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ACOUSTIC SYSTEMS Acoustical Research Facility

ACOUSTIC SYSTEMS ACOUSTICAL RESEARCH FACILITY OFFICIAL LABORATORY REPORT AS-TL1765

Subject: Sound Transmission Loss Test

Date: December 26, 2000

Contents: Transmission Loss Data, One-third Octave Bands
Transmission Loss Data, Octave Bands
Sound Transmission Class Rating
Outdoor /Indoor Transmission Class Rating

on Asymmetrical Staggered Metal Stud Wall Assembly w/Two Layers 5/8” FIRECODE Gypsum (Source Side), One Layer 5/8” FIRECODE Gypsum on RC-1 Channels (Receive Side), and R-19 UltraTouch Blue Insulation

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INTRODUCTION

The Transmission Loss of a partition in a specified frequency band is defined as ten times the common logarithm of the airborne sound power incident on the partition to the sound power transmitted by the partition and radiated on the other side. The quantity so obtained is expressed in decibels.

APPLICABLE STANDARDS

ASTM E 90-97, "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions"
ASTM E 413-87, "Classification for Sound Insulation Rating"
ASTM E 1332-90, "Classification for Determination of Outdoor-Indoor Transmission Class"

SPECIMEN DESCRIPTION

The test specimen was an asymmetrical wall assembly whose dimensions were 2438 mm in length by 2438 mm in width by 212.7 mm in depth *[96 by 96 by 8-3/8 inches]*. The test specimen was submitted for test and designated "Asymmetrical Staggered Metal Stud Wall Assembly w/ Two Layers 5/8" FIRECODE Gypsum (Source Side), One Layer 5/8" FIRECODE Gypsum on RC-1 Channels (Receive Side), and "R-19 UltraTouch Blue Insulation" by manufacturer for Acoustical Surfaces Inc. 123 Columbia Court North, Suite 201, Chaska MN 55318. The wall specimen was fabricated during the week of December 11, 2000 as follows:

Source Side - Base-layer: One (1) layer of 15.9 mm [5/8 inch] thick US Gypsum SHEETROCK gypsum panels, FIRECODE (Type X) core, applied parallel (vertical) to 20 ga by 92 mm *[3-5/8 inches]* steel studs 406.4mm *[16 inches]* o.c. with 47.6 mm *[1-7/8 inches]* drywall screws 304.8 mm *[12 inches]* o.c. Single floor plate and ceiling runners were constructed of 25 ga by 152.4 mm *[6 inches]* drywall track sections with 31.8 mm *[1-1/4 inches]* legs. Fasteners placed approximately 51 mm *[2 inches]* in from framing corners and approximately 9.5 mm *[3/8 inch]* in from wallboard edges. Face layer: One (1) layer of 15.9 mm *[5/8 inch]* thick US Gypsum SHEETROCK gypsum panels, FIRECODE (Type X) core, applied perpendicular (horizontal) to 20 ga by 92 mm *[3-5/8 inches]* steel studs 406.4 mm *[16 inches]* o.c. with 47.6 mm *[1-7/8 inches]* drywall screws 304.8 mm *[12 inches]* o.c. Face layer panel joint perpendicular to base layer panel. Face layer joint was not floated. Duct tape was applied over this joint for the acoustic test.

Insulation - Staggered stud cavities filled with layers of R-19 UltraTouch Blue Insulation manufactured by manufacturer for Acoustical Surfaces Inc. 123 Columbia Court North, Suite 201, Chaska MN 55318.

Receive Side - 20 ga by 92 mm *[3-5/8 inches]* steel studs 406.4 mm *[16 inches]* o.c. were attached to the single floor plate and ceiling runners using 11 mm *[7/16 inch]* metal screws. The metal studs were offset from the Source Side studs by 203.2 mm *[8 inches]*. RC-1 Channel was attached perpendicular to the metal studs on 609.6mm *[24 inches]* centers using 11 mm *[7/16 inch]* metal screws. Face layer: One layer of 15.9 mm *[5/8 inch]* thick US Gypsum SHEETROCK gypsum panels, FIRECODE (Type X) core, applied perpendicular (vertical) to RC-1Channel using 47.6 mm *[1-7/8 inches]* screws 304.8 mm *[12 inches]* o.c. The circumferential seam between the US Gypsum SHEETROCK gypsum panels and the floor plate and ceiling drywall runner (created by the RC-1 channel depth) was sealed with dense mastic putty for the acoustic test.

