
FIELD SOUND TRANSMISSION LOSS AND FIELD SOUND TRANSMISSION CLASS MEASUREMENTS OF NUDURA 4" CORE WALL

Prepared for:

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1 INTRODUCTION

HGC Engineering was retained by Nudura Corporation to measure the Field Transmission Loss (FTL), of their 4 inch core product, and thereby determine the corresponding Field Sound Transmission Class (FSTC) rating. The bare product was tested (with no surface treatments affixed to either side), as were two assemblies formed by attaching various surface finishes to the two sides of the wall. The measurements were conducted on August 25, 2003, in accordance with ASTM Test Standard E336-97, at a temporary test chamber erected by Nudura.

2 TERMINOLOGY

The sound insulation of a material or assembly represents the difference between the sound energy incident on one side of the material and that transmitted through and emitted from the other side. Sound insulation is commonly quantified in terms of Transmission Loss (TL), which is defined as the difference in decibels [dB], between the incident and transmitted sound power. Because the sound insulation characteristics of a material vary with the frequency of the incident sound, TL values are typically provided in each of a set of 1/3-octave frequency bands spanning the frequency range of interest. A higher TL or STC value indicates a greater degree of sound insulation.

A standardized single-number descriptor of sound insulation is the Sound Transmission Class (STC) rating, as defined in ASTM Standard E413-87, "Classification for Rating Sound Insulation." This standard defines a calculation procedure in which the sixteen individual TL values in the 1/3-octave bands from 125 to 4000 Hz are evaluated against a reference curve to determine a single number rating.

ASTM Standard E336-97, "Standard Test Method for Measurement of Airborne Sound Insulation in Buildings," defines a method for field testing (i.e., *in situ* testing) of transmission loss and sound transmission class. The quantities measured in accordance with ASTM E336-97 are denoted as FTL and FSTC, where the "F" indicates "field-measured." Because the acoustical conditions *in situ* may be less optimal than the ideal conditions present in an acoustical laboratory, it is common for FTL and FSTC values to be slightly less (e.g., often by 2 to 3 dB) than similar measurements conducted in a laboratory for the same partition or assembly.

3 TEST SPECIMENS

Three wall assemblies were tested, all of which incorporate the 4 inch core Nudura form-wall product. This basic form-wall consists of a nominal 4" deep central cavity, which is filled with concrete during installation, and with nominal 2.5" thick EPS foam on either side, connected with a hinged polypropylene web. The first test assembly consisted of this basic form-wall assembly, with no additional surface finishes on either side.

The second test assembly consisted of the basic form-wall with ½" thick standard gypsum board affixed directly to both sides. The gypsum board was attached at with screws at 16" on-centre which penetrated the EPS forms into the polypropylene webs. The seams between the gypsum board panels were sealed and taped.

The third test assembly consisted of the basic form wall with ½" thick standard gypsum board attached directly to one side, and a stood-off assembly on the other side, comprised of nominal 7/8" deep roll-formed hat channels run horizontally and screwed to the base wall at 24" centres with fiberglass batt insulation in the inter-channel cavities and ½" thick standard gypsum board screwed to the hat channels. The drywall was screwed in place at 16" on-centre, and the seams were sealed and taped.

4 METHOD

The measurements were conducted in a temporary test chamber erected by Nudura, and consisting of a pair of semi-reverberant rooms separated by a demising wall made of the Nudura 4 inch core product. An acoustical test signal was produced in one room (the "source" room) and the resulting sound pressure levels were measured in that room and the adjacent room (the

“receiver” room). The interior dimensions of the source room were: 3.1m x 3.3m x 2.1m high. The interior dimensions of the source room were 3.1m x 3.4m x 2.2 m high.

The acoustical measurements were conducted in accordance with methods specified in ASTM Standard E336-97, using a Hewlett Packard 3569A Real Time Frequency Analyzer (S/N 3442A00141) equipped with a two Brüel & Kjær model 4188 condenser microphones. The instrumentation was calibrated correctly before and after the measurements using a Brüel & Kjær model 4231 Acoustical Calibrator.

