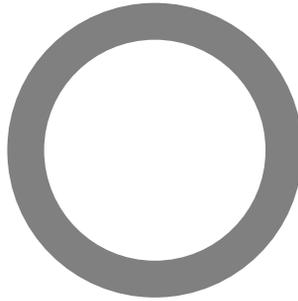


ASTM E 90: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

ASTM E 492: Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine

Orfield Laboratories Inc



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

TEST

Client: **Saint-Gobain Performance Plastics**
Report Date: **February 10, 2011**
Test Date: **July 9, 2009**
Test Number: **OL09-0712**

ACCREDITATION



For the scope of accreditation under NVLAP code 200248-0

RESULT SUMMARY

STC=60
IIC=53

CLIENT ADDRESS

Saint-Gobain Performance Plastics
Green Glue Division
One Sealants Park
Granville, NY 12832
Phone (800) 724-0883
www.nortoncst.com

PREPARED BY

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

Prepared by:

ELECTRONICALLY REPRODUCED SIGNATURE

David M. Berg
Laboratory Manager

Reviewed by:

ELECTRONICALLY REPRODUCED SIGNATURE

Michael R. Role

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

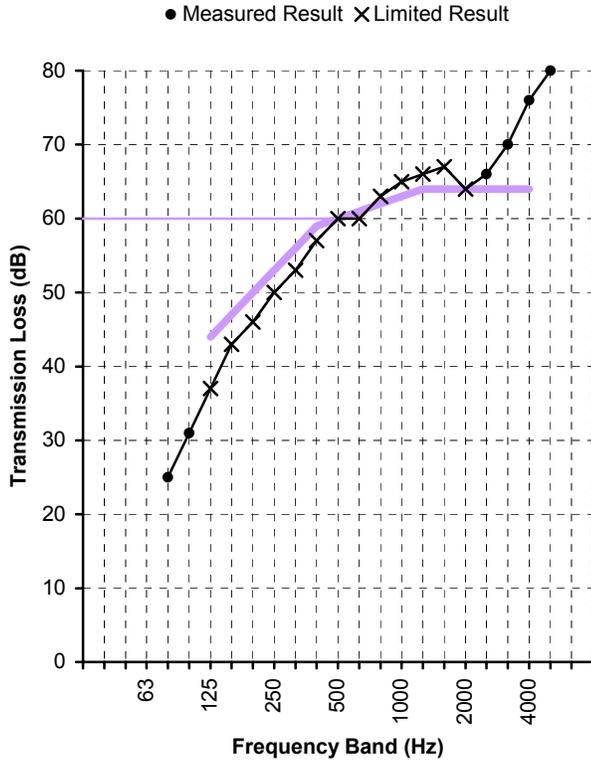




Test Date July 9, 2009
Specimen Floor / Ceiling

Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 60



Freq. (Hz)	TL (dB)	Def. (dB)
80	25	
100	31	
125	37*	7
160	43*	4
200	46*	4
250	50*	3
315	53*	3
400	57*	2
500	60*	-
630	60*	1
800	63*	-
1000	65*	-
1250	66*	-
1600	67*	-
2000	64*	-
2500	66	-
3150	70	-
4000	76	-
5000	80	-

Total Deficiencies 24

* Estimate of lower limit

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

- 0.3125" (5/16") laminate T&G flooring; floating
- 1.5" (2 x 3/4") OSB GG Sandwich; 2" #9 Screw @ 12" O.C.
- 2 x 10 wood joists @ 16" O.C.
- (6.25") R19 kraft-faced CertainTeed glass fiber batt insulation
- 25 gauge resilient sound channels @ 24" O.C.; 1.25" screw @ 24" O.C.
- 0.625" CertainTeed ProRoc gypsum board type x; 1.625" screw @ 12" O.C.

