



Standard Guide for Field Measurements of Airborne Sound Attenuation of Building Facades and Facade Elements¹

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^ε¹ NOTE—Editorial changes were made throughout in April 2011.

INTRODUCTION

This guide provides methods to measure the sound isolation of a room from outdoor sound, and to evaluate the sound transmission or apparent sound transmission through a particular facade of the room or an element of that facade such as a window or door. Measurements from outdoors to indoors differ from measurements between two rooms. The outdoor sound field is not diffuse and the transmission of that sound through the structure is a function of the outdoor sound angle of incidence. The outdoor-indoor transmission loss values obtained with this guide are not expected to be the same as that obtained in laboratory or other tests between two rooms using diffuse incident sound. At this time, there are insufficient data available to specify a single, standard measurement procedure suitable for all field situations. For this reason, this guide provides alternative test procedures for the measurements of facade field level reduction and transmission loss.

This guide is part of a set of standards for evaluating the sound isolation of rooms and the sound insulating properties of building elements. Others in this set cover the airborne sound transmission loss of an isolated partition element in a controlled laboratory environment (Test Method E90), the laboratory measurement of impact sound transmission through floors (Test Method E492), the measurement of airborne sound transmission in buildings (Test Method E336), the measurement of impact sound transmission in buildings (Test Method E1007), and the measurement of sound transmission through a common plenum between two rooms (Test Method E1414).

1. Scope

1.1 This guide may be used to determine the outdoor-indoor noise reduction (OINR), which is the difference in sound pressure level between the free-field level outdoors in the absence of the structure and the resulting sound pressure level in a room. Either a loudspeaker or existing traffic noise or aircraft noise can be used as the source. The outdoor sound field geometry must be described and calculations must account for the way the outdoor level is measured. These results are used with Classification E1332 to calculate the single number rating outdoor-indoor noise isolation class, OINIC. Both OINR and OINIC can vary with outdoor sound incidence angle.

1.2 Under controlled circumstances where a single facade is exposed to the outdoor sound, or a facade element such as a

door or window has much lower transmission loss than the rest of the facade, an outdoor-indoor transmission loss, OITL(θ), or apparent outdoor-indoor transmission loss, AOITL(θ), may be measured using a loudspeaker source. These results are a function of the angle of incidence of the sound field. By measuring with sound incident at many angles, an approximation to the diffuse field transmission loss as measured between two rooms can be obtained. The results may be used to predict interior sound levels in installations similar to that tested when exposed to an outdoor sound field similar to that used during the measurement. The single number ratings of apparent outdoor-indoor transmission class, AOITC(θ), using AOITL(θ) and field outdoor-indoor transmission class, FOITC(θ), using OITL(θ) may be calculated using Classification E1332. These ratings also may be calculated with the data obtained from receiving room sound pressure measurements performed at several incidence angles as discussed in 8.6.

1.3 To cope with the variety of outdoor incident sound field geometries that are encountered in the field, six testing techniques are presented. These techniques and their general applicability are summarized in Table 1 and Figs. 1-6. The

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