20,6
5	Return(mm)	20.2	20,3	20,3
	Arqoq			
1	Load (kg)			
2	Time (minute)	30	30	30
3	Initial position (mm)	20	20	20
4	Stretching (mm)	22,5	20,3	20,8
5	Return(mm)	22	20,2	20,7

Figure 9. The process of checking the elongation of the fabric at break.

Conclusion

The results of the experiments obtained in the above diagram show that the physical-mechanical and hygienic characteristics of silk, adras and satin fabrics can meet the consumer requirements in all respects. After experimental studies, it was concluded

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that: Fabrics are rugged, durable due to their high density, as well as fabric weaves; the elasticity of silk fibres leads to the restoration of the shape of fabrics after deformation, increasing the non-shrinkage properties; Woven from natural fibres, it fully meets the hygienic characteristics of the fabric, increases the level of hygroscopicity.

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