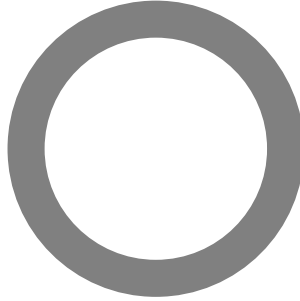


ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

Orfield Laboratories Inc



Design Research Testing

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

TEST

Client: **Whisper Industries, L.L.C.**
 Report Date: **August 14, 2008**
 Test Date: **July 9, 2008**
 Test Number: **OL08-0710**

ACCREDITATION



For the scope of accreditation under NVLAP code 200248-0

RESULT SUMMARY

STC=56

CLIENT ADDRESS

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PREPARED BY

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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.

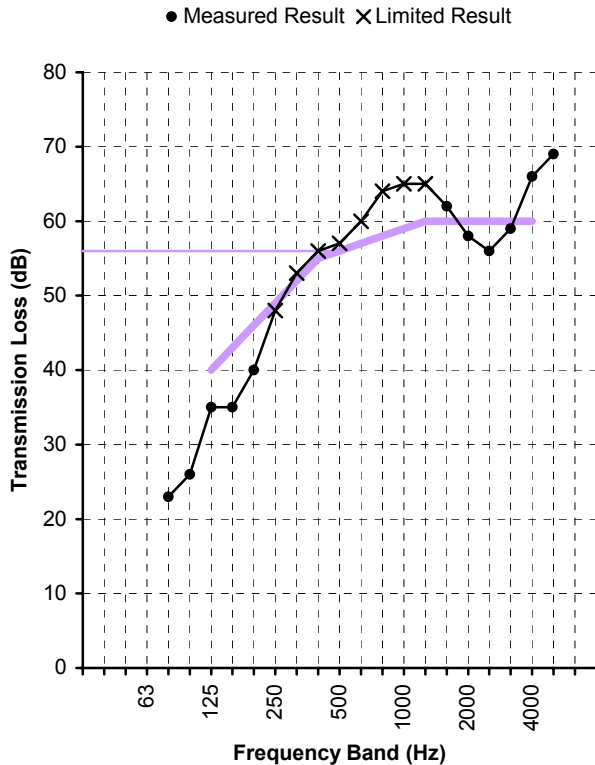




Test Date July 9, 2008
Specimen Interior Wall Assembly

Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 56



Freq. (Hz)	TL (dB)	Def. (dB)
80	23	
100	26	
125	35	5
160	35	8
200	40	6
250	48*	1
315	53*	-
400	56*	-
500	57*	-
630	60*	-
800	64*	-
1000	65*	-
1250	65*	-
1600	62	-
2000	58	2
2500	56	4
3150	59	1
4000	66	-
5000	69	-

Total Deficiencies 27

* Estimate of lower limit

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

- 0.625" (5/8") gypsum board type X; 1.625" screw @ 12" O.C.
- (7/8") Hat Channel @ 24" O.C.
- Whisper Industries WhisperClip™; 1.625" screw
- 2x4 wood studs @ 16" O.C.
- (6-1/2") R19 glass fiber insulation
- 0.625" (5/8") gypsum board type X; 1.625" screw @ 16" 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 wall assembly 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]
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Chamber Volume - Airborne Transmission

Source Room Volume	3284 ft ³ [93.0 m ³]
Receiving Room Volume	8245 ft ³ [233.5 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	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	24.5		40	
40	19.0		47	
50	17.0		43	
63	14.3		43	
80	23.2	±1.63	42	
100	25.7	±1.15	45	
125	35.0	±0.95	46	5
160	34.8	±1.27	52	8
200	40.4	±1.24	53	6
250	48.2 §	±0.65	56	1
315	53.3 §	±0.65	60	-
400	55.9 §	±0.62	61	-
500	57.0 §	±0.40	65	-
630	59.7 §	±0.50	66	-
800	63.7 §	±0.40	69	-
1000	65.5 §	±0.25	70	-
1250	65.3 §	±0.25	72	-
1600	61.6	±0.32	72	-
2000	58.0	±0.44	74	2
2500	55.9	±0.35	79	4
3150	58.6	±0.31	83	1
4000	66.3	±0.49		-
5000	69.0	±0.35		
6300	69.2			
8000	69.1 *			
10000	64.5 *			
Total deficiencies below STC contour (dB)				27
STC contour [ASTM E413]				56

* 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.

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 elements in the wall assembly, with the source-room-side element first and the receiving-room-side element last.

Overall Mass = 398.8 lb [180.9 kg]

Overall Surface Density = 6.18 PSF [30.18 kg/m²]

Element	Mass	Surf. Dens.
	lb [kg]	PSF [kg/m ²]
0.625" (5/8") gypsum board type X; 1.625" screw @ 12" O.C.	145.5 [66.0]	2.26 [11.01]
(7/8") Hat Channel @ 24" O.C.	8.8 [4.0]	0.14 [0.66]
Whisper Industries WhisperClip™; 1.625" screw	2.0 [0.9]	0.03 [0.15]
2x4 wood studs @ 16" O.C.	84.0 [38.1]	1.30 [6.36]
(6-1/2") R19 glass fiber insulation	14.0 [6.4]	0.22 [1.06]
0.625" (5/8") gypsum board type X; 1.625" screw @ 16" O.C.	144.5 [65.5]	2.24 [10.94]

WhisperClips™ and SilenSeal™ supplied by client. All other materials purchased through retail channels. All materials were weighed prior to installation. Weights of fasteners are not represented in the above totals.

