

**THE STUDY OF THE DURABILITY  
OF SPECIAL CLOTHES' TEXTILE MATERIALS TO OIL**

**ИССЛЕДОВАНИЕ СТОЙКОСТИ  
ТЕКСТИЛЬНЫХ МАТЕРИАЛОВ СПЕЦОДЕЖДЫ К НЕФТИ**

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*The article presents the study of the durability of the special clothes' textile materials to oil. The studies of the protective properties of materials were conducted, which allowed choosing of the optimal fabric vender code 18422 as a/X-M to produce the special clothing which has high oil resistance.*

*Статья посвящена исследованию стойкости материалов спецодежды к нефти. Проведены исследования защитных свойств материалов, которые позволили выбрать оптимальную ткань арт. 18422 а/Х-М для изготовления спецодежды, обладающей высокой нефтестойкостью.*

**Keywords:** special clothing, textile materials, the durability to the oil, durability, the bursting load.

**Ключевые слова:** спецодежда, текстильные материалы, стойкость к нефти, прочность, разрывная нагрузка.

In industrial conditions of the petroleum company "Master Munay – Gaz Energo" LLC (city of Aktobe) one of the dangerous and harmful industrial factors to be noted are the petroleum and petroleum products [1].

The petroleum permeability of the textile materials defines the protection level of workers from the aggressive environments' influence. As it known, the petroleum has the property to permeate into porous structures of textile materials, which affects negatively on

materials' property and wear date of special clothing [2], [3].

As the research objects in the present work there were chosen materials having different fibres composition and interweaving, such as: vender code 18422 a/X-M, 81421, 18452, characteristic of which presented in a table 1. The tests on order to define the durability properties of the textile materials to petroleum were conducted according to GOST №29104.12–91 [4].

Table 1

№	Fabric	Vender Code	Composition of the fibrous fabric, %	Finishing	Interweaving
1	Prime - Comfort 250A	18422 a/X-M	80 Cotton 20 Polyester + antistatic thread	petroleum moisture-repellent, petroleum petroleum moisture-repellent, Stop Petroleum	Twill
2	Prime Standard 250	81421	65Polyester, 35 Cotton	Moisture-repellent, petroleum moisture-repellent, petroleum petroleum moisture-repellent, Acid-50, Acid-80, petroleum shrink, CH	Twill 2/1
3	Premier Cotton Rich 230	18452	60 Cotton, 40 Polyester	Moisture-repellent, petroleum moisture repellent	Twill 2/1

In order to conduct the experimental research works, the elementary samples with 40x500mm size were prepared: six on the basis and eight by the weft. To obtain the comparative analysis the bursting load of materials were tested on the bursting machine MT-150/EV, starting with three on the basis and for by the weft before cooling in petroleum, and after three samples on the basis and four by the weft after cooling in petroleum. The bursting load indicators of fabric samples of vender code 18422 a/X-M, 81421, 18452 before cooling in the petroleum is presented on the Fig. 1 (the bursting load indicators of the fabric samples on the basis and by the weft before the cooling in petroleum).

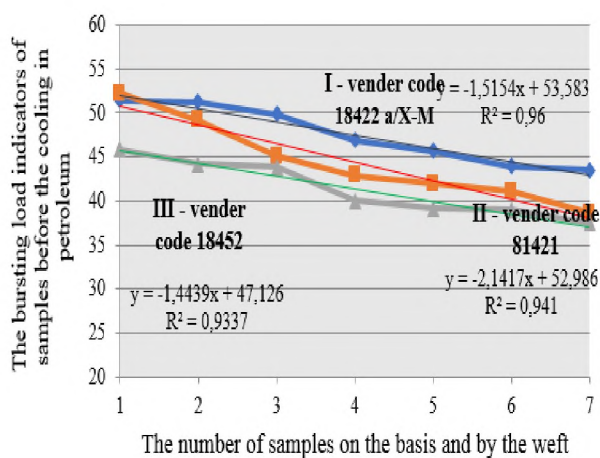


Fig. 1

As seen in the Fig. 1, the bursting load on the basis of the fabric having vender code 18422 a/X-M (I) ranges from 51 to 50 N, and by the weft from 47 to 44 N. The bursting load on the basis of the fabric having vender code 18421 (II) ranges from 52 to 45 N, and by the weft from 43 to 37 N.

The bursting load indicators of samples from fabrics of vender code 18452 (III) before cooling in petroleum is on the basis – 46 – 44 N, by the weft – 40 – 37 N. It should be noted, that the presence of the most percentage content of the polyester fibre and twill interweaving initially provides high indexes of the bursting load to the special clothing fabrics. In our case, the conducted comparative analysis of the materials indicates that most durability kept by fabric with 18422 a/X-M vender code.

