Conclusions

In this research work, it was attempted to investigate the effect of the number of layers and the distance between them in the multi-layer structures on the sound absorption of multi-layer structures made from nonwoven. Therefore some nonwoven layers with the best structural and geometrical properties were prepared according to the findings of previous works. Regarding the results, we can conclude that the amount of NAC in multi-layer structures made from nonwoven layers produced by needle punching depends on the number of layers i.e. the thickness of the multi-layer structures.

As observed from this work, at all frequencies the NAC of the structures without a space between the layers increases with an increase in the number of layers of up to three; however, when the number of layers in the structure is increased to four, this characteristic decreases significantly. However, there is an exception - the three layer structure at 1600 Hz.

Comparing the performance of the multi-layer structures with different distances between the layers, it may be mentioned that in the multi-layer structures with a low distance between the layers (5 mm), increasing the layers has a positive effect on the NAC. As can be seen, the three layer multi-layer structure with a 5 mm distance between the layers performed better than the multi-layer structure with two layers with the same distance between them.

Meanwhile, if the distance between the layers in the two layer structures is increased, for instance to 15 mm, the NAC of the multi-layer structure also improves. In other words the NAC of the two layer structure with a 15 mm distance between the layers has better performance in comparison with the three layer structure with a similar distance between its layers.

In the future, the results relevant to other structure configurations will be presented in part - II.

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Received 27.08.2010 Reviewed 13.10.2011