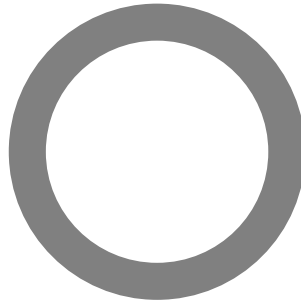


ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

Orfield Laboratories Inc



Design Research Testing
Acoustics / Vibration / Vision / Lighting / Architecture / Market Research

TEST

Client: **Serious Materials, Inc**
Report Date: **October 9, 2009**
Test Date: **August 27, 2009**
Test Number: **OL09-0825**

ACCREDITATION



For the scope of accreditation
under NVLAP code 200248-0

RESULT SUMMARY

STC = 48

CLIENT

ADDRESS

Serious Materials, Inc.
1250 Elko Drive
Sunnyvale, CA 94089
email: info@SeriousMaterials.com

PREPARED BY

David M. Berg
Orfield Laboratories, Inc.
2709 East 25th Street
Minneapolis MN 55406
Voice (612) 721-2455
FAX (612) 721-2457

Prepared by:


ELECTRONICALLY
REPRODUCED
SIGNATURE

David M. Berg
Laboratory Manager

Reviewed by:


ELECTRONICALLY
REPRODUCED
SIGNATURE

Michael R. Role

Signatures are required on this document for an official laboratory test report.
Copies of this document without signatures are for reference only.

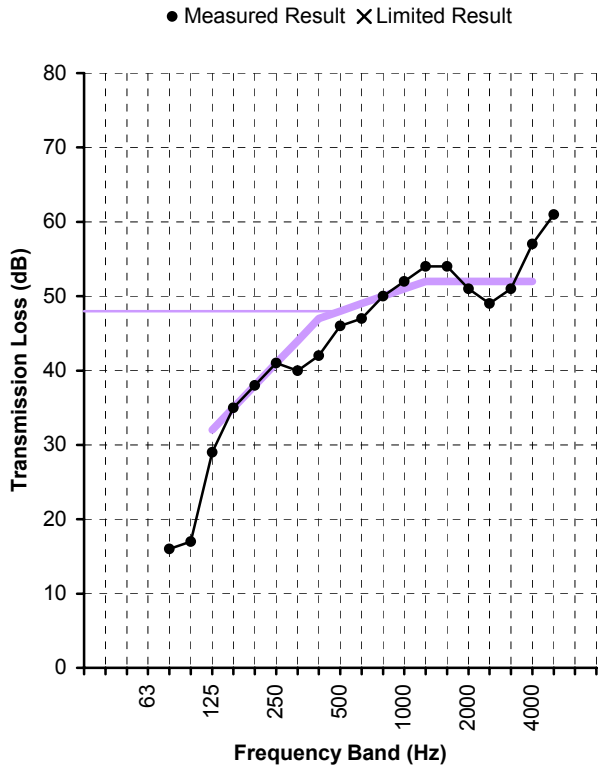




Test Date August 27, 2009
Specimen Interior Wall Assembly

Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 48



Freq. (Hz)	TL (dB)	Def. (dB)
80	16	
100	17	
125	29	3
160	35	-
200	38	-
250	41	-
315	40	4
400	42	5
500	46	2
630	47	2
800	50	-
1000	52	-
1250	54	-
1600	54	-
2000	51	1
2500	49	3
3150	51	1
4000	57	-
5000	61	

Total Deficiencies 21
 * Estimate of lower limit

Assembly Elements (listed in order from source room side to receiver room side)
 0.625" (5/8") type X gypsum board; 1.25" screw @ 12" O.C.
 2x4 wood studs @ 24" O.C.
 3-1/2" kraft faced glass fiber insulation batts
 0.625" (5/8") QuietRock ES; 1.25" screw @ 12" O.C.





SPECIMEN DESCRIPTION

The specimen under test was one interior wall assembly. The elements in the assembly are described below the results table and chart. Additional information regarding the specimen may be found in the appendices.

Test results pertain to this specimen only.

INSTALLATION AND DISPOSITION

Independent contractors fabricated the filler wall and test specimen in the specimen opening. Qualified representatives of Orfield Laboratories observed the installation progress, and visually inspected the specimen prior to testing.

