SILENT ROAD CLOTHING. LABORATORY STUDIES

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Abstract: *Studies have shown that noise pollution is a very harmful form of pollution for human health and also for labor efficiency. The noise pollution is mainly due to traffic that may be the form of road traffic, rail traffic or air traffic. As the noise pollution, caused by the circulation of vehicles on road clothing, has increased substantially due to the increase of the fleet of vehicles in Romania, I tried at the Road Research Station at the Faculty of Civil Engineering of Iaşi to determine the noise produced by road traffic on different types of bituminous clothing. The goal is to get bituminous clothing that emits as little noise as possible and satisfies the conditions of resistance in exploitation.*

Measurements will be made with special sonometers in different situations, which will give a realistic look at the operating conditions at different vehicle speeds and under certain weather conditions (clear, rain, etc.). After analyzing the noise level of each required embroidery, I will try to develop a mineral skeleton that will represent the base of an asphalt mix. Moreover, the asphalt mix will be as silent as possible and the physico-mechanical and the dynamic characteristics will fit within the limits of the current standards.

keywords: noise pollution,bituminous clothing,sonometers,asphalt mix

1.Introduction

Following studies in recent years, it has been found that noise pollution is a form of pollution that is very damaging to human health and also for work efficiency. The noise pollution is mainly due to:

¬ Road traffic;
¬ Rail traffic;
¬ Air traffic;

Worldwide, road traffic is the second form of pollution, after atmospheric pollution. In that circumstance, it is important to study these forms of noise pollution that affect residents not only during the day but also during the night.

2.The curent situation

In the past decades, traffic noise was not a form of pollution because the number of cars passing through cities was very low. With the increase in the number of vehicles, the noise pollution caused by them also increased. As noise pollution has risen globally, it has been taken into consideration the proper mean of reducing it and one of these main sources is by reducing the road traffic.

The main source of noise produced by the road traffic is due to the wheel contact with the rolling coat. In the attempt of reducing the noise emission by making asphalt and to make it as quiet as possible, it is necessary to investigate and identify the mineral skeletons to satisfy them.

One of the particle sizes ranges used in the western countries for low-noise clothing is shown in the figure below.

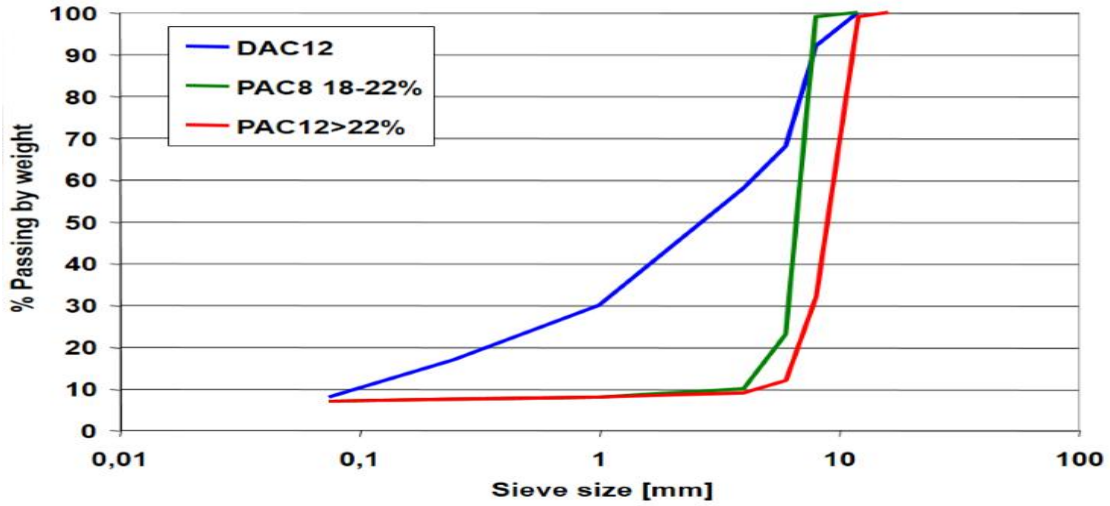

Fig. 1 *Example of a Particle size area for silent clothin.*

3.Solution of the examined problem

Within the Road Research Station at the Faculty of Civil Engineering and Installations in Iasi, we have tried to develop certain recipes of asphalt mixtures that once used in operation have they are able to emit as little noise as possible, but also to satisfy the physico-mechanical and dynamic characteristics, provided in current standards.

4.Results and discussion

One of the mixes studied is a mix of SMA 16.
Below is presented the study curve of the mix.