Moreover, the work presents the processes of the petroleum permeate into fabrics' structure by the next samples: three samples on the basis and four is the weft. To conduct the research the samples are put in the desiccator with petroleum. In accordance with [4] the samples should be cooled in petroleum for 72 hours, after the washing with petrol for 7 minutes they are to be slightly pressed to removal of the petroleum residue, and then they will be put in between filter paper layers and dried by GOST 10681 in a room temperature.

After conducting the research work described above, the bursting load indicators on the basis and by the weft of the elementary samples were determined. The bursting load of the material samples vender coded as 18422, a/X-M, 81421, 18452 after cooling in petroleum presented in the Fig. 2 (the bursting load indicators of the fabric samples on the basis and by the weft before the cooling in petroleum).

As seen in the Fig. 2, the changes of the bursting load indicators of studied materials after the cooling in petroleum are determined. The bursting load indicators of the fabric samples vender having vender code 18422 a/X-M (I) has decreased for 4%, the vender code 81421 (II) for 9%, and the bursting load indicators of the vender code 18452 (III) has decreased to 13%. Besides, from the obtained equations of the mathematical relationship demonstrated in the Fig. 2, it's necessary to note, that the petroleum penetration character expressed almost identical for fabrics from the chosen assortment.

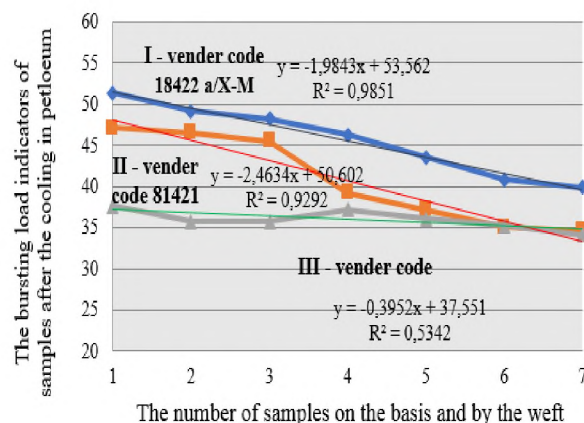


Fig. 2

The fabrics' durability to the petroleum effect on the basis and by the weft is calculated by the next formula:

$$CH_{\sigma(\gamma)} = \frac{P_{p2}}{P_{p1}} 100, \quad (1)$$

where  $P_{p1}$  – average arithmetic mean of the bursting load of fabric strip 25×200 mm be-

fore the cooling in petroleum;  $P_{p2}$  – average arithmetic mean of the bursting load of fabric strip 25×200 mm after the cooling in petroleum.

The changes of the fabrics' durability to the petroleum effect on the basis and by the weft in percentage are presented in the table 2.

Table 2

№	Fabrics, vender code.	$P_{p1}$ before cooling in petroleum	$P_{p2}$ after cooling in petroleum	$CH_{\sigma(\gamma)}$ , %
1	18422 a/X-M	47,52	45,62	96
2	81421	44,42	40,75	91
3	18452	41,35	35,97	87

The table 2 shows, that the high durability to petroleum has the fabric with petroleum repelling finishing, vender code 18422 a/X-M (I). The fabric vender coded as 81421 (II) has the second place, has the durability to petroleum of 91%. The 18452 vender coded fabric has a low durability to petroleum, which can premature wear of the special clothing.

## CONCLUSIONS

1. On the basis of conducted research works of the materials' durability to petroleum it should be noted, that from fabrics tested, the most durability to petroleum effect has the fabric vender coded as 18422 a/X-M, so far as the fabric content has the antistatic thread and indelible finishing.

2. The approximation ways of the results obtained with help of trend line, which connects two important maximum and minimum points of the bursting load indicators of the materials on the basis and by the weft, before and after cooling in petroleum.

## BIBLIOGRAPHY

1. Ganiyeva G.A., Ryskulova B.R. Design of the special clothing for the petroleum industry workers based on the study of working conditions (abstracts) // Materials of the International Scientific-Practical Conference: Innovative Development of Food, Light Industry and the Industry of Hospitality. - Almaty: ATU, 2014. P.270...271.

2. Ganiyeva G.A., Ryskulova B.R. Analysis of methods and devices to determine the petroleum permeability of textile materials' petroleum permeability // Materials of the Republican Scientific-Practical Conference: Modern Problems of Textile and Light Industry Development. - Semey: Republican State Enterprise on the Right of Business. State University named after Shakarim of Semey city. – 2015, November 27. P.132...135.

3. Ganiyeva G.A., Ryskulova B.R. Methods of petroleum permeability determination of materials to produce the protective clothing for the petroleum industry workers // Thesis report XVI International scientific – technical conference: Modern concepts of Scientific Research / Eurasian Union of Science. – Moscow, 2015, July 24-25. P.46...48

4. GOST 29104.12–91. Technical fabrics. Method for determination for petroleum products. – Standards' publisher, 1992.

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