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Effect of mineral powder obtained from shale rocks on production of reinforced asphalt concrete mixtures

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Today, the problem of production and quality improvement in road construction is of urgent importance in our Republic. Most of the pavements on public highways are unpaved, and the demand for construction and reconstruction of asphalt-concrete pavements is increasing. In the scientific work conducted by many researchers, mineral powder was used as a filler in the asphalt-concrete mixture, that is, it was focused on ensuring the coverage density. [1,2]

In such cases, cement and powders obtained by grinding ordinary stones are added to the hot dense asphalt concrete mixture produced in our Republic. These added materials fill small voids between large and small aggregates in the asphalt concrete mixture, but do not serve to increase the strength of the asphalt concrete mixture and increase the activity of the binder. GOST 16557-2005 "Mineral powder for asphalt concrete and organomineral mixtures" T.U. As a result of insufficient production of mineral powders that meet the requirements of Table 1 of the regulatory document, in some cases they are not added at all, which causes a decrease in the service life of the asphalt-concrete mixture laid on the pavement.

One of the main differences in the preparation of fine-grained hot dense asphalt concrete and large-grained hot porous asphalt concrete mixtures is the addition of mineral powder to the dense asphalt concrete mixture. That is, the mineral powders added to the asphalt-concrete mixture increase the density of the mixture, increase its water absorption, water resistance, and the activity of the binder, improve its viscosity in relation to the mineral part of the mixture, and increase the strength of the mixture.

Mineral powder added in the preparation of fine-grained hot dense asphalt concrete mix is obtained from fine limestone, shale rock, dolomite by grinding, meeting the requirements of GOST 16557-2005 normative document, i.e. passing 70% of the 0.71 mm sieve on the level of grinding, bitumen with mineral powder It is determined that the density of the mixed sample is 2.5, Porosity, at least 35% moisture content and 1.0%. [4]

Asphaltoconcrete mixtures are divided into several types according to their type and composition, depending on their working conditions, durability and physical-mechanical indicators. Asphalt-concrete mixture is prepared on the basis of selected composition by heating large and small aggregates and binding material. GOST 9128-2013 "A mixture of asphalt concrete, polymer asphalt concrete, asphalt concrete polymer asphalt concrete for automobile roads and airfields" T.U. according to the regulatory document, it is qualified as follows:

1) Asphaltoconcrete mixture of hot type, the binder is prepared at a temperature not lower than 120 C. In the preparation of cold-type asphalt-concrete

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mixtures, it is prepared from bitumen, which goes into a state of softening at low temperature, i.e. at a temperature of 5 C.

2) Depending on the size of the inert material particles, it is divided into large-grained (up to 40 mm), fine-grained (up to 20 mm) and sand (up to 5 mm) types of asphalt concrete mixtures.

3) Depending on the residual porosity, the ash is dense when the residual porosity is from 1.0% to 2.5%, dense when the residual porosity is from 2.5% to 5.0%, and when the residual porosity is from 5.0% to 10.0% pore and residual porosity are divided into porous types from 1.0% to 10.0%.

4) Asphalt-concrete mixtures are divided into A, B, V, G and D types depending on the proportion of crushed stone.

5) According to the physical and mechanical characteristics of asphalt concrete mixtures, hot type asphalt concrete mixtures are divided into 3 types (I, II, III) and cold type asphalt concrete mixtures are divided into 2 types (I, II).

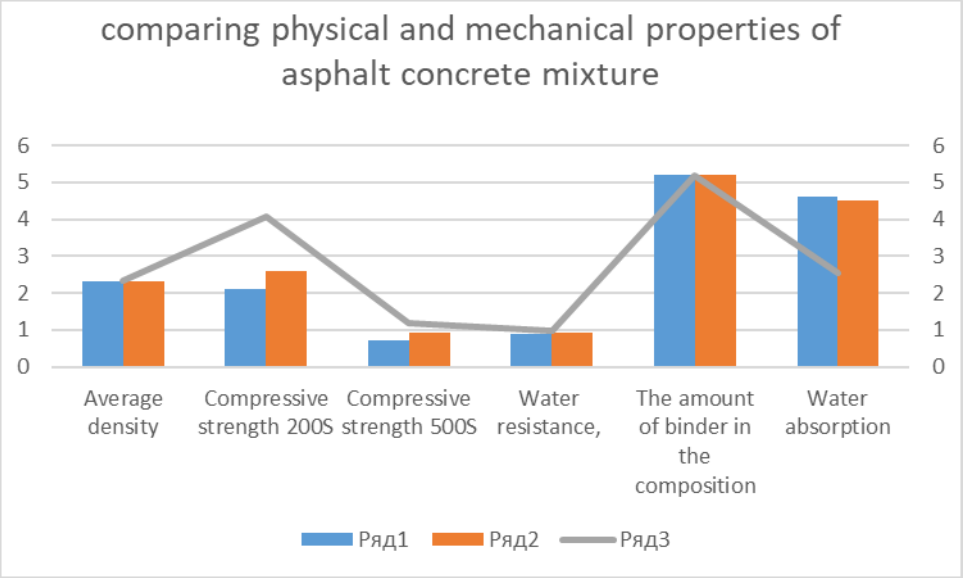
Under laboratory conditions GOST 12801-98 "Materialy na osnove organicheskikh vyajushchikh dlya dorojnogo i aerodromenogo stroitelstva" M.I. on the effect of mineral powder in the development of B-type fine-grained hot dense asphalt concrete mixture was studied. GOST 9128-2013 "Smesi asfaltobetonnye, polimerasfaltobetonnye, asphaltobeton, polimerasfaltobeton dlya avtomobilnykh dorog i aerodromemov" The granular composition was selected according to table 3 of the regulatory document of T.U. Samples were prepared by adding a binder in the amount of 5.2% to the selected mineral part, and the physical and mechanical properties of the samples were tested in accordance with GOST 9128-2013.

Table 1.

№	Pointer names	Unit of measure	The value of indicators			
			Requirements according to GOST 9128-13	Average value obtained		
				Content 1	Content 2	Content 3
1	Average density	g/sm^3	not moderated	2,30	2,32	2,35
2	Compressive strength 20^{0}S	MPa	2,5	2,12	2,58	4,08
3	Compressive strength 50^{0}S	MPa	1,1	0,7	0,94	1,2
4	Water resistance,		At least 0,85	0,89	0,92	0,96
5	The amount of binder in the composition	%	5,0-6,5	5,2	5,2	5,2
6	Water absorption	%	1,0-4,0	4,6	4,5	2,54

**when mineral powder is not added to asphalt concrete mixture in composition 1. In the 2nd composition, the mineral powder produced today is added, in the 3rd composition, the activated shale mineral powder obtained from the shale rocks of the Samarkand region is added.*

Figure 1



Conclusion: As can be seen from the above table 1 and figure 1, in terms of physical and mechanical properties, water resistance, water permeability, compressive strength and average density are better than those of small-grained hot dense asphalt concrete samples without adding mineral powder and with added mineral powder. Shale mineral powder. we can see that that of the added sample is much higher. The shale mineral powder has a great influence on the physical and mechanical parameters of asphalt concrete and causes the long-term durability of asphalt concrete to be hidden and the traffic performance indicators of the road.

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4. GOST 16557-2005 "Mineral powder for asphalt concrete and organomineral mixtures" Technical conditions