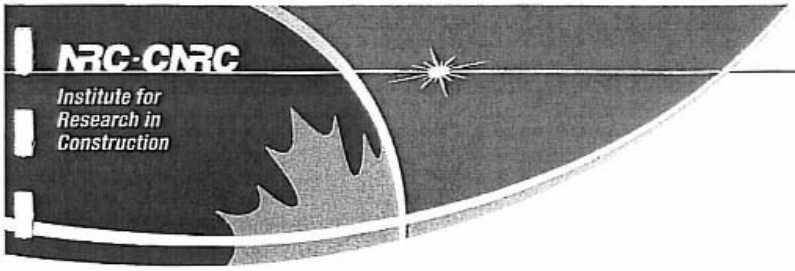

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National Research Council of Canada

Client Report

B-3456.2

Final Report

Airborne Sound Transmission Loss Measurement Performed on One Wall Assembly

for

NGC Testing Services
1650 Military Road
Buffalo, NY, USA
14217

09 January 2007

Airborne Sound Transmission Loss Measurement Performed on One Wall Assembly for NGC Testing Services

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Program: Indoor Environment

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Client: NGC Testing Services

Specimen: Wall assembly with National Gypsum SoundBreak ® Wallboard

Specimen ID: B3456-2W

Construction Dates: January 4th, 2007

Test Specimen:

The wall had a single row of non load bearing lightweight steel studs; on the exterior face of one side was two layers of 16 mm thick, type X gypsum boards and on the other side was a base layer of 13 mm thick National Gypsum SoundBreak ® Wallboard and a face layer of 16 mm thick, type X gypsum boards. The 32 x 152 mm metal studs were spaced 610 mm on center. The 152 mm thick, R20 glass fibre batts were installed in the cavities of the single row of steel studs. The joints of the 16 mm thick, type X gypsum boards were caulked then covered with a metal tape. The type X gypsum boards and the National Gypsum SoundBreak ® Wallboard were attached vertically to the studs with 41 mm long, type S drywall screws. The screws were spaced 610 mm on center, along the edges and in the field of the base layers and 305 mm on center, along the edges and in the field of the face layers.

Specimen Properties

Element	Actual Thickness (mm)	Surface weight (kg/m²)	Mass (kg)
Gypsum Board		10.91	97.3
Gypsum Board		11.12	99.2
Steel Studs		2.24	20.0
Glass Fibre Batts		1.47	13.1
National Gypsum SoundBreak ® Wallboard		13.39	119.4
Gypsum Board		11.30	100.8
Total	213		449.8

Test Specimen Installation:

During the measurements, the test specimen was mounted in the IRC acoustical wall test opening which measures approximately 3.66 m x 2.44 m.

The perimeter of the specimen was sealed on both sides with caulking and then covered with a metal tape.

The area used for the calculation of the airborne sound transmission loss was 8.92 m².

Airborne sound transmission loss measurements were conducted in accordance with the requirements of ASTM E90-04, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements".

Client: NGC Testing Services

Specimen ID: B3456-2W

Test ID: TLA-07-002

Tested: 4-Jan-07

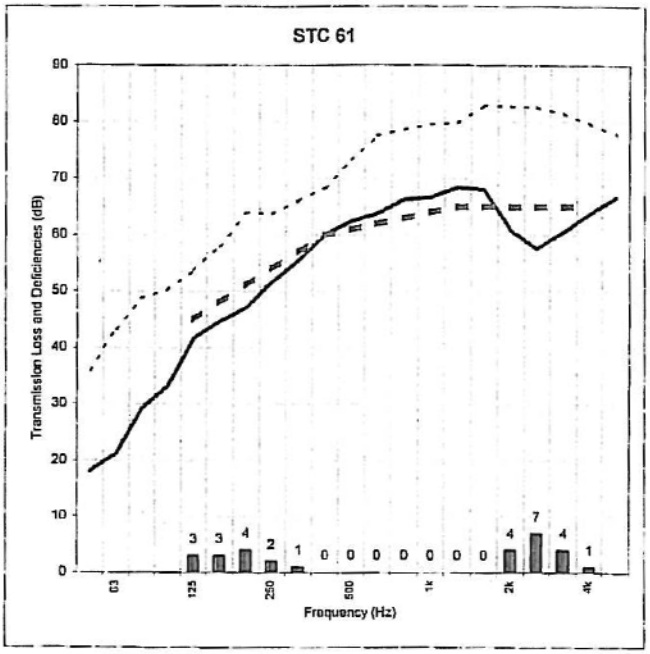
Small Room Volume: 138 m^3

Large Room Volume: 250 m^3

Measured Temperature and Relative Humidity During

	Temperature, °C		Humidity %	
Room	Min	Max	Min	Max
Small	18.3	18.4	42.5	43.2
Large	22.1	22.2	53.5	61.2

