

# JOHNS MANVILLE TECHNICAL CENTER ACOUSTICAL LABORATORIES

Report Summary A97-083s  
September 9, 1997

Subject:

**Random Incidence Absorption of Acoustical Fabric Wall &  
Ceiling Systems**

for

**Whisper Walls**

Submitted by:

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Reported By:



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## INTRODUCTION

A series of measurements were made at the Johns Manville Technical Center (JMTC) Acoustical Laboratories to determine the random incidence sound absorption of several acoustical fabric wall & ceiling systems, provided by Whisper Walls. Measurements were made in full accordance with the requirements of current ASTM standard test method C 423-90a. This document summarizes the testing performed on July 26, 1997, and September 3, 1997. The reports referenced are Johns Manville contract report numbers 500-1441 & 500-1443.

## TEST SPECIMEN

The specimens submitted for testing were described by the client as follows:

Whisper Walls ½" system: Whisper Walls ½" square edge tensioning track, ½" Acoustitherm 600 fiberglass core, covering made of 100% polyester panel fabric, with the track mounted on 5/8" gypsum board. Total system wt. = 192.0 lb. Measurements taken on 3-Sept-97.

Whisper Walls 1" system: Whisper Walls 1" square edge tensioning track, 1" Acoustitherm 600 fiberglass core, covering made of 100% polyester panel fabric, with the track mounted on 5/8" gypsum board. Total system wt. = 198.0 lb. Measurements taken on 26-July-97.

Whisper Walls 2" system: Whisper Walls 2" square edge tensioning track, 2" Acoustitherm 600 fiberglass core, covering made of 100% polyester panel fabric, with the track mounted on 5/8" gypsum board. Total system wt. = 259.0 lb. Measurements taken on 3-Sept-97.

Each sample was constructed by attaching the extruded track to the gypsum board, laying the core inside the track, and then stretching the fabric over the core, tucking it into the track. The tension track dimensions were 8' by 9', and these system dimensions were used in the absorption calculations.



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## TEST METHOD

The tests were conducted in full accordance with the American Society of Testing and Materials (ASTM) methods C 423-90a, "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method".

### C 423-90a:

The specimens were tested with a Type A mounting. As required by the test method, each sample was laid out on the reverberation room floor, with the edges of the sample framed using 1½" or 1½" + 1" aluminum framing members. The perimeter of the frame was flashed to the chamber floor with duct tape as required by ASTM E 795-90 to prevent possible test bias.

### Test Chambers

The JMTC reverberation rooms are constructed of 305 mm [12 inch] thick, reinforced concrete and is surrounded by 203 mm [8 inch] thick solid concrete block walls which are spaced from the reinforced concrete walls a distance of 203 mm [8 inches]. The large reverberation room has interior dimensions of 8.66 m [28 feet-5 inches] in length by 5.49 m [18 feet] in width with a height of 6.71 m [22 feet] for a total volume of 319 cubic meters [11,253 cubic feet].

### Instrumentation

All sound pressure levels were measured using a Brüel and Kjær ½" type 4143 condenser microphone operating on a Brüel and Kjær type 3923 rotating microphone boom. The microphone was calibrated immediately before all measurements were started using Brüel and Kjær type 4220 pistonphone with output corrected for local barometric pressure.

The microphone was connected to a Norwegian Electronics type NE-830 digital frequency analyzer which was configured to average the microphone output over multiple sample/decay periods. Measurements were made at the 1/3 octave bands covering a center frequency range of from 100 to 5,000 Hz. The rate of sound field decay was determined by making a regressive fit to the average of 10 ensembles of 5 decays each.



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### TEST RESULTS

The detailed results of the tests, including  $1/3$ -Octave Band absorption data and absorption coefficient curves are presented as pages 5 through 10 of this document for the Whisper Walls acoustical fabric wall & ceiling systems. The Noise Reduction Coefficients (NRC) are shown below in Table 1. Test data sheets of the systems' performance, as printed by the test equipment, are kept on record within the laboratory.

