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# Research of Quality Indicators and Raw Materials of Carpet Products

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**ANNOTATION:** The article examines the raw materials and quality indicators of carpet products, and provides quality indicators of yarns made from different raw materials. The indicators of maximum breaking strength, relative strength of silk, cotton, wool, polyester yarns are analyzed, and the best performance corresponds to the raw material made of silk yarns.

**KEYWORDS:** carpet, silk, cotton, polyester, wool, quality, tensile strength, relative strength, fluffy, hairless.

## I. INTRODUCTION

As the interest in modern carpets has increased in recent years, there is a period of their production. The types of raw materials required for the production of carpet products are also expanding. Nowadays, there is a growing demand for the use of different raw materials in the production of carpets of different designs [1].

The production of carpet products, especially for home use, is one of the most important industries today. Carpets and rug products are also a type of fabric, and mankind has been engaged in their preparation since ancient times. As soon as they learned to spin yarn from different fibers, the carpet weaving industry also emerged and began to develop.

The appearance of fibers and yarns plays an important role in the production of quality carpet products. The appearance of the yarns affects the properties of the woven carpet products. It should be noted that mixed carpets consisting of different components soon lose their appearance and become unusable.

Carpets made from raw materials that have close properties to each other will have a durable and quality look. It should be noted that the highest quality carpets are carpets made of silk yarn, which have become known around the world as their properties increase over time.

In the research work, scientists have studied the quality indicators of different fibers. One of the unexpected advantages of the new trend of silk carpets is that it differs from other types of modern carpet production [4-5].

The authors conducted scientific and practical experiments to determine the criteria used in the manufacture of carpets, such as the strength, elongation, elasticity, bending resistance, abrasion resistance, hair stiffness.

## II. METHODOLOGY

In accordance with the requirements for carpet products, a mixture of different fibers is currently used in order to expand the raw material base of carpets.

Nowadays, there are 2 different ways of weaving carpet products, which can be made by hand labor and by machine. The sizes of hand-woven rugs are not very large and they are mainly made of sheep, goat, camel wool, natural silk and yarns made of bicomponent fibers. Hand-woven rugs are fluffy and hairless (bald) on the surface structure. In the feathered, three systems of yarns are obtained: the body and back, which form the fabric, and the feather-colored threads, which form the image of carpet products. The base (frame) of woolen carpets today is mainly made of cotton,



bamboo, wool, silk and polyester fibers. The back yarn is obtained by weaving yarns made from the above-mentioned fibers, and the hair is formed by tying pieces of wool, silk, bamboo yarn into hair knots[4-6]. Hairless rugs and carpet products are produced with one-sided or two-sided pattern and show the texture of the carpet, which consists of colored tan and back yarn in the fabric weaving on the structure [1-3].

Types of machine-made carpets are divided into two classes according to the method of carcass (base) formation: woven and non-woven. According to the type of production is divided into the following groups: two-layer jacquard, accent, pile, chiffon (jacquard and flat), hairless (jacquard and flat). Flower hairs may not swell on hairless carpets, while flower hairs may grow to 2-8 cm on hairless carpets. Non-woven carpet products can be: tafting (knitted), knitted, woven-stitched, glued, needle-punched, floccular [2].

### III. RESULTS AND DISCUSSION

Currently, carpets and rug products are divided into different types according to the texture and the composition of raw materials used: pure wool, wool and other fibers mixed with cotton, natural silk, bamboo, artificial and synthetic fiber carpets.

Therefore, the properties of yarns used as a raw material for carpets were studied.

The following table shows the quality indicators of different carpet yarns.  
Table

<i>Raw material made of silk thread</i>							
Total evaluation	-N-	-X-	-S-	-CV-	-Q(95%)-	-MIN-	-MAX-
Elongation (Fmax)	10	10,91 %	9,46	86,73	86,97	4,22	17,60
EAR; 1% Fmax	10	11,07 %	9,21	83,20	84,64	4,56	17,58
Maximum force	10	1843,63 cN	340,16	18,45	3126,90	1603,10	2084,16
Work to break	10	81109,57 cN*cm	8797,9 9	108,49	80874,52	1888,46	14330,69
Tenacity	10	12,48 cN/tex	2,57	18,45	14,48	7,42	9,65
Count	1	216 tex					
Time to Rupture	10	6.64 sec	5,52	83,20	50,79	2,73	10,55
<i>Raw material made of cotton yarn</i>							
Elongation (Fmax)	10	7,57 %	0,13	1,70	0,30	7,43	7,67
EAR; 1% Fmax	10	7,61 %	0,11	1,45	0,26	7,49	7,70
Maximum force	10	1760,16 cN	174,78	2,88	403,65	5859,42	6178,59
Work to break	10	6586,27 cN*cm	421,47	5,56	973,33	7249,54	8058,93
Tenacity	10	22,45 cN/tex	0,65	2,88	1,49	21,70	22,88
Count	1	270 tex					
Time to Rupture	10	5.06 sec	0,10	2,00	0,23	4,97	5,17
<i>Raw material made of polyester yarn</i>							
Elongation (Fmax)	10	14,75 %	2,25	5,40	3,03	39,43	44,75
EAR; 1% Fmax	10	44,80 %	3,46	7,72	4,64	41,19	48,97
Maximum force	10	4303,94 cN	40,91	0,95	54,89	4255,34	4362,38
Work to break	10	58302,81 cN*cm	3967,82	6,81	5323,39	54197,82	62761,38
Tenacity	10	20,49 cN/tex	0,19	0,95	0,26	20,26	20,77
Count	1	220 tex					
Time to Rupture	10	27.12 sec	2,80	7,69	2,80	24,85	29,63
<i>Raw material made of wool yarn</i>							
Elongation (Fmax)	10	37,84 %	1,37	3,62	2,06	36,32	39,38
EAR; 1% Fmax	10	36,23 %	1,92	5,29	2,88	33,59	38,09
Maximum force	10	5424,41 cN	227,25	4,19	340,87	5265,07	5760,91
Work to break	10	50904,79 cN*cm	2334,61	4,59	3501,91	48382,50	53815,09
Tenacity	10	7,23 cN/tex	0,30	4,19	0,45	7,02	7,68



Count	1	750 tex					
Time to Rupture	10	21,77 sec	1,18	5,40	1,76	20,16	22,90

#### IV. CONCLUSION

It can be seen from the results that the elongation at the point with the maximum breaking force. It was 10,91% silk, 7,57% in cotton yarn, 37,84% in wool, and 14.75 % in polyester.

Relative strength was 12.48 *cN/tex* in 216 *tex* silk, 22.45 *cN/tex* in 270 *tex* cotton yarn, 7.23 *cN/tex* in 750 *tex* wool yarn, 20.49 *cN/tex* in 220 *tex* polyester yarn.

We can see that the quality of raw materials used in carpet products is high in silk yarns.

Manufactured silk carpets need quality raw materials to be of all-round quality. This will require the right choice of production technology.

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