Frequency (Hz)	Airborne Sound Transmission Loss (dB)	95% Confidence Limits
50	18 *	
63	21	
80	29	± 5.3
100	33	± 3.6
125	42	± 1.9
160	45	± 2.7
200	47	± 1.1
250	52	± 0.8
315	56	± 0.9
400	60	± 0.8
500	62	± 0.5
630	64	± 0.6
800	66	± 0.5
1000	67	± 0.5
1250	68	± 0.4
1600	68	± 0.5
2000	61	± 0.6
2500	58	± 0.6
3150	61	± 0.6
4000	64	± 0.7
5000	67	± 0.9
Sound Transmission Class (STC) = 61		



In the graph:
Solid line is the measured sound transmission loss for this specimen. Dashed line is the STC contour fitted to the measured values according to ASTM E413-04. The dotted line is 10 dB below the flanking limit established for this facility. For any frequency where measured transmission loss is above the dotted line, the reported value is potentially limited by vibration transmission via laboratory surfaces, and the true value may be higher than that measured.

Bars at bottom of graph show deficiencies. At each frequency the difference between the shifted reference contour value and the measured data is calculated. Only deficiencies, that is, where the measured data are less than the reference contour, are counted in the fitting procedure for the STC, defined in ASTM E413.

In the table:
Values marked "*" indicate that the measured background level was less than 5 dB below the combined receiving room level and background level. The reported values provide an estimate of the lower limit of airborne sound transmission loss.

The results reported above apply only to the specific sample submitted for measurement. No responsibility is assumed for performance of any other specimen.

APPENDIX:
Airborne Sound Transmission Wall Facility

National Research Council Canada
Institute for Research in Construction
Acoustics Laboratory
1200 Montreal Road, Ottawa, Ontario K1A 0R6
Tel: 613-993-2305 Fax: 613-954-1495

Facility and Equipment: The acoustics test facility comprises two reverberation rooms (referred to in this report as the small and large rooms) with a moveable test frame between the two rooms. In each room, a calibrated Bruel & Kjaer type 4166 condenser microphone with preamp is moved under computer control to nine positions, and measurements are made in both rooms using a real time analyzer controlled by a desktop PC-type computer. Each room has four loudspeakers driven by separate amplifiers and noise sources controlled by the computer. To increase the randomness of the sound field, there are also fixed diffusing panels in each room.

Test Procedure: Airborne sound transmission measurements were conducted in accordance with the requirements of ASTM E90-04, "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions". Airborne sound transmission loss tests were performed in the forward (receiving room is the large room) and reverse (receiving room is the small room) directions. Results presented in this report are the average of the tests in these two directions. In each case, sound transmission loss values were calculated from the average sound pressure levels of both the source and receiving rooms and the average reverberation times of the receiving room. One-third octave band sound pressure levels were measured for 32 seconds at nine microphone positions in each room and then averaged to get the average sound pressure level in each room. Five sound decays were averaged to get the reverberation time at each microphone position in the receiving room; these times were averaged to get the average reverberation times for the room. Information on the flanking limit of the facility and reference specimen test results are available on request.

Significance of Test Results: ASTM E90-04 requires measurements in 1/3-octave bands in the frequency range 100 Hz to 5000 Hz. Within those ranges, reproducibility has been assessed by inter-laboratory round robin studies. The standards recommend making measurements and reporting results over a larger frequency range, and this report presents such results, which may be useful for expert evaluation of the specimen performance. The precision of results outside the 100 to 5000 Hz range has not been established, but is expected to depend on laboratory-specific factors.

Sound Transmission Class (STC): was determined in accordance with ASTM E413-04, "Classification for Rating Sound Insulation". The Sound Transmission Class (STC) is a single-figure rating scheme intended to rate the acoustical performance of a partition element separating offices or dwellings. The higher the value of the rating, the better the performance. The rating is intended to correlate with subjective impressions of the sound insulation provided against the sounds of speech, radio, television, music, and similar sources of noise characteristic of offices and dwellings. The STC is of limited use in applications involving noise spectra that differ markedly from those referred to above (for example, heavy machinery, power transformers, aircraft noise, motor vehicle noise). Generally, in such applications it is preferable to consider the source levels and insulation requirements for each frequency band.

Confidence Limits: Acoustical measurement in rooms is a sampling process and as such has associated with it a degree of uncertainty. By using enough microphone and loudspeaker positions, the uncertainty can be reduced and upper and lower limits assigned to the probable error in the measurement. These limits are called 95% confidence limits. They are calculated for each test according to the procedures in ASTM E90-04 and must be less than upper limits given in the standards. These confidence limits do not relate directly to the variation expected when a nominally identical specimen is built, installed and tested (repeatability). Nor do they relate directly to the differences expected when nominally identical specimens are tested in different laboratories (reproducibility).

In Situ Performance: Ratings obtained by this standard method tend to represent an upper limit to what might be measured in a field test, due to structure-borne transmission ("flanking") and construction deficiencies in actual buildings.