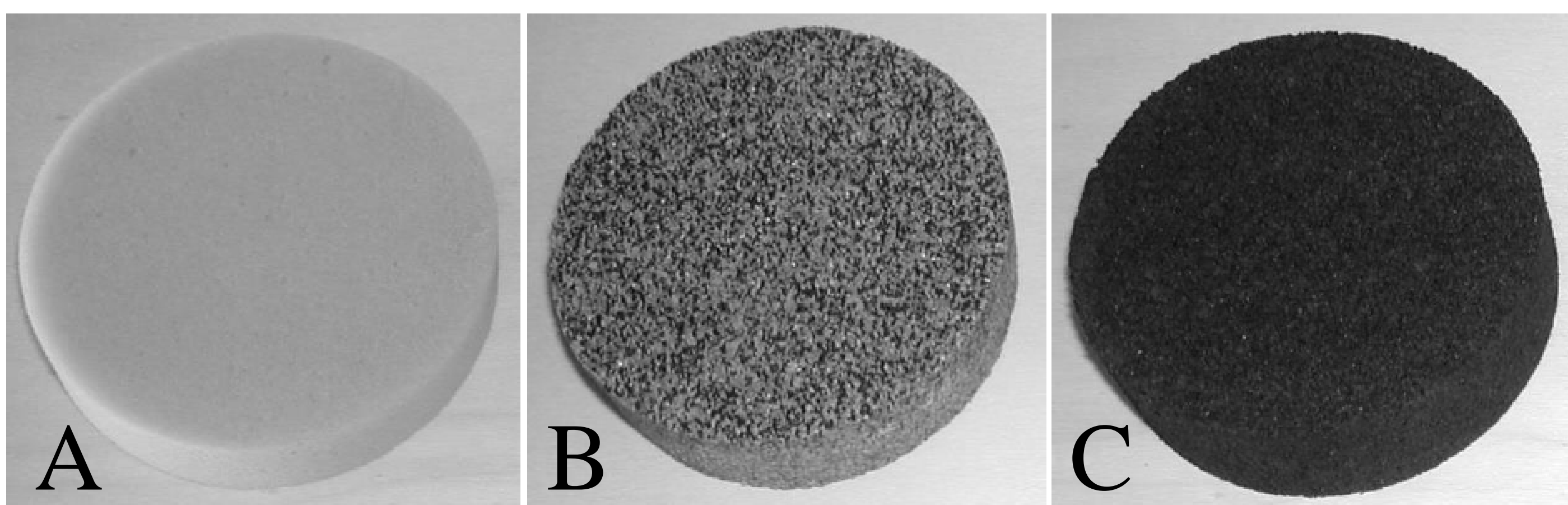


Abstract

There is a considerable number of research publications on the characterization of porous media that is carried out in accordance with the ISO 10534-2 (1998). However, the reproducibility of these characterization procedures is not well understood. This work deals with the reproducibility of some standard characterization procedures for acoustic porous materials. One novelty of this paper is that 7 sets of independent laboratory measurements in Europe and North America were performed on the same material specimens so that the naturally occurring inhomogeneity in materials was controlled. Another novelty of this work is that it presents the reproducibility data for the acoustical and for some related non-acoustical properties. This work is helpful to understand better the tolerances of these material characterization procedures so the improvements can be developed to reduce the experimental errors and improve the reproducibility between laboratories.