It is noted that, due to construction constraints, the room dimensions were smaller than stipulated in Standard E336-97 for the 125 Hz and 160 Hz octave bands. As a result, there may be greater measurement uncertainty associated with the results in those frequencies, than in the other frequency bands.

5 MEASUREMENT RESULTS

The measurement results are presented in the attached test report sheets, and are summarized in the Table below.

Test	Field Sound Transmission Class
Assembly #1	FSTC-45
Assembly #2	FSTC-42
Assembly #3	FSTC-52

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Robert D. Stevens, MASC, PEng

This report was prepared by HGC Engineering for the account of Nudura Corporation. The material in it reflects the best judgement in light of the information available at the time of preparation. Any use which a third party makes of this report or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Field Sound Transmission Class Test Report

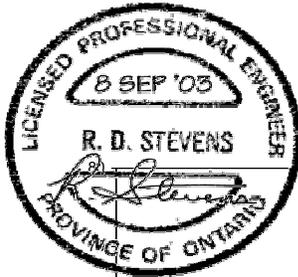
Nudura 4" Core Wall, Bare

Conducted by: R.D. Stevens, MAsc, PEng
25-Aug-03

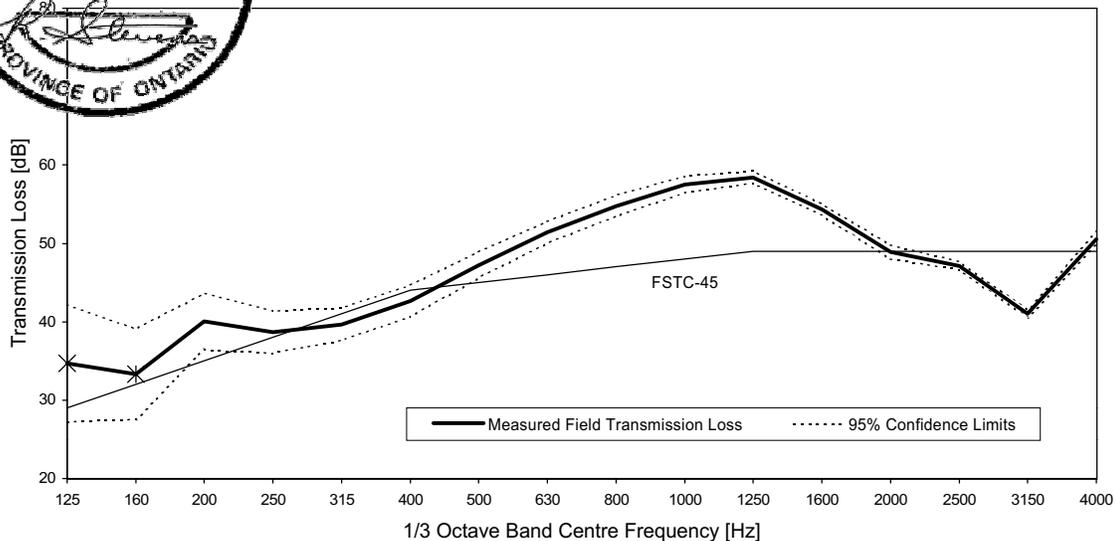
Item	1/3 Octave Band Centre Frequency [Hz]															
	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
Average Source Room sound pressure level [dB]	115	112	110	105	106	108	110	110	110	108	107	110	109	107	106	103
Average Receiver Room sound pressure level [dB]	85.3	85.1	76.9	74.2	74.0	71.7	70.1	64.7	61.8	56.6	54.9	60.9	64.1	63.0	65.8	52.8
Noise Reduction [dB]	29.5	26.9	33.5	31.1	31.9	36.2	40.1	45.1	48.3	51.4	52.6	49.0	45.1	44.4	39.9	50.3
Receiver Room reverberation time [s]	1.8	2.3	2.4	3.0	3.2	2.4	2.7	2.3	2.4	2.2	2.0	1.8	1.3	1.0	0.7	0.6
Area / Absorption correction factor [dB]	5.2	6.4	6.6	7.6	7.8	6.5	7.1	6.4	6.5	6.1	5.9	5.4	3.8	2.8	1.1	0.2
Transmission Loss [dB]	34.7	33.3	40.0	38.7	39.7	42.7	47.2	51.4	54.8	57.5	58.4	54.4	48.9	47.2	41.0	50.6
95% Confidence Interval [± dB]	7.5	5.8	3.6	2.6	2.1	2.0	1.7	1.4	1.3	1.1	0.8	0.7	0.9	0.5	0.5	0.8
Nearest STC Curve	29	32	35	38	41	44	45	46	47	48	49	49	49	49	49	49
Delta						1	1						0	2	8	