The weight of the test specimen was measured as 228.8 kg *[504 pounds]*, giving an overall weight per unit area of 38.5 kg/M2 *[7.9 pounds per square foot]*.

TEST SPECIMEN MOUNTING

The specimen was mounted in the 2440 mm by 2440 mm transmission loss test opening. The face of the specimen was sealed to the edge of the test aperture with dense mastic putty and metal battens. The calculated transmission loss of the test specimen was adjusted to account for sound power transmitted through the facility boundaries.

DESCRIPTION OF TEST

Two (2) loudspeakers in a 200 cubic meter reverberation chamber, designated as the “Source Room”, produced broadband pink noise. A 254 cubic meter reverberation chamber, designated as the “Receive Room”, is coupled to the Source Room through the transmission loss opening. The steady-state space-time average sound pressure levels in the Source and Receive Room were determined using rotating microphone booms and a Norsonic NI-830 Dual Channel Real Time Analyzer. Sound absorption in the Receive Room was determined by reverberation time measurements. The precision of the resulting calculated Sound Transmission Loss varies with frequency band and is included in the Data Table that follows. The test was performed in accordance with ASTM E90-97 except where discussed. This test took place at ACOUSTIC SYSTEMS ACOUSTICAL RESEARCH FACILITY, Austin, Texas, on December 20, 2000.

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SOUND ABSORPTION DATA

The Sound Transmission Loss of the test specimen at the preferred one-third octave band center frequencies is tabulated below and then presented graphically. Octave-band Transmission Loss values are calculated as described in Section 12.4 of ASTM E90-97.

Asymmetrical Staggered Metal Stud Wall Assembly w/Two Layers 5/8" FIRECODE Gypsum (Source Side), One Layer 5/8" FIRECODE Gypsum on RC-1 Channels (Receive Side), and R-19 Ultra Touch Blue Insulation

1/3 Octave Band Center Freq. (Hz)	Transmission Loss (dB)	Uncertainty (+/-dB)	NOTES	Octave Band TL (dB)	STC Deficiencies
50	18		[g]		
63	24		[d] [g]	22	
80	28	1.8	[g]		
100	32	1.8	[d]		
125	40	2.6	[d]	36	1
160	44	1.5	[d]		
200	49	0.7	[d]		
250	53	1.0	[d]	52	
315	57	0.6	[d]		
400	57	0.6			
500	57	0.5		57	
630	59	0.4			
800	62	0.4			
1000	63	0.4	[c]	62	
1250	63	0.3	[c]		
1600	60	0.2	[c]		1
2000	53	0.3		55	8
2500	53	0.3			8
3150	59	0.2	[c]		2
4000	63	0.2	[c]	62	
5000	68	0.3	[c]		
6300	70	0.4	[a] [c]		
8000	70	0.5	[a] [c]	68	
10000	65	0.8	[a]		
STC	**57**				
OITC	**44**				