Material Samples

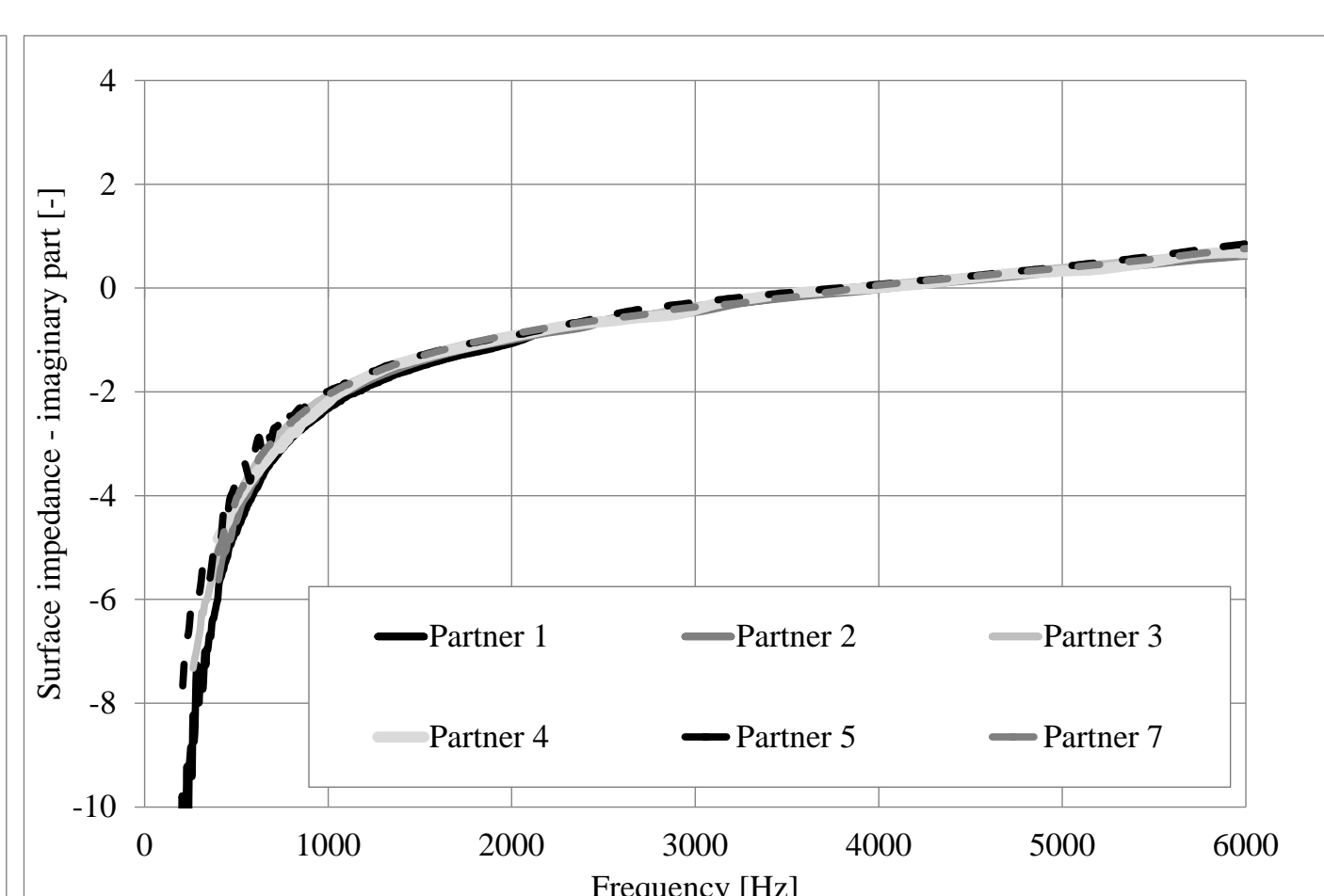