**Table 1: Acoustical Performance of Whisper Walls Acoustical Fabric Wall & Ceiling Systems**

Frequency (Hz)	Noise Reduction Coefficient (NRC)
Whisper Walls 1/2" system	0.55
Whisper Walls 1" system	0.80
Whisper Walls 2" system	0.95



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### Johns Manville Technical Center Acoustical Laboratories ASTM C423 Sound Absorption Test

Empty Room Test Date 03-Sep-97	Temp (F)	83.8 °F
	Humidity	55.2 %
Full Room Test Date 03-Sep-97	Temp (F)	83.8 °F
	Humidity	55.2 %
Test Number :	A97-083A	
Sample ID :	Whisper Wall ½" System	
Sample Description :	Whisper Wall ½" acoustical fabric wall & ceiling system	
Sample Area :	72 ft²	

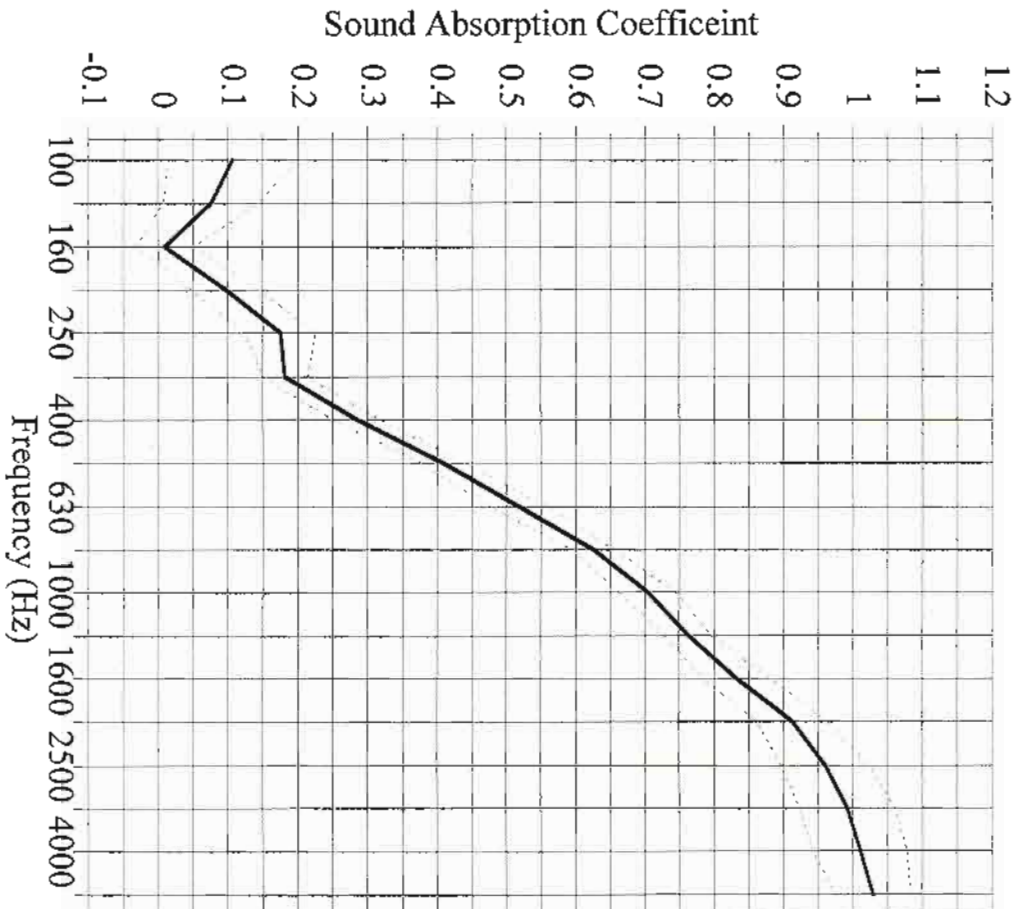
Frequency (Hz)	Full Abs. (Sabins)	95% Unct'y (Sabins)	Empty Abs. (Sabins)	95% Unct'y (Sabins)	Absorption Coef. (Sabins/ft²)	95% Unct'y (Sabins/ft²)
100	80.06	3.89	72.39	5.20	0.11	0.09
125	82.10	3.78	76.65	3.16	0.08	0.07
160	82.83	1.93	82.18	2.26	0.01	0.04
200	81.47	2.47	74.51	2.42	0.10	0.05
250	90.52	3.17	77.94	1.75	0.17	0.05
315	84.58	1.87	71.49	1.31	0.18	0.03
400	95.52	2.01	74.92	1.49	0.29	0.03
500	108.82	1.85	79.42	1.28	0.41	0.03
630	122.47	2.40	85.13	1.73	0.52	0.04
800	131.96	1.94	86.90	1.06	0.63	0.03
1000	143.20	2.77	92.54	1.10	0.70	0.04
1250	151.00	2.16	96.10	1.12	0.76	0.03
1600	164.99	3.38	105.06	1.01	0.83	0.05
2000	183.80	3.34	118.10	1.46	0.91	0.05
2500	196.58	4.48	127.41	0.86	0.96	0.06
3150	211.50	4.74	140.09	1.29	0.99	0.07
4000	231.82	4.66	159.05	1.44	1.01	0.07
5000	262.90	3.58	188.79	1.56	1.03	0.05

