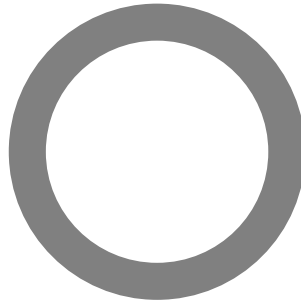


**ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements**

**Orfield** Laboratories Inc



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

**TEST**

Client: **Serious Materials, Inc**  
 Report Date: **January 21, 2009**  
 Test Date: **September 12, 2008**  
 Test Number: **OL08-0915**

**ACCREDITATION**



For the scope of accreditation  
 under NVLAP code 200248-0

**RESULT SUMMARY**

**STC=51**

**CLIENT**

**ADDRESS**

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

**PREPARED BY**

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 ELECTRONICALLY  
 REPRODUCED  
 SIGNATURE

**David M. Berg**  
**Laboratory Manager**

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

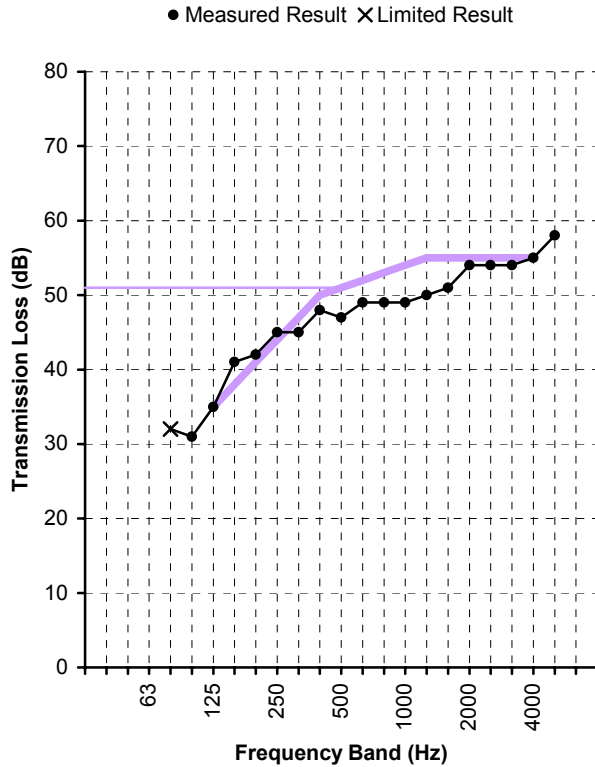




**Test Date** September 12, 2008  
**Specimen** Operable Door

**Method** ASTM Standard E90  
**Technician** D. Berg

Single Number Rating  
**STC = 51**



Freq. (Hz)	TL (dB)	Def. (dB)
80	32*	
100	31	
125	35	-
160	41	-
200	42	-
250	45	-
315	45	2
400	48	2
500	47	4
630	49	3
800	49	4
1000	49	5
1250	50	5
1600	51	4
2000	54	1
2500	54	1
3150	54	1
4000	55	-
5000	58	

Total Deficiencies 32

\* Estimate of lower limit

**Assembly Elements** (listed in order from source room side to receiver room side)

- Serious Materials THX Door
- Zero International gasket set including:
  - 770A Head and Jam
  - 119WB Spring Bronze
  - 564A Saddle
  - 367A Door Bottom

Kwikset lockset (grease filled)





## SPECIMEN DESCRIPTION

The specimen under test was one operable door. 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. A representative from Zero International installed and adjusted the gasket set. Qualified representatives of Orfield Laboratories observed the installation progress, and visually inspected the specimen prior to testing. The door was opened and closed after assembly and prior to testing. The door was shipped back to the client after testing was completed.

## 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	72°F [22.2°C]
Relative Humidity	55%

**Specimen Area**

Specimen Area	17.8 ft² [1.65 m²]
Filler Wall Area	47.6 ft² [4.42 m²]
Composite Wall Area	65.4 ft² [6.08 m²]

**Chamber Volume - Airborne Transmission**

Source Room Volume	3284 ft³ [93.0 m³]
Receiving Room Volume	8281 ft³ [234.5 m³]

**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	Brüel & Kjær	Type 2133	1389369



**APPENDIX B: CALCULATION RESULTS**

Freq. Band (Hz)	Specimen T.L. (dB)	95% Conf. (dB)	Flanking Limit (dB)	STC Defic. (dB)
25				
31.5	23.2 †		40	
40	30.2 †		47	
50	34.3 §†		43	
63	23.2 ‡		43	
80	32.5 §‡	±1.63	42	
100	31.4 ‡	±1.15	45	
125	35.2 ‡	±0.95	46	-
160	40.7 ‡	±1.27	52	-
200	41.5 ‡	±1.24	53	-
250	45.0 ‡	±0.65	56	-
315	45.0 ‡	±0.65	60	2
400	47.8 ‡	±0.62	61	2
500	47.4 ‡	±0.40	65	4
630	48.5	±0.50	66	3
800	48.7	±0.40	69	4
1000	48.6	±0.25	70	5
1250	49.6	±0.25	72	5
1600	51.5	±0.32	72	4
2000	53.9	±0.44	74	1
2500	54.4	±0.35	79	1
3150	54.1	±0.31	83	1
4000	54.8	±0.49		-
5000	58.0	±0.35		
6300	61.7 ‡			
8000	65.6 *†			
10000	63.1 *†			
Total deficiencies below STC contour (dB)				32
STC contour [ASTM E413]				<b>51</b>

\* 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".