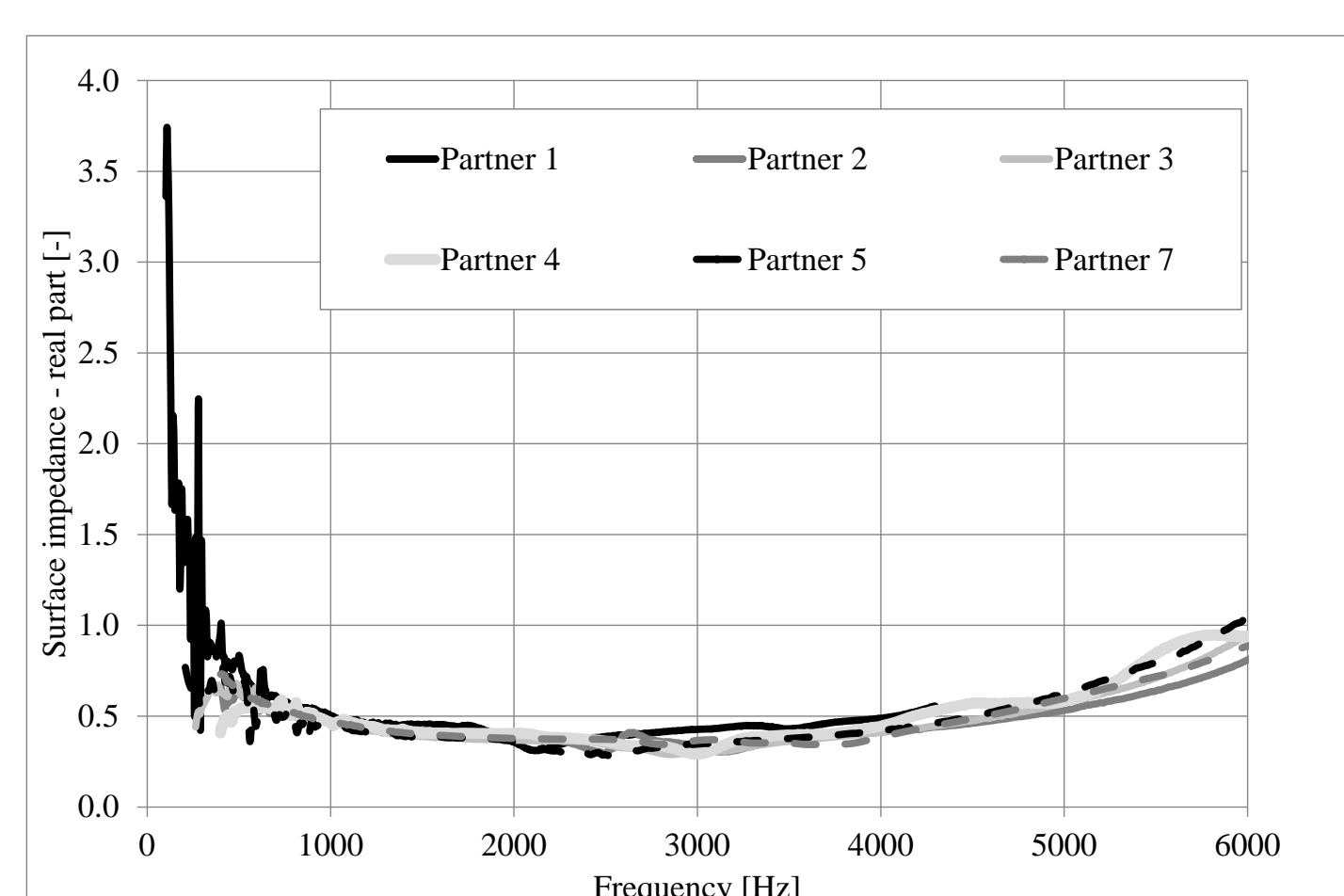