TEST METHODS

The methods followed these published standards:

ASTM E90*: *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413: *Classification for Rating Sound Insulation*

** Orfield Laboratories, Inc. has been accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under their National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure. This report shall not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.*

CONFIDENTIALITY

The client has full control over this information and any release of information will be only to the client. The specific testing results are deemed to be confidential exclusively for the client's use. Reproduction of this report, except in full, is prohibited.



APPENDIX A: MEASUREMENT SETUP

ENVIRONMENT

Environment

Temperature	70°F [21.1°C]
Relative Humidity	55%

Specimen Area

Specimen Area	64.5 ft ² [5.99 m ²]
---------------	---

Chamber Volume - Airborne Transmission

Source Room Volume	3284 ft ³ [93.0 m ³]
Receiving Room Volume	8079 ft ³ [228.8 m ³]

INSTRUMENTATION

Description	Brand	Model	S/N
Microphone	Brüel & Kjær	Type 4134	1478843
Preamplifier	Brüel & Kjær	Type 2639	1202479
Microphone	Brüel & Kjær	Type 4134	558007
Preamplifier	Brüel & Kjær	Type 2639	1312237
Analyzer	Norsonic	Type 121	31185



APPENDIX B: CALCULATION RESULTS

Freq. Band (Hz)	Specimen T.L. (dB)	95% Conf. (dB)	Flanking Limit (dB)	STC Defic. (dB)
25				
31.5	19.4		40	
40	17.1		47	
50	21.2		43	
63	15.9		43	
80	15.6	±1.63	42	
100	17.2	±1.15	45	
125	28.6	±0.95	46	3
160	35.0	±1.27	52	-
200	38.2	±1.24	53	-
250	40.9	±0.65	56	-
315	40.3	±0.65	60	4
400	42.2	±0.62	61	5
500	45.6	±0.40	65	2
630	47.3	±0.50	66	2
800	50.0	±0.40	69	-
1000	51.7	±0.25	70	-
1250	53.7	±0.25	72	-
1600	54.3	±0.32	72	-
2000	51.1	±0.44	74	1
2500	49.2	±0.35	79	3
3150	51.4	±0.31	83	1
4000	56.7	±0.49		-
5000	61.4	±0.35		
6300	65.4			
8000	68.3 *			
10000	64.5 *			
Total deficiencies below STC contour (dB)				21
STC contour [ASTM E413]				48

* Actual transmission loss of specimen may be higher than measured at this frequency band. Signal-to-noise in the receiving room less than 5 dB, therefore the result is "an estimate of the lower limit".

Note: 95% Confidence from room qualification data. Flanking Limit from chamber flanking measurements. Data available upon request. Extended frequency results below 80Hz and above 5000Hz for reference only.





APPENDIX C: SPECIMEN ASSEMBLY DESCRIPTION

The following table shows the description of the interior wall assembly.

Overall Mass = 391.6 lb [177.6 kg]

Overall Surface Density = 6.07 PSF [29.64 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m ²]
0.625" (5/8") type X gypsum board; 1.25" screw @ 12" O.C.	143.3 [65.0]	2.22 [10.85]
2x4 wood studs @ 24" O.C.	70.0 [31.8]	1.09 [5.30]
3-1/2" kraft faced glass fiber insulation batts	15.3 [6.9]	0.24 [1.16]
0.625" (5/8") QuietRock ES; 1.25" screw @ 12" O.C.	163.0 [73.9]	2.53 [12.34]

The Quiet Solution QuietRock ES and QuietSeal Pro were supplied by the client. All other materials were purchased through retail channels. All materials were weighed prior to installation. Weights of fasteners are not represented in the above totals.

TEST SPECIMEN DESCRIPTION

The test specimen was one interior wall assembly.

A wood 2x4 frame was constructed in the 8' x 8' test specimen opening. Wood 2x4 studs were fastened to the sill and top plates, spaced approximately 24" apart, on-centers, for a total of five vertical members including the frame sides.

Kraft-faced glass-fiber insulation batts measuring 23" wide and 3-1/2" thick were friction-fit into each entire stud cavity.

On the source side of the partition, the sheeting consisted of a single layer of 5/8" type X gypsum board. On the receiver side of the partition the sheeting consisted of a single layer of 5/8" thick Quiet Solution QuietRock ES (QR-ES).