*** Measured Field STC **45** ***
 Maximum delta 8 8 SEP/03
 Sum of deltas 13

Notes: 1) Room volume was smaller than required by Standard ASTM E336 for the 125 Hz and 160 Hz frequency bands, which increases the uncertainty associated with those results (marked '*' on graph)
 2) Supplementary tests for flanking not conducted, therefore the results can be considered minimum FTL values, at frequencies above 160 Hz.



Field Sound Transmission Class Test Report



Field Sound Transmission Class Test Report

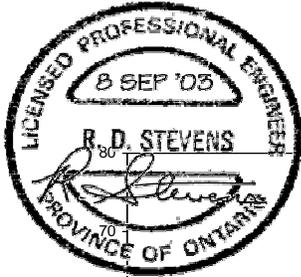
Nudura 4" Core Wall with
1/2" thick gypsum board, both sides

Conducted by: R.D. Stevens, MAsc, PEng
25-Aug-03

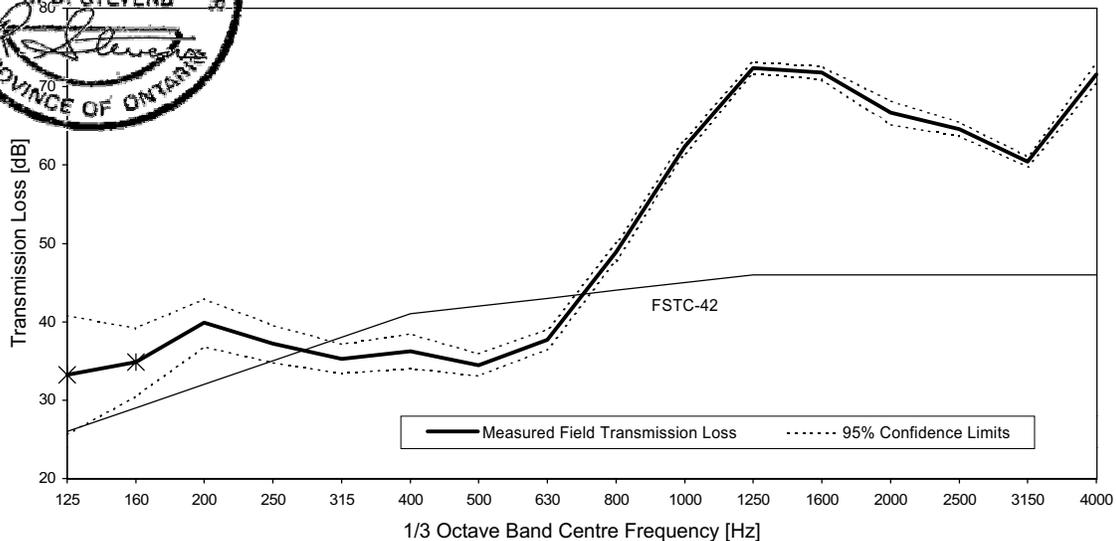
Item	1/3 Octave Band Centre Frequency [Hz]															
	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
Average Source Room sound pressure level [dB]	113	113	111	107	105	108	109	108	110	108	107	110	109	108	106	104
Average Receiver Room sound pressure level [dB]	86.6	86.4	78.6	77.6	77.5	78.2	79.3	74.8	67.0	52.7	41.1	44.1	46.9	46.1	47.5	33.2
Noise Reduction [dB]	26.0	26.7	32.2	29.0	27.7	29.3	29.4	33.2	42.9	55.8	65.9	66.0	62.5	61.5	58.7	70.9
Receiver Room reverberation time [s]	2.8	3.5	3.1	3.4	3.1	2.6	1.7	1.5	2.1	2.4	2.3	2.0	1.4	1.1	0.8	0.6
Area / Absorption correction factor [dB]	7.2	8.2	7.6	8.2	7.6	6.9	5.1	4.5	6.0	6.6	6.5	5.8	4.1	3.1	1.7	0.6
Transmission Loss [dB]	33.2	34.8	39.9	37.2	35.3	36.2	34.5	37.7	48.9	62.4	72.4	71.8	66.7	64.6	60.4	71.5
95% Confidence Interval [+/- dB]	7.6	4.4	3.0	2.4	1.9	2.2	1.4	1.3	1.1	0.9	0.7	0.9	1.5	0.9	0.7	1.3
Nearest STC Curve	26	29	32	35	38	41	42	43	44	45	46	46	46	46	46	46
Delta						3	5	8	5							

