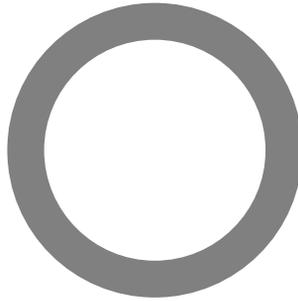


**ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements**

**Orfield** Laboratories Inc



**Design Research Testing**

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

**TEST**

Client: **Green Glue Company, L.L.C.**  
Report Date: **January 11, 2008**  
Test Date: **September 29, 2006**  
Test Number: **OL06-0942**

**ACCREDITATION**



For the scope of accreditation under NVLAP code 200248-0

**RESULT SUMMARY**

**STC=61**

**CLIENT**

**ADDRESS**  
Green Glue Company, L.L.C.  
710 11<sup>th</sup> Avenue Northeast  
West Fargo, ND 58078  
Phone: (866) 435-8893  
email: info@greengluecompany.com

**PREPARED BY**

David M. Berg  
Orfield Laboratories, Inc.  
2709 East 25<sup>th</sup> Street  
Minneapolis MN 55406  
Voice (612) 721-2455  
FAX (612) 721-2457  
e-mail dave@orfieldlabs.com

**Prepared by:**

Electronically  
Reproduced  
Signatures

**Reviewed by:**

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

**Elliott B. Dick**  
**Quality Manager**

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

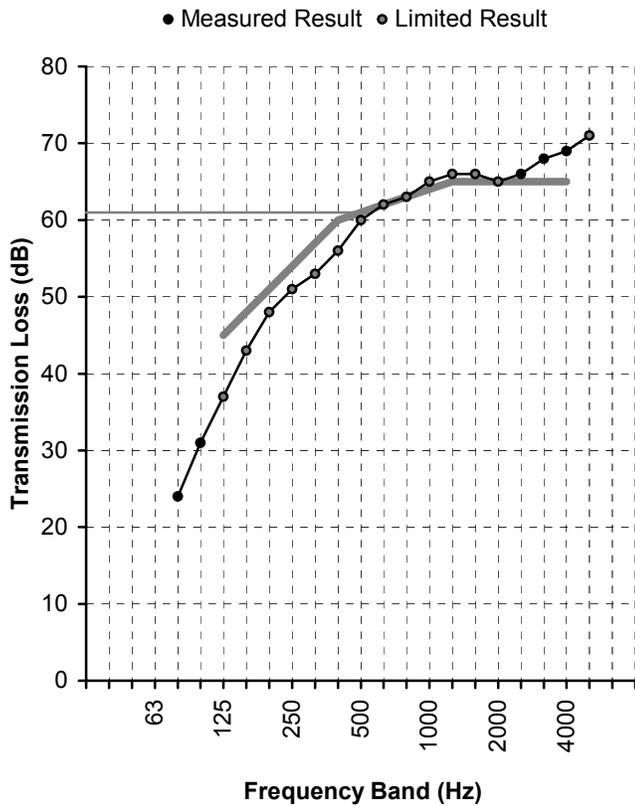




**Client** Green Glue Company  
**Project No.** OL06-0942  
**Specimen** Interior Wall Assembly

**Method** ASTM Standard E90  
**Test Date** September 29, 2006

**Single Number Rating**  
 STC=61



Freq. (Hz)	TL (dB)	Def. (dB)
80	24	
100	31	
125	37*	8
160	43*	5
200	48*	3
250	51*	3
315	53*	4
400	56*	4
500	60*	1
630	62*	-
800	63*	-
1000	65*	-
1250	66*	-
1600	66*	-
2000	65*	-
2500	66	-
3150	68	-
4000	69	-
5000	71*	
Total Deficiencies		28

\* Estimate of lower limit

**Wall Assembly Description**

(listed in order from source room side to receiver room side)  
 0.625" (5/8") gypsum drywall; 2" Screws @ 12" O.C.  
 Green Glue @ 58 oz. (2 tubes) per 4x8 sheet (116 oz. total)  
 0.625" (5/8") gypsum drywall  
 3-5/8" 25 gauge steel studs @ 24" O.C.  
 3.5" R13 glass fiber batts  
 0.625" (5/8") gypsum drywall  
 Green Glue @ 58 oz. (2 tubes) per 4x8 sheet (116 oz. total)  
 0.625" (5/8") gypsum drywall; 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.*

## 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 <sup>2</sup> [5.99 m <sup>2</sup> ]
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#### Chamber Volume - Airborne Transmission

Source Room Volume	3284 ft <sup>3</sup> [93.0 m <sup>3</sup> ]
Receiving Room Volume	8281 ft <sup>3</sup> [234.5 m <sup>3</sup> ]

