PABCO® Gypsum

what the job demands™

Important Notice

In August 1, 2013, PABCO® Gypsum, a division of PABCO® building products, LLC acquired the QuietRock® business and operations from Serious Energy, Inc. Serious Energy, Inc. corporate structure and legal name changed through the years from Quiet Solution, Inc. to Serious Materials, Inc to Serious Energy, Inc. The acquisition of the QuietRock® business by PABCO® Gypsum includes the products, technical data, test reports and other intellectual property. For the avoidance of confusion, references to "Quiet Solution", "Serious Materials", or "Serious Energy" used within test reports, in general, should be understood as references to PABCO® Gypsum as of August 1, 2013.

T E S T R E P O R T

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:	Serious Energy, Inc.
Report Date:	January 13, 2012
Test Date:	November 18, 2011
Test Number:	OL 11-1111

RESULT SUMMARY

STC=54

CLIENT ADDRESS
Serious Energy, Inc.
1250 Elko Drive
Sunnyvale, CA 94089
email: info@SeriousEnergy.com

ACCREDITATION
NVLAP
For the scope of accreditation under NVLAP code 200248-0

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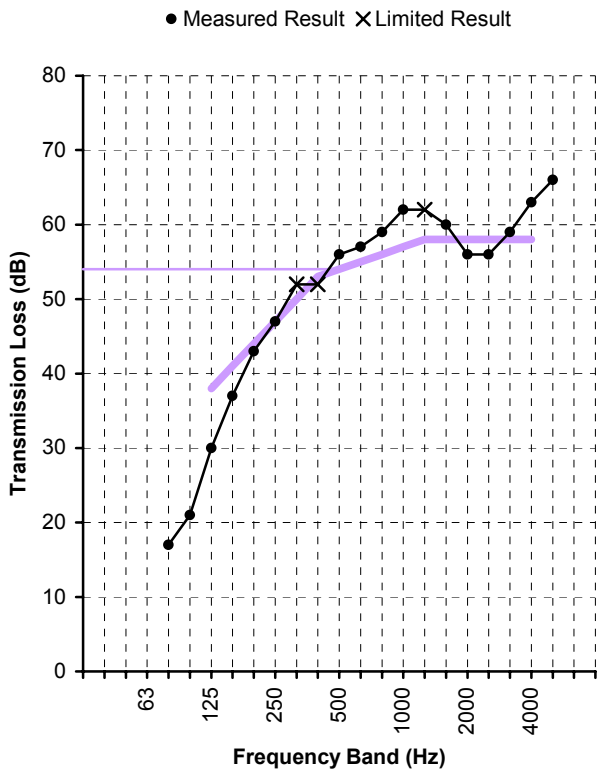
Signatures are required on this document for an official laboratory test report. Copies of this document without signatures are for reference only.

Test Date November 18, 2011
Specimen Wall Assembly
Method ASTM Standard E90
Technician D. Berg

Single Number Rating
STC = 54



Freq. (Hz)	TL (dB)	Def. (dB)
80	17	
100	21	
125	30	8
160	37	4
200	43	1
250	47	-
315	52*	-
400	52*	1
500	56	-
630	57	-
800	59	-
1000	62	-
1250	62*	-
1600	60	-
2000	56	2
2500	56	2
3150	59	-
4000	63	-
5000	66	
Total Deficiencies		18

* Estimate of lower limit

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

0.625" (5/8") QuietRock ES (v); 1.25" type S12 screws @ 12" O.C.
3-5/8" 20 gauge (.0205") steel studs @ 16" O.C.
3-1/2" fiberglass insulation batts
0.625" (5/8") type X gypsum board (vs); 1.25" type S12 screws @ 12" O.C.
0.625" (5/8") type X gypsum board (v); 1.625" type S12 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 November 17, 2011. The steel stud frame was retained from previous tests, and was used for subsequent tests in this series. The entire assembly was constructed by independent contractors. Qualified representatives of Orfield Laboratories observed the installation in 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 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	68°F [20.0°C]
Relative Humidity	50%

Specimen Area	
Specimen Area	64.5 ft² [5.99 m²]

Chamber Volume - Airborne Transmission	
Source Room Volume	3284 ft³ [93.0 m³]
Receiving Room Volume	8281 ft³ [234.5 m³]

