Johns Manville Technical Center
Acoustical Laboratories

Contract Report 500-2476 (A2005-057)
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Subject:

Sound Transmission on SIPS Panels

For:
ICS-RM
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INTRODUCTION

Measurements were made in October, 2005 at the Johns Manville Technical Center (JMTC) Acoustical Laboratory to determine the airborne sound transmission loss various Structural Insulated Panels (SIPS) from Insulated Component Structures – Rocky Mountain, Inc. (ICS-RM). Measurements were made in full accordance with the requirements of current ASTM standard test method E-90 02.

TEST SPECIMEN

All samples were constructed in the 9ft x 14ft test opening by the requestor

Sample	Construction
1	6.5" thick sample, OSB/OSB*
2	Same as #1 with 5/8" gypsum on both sides
3	Double 4.5" thick samples, both OSB/OSB, with a 2" gap

*Note; 6.5" Bare was run first, with unexpected results, sample was rerun 3 additional times to investigate material or mounting/leak issues. 1st time simple rerun of test, 2nd time taping of seams to see if leak at joints, 3rd time cut OSB along perimeter to look at possibility of coupling with chamber wall. All retests gave nearly identical results, therefore properties of foam were assumed to be what gave unexpected results.

TEST METHOD

The tests were conducted in full accordance with the American Society of Testing and Materials (ASTM) test method E 90-02. "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."

E90-02:

The specimens were mounted in the opening in the filler element separating the two reverberation room test chambers. The perimeters of specimens were sealed in the edges of the opening with 1" diameter dense mastic putty.

Test Chamber

The JMTC reverberation rooms are constructed of 305 mm *[12.00 in.]* thick, reinforced concrete, surrounded by 203 mm *[8.00 in.]* thick solid concrete block walls which are spaced from the reinforced concrete walls a distance of 203 mm *[8.00 in.]*. The large reverberation room (receive room) has interior dimensions of 8.66 m *[28 ft. 5 in.]* in length by 5.49 m *[18.00 ft.]* in width with a height of 6.71 m *[22.00 ft.]*, for a total volume of 319 m^3 *[11,253 ft^3]*. The small reverberation chamber (source room) has interior dimensions of 4.96 m *[16 ft. 3 in.]* in length by 4.26 m *[13 ft. 11.5 in.]* in width with a height of 6.71 m *[22 ft.]*, for a total volume of 142 m^3 *[5,014 ft^3]*.

Instrumentation; Microphones

All sound pressure levels were measured using a G.R.A.S 12.7 mm *[0.5 in.]* prepolarized random microphone type 40AQ operating on a Brüel and Kjær type 3923 rotating microphone boom. The microphone was calibrated immediately before all measurements were started using a Brüel and Kjær type 4220 pistonphone with output corrected for local barometric pressure.

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Instrumentation

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The microphone was connected to a National Instruments digital frequency analyzer that was configured to average the microphone output over multiple sample/decay periods. The analyzer was configured to average sound pressure levels (SPLs) over a sampling period of 64 seconds during the measurements of noise reduction (NR) and background levels, and was configured to average the microphone output over multiple sample/decay periods during the measurement of the receive room absorption. The rate of sound field decay was determined by making a regressive fit to the average of 25 decays. All measurements were made at third-octave bands covering a center frequency range from 100 to 5,000 Hz, inclusive.

TEST RESULTS

The detailed results of the tests, including measured third-octave band transmission loss (TL) data, as well as STC single number ratings for each specimen, are presented in Table 1 and Graph 1. Test data sheets of the specimens' performance, as printed by the test equipment, are kept on record within the laboratory.

Table 1. Airborne Sound Transmission Loss Performance of ICS-RM SIPS Constructions

Frequency (Hz)	*ICS-RM SIPS; 6.5in Bare TL (dB)*	*ICS - RM; 6.5in 5/8gypsum both sides TL (dB)*	*Double 4.5"with 2" gap TL (dB)*
100	18	24	21
125	22	26	21
160	23	27	23
200	24	29	26
250	25	28	30
315	25	24	32
400	25	23	34
500	19	32	35
630	18	40	31
800	31	44	28
1000	41	50	43
1250	46	54	57
1600	46	56	63
2000	42	55	60
2500	38	50	62
3150	39	54	65
4000	43	58	56
5000	47	64	69
STC	**25**	**32**	**34**

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Graph 1. Airborne Sound Transmission Loss of ICS-RM SIPS Constructions