On the receiver room side, two 5/8" thick, 4' x 8' Quiet Solution QuietRock ES panels were fastened vertically to the wood studs with 1-1/4" drywall screws, spaced 12" apart. The seams between the two QR-ES panels were sealed with Quiet Solution QuietSeal Pro and then covered with Nashua 322, 5 mil foil tape.

On the source room side of the partition the type X gypsum board panels were installed vertically, but with the seams staggered from those on the receiver side. The installation pattern consisted of two 2' x 8' vertical panels at the two sides, and one 4' x 8' sheet in the center of the specimen opening. The panels were fastened to the wood studs with 1-1/4" drywall screws, spaced 12" apart. The photograph in Figure 1 shows the typical staggered seam installation on the source room side. The seams between the three gypsum board panels were sealed with Quiet Solution QuietSeal Pro and then covered with Nashua 322, 5 mil foil tape.

The perimeter of the specimen was sealed, on both on the source and receiver room sides, with Quiet Solution QuietSeal Pro and then covered with Nashua 322, 5 mil foil tape.



Figure 1: Photograph of typical staggered seam pattern on source room side of partition



APPENDIX D: SINGLE-NUMBER CALCULATION TO ISO 717-1

Freq. Band (Hz)	R_i ($R_i = TL$) (dB)	Ref Curve (dB)	Unfav. Deviat. (dB)	L_{i1} Spectrum (dB)	$L_{i1} - R_i$ Level (dB)	L_{i2} Spectrum (dB)	$L_{i2} - R_i$ Level (dB)
50	21.2						
63	15.9						
80	15.6						
100	17.2	28	10.8	-29.0	-46.2	-20.0	-37.2
125	28.6	31	2.4	-26.0	-54.6	-20.0	-48.6
160	35.0	34	-	-23.0	-58.0	-18.0	-53.0
200	38.2	37	-	-21.0	-59.2	-18.0	-56.2
250	40.9	40	-	-19.0	-59.9	-15.0	-55.9
315	40.3	43	2.7	-17.0	-57.3	-14.0	-54.3
400	42.2	46	3.8	-15.0	-57.2	-13.0	-55.2
500	45.6	47	1.4	-13.0	-58.6	-12.0	-57.6
630	47.3	48	0.7	-12.0	-59.3	-11.0	-58.3
800	50.0	49	-	-11.0	-61.0	-9.0	-59.0
1000	51.7	50	-	-10.0	-61.7	-8.0	-59.7
1250	53.7	51	-	-9.0	-62.7	-9.0	-62.7
1600	54.3	51	-	-9.0	-63.3	-10.0	-64.3
2000	51.1	51	-	-9.0	-60.1	-11.0	-62.1
2500	49.2	51	1.8	-9.0	-58.2	-13.0	-62.2
3150	51.4	51	-	-9.0	-60.4	-15.0	-66.4
4000	56.7						
5000	61.4						
Sum =			23.6	$R_{A,1} =$	43.6	$R_{A,2} =$	36.4
$R_w =$			47	$C =$	-3	$C_{tr} =$	-11

$$R_w (C ; C_{tr}) = 47 (-3 ; -11)$$

$$R_w (C ; C_{tr} ; C_{50-3150} ; C_{tr, 50-3150}) = 47 (-3 ; -11 ; -5 ; -15)$$

$$R_w (C ; C_{tr} ; C_{100-5000} ; C_{tr, 100-5000}) = 47 (-3 ; -11 ; -2 ; -11)$$

$$R_w (C ; C_{tr} ; C_{50-5000} ; C_{tr, 50-5000}) = 47 (-3 ; -11 ; -4 ; -15)$$

Note: The calculations in ISO 717-1 are performed based on assumed equivalency of the ASTM and the corresponding ISO test methods. The test herein is performed according to ASTM standards.

The spectrum adaptation terms C and C_{tr} characterize performance against two specific sound sources, A-weighted pink noise and A-weighted traffic noise respectively. The standard ISO 717-1 includes a discussion of "Use of Spectrum Adaptation Terms" in Annex A (informative).

Each spectrum adaptation term may additionally be reported with extended frequency bands included. A calculation for the primary frequency range is shown above, but all available extended-frequency calculations were performed to compare against corresponding ratings of other specimens.