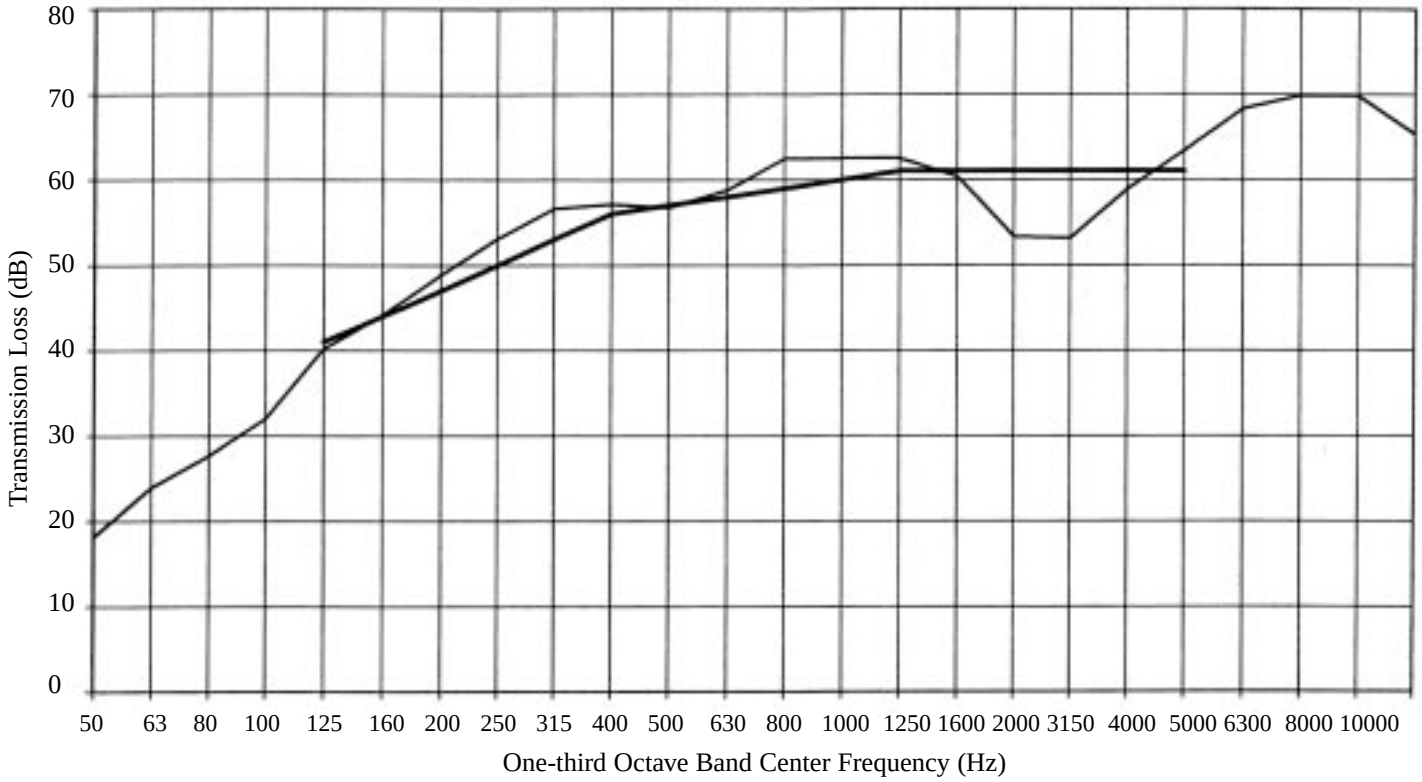
Note: Reverberation times are calculated based on the first 15 dB of decay including an initial 5 dB drop. Acoustic Systems maintains in its files quality assurance documentation indicating the result magnitude and uncertainty are consistent with calculation methods of Section 11.4.1 of ASTM E 90-97. [a]: Receive room SPL corrected for background noise; [b]: Receive room SPL too close to ambient. Correction of 2 dB applied and result represents lower bound for TL in this band; [c]: Correction made for flanking transmission; [d]: Transmission Loss of specimen too close to facility limit. No facility correction applied and result represents lower bound for TL in this band; [e]: Transmission Loss of specimen too close to filler wall. Result represents lower bound for TL in this band; [f]: Insufficient precision to meet requirements of Section A.2.2 of ASTM E 90-97; [g]: An insufficient number of statistically independent samples are available in the band to determine precision.

During the test, environmental conditions in the Receive Room were 24C with 74.2% relative humidity. Conditions in the Source Room were 24.1C with 63% relative humidity. The precision values [±] tabulated above represent 95% probability that the true mean value lies within the stated range.

Respectfully Submitted,

Michael C. Black
Laboratory Technical Director

Asymmetrical Staggered Metal Stud Wall Assembly w/Two Layers 5/8" FIRECODE Gypsum (Source Side), One Layer 5/8" FIRECODE Gypsum on RC-1 Channels (Receive Side), and R-19 UltraTouch Blue Insulation
AS-TL1765, STC 57 OITC 44



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