Material	Description	Thickness [mm]	Density [kg/m ³]	Diameters [mm]	Number of samples for each diameter
A	Reticulated foam	20±0.1	8,8	29/44/99	4
B	Consolidated flint	31±0.1	1500	29/44/99	6
C	Reconstituted porous rubber	28±0.1	242	29/44/99	6

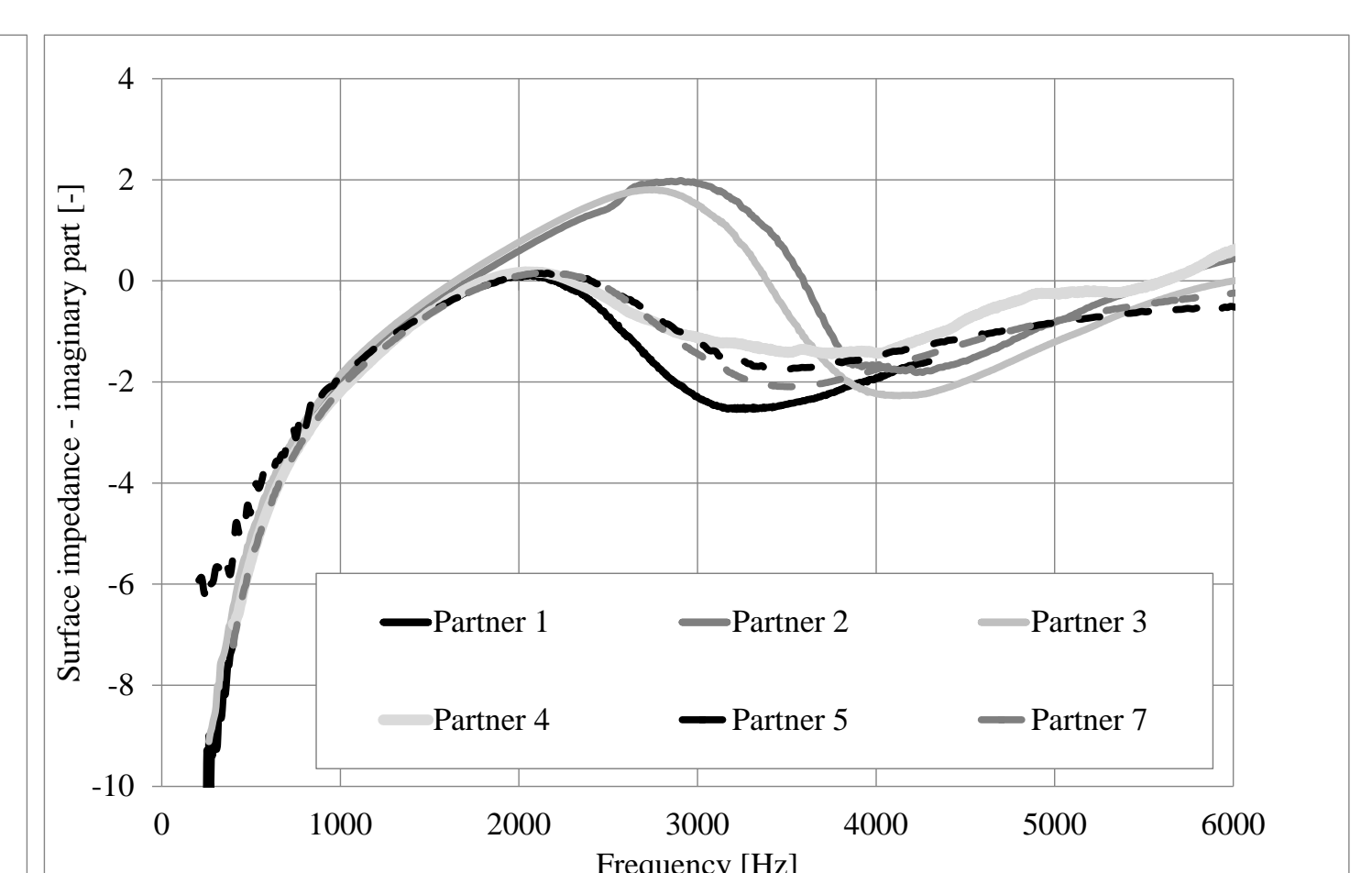
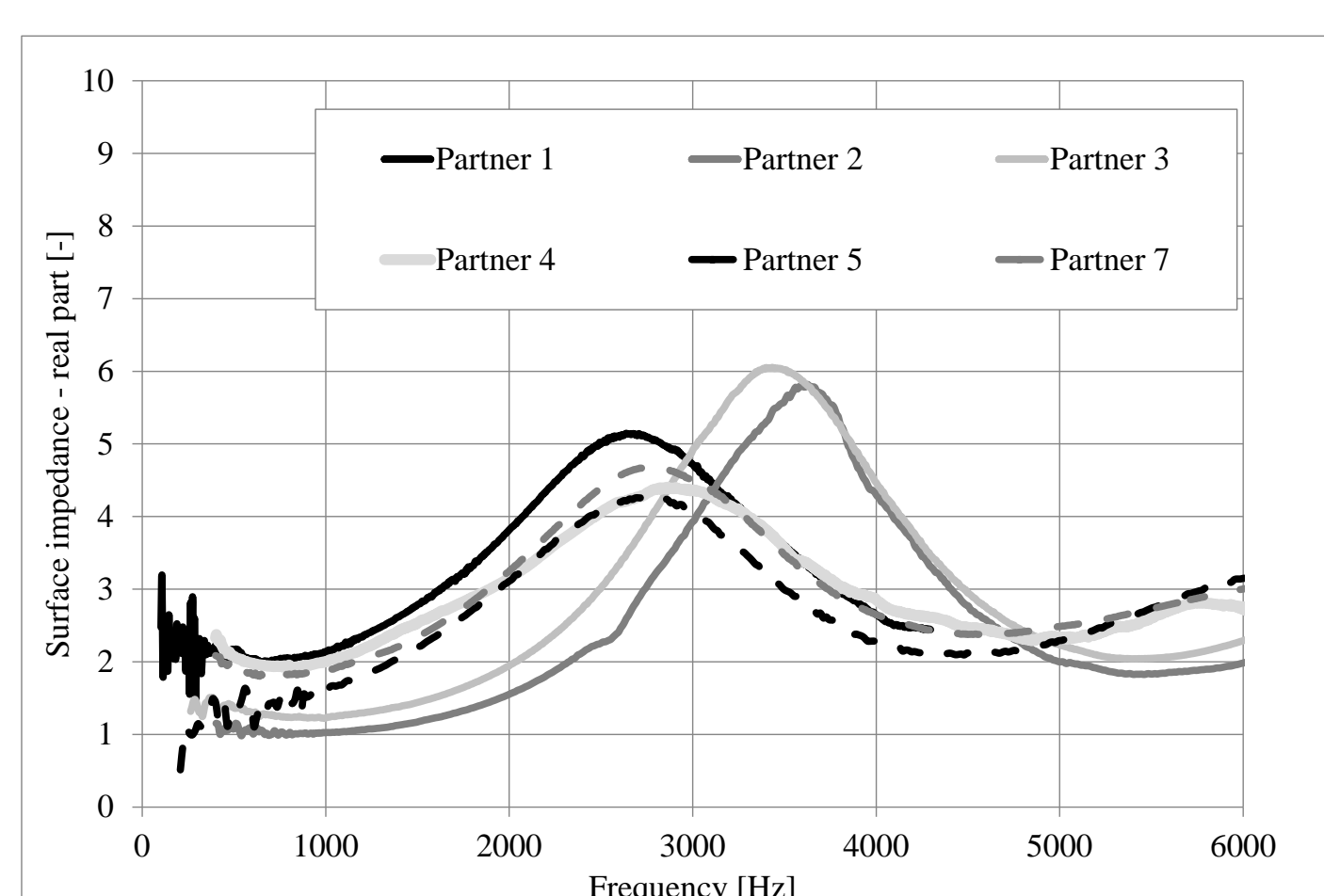
Experiment

Each laboratory carried out two different sets of the impedance tube tests in accordance with the ISO 10534-2: (i) tests on different samples of each material, (ii) tests on the same sample for each material.

Example spectra for surface impedance



Material A



Material B

Conclusions

The maximum relative errors in the absorption coefficient, real and imaginary parts of the surface impedance were found to be 19%, 29% and 13%, respectively. A major cause is likely to be the natural inhomogeneity in the material slab from which the samples were cut. Other causes can be the way the sample was actually cut and mounted in the impedance tube. These can lead to systematic errors between laboratories and there is a serious need for the revision of the ISO 10534-2 (1998).