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**MODERN METHODS OF INCREASING THE STRENGTH OF
ASPHALT CONCRETE**

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Abstract: The findings of a study on strengthening asphalt concrete pavements applied on roads are discussed in this article. The results of laboratory experiments with the addition of various surface-active additives are provided in order to enhance the strength of the asphalt concrete covering.

Key words: Asphalt concrete, bitumen, surface-active additives (SAA), physical and mechanical properties of asphalt concrete.

INTRODUCTION.

The state of the road surfaces affects how safely and comfortably cars can travel. At the moment, the majority of public roads in our nation are made of asphalt and concrete. The number of huge freight vehicles has increased dramatically in the previous four years, and this unusual climate change has caused many and obvious deformations in our nation's asphalt concrete pavements. Consequently, this has a detrimental effect on road safety and traffic situations. Research was done to strengthen the asphalt concrete layer in an effort to avert such unfavorable circumstances. Specifically, research was done in lab settings to add more surface-active elements to asphalt concrete in order to improve its resilience [1].

Many forms of SAA have been applied recently, both domestically and internationally. To begin our experimental work, we looked for SAA to improve the strength indicators of asphalt concrete. From there, we chose the following materials.: Topcel, Xrizopro, Aramid, Viatop 66, EkoTop, Xrizotop and RKM[2].

METHOD

The main purpose of the application of SAA is to expand the interval of plasticity, increase the viscosity and resistance to aging of bitumen, concrete and asphalt concrete, and increase its physical and mechanical properties.

Table 1

Additional surface-active materials

№	Name of the materials	Properties and structure	Usage ratios
1	Topcel	93-95% cellulose fiber, 5-7% wax mixture	0,5 % of the total mass AC
2	Xrizopro	Chrysotile fibers 85- 95 %, with the use of binders on the basis of bituminous components 5-15 %)	0,5 % of the total mass AC
3	Aramid	Synthetic fiber with high parameters of density	0,5 % of the total mass AC
4	Viatop 66	Ecologically safe natural fibers from cellulose	0,4 % of the total mass AC
5	EcoTop	Basis of chrysotile mineral fiber	0,5 % of the total mass bitumen
6	Xrizotop	Fiber made from cellulose	0,3% of the total mass AC

**Comment: The total mass AC - the total mass asphalt concrete*

The size of surface-active material treated with polymer (polybutadiene) on the rubber powder obtained on the basis of grinding old car tires, which is one of the secondary industrial wastes, is 9.5 mm.

We conducted experimental studies in laboratory conditions in order to increase the physical and mechanical properties of asphalt concrete [2, 6, 7].

RESULT AND DISCUSSION

The above-mentioned surface-active materials were added to asphalt concrete, their composition was selected, samples were prepared in laboratory conditions according to the requirements of GOST-9128, test-research works were carried out and the results are presented in the table 2.

Table 2.

Comparison of physical and mechanical properties of asphalt concrete
according to test results

№	The name of indicators	Unit of measure	According to GOST	Actual results						
				Topcell	RKM	Ekotop	Xrizopro	Xrizotop	Viatop 66	Aramid
1	Ultimate compressive strength at a temperature of 50 °C , not less than	MPa	0,7	2,5 times higher	3 times higher	2 times higher	As required	2,5 times higher	2 times higher	2,5 times higher
2	Ultimate compressive strength at a temperature of 20 °C , not less than	MPa	2,5	2,5 times higher	3 times higher	1,5 times higher	1,5 times higher	As required	As required	As required
3	Ultimate compressive strength at 0 °C , no more	MPa	3,0-6,5	1,5 times higher	As required	1,5 times higher	1,5 times higher	3 times higher	4 times higher	5 times higher
4	Water resistance, no less	-	As required	As required	As required	As required	As required	As required	As required	As required
5	Average density	g/cm ³	2.2-2.4	2,35	2,39	2,39	2,40	2,38	2.38	2,38

CONCLUSION

The following conclusions can be made based on the results of research conducted in laboratory conditions:

We used two different methods such as: Adding surface-active additives to bitumen and Adding surface-active materials to asphalt concrete to increase the durability of asphalt concrete.

1. By the adding surface-active materials to bitumen in the following ratio gives high efficiency", EkoTop- 0.5% of the total mass bitumen, rubber powder 12.5% of the total mass bitumen.

2. Topcell - 0.5% of the total mass AS, Khrizopro - 0.5% of the total mass AS, Khrizotop - 0.3% of the total mass AS, Viatop 66 - 0.4% of the total mass AS, Aramid - 0.5% of the total mass AS was added.

Adding these surfactants improved the physical and mechanical properties of asphalt concrete. At the same time, due to the addition of surface-active materials, the durability of the asphalt-concrete pavement is increased, and various deformations (cracks, shifts, ruts, etc.) that appear in it are reduced, and its service life is increased by at least 25-35%.

REFERENCES

1. Ablakulov A., Jamolov S. Using the new material to enhancing asphalt concrete's rheologic characteristics. "Mashinasozlik va muhandislik ta'limi muammolari" mavzusidagi xalqaro ilmiy-amaliy konferensiya. 8-iyun, 2023-yil.
2. Ablakulov A., Jamolov S., Ablullaev X. "Improve asphalt concrete's physical and mechanical characteristics", « IInd International Scientific Scopus Conference "Modern Materials Science" 2023-y.
3. J. Rottenmaier & Sohne GMBH Viatop. - http://sma-viatop.com/SMAviatop_engl/index.shtml
4. <https://flagma.kz/stabiliziruyushchaya-dobavka-ecotop-o2096244.html>
5. <http://www.chryzotop.ru/menu/product/>

6. Ablakulov, A, Mahkamov D., “Asfaltobeton qorishmasiga qo’shimcha moddalar qo’shib uning fizik-mexanik xususiyatlarini oshirish”. “Avtomobil yo'llari va muhandislik kommunikasiyalari qurilish jarayonlarining dolzarb muammolari” mavzusidagi respublika miqyosidagi ilmiy-amaliy konferensiya, 2021-y.
7. Ablakulov A., Jamolov S. Improving the quality of the road construction materials by modifying with additives to external influences. “Mashinasozlik va muhandislik ta’limi muammolari” mavzusidagi xalqaro ilmiy-amaliy konferensiya. 8-iyun, 2023-yil
8. Shaw P. S. Stress-Strain Relationships for Granular Materials under Repeated Loading. / P. S. Shaw. – PhD Thesis. Department of Civil Engineering. University of Nottingham, 2014. – p.120
9. Gost 9128 - 2013. Smesi asfaltobetonnye, polimerasfaltobetonny, asfalobeton, polimerasfaltobeton dlya avtomobilnyx dorog I aerodromov. Texnicheskie usloviya M., 2014.,- 56 s.
10. GOST 31015-2002 Smesi asfaltobetonnye va asfalobeton shchebenochno-mastichnye.
11. Asfaltobeton GOST 12801-98 Materialy na osnove organicheskix vyjushchix uchun dorojnogo va aerodromnogo stroitelstva.