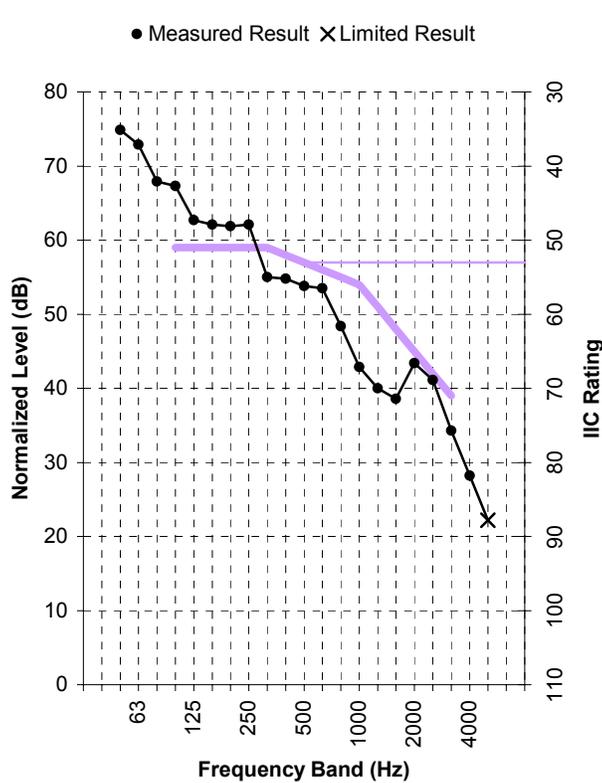




Test Date July 9, 2009
Specimen Floor / Ceiling

Method ASTM Standard E492

Single Number Rating
IIC = 53



Freq. (Hz)	L _n (dB)	Dev. (dB)
50	75	
63	73	
80	68	
100	67	8
125	63	4
160	62	3
200	62	3
250	62	3
315	55	-
400	55	-
500	54	-
630	54	-
800	48	-
1000	43	-
1250	40	-
1600	39	-
2000	43	-
2500	41	-
3150	34	-
4000	28	-
5000	22*	-
Total Deviations		21

* Limited by noise

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

- 0.3125" (5/16") laminate T&G flooring; floating
- 1.5" (2 x 3/4") OSB GG Sandwich; 2" #9 Screw @ 12" O.C.
- 2 x 10 wood joists @ 16" O.C.
- (6.25") R19 kraft-faced CertainTeed glass fiber batt insulation
- 25 gauge resilient sound channels @ 24" O.C.; 1.25" screw @ 24" O.C.
- 0.625" CertainTeed ProRoc gypsum board type x; 1.625" screw @ 12" O.C.





SPECIMEN DESCRIPTION

The specimen under test was one floor-ceiling 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

The 2x10 joist frame was originally constructed on May 6, 2009 and the resilient ceiling on June 2nd and 3rd, 2009. Independent contractors fabricated the floor-ceiling 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 E90-04: Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements

*ASTM E492-04: *Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine*

ASTM E413-04: Rating Sound Insulation

ASTM E989-89: *Standard Classification for Determination of Impact Insulation Class (IIC)*

ASTM E2235-04: *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

** 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

Temperature	70°F [21.1°C]
Relative Humidity	55%

Specimen Area

Specimen Area	176.8 ft² [16.43 m²]
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Chamber Volume - Airborne Transmission

Source Room Volume	2035 ft³ [57.6 m³]
Receiving Room Volume	8123 ft³ [230.0 m³]

Chamber Volume - Impact Transmission

Source Room Volume	8123 ft³ [230.0 m³]
Receiving Room Volume	2035 ft³ [57.6 m³]

INSTRUMENTATION

Description	Brand	Model	S/N
Calibrator	Brüel & Kjær	Type 4230	1379712
Microphone	Brüel & Kjær	Type 4134	1478843
Preamplifier	Brüel & Kjær	Type 2639	1202479
Microphone	Brüel & Kjær	Type 4134	558007
Preamplifier	Brüel & Kjær	Type 2639	1312147
Power Supply	Brüel & Kjær	Type WB1057	n/a
Analyzer	Norsonic	Type 121	31185



APPENDIX B: CALCULATION RESULTS

Airborne Test Results:

