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ASSESSMENT OF AESTHETIC PROPERTIES OF FINE PATTERN FABRICS

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Annotation: The work is devoted to assessing the aesthetic properties of finely patterned clothing fabrics with specified properties. Variants of fabrics with a constant and variable report of weaves and the number of thread transitions along the warp and weft have been developed and developed. The parameters of clothing fabrics were selected based on an assessment of their properties, which have good physical-mechanical, hygienic and consumer properties of fabrics.

Key words: Fabric, structural parameters, properties, assessment, quality.

During production, seven variants of finely patterned weaves were used with rapport $R_o = R_y = 8$, with the number of thread transitions (to, ty) from two to seven, linear thread density on the warp To = 20 tex, fabric density R_o = 240 threads/dm, two colors of weft threads - white and black with linear weft density Ty = 18.5x2 tex and fabric density for weft R_y= 300 threads/dm [1].
Table 1 shows the effect of constant repeat and variable number of transitions of threads in the weave on the breathability of the fabric. Analysis of Table 1 shows for finely patterned rapport weaves of fabrics
Ro = Ru = 8, with an increase in the number of thread transitions (to, ty) from two to seven, in variants with white weft thread, the air permeability of the fabric increases by 43%, and in variants with black weft thread, the air permeability of the fabric increases by 48%, and the surface tissue density remains unchanged [2].
Table 1.
The influence of constant repeat and variable number of transitions of threads in the weave on the breathability of the fabric.

№	Tissue structure parameters				Air permeable fabric tensile strength, cm^3/cm^2s		Surface density of fabric, g/m^2	
	R_O	R_u	t_o	T_u	White Ducks	Black Ducks	White Ducks	Black Ducks
1.	8	8	2	2	152	124	147	148
2.	8	8	3	3	130	112	155	156
3.	8	8	4	4	115	103	160	163
4.	8	8	4	4	114	104	158	161
5.	8	8	5	5	103	98	166	168
6.	8	8	6	6	94	77	172	174
7.	8	8	7	7	87	65	179	180

A comparison of white and black weft threads in fabric shows that the breathability of the fabric is reduced by an average of 14% when using black weft threads in fabric. The developed fabric samples must meet the aesthetic requirements for fabrics in terms of fashion, color, material

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texture, weave and appearance. Teachers, industry specialists, masters, etc. can be used as an expert in assessing the aesthetic properties of fabrics. etc. For expert assessment, data from a survey of m - specialist experts of pre-selected n- properties are used, material options X_1, X_2, ... X_n give a rank assessment of their significance, denoting the most important quality indicator with rank R = 1, and least significant with rank R = n (Table 2). If any properties, in the opinion of the expert, are equivalent, then we take the average of the adjacent ranks and assign each of the properties [3]. The results of the expert survey are entered into a matrix table, which is used to determine the significance of properties and calculate the coefficient of agreement (concordance), which characterizes the consistency of expert assessments.

Table 2.

Expert assessment results

Experts	Samples of finely patterned fabrics, *n*= 7							
m = 10	X_1	X_2	X_3	X_4	X_5	X_6	X_7	∑
1	3	6	2	5	1	7	4	28
2	2	1	4	6	3	7	5	28
3	3	4	2	1	5	6	7	28
4	4	3	1	5	7	2	6	28
5	1	4	3	6	2	7	5	28
6	1	2	3	5	4	6	7	28
7	3	2	4	5	1	6	7	28
8	3	4	2	5	1	6	7	28
9	2	6	7	1	4	5	3	28
10	6	7	4	2	5	3	1	28
S_i	28	39	32	41	33	55	52	280
$m{\cdot}n{-}S_i$	42	31	38	29	37	15	18	
γ_i	0,2	0,148	0,181	0,138	0,176	0,071	0,086	
γ_{io}	0,284	0,209	0,257	-	0,25	-	-	
$(\check{S}-S_i)$	12	1	8	-1	7	-15	-12	
$(\check{S}-S_i)^2$	144	1	64	1	49	225	144	628
T_i								2800

To determine the consistency of expert assessments, the initial data from the matrix table is used. The coefficient of agreement (concordance) is determined by the formula [4,5]:

$$W = \frac{\sum_{i=1}^{n} \left(S_i - \bar{S}\right)^2}{\frac{1}{12} m^2 \left(n^3 - n\right) - m \sum_{j=1}^{m} T_j}$$

Where: $\bar{S}$- average sum of ranks for all indicators.

$$\bar{S} = \frac{\sum_{i=1}^{n} S}{n}$$

Identical assessments of different indicators by individual experts are determined by the formula:

$$T_i = \frac{1}{12} \sum_{1}^{u} \left(t_i^3 - t_i\right)$$

Where: ***u***- number of ranks with the same scores **y *i*** - th expert; ***t_i*** - number of ratings with the same rank from the i-th expert. To assess the significance of the coefficient of agreement (concordance) using the Pearson criterion, we determine

χ_P^2 =13,2> χ_T^2 = 12,6, we have significant (significant) consistency in the ranking estimates of ten experts.

