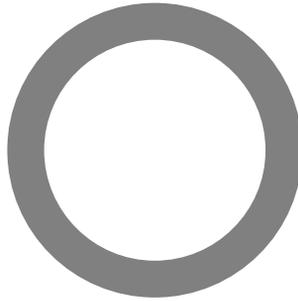


ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

Orfield Laboratories Inc



Design Research Testing

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

TEST

Client: **Green Glue Company, L.L.C.**
Report Date: **December 18, 2007**
Test Date: **May 30, 2007**
Test Number: **OL07-0530b**

ACCREDITATION



For the scope of accreditation under NVLAP code 200248-0

RESULT SUMMARY

STC=62

CLIENT

ADDRESS

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Phone: (866) 435-8893
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Signatures are required on this document for an official laboratory test report. Copies of this document without signatures are for reference only.

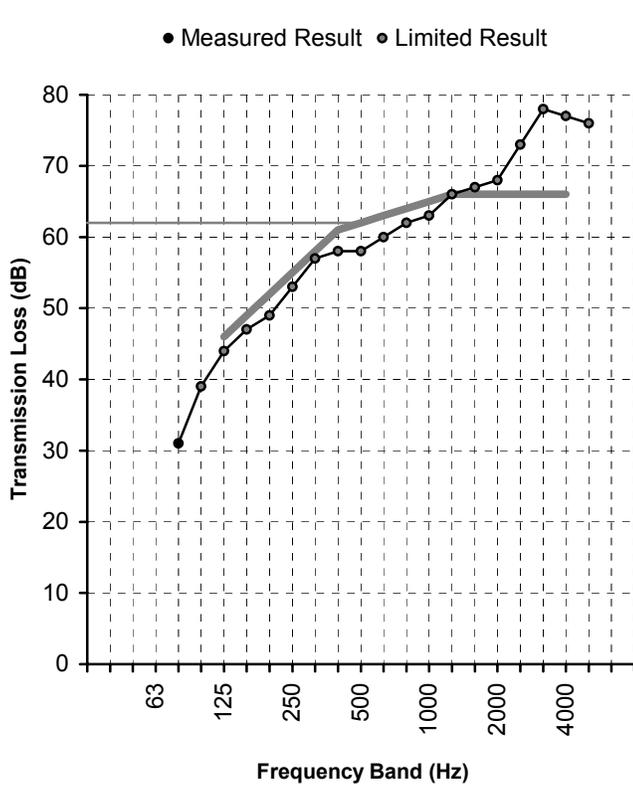




Test Date May 30, 2007
Specimen Interior Wall Assembly

Method ASTM Standard E90

Single Number Rating
STC = 62



Freq. (Hz)	TL (dB)	Def. (dB)
80	31	
100	39*	
125	44*	2
160	47*	2
200	49*	3
250	53*	2
315	57*	1
400	58*	3
500	58*	4
630	60*	3
800	62*	2
1000	63*	2
1250	66*	-
1600	67*	-
2000	68*	-
2500	73*	-
3150	78*	-
4000	77*	-
5000	76*	-
Total Deficiencies		24

* Estimate of lower limit

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

- 0.625" (5/8") gypsum board; 2" screws @ 12" O.C.
- Green Glue @ 58 oz. (2 tubes) per 4x8 sheet
- 0.625" (5/8") gypsum board
- staggered 2x4 wood stud wall @ 16" O.C.
- 3.5" R13 glass fiber insulation batts
- 0.625" (5/8") gypsum board
- Green Glue @ 58 oz. (2 tubes) per 4x8 sheet
- 0.625" (5/8") gypsum board; 2" screws @ 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 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.*

The method used for this test differed from the laboratory's adopted procedure only in that the subwoofer was absent from the receiver room for all measurements in this test. The presence or absence of the woofer does not affect the bands for which the room is qualified.

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	8281 ft ³ [234.5 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	23.6		40	
40	19.7		47	
50	25.4		43	
63	31.2		43	
80	31.4	±1.63	42	
100	38.8 §	±1.15	45	
125	44.1 §	±0.95	46	2
160	47.0 §	±1.27	52	2
200	49.5 §	±1.24	53	3
250	53.1 §	±0.65	56	2
315	57.4 §	±0.65	60	1
400	57.7 §	±0.62	61	3
500	57.5 §	±0.40	65	4
630	60.0 §	±0.50	66	3
800	62.5 §	±0.40	69	2
1000	63.5 §	±0.25	70	2
1250	65.7 §	±0.25	72	-
1600	66.6 §	±0.32	72	-
2000	68.1 §	±0.44	74	-
2500	73.3 §	±0.35	79	-
3150	77.7 §	±0.31	83	-
4000	76.8 *	±0.49		-
5000	76.3 *	±0.35		
6300	74.2 *			
8000	73.6 *			
10000	68.6 *			
Total deficiencies below STC contour (dB)				24
STC contour [ASTM E413]				62