Table 1 *Particle sizes composition of the mixture.*

Aggregate mix		Past on sieve,%:													
Natural aggregates	%	31,5	25	20	16	12,5	8	4	2	1	0,63	0,20	0,125	0,10	0,063
Chippings 16-20 mm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chippings 8-16 mm	53,00	-	-	-	51,8	-	3,1	-	-	-	-	-	-	-	-
Chippings 4-8 mm	20,00	-	-	-	20,0	-	20,0	3,5	0,2	-	-	-	-	-	-

Crushed sand. 0-4 mm	20,00	-	-	-	20,0	-	20,0	19,8	16,5	13,1	-	-	5,3	-	3,7
Filler	7,00	-	-	-	7,0	-	7,0	7,0	7,0	7,0	-	-	6,4	-	5,3
Aggregate mix curve		**-**	**-**	**100**	**98,8**	**-**	**50,1**	**30,3**	**23,7**	**20,1**	**-**	**-**	**11,7**	**-**	**9,0**

Noise measurements were made in the station on a track with SMA 16 mixed with fiber. At the road station of the Faculty of Civil Engineering and Engineering in Iasi, measurements were made on the noise produced by a two-pivot tire-arm installation on the MAS 16 runway shown above.
The projected system reproduces the standard axle (115 KN) and provides bituminous clothing to measure the sound level emitted by the contact between the wheel and the garment.

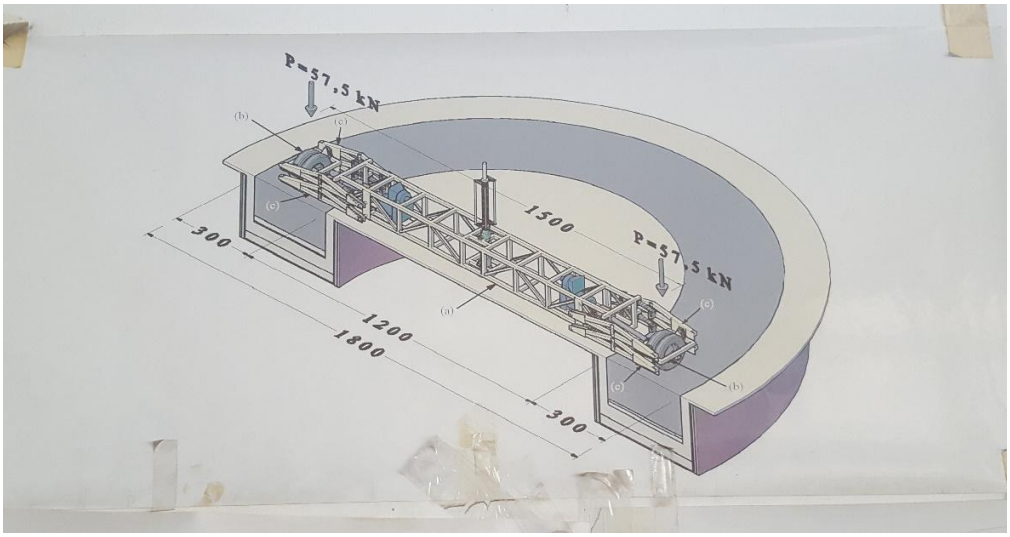

Fig. *2 Installation scheme.*

The measurements were made with a CEM DT-8852 type Sound Level Meter fixed at a height of 1.2 m on a metal tripod.

Fig. 3 *Sound Level Mete.*

Measurements were made on dry and wet track assumptions.

Fig. 4. *Noise Measurement.*

The following measurements were made:

Table 2. *Noise measurements in different assumptions.*

Measurement hypothesis	Sound level recorded dB (A)			Observations
	Minimum	Maximum	Average	
Full silence	41.3±1.4	43.7±1.4	42.2±1.4	Just the background noise in the hall
Engine operation	69.8±1.4	71.4±1.4	70.5±1.4	Only drive motors turned on without turning the arms
On the move	70.8±1.4	74.9±1.4	72.5±1.4	In normal operatio, 25km /h
While walking (but wet track)	70.2±1.4	75.6±1.4	72.8±1.4	Wet track

Measurements have been made on certain streets with this type of SMA 16 mix but also on the streets with other types of clothing, making a comparison between noise emissions.

