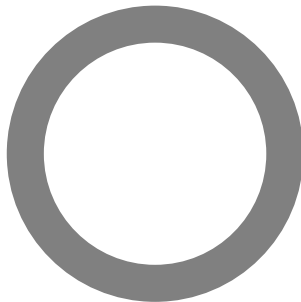


ASTM E 90-09: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

Orfield Laboratories Inc



Design Research Testing

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

TEST

Client: **Saint-Gobain Performance Plastics**
 Report Date: February 14, 2014
 Test Date: October 27, 2010
 Test Number: OL10-1034

ACCREDITATION



For the scope of accreditation under NVLAP code 200248-0

RESULT SUMMARY

STC=64

CLIENT

ADDRESS

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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.

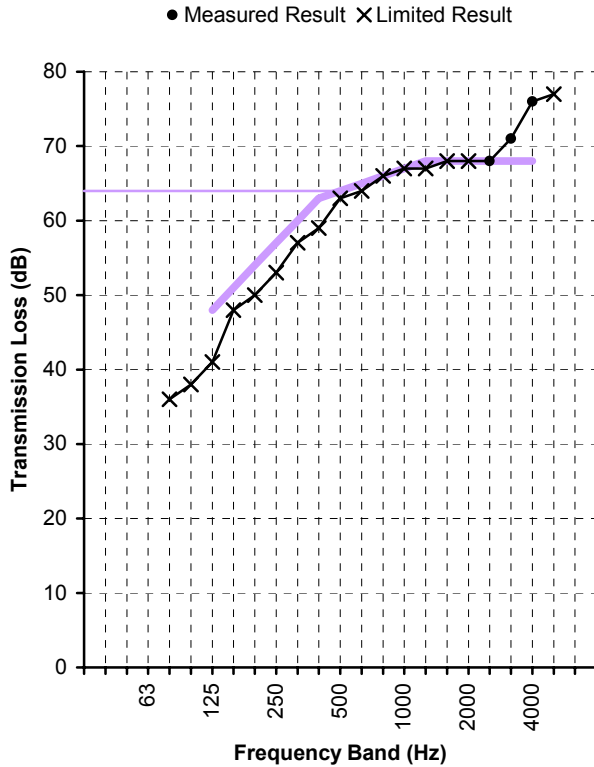




Test Date October 27, 2010
Specimen Wall Assembly

Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 64



Freq. (Hz)	TL (dB)	Def. (dB)
80	36*	
100	38*	
125	41*	7
160	48*	3
200	50*	4
250	53*	4
315	57*	3
400	59*	4
500	63*	1
630	64*	1
800	66*	-
1000	67*	-
1250	67*	1
1600	68*	-
2000	68*	-
2500	68	-
3150	71	-
4000	76	-
5000	77*	-

Total Deficiencies 28

* 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 (v); 1.625" type W screws @ 12" O.C.
- Green Glue @ 2 Tubes / sheet - total 116 oz
- (5/8") type X gypsum board (v)
- 25 gauge hat channel @ 24" O.C.
- GG Noiseproofing Clips RC (20)
- 3-5/8" 25 gauge steel studs @ 24" O.C.
- 3.5" kraft-faced insulation batts
- 0.625" (5/8") type X gypsum board (h)
- Green Glue @ 2 Tubes / sheet - total 116 oz
- 0.625" (5/8") type X gypsum board (h); 1.625" type W screws @ 12" O.C.





SPECIMEN DESCRIPTION

The specimen under test was a wall assembly. The elements in the assembly are described briefly below the results table and chart on page 2. Detailed information regarding the specimen may be found in Appendix C.

Test results pertain to this specimen only.

INSTALLATION AND DISPOSITION

The steel stud frame was originally constructed on October 27, 2010. The framing and insulation were retained for subsequent tests in the series. Independent contractors fabricated the test specimen and sealed it 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 E90-09*: *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-10: *Classification for Rating Sound Insulation*

The values presented in this report are from single-direction transmission loss measurements.