### 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**

<b>Freq. Band (Hz)</b>	<b>Specimen T.L. (dB)</b>	<b>95% Conf. (dB)</b>	<b>Flanking Limit (dB)</b>	<b>STC Defic. (dB)</b>
25				
31.5	<b>27.1</b>		40	
40	<b>18.8</b>		47	
50	<b>20.0</b>		43	
63	<b>19.9</b>		43	
80	<b>24.4</b>	±1.63	42	
100	<b>30.7</b>	±1.15	45	
125	<b>37.4</b> ‡	±0.95	46	8
160	<b>42.8</b> ‡	±1.27	52	5
200	<b>47.7</b> ‡	±1.24	53	3
250	<b>50.9</b> ‡	±0.65	56	3
315	<b>53.1</b> ‡	±0.65	60	4
400	<b>55.6</b> ‡	±0.62	61	4
500	<b>59.6</b> ‡	±0.40	65	1
630	<b>61.7</b> ‡	±0.50	66	-
800	<b>63.5</b> ‡	±0.40	69	-
1000	<b>64.7</b> ‡	±0.25	70	-
1250	<b>66.4</b> ‡	±0.25	72	-
1600	<b>65.9</b> ‡	±0.32	72	-
2000	<b>64.7</b> ‡	±0.44	74	-
2500	<b>66.4</b>	±0.35	79	-
3150	<b>67.7</b>	±0.31	83	-
4000	<b>69.5</b>	±0.49		-
5000	<b>71.0</b> †	±0.35		
6300	<b>70.8</b> †			
8000	<b>71.5</b> †			
10000	<b>67.0</b> †			
Total deficiencies below STC contour (dB)				<b>28</b>
STC contour [ASTM E413]				<b>61</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.

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 = 630.0 lb [285.8 kg]

Overall Surface Density = 9.77 PSF [47.69 kg/m<sup>2</sup>]

Element	Mass		Surf. Dens.	
	lb	[kg]	PSF	[kg/m <sup>2</sup> ]
0.625" (5/8") gypsum drywall; 2" Screws @ 12" O.C. Green Glue @ 58 oz. (2 tubes) per 4x8 sheet (116 oz. total)	297.0	[134.7]	4.62	[22.54]
0.625" (5/8") gypsum drywall 3-5/8" 25 gauge steel studs @ 24" O.C.	23.0	[10.4]	0.36	[1.75]
3.5" R13 glass fiber batts	16.0	[7.3]	0.25	[1.21]
0.625" (5/8") gypsum drywall Green Glue @ 58 oz. (2 tubes) per 4x8 sheet (116 oz. total)				
0.625" (5/8") gypsum drywall; 2" Screws @ 12" O.C.	294.0	[133.4]	4.57	[22.31]

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

### FRAMING

A 3-5/8" wide steel track was laid on the floor and a 3-5/8" wide steel track was bolted to the top frame in the specimen opening. Steel 3-5/8" studs were fastened to the bottom and top tracks, spaced 24" apart, on-centers. The outermost steel 3-5/8" studs were also bolted to each side of the specimen opening frame.

### INSULATION

Insulation was R13 glass-fiber un-faced batt measuring 23" wide and 3.5" thick. Batts were friction-fit into each entire stud cavity.

### SHEETING

The Green Glue adhesive was pre-laminated into sandwiches, between two gypsum board panels. Each sandwich was assembled by the client off-site. According to the client, Green Glue was applied from two entire 29 oz. adhesive cartridges in a random pattern over one 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 Application (photo by client)**

The adhesive aged from the assembly date, August 17 according to the client, to the test date, September 29. This is more than the 14 days period stated in ASTM Standard E90 for water-based laminating adhesives.

Sandwiches were fastened to the studs on each side with 2" drywall screws, spaced 12" apart, driven through both layers of gypsum board at once. The seams were sealed with 1/8" strips of rope-caulk.

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 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)	$L_{i1}$ Spectrum (dB)	$L_{i1} - R_i$ Level (dB)	$L_{i2}$ Spectrum (dB)	$L_{i2} - R_i$ Level (dB)
50	20.0						
63	19.9						
80	24.4						
100	30.7	40	9.3	-29.0	-59.7	-20.0	-50.7
125	37.4	43	5.6	-26.0	-63.4	-20.0	-57.4
160	42.8	46	3.2	-23.0	-65.8	-18.0	-60.8
200	47.7	49	1.3	-21.0	-68.7	-18.0	-65.7
250	50.9	52	1.1	-19.0	-69.9	-15.0	-65.9
315	53.1	55	1.9	-17.0	-70.1	-14.0	-67.1
400	55.6	58	2.4	-15.0	-70.6	-13.0	-68.6
500	59.6	59	-	-13.0	-72.6	-12.0	-71.6
630	61.7	60	-	-12.0	-73.7	-11.0	-72.7
800	63.5	61	-	-11.0	-74.5	-9.0	-72.5
1000	64.7	62	-	-10.0	-74.7	-8.0	-72.7
1250	66.4	63	-	-9.0	-75.4	-9.0	-75.4
1600	65.9	63	-	-9.0	-74.9	-10.0	-75.9
2000	64.7	63	-	-9.0	-73.7	-11.0	-75.7
2500	66.4	63	-	-9.0	-75.4	-13.0	-79.4
3150	67.7	63	-	-9.0	-76.7	-15.0	-82.7
4000	69.5						
5000	71.0						
Sum =			24.8	$R_{A,1} =$	56.0	$R_{A,2} =$	49.1
$R_w =$			59	$C =$	-3	$C_{tr} =$	-10

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.

$$R_w(C; C_{tr}) = 59 (-3; -10)$$

$$R_w(C; C_{tr}; C_{50-3150}; C_{tr,50-3150}) = 59 (-3; -10; -8; -20)$$

$$R_w(C; C_{tr}; C_{100-5000}; C_{tr,100-5000}) = 59 (-3; -10; -2; -10)$$

$$R_w(C; C_{tr}; C_{50-5000}; C_{tr,50-5000}) = 59 (-3; -10; -7; -20)$$