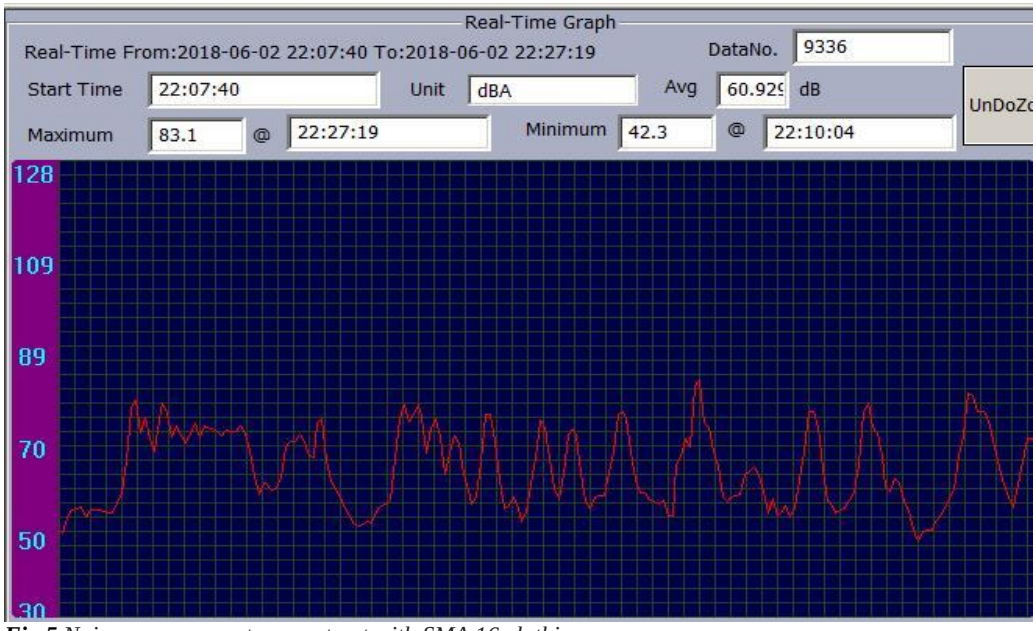

Fig 5 *Noise measurements on a street with SMA 16 clothing.*

It can be seen, from the chart, that the maximum recorded level is 83.1 dBA, the minimum of 42.3 dBA and the average level of 60.62 dBA.

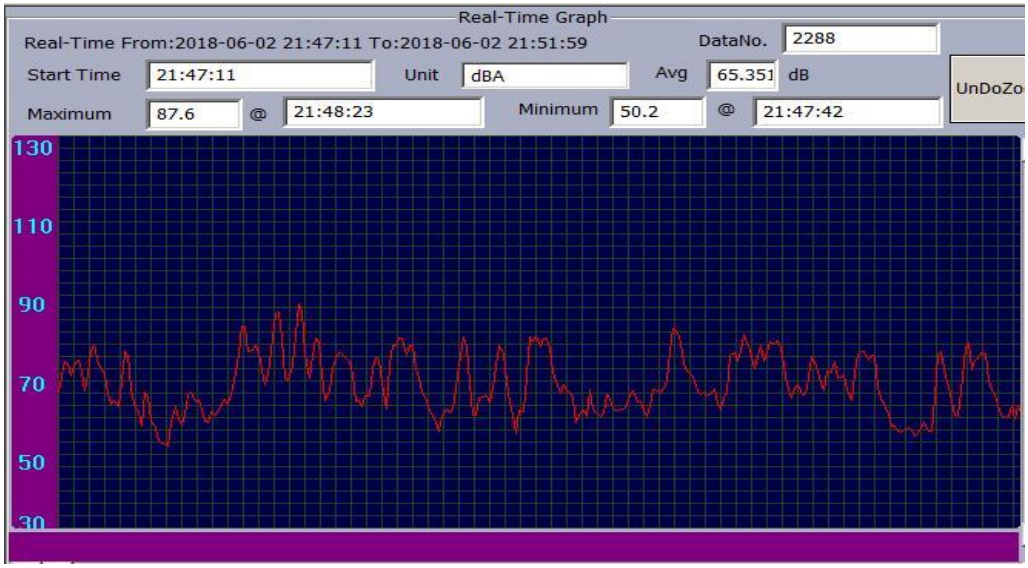

Fig. 6. *Noise measurements on a street with BA 16 clothing (classic).*

It can be seen from the chart, that the maximum recorded level is 87.6 dBA, the minimum of 50.2 dBA and the average level of 65.31 dBA.

From the comparative analysis of the two measurements, it can be seen that SMA 16 type asphalt is much quieter.

5.Conclusion

The research has shown that SMA 16 mixes are much quieter than asphalt concrete. A special importance is the identification of a mineral skeleton that satisfies both the stability and strength conditions of the asphalt mix but also the emission capacity to reduce of noise.

6.References

1.Catalina T. “Protection agains noise” ,Bucuresti,Matrix Rom,2015

2. INQUEST Workshop Bucharest, Romania,24 may 2007