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INVESTIGATION OF WET-HEAT TREATMENT OF CORE-SPUN COTTON/ POLYESTER YARN WITH THE USE OF ELECTROMAGNETIC WAVES OF ULTRA HIGH FREQUENCY

ИССЛЕДОВАНИЕ ПРОЦЕССА ВЛАЖНО-ТЕПЛОВОЙ ОБРАБОТКИ КОМБИНИРОВАННОЙ ХЛОПКОПОЛИЭФИРНОЙ НИТИ С ИСПОЛЬЗОВАНИЕМ ЭЛЕКТРОМАГНИТНЫХ ВОЛН ТОКОВ СВЕРХВЫСОКОЙ ЧАСТОТЫ

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ABSTRACT

YARN, DEGREE OF BULK, MICROWAVE,
BULK, SHRINKAGE

The aim of the research is to develop a new technology for producing high-bulk yarns using microwave currents. The paper discusses experiments on increase of bulk of the core-spun yarn, results of research show 1,5-3 times increase in bulk of a yarn.

АННОТАЦИЯ

ПРЯЖА, ОБЪЕМ, МИКРОВОЛНОВАЯ
ПЕЧЬ, ОБЪЕМ, УСАДКА

Целью проводимых исследований является разработка новой технологии получения высокообъемной пряжи с использованием токов СВЧ. В работе проведены эксперименты по повышению объемности комбинированной пряжи, результаты исследований показывают увеличение объемности пряжи в 1,5-3 раза.

The principle of manufacturing textile materials with specific properties (high shrinkage and high bulk) is the mixing of high shrinkage (20 - 60 %) and low-shrinkage fibers and filaments. After joint processing, a textile material is produced that has the ability to increase its bulk as a result of wet-heat treatment in a unstrained state. In this case, the high-shrinkage component is shortened, taking a more definite orientation along the axis of the material. The low shrinkage component is wrapped around the high shrinkable one, taking a less oriented position in the same direction. This gives the material greater fluffiness, significantly reduces the bulk density and increases the transverse dimensions [1].

In our work we used as a high-shrinkage component a polyester shrinkage complex yarn linear shrinkage, which accounts for 48 % of the content, produced by OJSC «Svetlogorsk Khimvolokno» by the method of physical modification of the linear density of 16.8 tex. The cotton roving of the combed spinning system with a linear density of 250 tex was used as a low shrinkable component. Physical and mechanical properties indicators of high shrinkable yarn are shown in Table 1.

Table 1 - Characteristics of polyester high shrink yarn

Index	Indicator value
Nominal linear density of the thread, tex	16.8
Specific breaking load, mN / tex,	331
The elongation of the thread at break, %	30
Linear shrinkage, %	48
The number of entangling	14
Mass fraction of lubricant, %	1.3
Actual humidity, %	0.5

The methodology for conducting research into the process of increasing the bulk of a core-spun yarn, of various linear density using microwave electromagnetic waves consists of the following stages [2]:

1. Preparation of samples according to GOST 6611.0 - 73.
2. Moistening of the core-spun high-shrinkable threads to excessive moisture content.
3. Water removal to a residual moisture content of 100–300 %.
4. Wet-heat treatment by ultra-high frequency currents of electromagnetic waves.

A comparison of the performance of the core-spun cotton-polyester yarn before and after wet-heat treatment with electromagnetic waves of ultra-high frequency currents is presented in Table 2.

As a result of experimental studies, it is established that the use of complex high-shrinkage yarns enables to increase the bulk of the core-spun yarn by more than 200 %. Application of microwave currents enables to reduce the time of wet-heat treatment by 1.5 – 2 times compared to the traditional wet-heat treatment used in textile enterprises, which will allow increasing the bulk of output and reducing energy costs.

Table 2 – Comparison of a core-spun cotton-polyester yarn indicators before and after wet-heat treatment with ultra-high frequency currents of electromagnetic waves

Index	Indicator value	
	Before wet heat treatment	After wet-heat treatment
Composition	39 % – Polyester, 61 % – Cotton	
Linear density of the core-spun yarn, tex	42x2	53,5x2
Explosive loading, cN / tex	13,3	10
Explosive elongation, %	22.30	26
Diameter, mm	0.7	1.2
Bulk, g / cm ³	4.58	10.54

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