** 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 certification, approval or endorsement by NVLAP, NIST, 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

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	8079 ft ³ [228.8 m ³]

INSTRUMENTATION

Description	Brand	Model	S/N
Calibrator	Brüel & Kjær	Type 4230	584761
Microphone	Brüel & Kjær	Type 4134	558007
Preamplifier	Brüel & Kjær	Type 2639	1202479
Rotating Boom	Brüel & Kjær	Type 3923	2036583
Microphone	Brüel & Kjær	Type 4134	1478843
Preamplifier	Brüel & Kjær	Type 2639	1312147
Rotating Boom	Brüel & Kjær	Type 3923	890569
Power Supply	Brüel & Kjær	Type WB1057	n/a
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	24.9		40	
40	16.7		47	
50	16.9		43	
63	24.9		43	
80	35.7 §	±1.63	42	
100	37.6 §	±1.15	45	
125	41.4 §	±0.95	46	7
160	47.8 §	±1.27	52	3
200	50.2 §	±1.24	53	4
250	53.2 §	±0.65	56	4
315	57.1 §	±0.65	60	3
400	59.4 §	±0.62	61	4
500	62.9 §	±0.40	65	1
630	63.8 §	±0.50	66	1
800	66.1 §	±0.40	69	-
1000	67.3 §	±0.25	70	-
1250	67.2 §	±0.25	72	1
1600	67.8 §	±0.32	72	-
2000	67.9 §	±0.44	74	-
2500	68.3	±0.35	79	-
3150	70.9	±0.31	83	-
4000	75.5	±0.49		-
5000	76.6 *	±0.35		-
6300	75.2 *			
8000	74.3 *			
10000	69.0 *			
Total deficiencies below STC contour (dB)				28
STC contour [ASTM E413]				64

* 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 description of the wall assembly.

Overall Mass = 627.2 lb [284.5 kg]

Overall Surface Density = 9.72 PSF [47.48 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m ²]
0.625" (5/8") type X gypsum board (v); 1.625" type W screws @ 12" O.C. Green Glue @ 2 Tubes / sheet - total 116 oz	291.8 [132.3]	4.52 [22.08]
(5/8") type X gypsum board (v) 25 gauge hat channel @ 24" O.C.	8.3 [3.7]	0.13 [0.62]
GG Noiseproofing Clips RC (20)	0.8 [0.4]	0.01 [0.06]
3-5/8" 25 gauge steel studs @ 24" O.C.	20.2 [9.1]	0.31 [1.53]
3.5" kraft-faced insulation batts	14.0 [6.4]	0.22 [1.06]
0.625" (5/8") type X gypsum board (h) Green Glue @ 2 Tubes / sheet - total 116 oz		
0.625" (5/8") type X gypsum board (h); 1.625" type W screws @ 12" O.C.	292.3 [132.6]	4.53 [22.12]

Green Glue Company Noiseproofing Clips 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.

FRAMING

A 3-5/8", 25 gauge steel frame was constructed in the perimeter of the laboratory test specimen opening. The frame consisted of 3-5/8" x 1-1/4" track plates at the top and bottom, and five, 3-5/8" x 1-1/4" studs installed 24" on center. The track plates and studs were made of 25 gauge galvanized steel. The track plates and studs were fastened together with two type S pan head screws at each intersection. The perimeter of the frame was sealed to the specimen opening with Green Glue Noiseproofing Sealant.

INSULATION

3-1/2" thick kraft-faced fiberglass insulation batts were installed in the stud cavities. The insulation batts were 24" wide. The faced fiberglass batts were friction fit into each of the stud cavities with the paper facing the source room.

CLIPS AND HAT CHANNEL

Twenty (20) Green Glue Noiseproofing Clips were attached to the vertical studs on the source room side using type S pan head screws. Five 8'-0" lengths of 25 gauge, 7/8" hat-channel were then attached to the Green Glue® Noiseproofing Clips at 24" nominal spacing.

