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**ACOUSTIC SYSTEMS
ACOUSTICAL RESEARCH FACILITY
OFFICIAL LABORATORY REPORT
AS-TL1766**



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 Typical Residential Wall w/ 2x4 Wood Studs and R-13
UltraTouch Blue Insulation

for Rendered by Manufacturer and released to:
Acoustical Surfaces
123 Columbia Court North
Chaska, MN 55318

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National Institute of Standards
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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 consisted of a nominal 2440 mm in length by 2440 mm in width by 120.7 mm in depth [96 by 96 by 4-3/4 inches] "2x4" plain/single plate/single stud partition. The test specimen was designed, submitted for test, and designated "Typical Residential Wall w/ 2x4 Wood Studs and R-13 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: On the Receive Room (quiet) side of the partition, 15.9 mm [5/8 inch] US Gypsum SHEETROCK gypsum panels, FIRE-CODE (Type X) core, were directly mounted to nominal 51 mm by 102 mm [2 by 4 inches] wood studs built on 406.4 mm [16 inches] centers. The gypsum board was attached to the wood studs with No 7 by 48 mm [1-7/8 inches] drywall screws on 304.8 mm [12 inches] centers. R-13 UltraTouch Blue Insulation was installed between studs to an average depth of 76 mm [3 inches] with a density of 19.2 kg/m³ [1.2 pounds per cubic foot]. On the Source Room side of the partition, 15.9 mm [5/8 inch] US Gypsum SHEETROCK gypsum panels, FIRE CODE (Type X) core, were directly mounted to the wood studs with No 7 by 48 mm [1-7/8 inches] drywall screws on 304.8 mm [12 inches] centers. On both the Source and Receive Room side of the partition, the gypsum board was mounted vertically with one (1) joint in the central plane of the specimen. The joint was not floated. Duct tape was applied over these joints for the acoustic test.

The weight of the test specimen was 157.5 kg [347 pounds], giving an overall weight per unit area of 26.4 kg/M² [5.4 pounds per square foot].

All components of the test specimen were fully cured at the time of test.

TEST SPECIMEN MOUNTING

The specimen was mounted in the 2440 mm by 2440 mm transmission loss test opening. The perimeter of the specimen was packed with fiberglass and 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 test 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.

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.

**Typical Residential Wall w/2x4 Wood Studs
& R-13 UltraTouch Blue Insulation**

1/3 Octave Band Center Freq. (Hz)	Transmission Loss (dB)	Uncertainty (+/-dB)	NOTES	Octave Band TL (dB)	STC Deficiencies
50	22		[d] [g]		
63	21		[g]	20	
80	18	1.8	[g]		
100	17	1.9			
125	19	2.6		17	
160	15	1.5			7
200	17	0.7			8
250	32	1.0		22	
315	36	0.6			
400	31	0.6			3
500	32	0.5		33	3
630	40	0.4			
800	41	0.4			
1000	42	0.4		42	
1250	44	0.3			
1600	41	0.2			
2000	36	0.3		37	3
2500	36	0.3			3
3150	40	0.3			
4000	43	0.2		42	
5000	47	0.3			
6300	51	0.4			
8000	54	0.5		53	
10000	56	0.8	[a][c]		
STC	35				
OITC	26				

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 23.4C with 78.9% relative humidity. Conditions in the Source Room were 23.6C with 75.1% 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

Typical Residential Wall w/ 2x4 Wood Studs & R-13 UltraTouch Blue Insulation
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