*Shaded frequency bands are arithmetically averaged to calculate NRC value*

Noise Reduction Coefficient (NRC) =	0.55
Exact NRC =	0.550
95% Uncertainty in NRC =	0.046

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### Sound Absorption by ASTM C423

Test Date: 03-Sep-97

Sample ID: Whisper Wall 1/2" System

Sample Description: Whisper Wall 1/2" acoustical fabric wall & ceiling system

NRC = 0.55

Dashed lines are ± 95% confidence limits

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**Johns Manville Technical Center  
Acoustical Laboratories  
ASTM C423 Sound Absorption Test**

Empty Room Test Date 26-Aug-97                      Temp (F)      85.4 °F  
   Humidity      53 %

Full Room Test Date    26-Aug-97                      Temp (F)      85.4 °F  
   Humidity      53 %

Test Number :                      A97-080

Sample ID :                              Whisper Walls 1" system

Sample Description :    Whisper Walls 1" acoustical fabric wall & ceiling system

Sample Area :                              72 ft<sup>2</sup>

Frequency (Hz)	Full Abs. (Sabins)	95% Unct'y (Sabins)	Empty Abs. (Sabins)	95% Unct'y (Sabins)	Absorption Coef. (Sabins/ft <sup>2</sup> )	95% Unct'y (Sabins/ft <sup>2</sup> )
100	79.16	3.10	73.48	5.58	0.08	0.09
125	84.31	2.92	76.73	3.11	0.11	0.06
160	88.58	2.27	81.97	2.23	0.09	0.04
200	91.81	2.78	76.50	2.57	0.21	0.05
250	102.30	3.36	79.32	1.41	0.32	0.05
315	104.69	2.57	71.74	1.67	0.46	0.04
400	120.22	1.85	74.26	1.28	0.64	0.03
500	136.98	3.55	80.33	1.24	0.79	0.05
630	150.73	3.38	84.99	1.13	0.91	0.05
800	158.29	2.04	88.61	0.89	0.97	0.03
1000	166.66	1.97	92.78	0.83	1.03	0.03
1250	171.40	2.06	96.72	1.23	1.04	0.03
1600	182.90	2.23	106.40	0.92	1.06	0.03
2000	198.65	1.51	121.08	1.31	1.08	0.03
2500	205.19	1.99	129.86	1.03	1.05	0.03
3150	219.03	1.42	143.47	0.88	1.05	0.02
4000	238.69	2.70	160.59	1.41	1.08	0.04
5000	265.97	1.98	190.02	2.14	1.05	0.04