SHEETING

The gypsum board sandwich panels with Green Glue adhesive were pre-laminated into sandwiches at the laboratory by independent contractors. Green Glue was applied from two 29 oz. adhesive cartridges in a random pattern over a whole 4' x 8' gypsum board panel. A second sheet of gypsum board was applied to the first side. The sandwich was thoroughly compressed by methodically walking over the entire face.





The assemblies were spaced out and stacked to dry with forced air ventilation. The adhesive aged from the assembly date, October 12, 2010 to the test date, October 27, 2010. This is greater than the 14 days period stated in ASTM Standard E90 for water-based adhesives.

Sandwiches on the source-room side were installed in a vertical orientation, so the seam between sandwiches ran parallel to the studs, and perpendicular to the hat channel. Sandwiches were fastened to the hat channel with 1-5/8" drywall screws, spaced 12" apart. The seam between source-room panels was sealed with Green Glue Noiseproofing Sealant and 1-7/8" wide 2 mil foil tape. 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 room side with Green Glue Noiseproofing Sealant and 1-7/8" wide 2 mil foil tape.

Sandwiches on the receiver-room side were installed in a horizontal orientation, so the seam between sandwiches ran perpendicular to the studs. Sandwiches were fastened to the studs with 1-5/8" drywall screws, spaced 12" apart. The seam between receiver-room panels was sealed Green Glue Noiseproofing Sealant. 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 receiver room side with Green Glue Noiseproofing Sealant, 1-7/8" wide 2 mil foil tape and 7/8" dense putty tape.



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	16.9						
63	24.9						
80	35.7						
100	37.6	44	6.4	-29.0	-66.6	-20.0	-57.6
125	41.4	47	5.6	-26.0	-67.4	-20.0	-61.4
160	47.8	50	2.2	-23.0	-70.8	-18.0	-65.8
200	50.2	53	2.8	-21.0	-71.2	-18.0	-68.2
250	53.2	56	2.8	-19.0	-72.2	-15.0	-68.2
315	57.1	59	1.9	-17.0	-74.1	-14.0	-71.1
400	59.4	62	2.6	-15.0	-74.4	-13.0	-72.4
500	62.9	63	0.1	-13.0	-75.9	-12.0	-74.9
630	63.8	64	0.2	-12.0	-75.8	-11.0	-74.8
800	66.1	65	-	-11.0	-77.1	-9.0	-75.1
1000	67.3	66	-	-10.0	-77.3	-8.0	-75.3
1250	67.2	67	-	-9.0	-76.2	-9.0	-76.2
1600	67.8	67	-	-9.0	-76.8	-10.0	-77.8
2000	67.9	67	-	-9.0	-76.9	-11.0	-78.9
2500	68.3	67	-	-9.0	-77.3	-13.0	-81.3
3150	70.9	67	-	-9.0	-79.9	-15.0	-85.9
4000	75.5						
5000	76.6						
Sum =			24.6	$R_{A,1} =$	60.6	$R_{A,2} =$	54.7
$R_w =$			63	$C =$	-2	$C_{tr} =$	-8

$$R_w (C ; C_{tr}) = 63 (-2 ; -8)$$

$$R_w (C ; C_{tr} ; C_{50-3150} ; C_{tr, 50-3150}) = 63 (-2 ; -8 ; -9 ; -22)$$

$$R_w (C ; C_{tr} ; C_{100-5000} ; C_{tr, 100-5000}) = 63 (-2 ; -8 ; -2 ; -8)$$

$$R_w (C ; C_{tr} ; C_{50-5000} ; C_{tr, 50-5000}) = 63 (-2 ; -8 ; -8 ; -22)$$

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 the ASTM standards. Orfield Laboratories *does not* hold accreditation for ISO 140 or ISO 717 under their NVLAP scope of accreditation.

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

