

Airborne sound insulation in building acoustics – Uncertainty of the apparent sound insulation index $R'w$ by a Monte-Carlo approach

Isolement aux bruits aériens dans les bâtiments - Calcul d'incertitude de l'indice d'affaiblissement acoustique apparent pondéré, $R'W$, selon les méthodes de Monte-Carlo

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In the field of building acoustics, the uncertainty of the apparent sound reduction index $R'w$ is complicated to calculate. The ISO 12999-1 standard offers two main solutions:

inter-laboratory testing and calculation of an upper limit of uncertainty. The first solution may be difficult to implement. Results of the second one are pessimistic. This document presents an alternative method based on numerical simulation of Monte-Carlo. Based on an assumption of no correlation between the insulation values obtained from each third octave band, this method has the advantage that corresponds to a measurement procedure or a particular measurement situation. Indeed, each of uncertainty factors can be customized to correspond to the equipment and methodology of a testing laboratory. In addition, uncertainties in the volume of the receiving room and on the surface of the separating element are taken into account. With a confidence level of 95% ($k = 2$), the expanded uncertainty obtained by this numerical simulation method (2 dB) seems quite consistent with the expanded uncertainty given in the ISO 12999-1 standard (1.8 dB).