Session 7AA

Architectural Acoustics, Noise, and Speech Communication: Low-Frequency and Nonstandard Sound Isolation

David L. Adams, Chair
David L. Adams and Associates, 1701 Boulder Street, Denver, Colorado 80211

Chair's Introduction—1:30

Invited Papers

1:35

7AA1. Sound transmission through wood joist floor/ceiling systems: A study of the effects of sound absorbing materials and changes to the ceiling structure. A. C. C. Warnock (Natl. Res. Council Canada, Montreal Rd., Ottawa, Ontario K1A 0R6, Canada) and M. J. Morin (MJM Acoust. Consultants, Inc., Montreal, Quebec H3S 2A6, Canada)

A wood joist floor system was constructed in the Acoustics Laboratory at NRC. Measurements of airborne and impact sound transmission were made for different types and amounts of sound absorbing material in the cavity. Differences between materials were small. Different makes of resilient metal channels were installed; all gave about the same results. Methods of improving an unsatisfactory floor were examined. Over 20 floor systems were measured. The study was funded by Canada Mortgage and Housing Corporation. Measurements were made down to 63 Hz and revealed that in many cases there are resonances occurring below 125 Hz that have a strong influence on transmission loss values at and above 125 Hz. While the causes of the resonances are not always clear, measurements to these low frequencies give a clearer picture of the effect of changes to the structure. This paper will give a summary of the results obtained.

2:00

7AA2. Sound reduction of panels and walls using small-scale models. Keith W. Walker (USG Corp., P.O. Box 460, Round Lake, IL 60073)

The ability to make sound reduction and transmission loss measurements on small-scale wall models is an attractive proposition for R&D work. Using the impulse response technology offered by the Grozier GTS-800 acoustical measurement system, measurements of insertion loss were made on single free-standing panels at normal incidence and at 45 deg. In the range 4 to 40 kHz, the results were in good agreement with mass law theory. Additional measurements of a wall between two $\frac{1}{8}$-scale offices also showed characteristics similar to full-scale walls, but in the range 1 to 40 kHz.

2:25

7AA3. Comparison between ASTM and FAA procedures for determining airborne sound insulation of building facades. Michael B. Barnhardt (David L. Adams Associates, Inc., 1701 Boulder St., Denver, CO 80211)

Variations in sound level measurement procedures and the test results between American Society for Testing and Materials, "Standard Guide for Field Measurement of Airborne Sound Insulation of Building Facades" (ASTM Designation E 966), and the Federal Aviation Administration (FAA) Noise Reduction Audit used to determine eligibility for federal funds, are compared. An empirical analysis is used to compare the results of these two methods whose differences are primarily the type and location of the exterior noise source. The contribution of low-frequency sound to the noise reduction will be presented. The structures used in the analysis are homes participating in the Stapleton Noise Insulation Program (SNIP). The purpose of the SNIP program is to improve the sound insulation of homes, churches, and schools in close proximity to Stapleton International Airport. Sound measurements using both methods were conducted for a sample of homes of varying construction types before and after the construction modifications were implemented. An analysis of the sound insulation improvement as reflected by each of the testing procedures is also presented.