* 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 = 779.0 lb [353.3 kg]
 Overall Surface Density = 12.08 PSF [58.97 kg/m²]

Element	Mass		Surf. Dens.	
	lb	[kg]	PSF	[kg/m ²]
0.625" (5/8") gypsum board; 2" screws @ 12" O.C. Green Glue @ 58 oz. (2 tubes) per 4x8 sheet	316.5	[143.6]	4.91	[23.96]
0.625" (5/8") gypsum board staggered 2x4 wood stud wall @ 16" O.C.	129.0	[58.5]	2.00	[9.76]
3.5" R13 glass fiber insulation batts	18.0	[8.2]	0.28	[1.36]
0.625" (5/8") gypsum board Green Glue @ 58 oz. (2 tubes) per 4x8 sheet 0.625" (5/8") gypsum board; 2" screws @ 12" O.C.	315.5	[143.1]	4.89	[23.88]

All materials were weighed prior to installation. Weights of fasteners are not represented in the above totals.

FRAMING

A wood 2x6 sill plate was laid on the floor and a wood 2x6 top plate was bolted to the top frame in the specimen opening. Wood 2x4 studs were bolted to each side of the specimen opening frame, aligned with the face of the 2x6 plates on the receiver-room side. Wood 2x4 studs were fastened to the sill and top plates in a staggered pattern, so the face of the 2x4 stud aligned with the face of the 2x6 plates on alternating sides of the plates. Studs were staggered so there were 7 studs on the receiver-room side, spaced 16" apart, on-centers, and 6 studs on the source-room side, spaced 8" from the frame and 16" apart, on-centers.

INSULATION

Insulation was R13 glass-fiber un-faced batt measuring 15" wide and 3.5" thick. Batts were split apart into approximately 1.75" thick batts and stapled to the backside of the receiver-room gypsum and to the source-room studs.

SHEETING

The gypsum board panels and the Green Glue adhesive were pre-laminated into sandwiches. Each sandwich was assembled by the client off-site. According to the client, Green Glue was applied from two 29 oz. adhesive cartridges in a random pattern over a whole gypsum board panel. A second sheet of gypsum board was applied to the adhesive. The sandwich was thoroughly compressed by methodically walking over the entire face.





Figure 1 Typical Green Glue Random Application Pattern (photo by client)

The assemblies were dried spaced out and with forced air ventilation. The adhesive aged for a period greater than 90 days. A period of 14 days is stated in ASTM Standard E90 for water-based adhesives.

Sandwiches were fastened to the studs on each side with 2" drywall screws, spaced 12" apart. The seams were sealed with 7/8" Mortite-brand rope-caulk. The perimeter was sealed on the both sides with 7/8" Mortite-brand rope-caulk.



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_{f1} Spectrum (dB)	$L_{f1} - R_i$ Level (dB)	L_{f2} Spectrum (dB)	$L_{f2} - R_i$ Level (dB)
50	25.4						
63	31.2						
80	31.4						
100	38.8	43	4.2	-29.0	-67.8	-20.0	-58.8
125	44.1	46	1.9	-26.0	-70.1	-20.0	-64.1
160	47.0	49	2.0	-23.0	-70.0	-18.0	-65.0
200	49.5	52	2.5	-21.0	-70.5	-18.0	-67.5
250	53.1	55	1.9	-19.0	-72.1	-15.0	-68.1
315	57.4	58	0.6	-17.0	-74.4	-14.0	-71.4
400	57.7	61	3.3	-15.0	-72.7	-13.0	-70.7
500	57.5	62	4.5	-13.0	-70.5	-12.0	-69.5
630	60.0	63	3.0	-12.0	-72.0	-11.0	-71.0
800	62.5	64	1.5	-11.0	-73.5	-9.0	-71.5
1000	63.5	65	1.5	-10.0	-73.5	-8.0	-71.5
1250	65.7	66	0.3	-9.0	-74.7	-9.0	-74.7
1600	66.6	66	-	-9.0	-75.6	-10.0	-76.6
2000	68.1	66	-	-9.0	-77.1	-11.0	-79.1
2500	73.3	66	-	-9.0	-82.3	-13.0	-86.3
3150	77.7	66	-	-9.0	-86.7	-15.0	-92.7
4000	76.8						
5000	76.3						
Sum =			27.2	$R_{A,1} =$	60.3	$R_{A,2} =$	55.3
$R_w =$			62	$C =$	-2	$C_{tr} =$	-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.

$$R_w(C; C_{tr}) = 62 (-2; -7)$$

$$R_w(C; C_{tr}; C_{50-3150}; C_{tr,50-3150}) = 62 (-2; -7; -5; -15)$$

$$R_w(C; C_{tr}; C_{100-5000}; C_{tr,100-5000}) = 62 (-2; -7; -1; -7)$$

$$R_w(C; C_{tr}; C_{50-5000}; C_{tr,50-5000}) = 62 (-2; -7; -4; -15)$$