§ Actual transmission loss of specimen may be higher than measured at this frequency band. Result within 10 dB of flanking limit found in separate study, therefore the result may be "potentially limited by the laboratory" due to flanking around the specimen.

‡ Correction included in calculation due to a portion of the sound transmitted by way of the filler wall. Sound transmission through the filler wall is within correction limits established in ASTM E90.

† Actual transmission loss of specimen may be higher than measured at this frequency band. Sound transmission through the filler wall exceeds correction limits established in ASTM E90; therefore the result is "an estimate of the lower limit".





**APPENDIX C: SPECIMEN ASSEMBLY DESCRIPTION**

The following table shows the description of the operable door with gasket set.

Overall Mass = 270.0 lb [122.5 kg]  
 Overall Surface Density = 15.17 PSF [74.06 kg/m<sup>2</sup>]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m <sup>2</sup> ]
Serious Materials THX Door	270.0 [122.5]	15.17 [74.06]
Zero International gasket set including:		
770A Head and Jam		
119WB Spring Bronze		
564A Saddle		
367A Door Bottom		

Kwikset lockset (grease filled)

The test specimen was supplied by client. The gasket set was provided by Zero International. 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.

**FILLER WALL**

A double-stud filler wall was constructed. The filler wall contained three layers of 5/8" gypsum board at each surface and two layers of glass fiber batt insulation, one in each stud cavity. The sample test frame was pre-built into the wall and lined with 2 layers of 5/8" gypsum board. The sample frame was prevented from coupling the two stud walls by cutting around the perimeter. The resulting narrow gap with filled with non-hardening acoustic sealant. The finished filler wall had a surface density of roughly 14.9 lbs per square foot and an STC rating of 69. Appropriate filler wall corrections were applied to the sample transmission loss calculations in accordance with ASTM E90 and are reflected in the data as indicated in Appendix B.

**TEST SPECIMEN DESCRIPTION**

The test specimen was one operable Serious Materials THX rated door. The dimensions of the door were 32" wide by 80" high by 2.25" thick. The door surface was wood laminate. The door weighed 270 lbs. The door was installed with a gasket set provided by Zero International. The gasket set consisted of 770A Head and Jam set, 119WB Spring Bronze, 564A Saddle, and a 367A Door Bottom.





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

Freq. Band (Hz)	$R_i$ ( $R_i \equiv TL$ ) (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	34.3						
63	23.2						
80	32.5						
100	31.4	31	-	-29.0	-60.4	-20.0	-51.4
125	35.2	34	-	-26.0	-61.2	-20.0	-55.2
160	40.7	37	-	-23.0	-63.7	-18.0	-58.7
200	41.5	40	-	-21.0	-62.5	-18.0	-59.5
250	45.0	43	-	-19.0	-64.0	-15.0	-60.0
315	45.0	46	1.0	-17.0	-62.0	-14.0	-59.0
400	47.8	49	1.2	-15.0	-62.8	-13.0	-60.8
500	47.4	50	2.6	-13.0	-60.4	-12.0	-59.4
630	48.5	51	2.5	-12.0	-60.5	-11.0	-59.5
800	48.7	52	3.3	-11.0	-59.7	-9.0	-57.7
1000	48.6	53	4.4	-10.0	-58.6	-8.0	-56.6
1250	49.6	54	4.4	-9.0	-58.6	-9.0	-58.6
1600	51.5	54	2.5	-9.0	-60.5	-10.0	-61.5
2000	53.9	54	0.1	-9.0	-62.9	-11.0	-64.9
2500	54.4	54	-	-9.0	-63.4	-13.0	-67.4
3150	54.1	54	-	-9.0	-63.1	-15.0	-69.1
4000	54.8						
5000	58.0						
Sum =			22.0	$R_{A,1} =$	49.1	$R_{A,2} =$	46.1
$R_w =$			50	$C =$	-1	$C_{tr} =$	-4

$$R_w (C ; C_{tr}) = 50 (-1 ; -4)$$

$$R_w (C ; C_{tr} ; C_{50-3150} ; C_{tr, 50-3150}) = 50 (-1 ; -4 ; -1 ; -7)$$

$$R_w (C ; C_{tr} ; C_{100-5000} ; C_{tr, 100-5000}) = 50 (-1 ; -4 ; 0 ; -4)$$

$$R_w (C ; C_{tr} ; C_{50-5000} ; C_{tr, 50-5000}) = 50 (-1 ; -4 ; -1 ; -7)$$

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.

