LABORATORY AND FIELD MEASUREMENTS OF AIRBORNE SOUND INSULATION USING THE SOUND INTENSITY TECHNIQUE

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1 Introduction The advantages of the sound intensity method for transmission loss measurement in comparison with the conventional two-room method are well known [1]. In the present paper the results of a recent experimental analysis, carried out both in the laboratory and in the field, are reported. The measurements, carried out with both methods, were made with different types of wall constructions.

2 Experimental results In the laboratory each specimen, measuring about 10 m^2, was placed in a 25 cm deep niche. The measurements were carried out on a 7x6 grid, using the scanning method, at a distance of 10-15 cm from the specimen. The microphone separation was 12 mm. For each area, the pressure-intensity index was kept under control. Thus, it was necessary to add absorbing material inside the receiving room in order to lower the field's reactivity. In spite of this, in some cases it was not possible to meet the validity criteria at all the frequencies. The values of the single-number quantity obtained with this technique were very close to the corresponding conventional measurements, with a maximum difference of 1 dB.

In the field the partition in question was not homogeneous, and was made up of modular elements with 3-meter-high and 1-meter-wide panels and an extra 30-cm-wide panel considerably thinner than the others. With the sound intensity method it was possible to determine the overall sound reduction index of the partition and the sound reduction index of the single elements by carrying out measurements on small homogeneous surfaces. There were important differences between the values of the single-number quantities of the different parts of the partition (9-10 dB).

Measurements both in the laboratory and in the field were also made using different conditions, reduced surfaces and box-shaped scan areas.

3 Conclusions. The two methods give comparable results, particularly in the laboratory, where the flanking transmission is negligible. In the field the difference can be greater.

In the reactive field the measurements were more difficult and different ways of elaborating the measurement data may give different values of sound transmission loss.

Particular attention has to be paid when using box shaped scan areas. In the scan surface perpendicular to the specimen surface the sound intensity is measured in a condition in which it is possible to have a sign inversion for an incorrect position of the probe. Due to the significant side scan area, significant error can be caused. Thus, it would be better not to use the side scan area perpendicular to the specimen surface.

References

[1] Fausti P., Farina A., Pompoli R., (1994) "Transmission loss measurements: validity of the sound intensity technique in laboratory and in the field", FASE congress, Valencia.