

**Acoustic Systems
Acoustical Research Facility
Official Laboratory Report
AS-TL1735**

Subject: **Sound Transmission Loss Test**

Date: November 1, 2000

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

Performed on:

**SecureAll® Level 3 Bullet-Resistant Fiberglass Panels (Thickness 1/2")
Butt Jointed with Batten Strip, Mechanically Attached**

For:

Protective Structures, Ltd.
1150 Alpha Drive, Suite 160
Alpharetta, GA 30004

Acoustic Systems Acoustical Research Facility is NVLAP-Accredited for this and other test procedures.

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 comprised of two (2) composite panels and one (1) batten strip, all of the same composition. Each composite panel had the dimensions of 1219 mm in width by 2438 mm in height by 12.7 mm in thickness [48 by 96 by 1/2 inches]. They were butted together along the long dimension and secured with 102 mm in width by 2438 mm in height by 12.7 mm in thickness [4 by 96 by 1/2 inches] batten strip on the Receive Room side of the specimen. The batten strip joined the two (2) composite panels together using pairs of sheet metal screws spaced nominally 305 mm [12 inches] on center along the long dimension of the specimen.

The test specimen was designed, manufactured, submitted for test, and designated "SecureAll® Level 3 Bullet Resistant Fiberglass Panels (Thickness ½") Butt Jointed with Batten Strip, Mechanically Attached" by Protective Structures, Ltd. of Alpharetta, GA. Each component of the specimen was constructed with multiple plies of woven roving fiberglass impregnated with a thermoset polyester resin. The unit was then hydraulically pressed to its final thickness using 1.4×10^7 Pa [2000 pounds per square inch]. The test specimen was fully cured at the time of testing.

The total weight of the test specimen was measured to be 149 kg [328 pounds].

Test Specimen Mounting

The specimen was mounted in the 2440 mm by 2440 mm transmission loss test opening. The perimeter 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 assembly 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 October 5, 2000.

**Protective Structures, Ltd. SecureAll® Level 3 Bullet-Resistant Fiberglass Panels
(Thickness 1/2") Butt Jointed with Batten Strip, Mechanically Attached**

1/3 Octave Band Center Freq. (Hz)	Transmission Loss (dB)	Uncertainty (+/-dB)	Notes	Octave Band TL (dB)	STC Deficiencies
50	22		[d][g]		
63	23		[g]	22	
80	23	1.8	[g]		
100	20	1.9			
125	26	2.5		23	
160	25	1.5			
200	27	0.7			
250	29	0.9		29	
315	31	0.6			
400	32	0.6			
500	33	0.5		33	
630	34	0.4			
800	35	0.4			
1000	35	0.4		34	
1250	32	0.3			4
1600	28	0.2			8
2000	29	0.3		29	7
2500	31	0.3			5
3150	35	0.2			1
4000	38	0.2		36	
5000	37	0.3			
6300	37	0.4			
8000	40	0.5		38	
10000	38	0.8			
STC	32				
OITC	30				

During the test, environmental conditions in the Receive Room were 24.9C with 69.1 % 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