*Shaded frequency bands are arithmetically averaged to calculate NRC value*

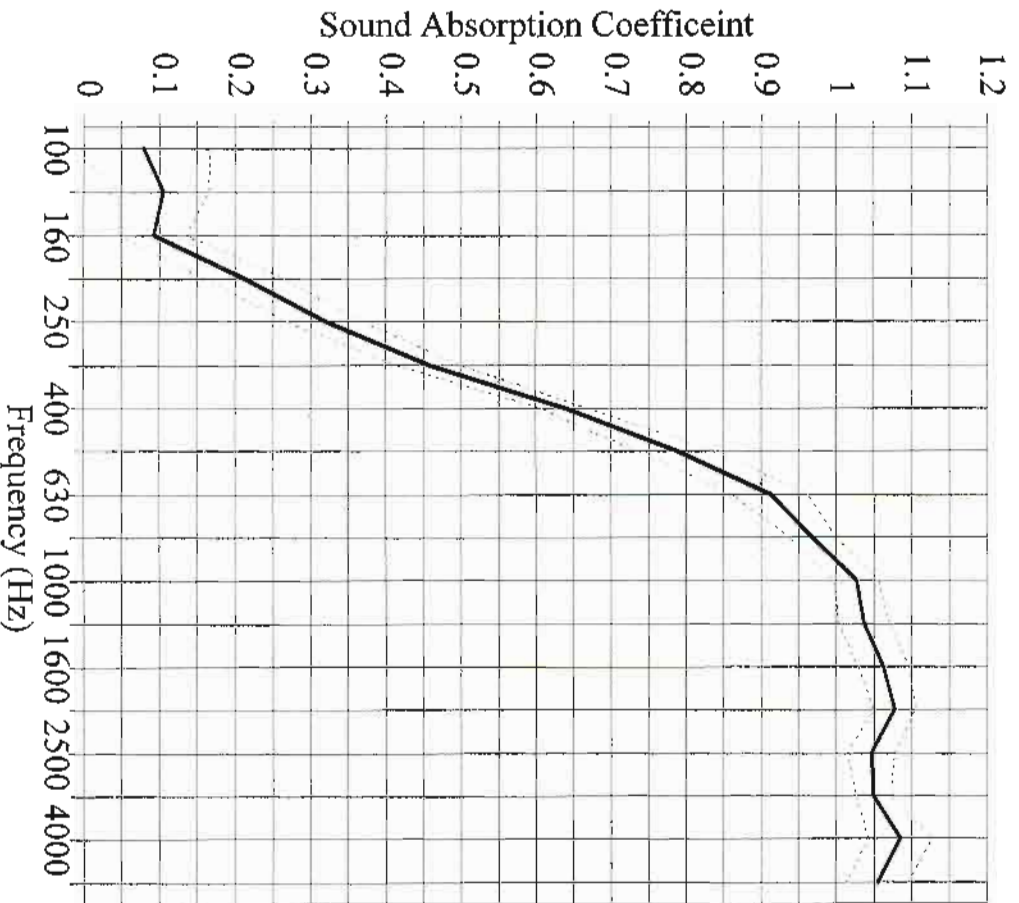
Noise Reduction Coefficient (NRC) =                      0.80

Exact NRC =    0.802

95% Uncertainty in NRC =                                      0.030

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### Sound Absorption by ASTM C423

Test Date: 26-Aug-97

Sample ID: Whisper Walls 1" system

Sample Description: Whisper Walls 1" acoustical fabric wall & ceiling system

NRC = 0.80

Dashed lines are ± 95% confidence limits

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**Johns Manville Technical Center  
Acoustical Laboratories  
ASTM C423 Sound Absorption Test**

Empty Room Test Date 03-Sep-97                      Temp (F)      83.8 °F  
   Humidity      55.2 %

Full Room Test Date    03-Sep-97                      Temp (F)      83.8 °F  
   Humidity      55.2 %

Test Number :                      A97-083C

Sample ID :                              Whisper Wall 2" System

Sample Description :    Whisper Wall 2" acoustical fabric wall & ceiling system

Sample Area :                              72 ft<sup>2</sup>

Frequency (Hz)	Full Abs. (Sabins)	95% Unct'y (Sabins)	Empty Abs. (Sabins)	95% Unct'y (Sabins)	Absorption Coef. (Sabins/ft <sup>2</sup> )	95% Unct'y (Sabins/ft <sup>2</sup> )
100	92.39	2.41	72.39	5.20	0.28	0.08
125	97.71	4.71	76.65	3.16	0.29	0.08
160	112.15	5.84	82.18	2.26	0.42	0.09
200	118.93	6.77	74.51	2.42	0.62	0.10
250	137.16	4.10	77.94	1.75	0.82	0.06
315	140.86	4.30	71.49	1.31	0.96	0.06
400	148.08	3.17	74.92	1.49	1.02	0.05
500	152.65	3.44	79.42	1.28	1.02	0.05
630	156.62	3.80	85.13	1.73	0.99	0.06
800	162.47	4.22	86.90	1.06	1.05	0.06
1000	164.69	5.35	92.54	1.10	1.00	0.08
1250	169.94	3.18	96.10	1.12	1.03	0.05
1600	179.79	3.56	105.06	1.01	1.04	0.05
2000	192.47	2.29	118.10	1.46	1.03	0.04
2500	203.81	1.93	127.41	0.86	1.06	0.03
3150	216.91	1.88	140.09	1.29	1.07	0.03
4000	235.64	1.77	159.05	1.44	1.06	0.03
5000	264.56	2.02	188.79	1.56	1.05	0.04