Freq. Band (Hz)	Specimen T.L. (dB)	95% Conf. (dB)	Flanking Limit (dB)	STC Defic. (dB)
25				
31.5	31.7 §		40	
40	18.8		47	
50	20.4		43	
63	30.7		43	
80	25.4	±1.63	42	
100	31.4	±1.15	45	
125	37.0 §	±0.95	46	7
160	42.6 §	±1.27	52	4
200	46.3 §	±1.24	53	4
250	50.2 §	±0.65	56	3
315	53.4 §	±0.65	60	3
400	57.4 §	±0.62	61	2
500	60.4 §	±0.40	65	-
630	59.9 §	±0.50	66	1
800	63.1 §	±0.40	69	-
1000	64.8 §	±0.25	70	-
1250	65.8 §	±0.25	72	-
1600	66.8 §	±0.32	72	-
2000	64.4 §	±0.44	74	-
2500	65.6	±0.35	79	-
3150	69.7	±0.31	83	-
4000	75.7	±0.49		-
5000	80.2	±0.35		-
6300	80.2 *			
8000	77.0 *			
10000	70.8 *			
Total deficiencies below STC contour (dB)				24
STC contour [ASTM E413]				60

* 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.





Impact Test Results:

Freq. Band (Hz)	Normalized Level (L_n) (dB)	95% Confidence (dB)	IIC Deviations (dB)
25			
31.5	66.8		
40	66.5		
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50	74.9	±0.5	
63	72.9	±0.6	
80	67.9	±0.7	
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100	67.3	±0.4	8
125	62.7	±0.2	4
160	62.1	±0.8	3
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200	61.9	±1.1	3
250	62.1	±0.5	3
315	55.0	±0.5	-
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400	54.8	±0.4	-
500	53.8	±0.3	-
630	53.5	±0.2	-
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800	48.4	±0.1	-
1000	42.9	±0.2	-
1250	40.0	±0.2	-
<hr style="border-top: 1px dashed black;"/>			
1600	38.6	±0.1	-
2000	43.4	±0.1	-
2500	41.1	±0.1	-
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3150	34.3	±0.2	-
4000	28.2	±0.2	-
5000	22.2 *	±0.3	-
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6300	19.7 *		
8000	19.8 *		
10000	19.9 *		
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Total deviations above IIC contour			21
IIC contour (ASTM E989)			53

* Actual impact isolation of specimen may be higher than measured at this frequency band. Signal-to-noise in the receiving room less than 5 dB, therefore the "background noise level was too high".

Note: 95% Confidence from room qualification data. Data available upon request. Extended frequency results below 50Hz and above 5000Hz for reference only.



APPENDIX C: SPECIMEN ASSEMBLY DESCRIPTION

The following table shows the elements in the floor-ceiling assembly, with the top-most element first and the bottom-most element last (from floor-top to ceiling-surface). Independent contractors constructed and installed the specimen floor-ceiling assembly in the laboratory test opening. A qualified representative of Orfield Laboratories periodically observed the installation in process and visually inspected the completed specimen and seals. All materials were weighed prior to installation. Fastener weights are not included.

Overall Mass = 1728.2 lb [783.9 kg]
 Overall Surface Density = 9.77 PSF [47.72 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m ²]
0.3125" (5/16") laminate T&G flooring; floating	258.0 [117.0]	1.46 [7.12]
1.5" (2 x 3/4") OSB GG Sandwich; 2" #9 Screw @ 12" O.C.	813.3 [368.9]	4.60 [22.46]
2 x 10 wood joists @ 16" O.C.	183.0 [83.0]	1.04 [5.05]
(6.25") R19 kraft-faced CertainTeed glass fiber batt insulation	52.5 [23.8]	0.30 [1.45]
25 gauge resilient sound channels @ 24" O.C.; 1.25" screw @ 2	20.0 [9.1]	0.11 [0.55]
0.625" CertainTeed ProRoc gypsum board type x; 1.625" screw @	401.4 [182.1]	2.27 [11.08]

Green Glue (GG) damping adhesive was provided by the client. Other construction materials were acquired by the construction contractors through local construction material suppliers. The framing and sub-floor sandwiches were constructed for previous tests in this series for this client, and portions of this specimen assembly were used in subsequent tests in the series.