Table 3 shows calculations assessing the quality of fabric samples with constant repeat and a constant number of transitions of threads in the weave on the breathability of the fabric.

Table 3.

The influence of a constant report and a constant number of transitions of threads in the weave on the breathability of the fabric.

№	Tissue structure parameters						Breathability of the fabric cm^3/cm^2 s
	R_o R_u	t_o t_u	P_o thread/dm.	P_y thread/dm	T_o Tex	T_u tex	
1.	4	2	258	150	25x2	14,3x5	32
2.	4	2	258	165	25x2	14,3x4	21
3.	4	2	258	190	25x2	14,3x3	17
4.	4	2	258	235	25x2	14,3x2	12
5.	4	2	258	330	25x2	14,3x1	10

Comparison of the quality of m = 5 fabric samples with the following quality indicators: X_1 - appearance of the fabric; X_2 - surface density of fabric; X_3 - breathability of fabric; X_4 - fabric abrasion resistance; X_5 - processing on the basis of the fabric; X_6 - processing by weft of the fabric are given in Table 4. Each property of the fabric is assessed by rank R, the best property of the fabric sample is R = 1, and the worst property of the fabric sample is R = m. Of the natural indicators of fabric quality n = 6, indicator X_1 is determined organoleptically, and the rest X_2, X_3, X_4, X_5 and X_6 are determined by the instrumental method. Table 5 shows the results of assessing the quality of tissue samples. It follows that the compared fabric samples in terms of quality in the direction of its deterioration are arranged in the following order: 2-4-5-3-1.

Table 4.

Results of quality indicators of tissue samples.

Fabric samples *t* = 5	Natural indicators of fabric quality *n*= 6					
	X_1- Fabric appearance	X_2 Surface density of fabric g/m^2	X_3 Breathability of the fabric cm^3/cm^2s	X_4 Fabric abrasion cycle	X_5 Work on basis, %	X_6 Duck work %
1	2	270	32	6900	9,5	2,9
2	3	260	21	7300	8,7	3,9
3	1	246	17	10700	8,4	4,4
4	4	213	12	14000	6,0	6,1
5	5	191	10	16000	4,8	5,7

Table 5.
Results of assessing the quality of tissue samples.

Fabric samples t = 5	Rank assessments of quality indicators of tissue samples R						$\overset{6}{\underset{1}{R}}$	Place
	X_1	X_2	X_3	X_4	X_5	X_6		
1	2	5	1	5	5	1	19	5
2	1	3	3	3	3	3	16	1
3	3	4	2	4	4	2	19	4
4	4	2	4	2	2	4	18	2
5	5	1	5	1	1	5	18	3
$\overset{5}{\underset{1}{R}}$	15	15	15	15	15	15	90	-

We clarify the quality assessment using the significance coefficients of individual indicators of fabric samples, which are presented in Table 6. In terms of quality in the direction of deterioration, fabric samples (according to Table 6) are arranged in the following order: 2-4-3-1-5. The assessment of the two best fabric samples remained unchanged, with sample 2 being the best, with the following parameters: fabric surface density 246 g/m^2;

Table 6.
Significance coefficients of individual indicators of tissue samples.

Fabric samples t= 5	Rank assessments of quality indicators $R{\cdot}\gamma$						$\sum R{\cdot}\gamma$	Place
	X_1	X_2	X_3	X_4	X_5	X_6		
1	0,4	0,5	0,2	1,0	0,75	0,15	3,1	4
2	0,2	0,3	0,6	0,6	0,45	0,45	2,6	1
3	0,6	0,4	0,4	0,8	0,6	0,3	3,1	3
4	0,8	0,2	0,8	0,4	0,3	0,6	3,1	2
5	1,0	0,1	1,0	0,2	0,15	0,75	3,2	5
Γ	0,2	0,1	0,2	0,2	0,15	0,15	-	-

breathability of fabric 17 cm^3/cm^{2}s; fabric abrasion resistance 10700 cycle; fabric base recovery 8.4%; weft processing rate 4.4%; fabric porosity 66%.

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