*** Measured Field STC **42** ***
 Maximum delta 8 8 SEP/03
 Sum of deltas 20

Notes: 1) Room volume was smaller than required by Standard ASTM E336 for the 125 Hz and 160 Hz frequency bands, which increases the uncertainty associated with those results (marked '*' on graph)
 2) Supplementary tests for flanking not conducted, therefore the results can be considered minimum FTL values, at frequencies above 160 Hz.



Field Sound Transmission Class Test Report



Field Sound Transmission Class Test Report

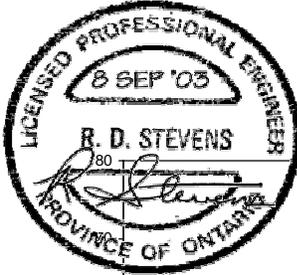
Nudura 4" Core Wall with
1/2" thick gypsum board on one side, 7/8" deep hat
channels w/ batt insul in cavities and 1/2" thick
gypsumboard on other side

Conducted by: R.D. Stevens, MAsc, PEng
25-Aug-03

Item	1/3 Octave Band Centre Frequency [Hz]															
	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000
Average Source Room sound pressure level [dB]	111	110	107	105	107	107	109	111	109	108	107	110	109	107	106	104
Average Receiver Room sound pressure level [dB]	90.2	83.8	75.0	71.6	69.3	63.5	58.1	56.4	50.2	43.0	39.2	43.8	46.6	45.0	47.2	32.4
Noise Reduction [dB]	20.8	25.8	32.1	33.6	37.4	43.6	51.1	54.4	59.3	65.2	67.8	66.2	62.8	62.2	59.1	72.0
Receiver Room reverberation time [s]	2.8	3.5	3.1	3.4	3.1	2.6	1.7	1.5	2.1	2.4	2.3	2.0	1.4	1.1	0.8	0.6
Area / Absorption correction factor [dB]	7.2	8.2	7.6	8.2	7.6	6.9	5.1	4.5	6.0	6.6	6.5	5.8	4.1	3.1	1.7	0.6
Transmission Loss [dB]	28.0	34.0	39.7	41.8	45.0	50.5	56.3	58.9	65.3	71.8	74.3	72.0	66.9	65.3	60.8	72.6
95% Confidence Interval [+/- dB]	10.0	4.1	3.4	2.3	2.0	1.5	1.3	1.1	0.9	1.3	0.9	0.5	2.1	0.9	0.6	1.0
Nearest STC Curve	36	39	42	45	48	51	52	53	54	55	56	56	56	56	56	56
Delta	8	5	2	3	3	1										

*** Measured Field STC **52** ***
Maximum delta 8
Sum of deltas 22

Notes: 1) Room volume was smaller than required by Standard ASTM E336 for the 125 Hz and 160 Hz frequency bands, which increases the uncertainty associated with those results (marked '*' on graph)
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