FRAMING

A wood 2x4 sill plate was laid on the floor and a wood 2x4 top plate was bolted to the top frame in the specimen opening. Wood 2x4 studs were fastened to the sill and top plates, spaced 16" apart, on center. The outermost wood 2x4 studs were also bolted to each side of the specimen opening frame. Seventeen (17) Whisper Industries WhisperClips™ were attached to the vertical studs on the source room side using 1-5/8" drywall screws (see Figure 1 for clip layout). 8'-0" lengths of 25 gauge, 7/8" hat-channel were then attached to the WhisperClips™ at 24" nominal spacing.

INSULATION

Insulation was R19 glass-fiber batt measuring 15" wide and 6.5" thick. Batts were friction-fit into each entire stud cavity.

SHEETING

The source room side gypsum board was 5/8" thick 4' by 8' panels. The gypsum board was fastened to the hat-channel with 1-5/8" drywall screws, spaced in a 12" x 24" pattern.

The receiver room side gypsum board was 5/8" thick 4' by 8' panels. The gypsum board was fastened directly to the studs with 1-5/8" drywall screws, spaced in a 16" x 16" pattern.

Panels were shimmed at installation so equal gaps were at the top and bottom. Gaps were less than 1/2" in all cases. Shims were removed after sheeting was fastened and the perimeter was sealed on the source and receiver room sides with Green Glue Company SilenSeal™. Additionally, the perimeter on both the source and receiver room was sealed with 7/8" wide by 1/8" thick putty tape. The seams between gypsum board panels were sealed with Green Glue Company SilenSeal™ on both the source and receiver room sides.

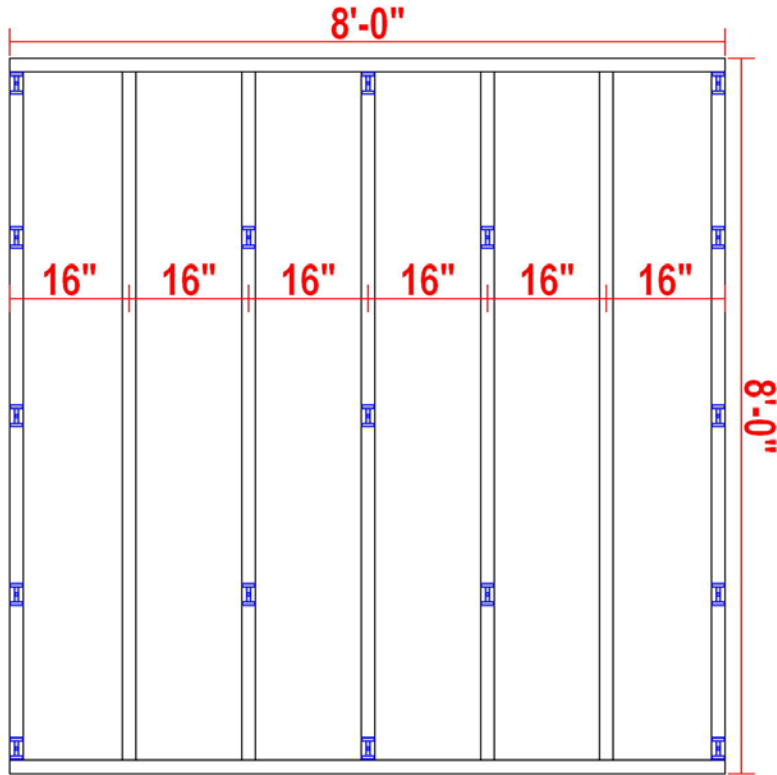


Figure 1: WhisperClip™ Layout Diagram



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	17.0						
63	14.3						
80	23.2						
100	25.7	36	10.3	-29.0	-54.7	-20.0	-45.7
125	35.0	39	4.0	-26.0	-61.0	-20.0	-55.0
160	34.8	42	7.2	-23.0	-57.8	-18.0	-52.8
200	40.4	45	4.6	-21.0	-61.4	-18.0	-58.4
250	48.2	48	-	-19.0	-67.2	-15.0	-63.2
315	53.3	51	-	-17.0	-70.3	-14.0	-67.3
400	55.9	54	-	-15.0	-70.9	-13.0	-68.9
500	57.0	55	-	-13.0	-70.0	-12.0	-69.0
630	59.7	56	-	-12.0	-71.7	-11.0	-70.7
800	63.7	57	-	-11.0	-74.7	-9.0	-72.7
1000	65.5	58	-	-10.0	-75.5	-8.0	-73.5
1250	65.3	59	-	-9.0	-74.3	-9.0	-74.3
1600	61.6	59	-	-9.0	-70.6	-10.0	-71.6
2000	58.0	59	1.0	-9.0	-67.0	-11.0	-69.0
2500	55.9	59	3.1	-9.0	-64.9	-13.0	-68.9
3150	58.6	59	0.4	-9.0	-67.6	-15.0	-73.6
4000	66.3						
5000	69.0						
Sum =			30.6	$R_{A,1} =$	51.0	$R_{A,2} =$	44.2
$R_w =$			55	$C =$	-4	$C_{tr} =$	-11

$$R_w (C ; C_{tr}) = 55 (-4 ; -11)$$

$$R_w (C ; C_{tr} ; C_{50-3150} ; C_{tr, 50-3150}) = 55 (-4 ; -11 ; -8 ; -20)$$

$$R_w (C ; C_{tr} ; C_{100-5000} ; C_{tr, 100-5000}) = 55 (-4 ; -11 ; -3 ; -11)$$

$$R_w (C ; C_{tr} ; C_{50-5000} ; C_{tr, 50-5000}) = 55 (-4 ; -11 ; -7 ; -20)$$

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.

