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CHARACTERISTICS OF THE FILLERS USED FOR REALIZING THE ASPHALT MIXTURES IN ROMANIA

BY

IRINA-MIHAELA DĂMIEAN and GH. GUGIUMAN

This paper presents the lab results for four types of filler used in producing the asphalt mixture in Romania, as well as other physical-chemical characteristics of a new type of filler, derivate of the grinding of the bituminous schists through a ball mill/crusher.

Knowing these physical-chemical characteristics is crucial for asphalt mixtures due to the complex purpose of the filler.

1. Introduction

The filler is a mineral dust made of 72% particles of 72 microns.

In the composition of concretes and asphalt grout, the filler is a mandatory component which must fulfill certain requisites:

- a) It mustn't react chemically with binding agents.
- b) It must ensure a good adhesiveness of the binding agent on the filler granule.
- c) Its granules shouldn't be porous, in order not to increase the binding agent consumption through absorption.
- d) It must not selectively adsorb certain components of the bitumen, which might lead to the incongruous modification of the binding agent's characteristics.
- e) It must have an adequate hardness.
- f) It must have an adequate gauge.
- g) The humidity must be maximum 2%.

In order to realize the asphalt mixtures, in our country there are three types of fillers (according to STAS 539-79): a) limestone filler; b) chalk filler; c) powder hydrated lime filler.

Limestone filler is obtained from limestone rocks, with a calcium carbonate content of at least 90%, through their fine grinding and centrifugal processing of the material in order to achieve the necessary granulation.

The chalk filler is obtained through fine grinding of raw chalk.

Powder hydrated lime filler is obtained through the liming of the construction balls with water or stream quantities, followed by the corresponding separation.

2. Lab Tests

Subsequently to these premises, in the laboratory we studied four classic types of fillers:

- a) Delnița filler, extracted from Delnița;
- b) Bicaz filler, extracted from Bicaz;
- c) Fieni filler, extracted from Fieni;
- d) Basarabi filler, extracted from Basarabi.

For these types of fillers the following physical characteristics were studied:

- a) granularity; b) wettability coefficient/value; c) hole coefficient in compact state;
- d) apparent density; e) specific surface.

Table 1
Physical Characteristics of the Fillers Studied in the Lab.

No.	Physical characteristic	Type of filler				
		Delnița	Bicaz	Fieni	Basarabi	
1	Granularity, [%]					
	Sifting through the screen and sieve, [%]	0.63	100.00	99.17	89.58	79.63
		0.200	100.00	96.67	78.99	66.31
		0.100	100.00	98.02	85.67	72.15
0.063		100.00	97.29	86.17	77.66	
2	Wettability coefficient	0.55	0.75	0.88	0.67	
3	Hole coefficient in compact state	0.28	0.27	0.28	0.30	
4	Apparent density, g/cm ³	2.84	2.64	2.73	2.73	
5	Specific surface, cm ² /g	3,842	4,623	3,711	3,717	

Currently, as a novelty in the field of road constructions in our country, within the aggregates used in realizing the bituminous mixtures, the searched filler is that obtained from the grinding of the bituminous rocks (the so-called schist filler).

The schist filler was obtained through the grinding of the bituminous schists, extracted from the Vadu Moldovei area, which after drying have been grinded in a ball mill.

The chemical characteristics of the schist filler are presented in Table 2, and the physical characteristics in Table 3.

Table 2
Chemical Characteristics of Schist Filler

No.	Anorganic components distribution	Organic components distribution
1	SiO ₂ - 51.67%	Asphaltene - 5.10%
	SiO ₃ - 9.73%	Raisins - 3.71%
	Al ₂ O ₃ - 7.49%	Oils - 0.8%
	CaO - 6.80%	Carbene - 0.21%
2	Total = 90.42%	Total = 9.82%

Table 3
Physical Characteristics of Schist Filler

No.	Test name	Test result	SR 667 limits	Test rate	
1	Granularity			STAS 239-79	
	Sifting through the screen and sieve, [%]	0.63	100.00		100.00
		0.200	93.54		Min. 98
		0.100	81.23		-
0.063		70.64	Min. 72		
2	Wettability coefficient	0.98	Max. 1...0	STAS 539-79	
3	Hole coefficient in compact state	0.41	0.3...0.5	STAS 539-79	
4	Apparent density, g/cm ³	2.33	-	STAS 539-79	
5	Specific surface, cm ² /g	5,144	3,500...5,500	STAS 539-79	

3. Conclusions

In conclusion, the physical-chemical characteristics of fillers studied in the lab correspond to the STAS 563-79 values, being useful in realizing the bituminous mixtures, as the filler influences in a different and complex manner the properties of asphalt mixtures, of bitumen, as well as their consolidation possibility.

The presence of organic components in the schist filler decreases the influence of atmospheric humidity over it, reducing at the same time the bitumen quantity used for processing the mixtures.

The research we started shall emphasize the actual influence of the schist filler and the physical-mechanical characteristics of the asphalt mixtures in which it is introduced.

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"Gh. Asachi" Technical University, Jassy,
Department of Foundations,
Railways, Roads and Bridges

REFERENCES

1. Bilțiu A., Nicoară L., *Îndrumător pentru laboratorul șantierului de drumuri*. Ed. II, Edit. Tehnică, București, 1971.
2. Bruno B., Di Renzo A., *Pavimentazioni stradali*. Edit. Ulrico Hoepli, Milano, 1959.
3. Duriez M., Arrambide J., *Les enrobés bitumineux*. T. I, *Nouveau Traité de Matériaux de Construction*. RGRA, Paris, 2002.
4. Grasu L., Cătană L., Grinea D., Ionesi L., *Considerații geologice și geotehnice asupra rocilor bituminoase oligene din zona cuprinsă între Pârâul Cujești și Ozana (Carpații Orientali)*. Anuarul Muzeului de St. Național, Piatra Neamț, Geol.-Geogr., III, Piatra Neamț, 1971.
5. Gugiu Gh., *Suprastructura drumurilor*. Edit. Tehnică, Chișinău, 1996.
6. Lucaci Gh., Nicoară L., *Construcția drumurilor*. Edit. Tehnică, București, 2000.
7. * * * *Filer de calcar, filer de cretă și filer de var stins în pulbere*. STAS 539-79.
8. * * * *Agregate naturale pentru lucrări de căi ferate-drumuri; Metode de încercare*. STAS 730-89.

9. * . *Agregate pentru amestecuri bituminoase și pentru finisarea suprafețelor, utilizate la construcția șoselelor, a aeroporturilor și a altor zone cu trafic. SR EN 13043-2003.*

CARACTERISTICILE FILERELOR UTILIZATE LA REALIZAREA MIXTURILOR ASFALTICE IN ROMANIA

(Rezumat)

Se prezintă rezultatele de laborator, pentru patru tipuri clasice de filer, care se utilizează la realizarea mixturilor asfaltice din România, precum și caracteristicile fizico-chimice pentru un nou tip de filer, rezultat din măcinarea șisturilor bituminoase cu ajutorul unei mori cu bile.

Cunoașterea acestor caracteristici fizico-chimice, este foarte importantă pentru mixturile asfaltice, datorită rolului foarte complex al filerului.