

Report 500-2476

Page 1 of 4

# Johns Manville Technical Center Acoustical Laboratories

Contract Report 500-2476 (A2005-057)  
November 22, 2005

Subject:

**Sound Transmission on SIPS Panels**

For:

**ICS-RM**

**5858 Wright Dr.**

**Loveland, CO 80538-8806**

Submitted by:

**Johns Manville Technical Center**

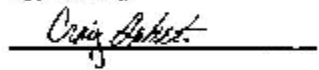
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Report 500-2476

Page 2 of 4

### 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 requester

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. 1<sup>st</sup> time simple rerun of test, 2<sup>nd</sup> time taping of seams to see if leak at joints, 3<sup>rd</sup> time cut OSB along perimeter to look at possibility of coupling with chamber wall. All retests gave nearly identical results, therefore properties of four 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<sup>3</sup> (11,253 ft.<sup>3</sup>). 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<sup>3</sup> (5,014 ft.<sup>3</sup>).

#### 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 Kjer type 3923 rotating microphone boom. The microphone was calibrated immediately before all measurements were started using a Brüel and Kjer type 4220 pistonphone with output corrected for local barometric pressure.



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Report 500-2476

Page 3 of 4

**Instrumentation**

All sound pressure levels were measured using a G.R.A.S. 12.7 mm (0.5 in.) type 40AO microphone operating on a Bruel and Kjaer type 3923 rotating microphone boom. The microphones were calibrated immediately before all measurements were started using a Bruel and Kjaer type 4222 pistonphone with output corrected for local barometric pressure.

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		ICS - RM; 6.5in	Double 4.5" with 2" gap
	Bare TL (dB)		5/8 gypsum both sides TL (dB)	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		37	35
630	18		40	31
800	31		44	28
1000	41		50	43
1250	46		54	57
1600	46		56	63
2000	42		53	60
2500	36		60	62
3150	39		54	65
4000	43		58	56
5000	47		64	69
STC	25		32	34



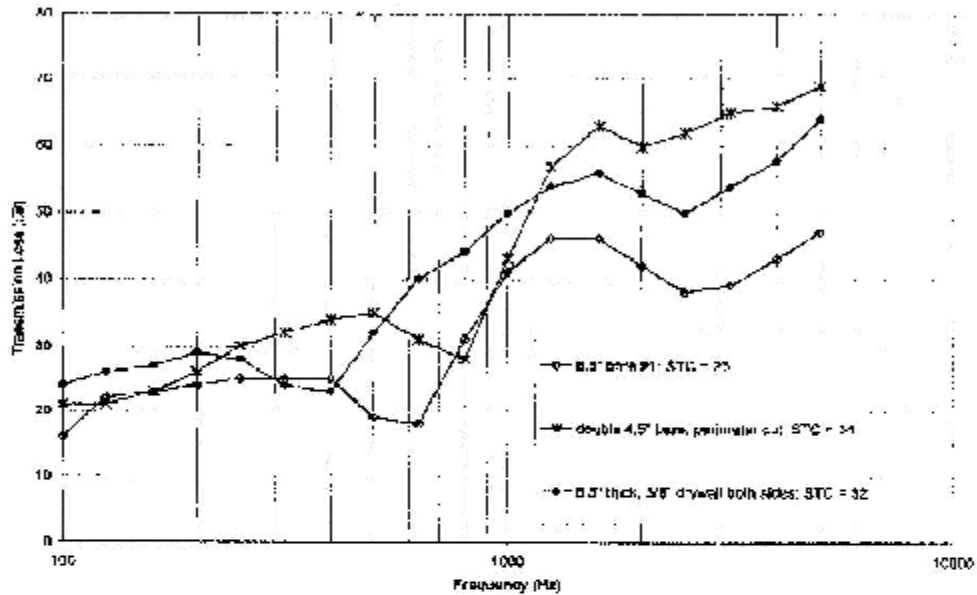
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*Graph 1. Airborne Sound Transmission Loss of ICS-RM SIPS Constructions*



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