In order to maximize the volume of the lower reverberation room (impact receiver room, airborne source room), a 2 x10 frame was constructed above the floor test opening and rested on its perimeter. The 2x10 joists were spaced at 16" O.C. The exposed vertical perimeter of the rim joists was covered by several additional layers of materials to prevent airborne flanking through the sides of the test sample. The additional layers consisted of a second 2x10 joist screwed in place and damped with Green Glue damping adhesive. Over that a 1" sandwich (2 x .5") of Green Glue-damped cement board was attached with screws. All gaps and seams were filled with Green Glue Noiseproofing Sealant.

The sub-flooring was constructed of two 3/4" thick pieces of OSB (oriented strand board) with Green Glue damping adhesive sandwiched between them. The sandwiches were constructed by independent contractors prior to the testing. The sandwiches were created by applying approximately two 28 oz tubes of Green Glue damping adhesive per 4'x8' sandwich (or 1.75 oz per square ft.). The Green Glue is randomly applied to one sheet and then the second sheet is applied on top of the first. The sandwiches were then compressed by walking on them. The sheets were initially stacked directly on one another for one week, then were spaced out with 2x4 wood studs for drying. The panels were dried at room temperature for approximately 40 days prior to testing. Figures 1 and 2 show the randomly applied glue pattern and stacking of the OSB sandwiches.



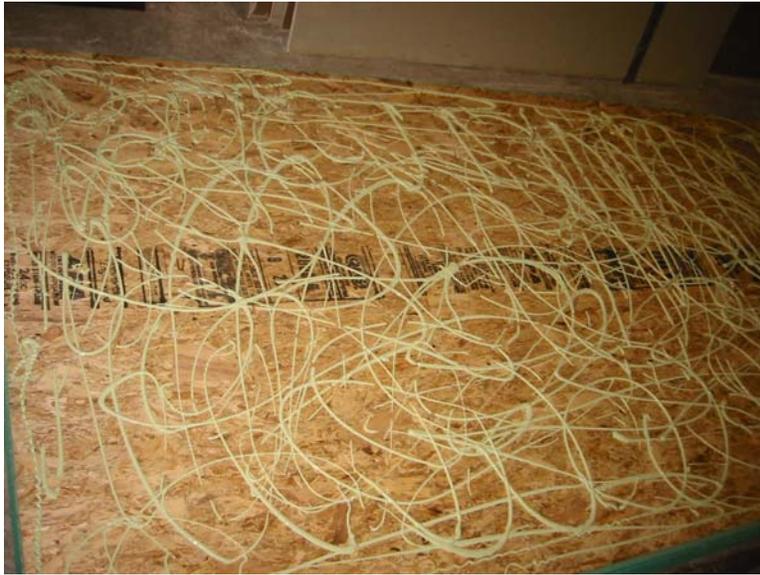


Figure 1: Green Glue randomly applied to a sheet of OSB



Figure 2: Walking on stacked sandwiches

The OSB sandwiches were fastened directly to the joists with 2" #9 screws spaced 12". The seams of the sub-floor were sealed with Green Glue Company Noiseproofing Sealant and 7/8" dense putty tape.

5/16" thick manufactured laminate tongue-and-groove flooring was installed directly over the OSB / Green Glue damped sub-floor. The laminate flooring was not mechanically fastened to the OSB. Figure 3 is a representative photograph of the installed laminate flooring.



Figure 3: Installed laminate flooring

25 Gauge resilient sound channel was fastened to the under side of the joists using 1-5/8" screws, spaced 24" on center. 6.25" R19 Kraft-faced CertainTeed glass fiber insulation batts were friction fit in each joist cavity. The finished ceiling was 5/8" CertainTeed ProRoc gypsum board, type 'X', fastened to the resilient channel with 1-5/8" screws, spaced 12" on-center. The perimeter of the finished ceiling was sealed with Green Glue Company Noiseproofing Sealant.

Figure 4 is the partially completed ceiling installation revealing the joists, insulation and resilient channels.



Figure 4: Partially installed resilient ceiling