*Shaded frequency bands are arithmetically averaged to calculate NRC value*

Noise Reduction Coefficient (NRC) =                      0.95

Exact NRC =    0.969

95% Uncertainty in NRC =                                      0.048

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# Johns Manville Technical Center Acoustical Laboratories

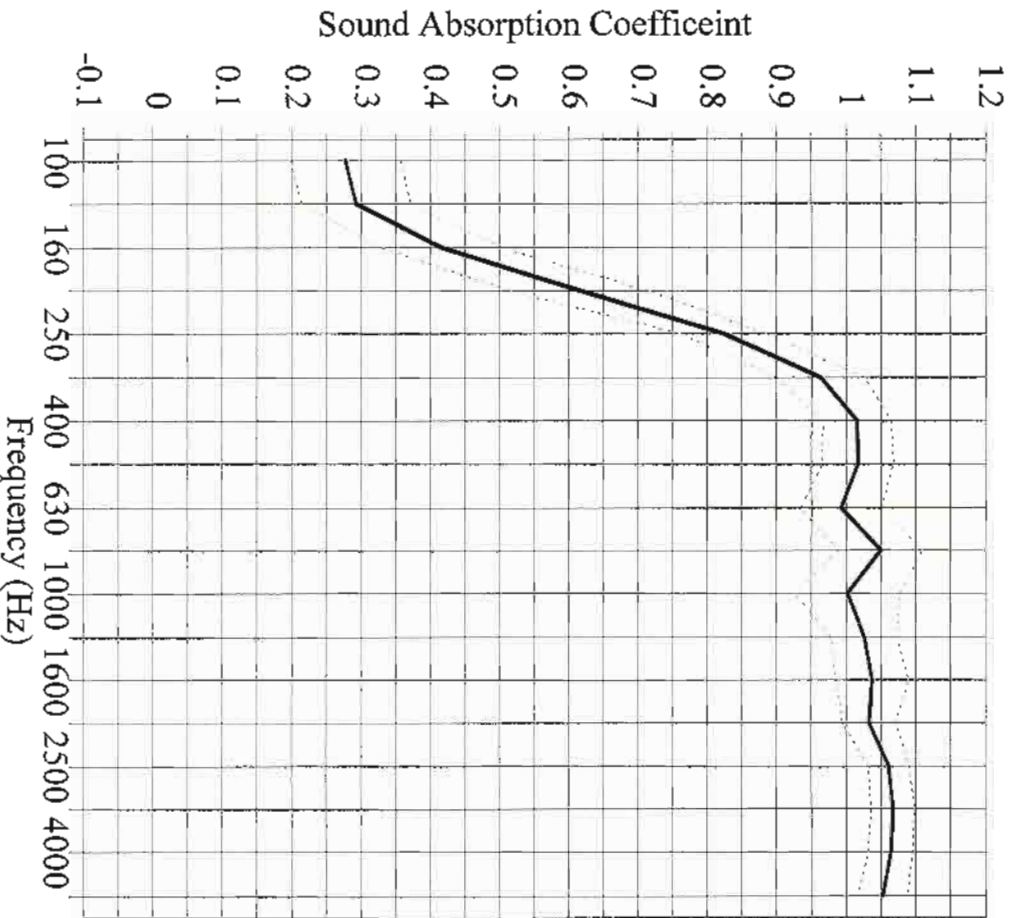
## Sound Absorption by ASTM C423

Test Date: 03-Sep-97

Sample ID: Whisper Wall 2" System

Sample Description: Whisper Wall 2" acoustical fabric wall & ceiling system

NRC = 0.95



Dashed lines are ± 95% confidence limits

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