INSTRUMENTATION

Description	Brand	Model	S/N
Calibrator	Brüel & Kjær	Type 4230	1379712
Microphone	Brüel & Kjær	Type 4134	296819
Preamplifier	Brüel & Kjær	Type 2639	1202479
Microphone	Brüel & Kjær	Type 4134	1675265
Preamplifier	Brüel & Kjær	Type 2639	1312147
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	**29.9**		40	
40	**18.9**		47	
50	**17.8**		43	
63	**16.9**		43	
80	**16.5**	±3.04	41	
100	**20.9**	±3.11	46	
125	**29.5**	±1.39	51	8
160	**36.7**	±1.22	55	4
200	**43.3**	±1.53	57	1
250	**47.1**	±1.70	60	-
315	**51.7** §	±0.98	60	-
400	**52.5** §	±0.99	61	1
500	**55.5**	±0.82	66	-
630	**57.2**	±0.69	68	-
800	**58.7**	±0.60	72	-
1000	**61.7**	±0.50	75	-
1250	**62.3** §	±0.56	72	-
1600	**60.5**	±0.44	73	-
2000	**56.2**	±0.35	77	2
2500	**56.2**	±0.63	81	2
3150	**58.6**	±0.58	84	-
4000	**62.9**	±0.47	78	-
5000	**65.9**			
6300	**69.3** *			
8000	**70.8** *			
10000	**66.3** *			
Total deficiencies below STC contour (dB)				18
STC contour [ASTM E413]				**54**

* 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 intervals from room qualification data. Flanking Limit from chamber flanking study. Reference sample and repeatability data available upon request. Extended frequency results below 80Hz and above 5000Hz are for reference only.

APPENDIX C: SPECIMEN ASSEMBLY DESCRIPTION

The following table shows the elements in the wall assembly in order from the source room to receiving room. Independent contractors constructed and installed the wall assembly in the laboratory test opening. A qualified representative of Orfield Laboratories 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 in the reported weights.

Overall Mass = 507.8 lb [230.3 kg]
Overall Surface Density = 7.87 PSF [38.44 kg/m²]

Element	Mass lb [kg]	Surf. Dens. PSF [kg/m²]
0.625" (5/8") QuietRock ES (v); 1.25" type S12 screws @ 12" O.C.	175.0 [79.4]	2.71 [13.25]
3-5/8" 20 gauge (.0205") steel studs @ 16" O.C.	34.0 [15.4]	0.53 [2.57]
3-1/2" fiberglass insulation batts	13.8 [6.3]	0.21 [1.04]
0.625" (5/8") type X gypsum board (vs); 1.25" type S12 screws @ 12" O.C.	143.0 [64.9]	2.22 [10.82]
0.625" (5/8") type X gypsum board (v); 1.625" type S12 screws @ 12" O.C.	142.0 [64.4]	2.20 [10.75]

The QuietRock ES (EZ-SNAP) noise reducing drywall and QuietSeal Pro acoustical sealant were supplied by the Client. All other materials were purchased through independent retail suppliers and were acquired by the independent construction contractors. The frame and insulation 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.

FRAMING

A 3-5/8”, 20-gauge (.0205”) steel frame was constructed in the perimeter of the laboratory test specimen opening. The frame consisted of 20-gauge (.0205”) steel, 3-5/8” x 1-1/4” track plate at the top and bottom, and seven, 3-5/8” x 1-1/4”, 20-gauge (.0205”) steel studs installed, 16” on center. 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 QuietSeal Pro acoustical sealant.

INSULATION

Fiberglass insulation batts were installed in the stud cavities. The insulation batts were 16” wide, 3-1/2” thick (R13) and were friction fit into each of the six stud cavities. Figure 1 is a photograph of the insulated frame before the installation of the sheeting layers.

Figure 1: Insulated steel stud frame viewed from receiving room side

SHEETING

The single source room side sheeting layer consisted of two 5/8" thick 4' by 8' sheets of QuietRock ES (EZ-SNAP) noise reducing drywall. The QuietRock ES sheets were fastened parallel to the steel stud frame with 1-1/4" long, type S12 drywall screws spaced at 12" on center. The single layer was comprised of two complete 4' by 8' sheets. Figure 2 is a photograph of the source side sheeting.

Figure 2: Source room side QuietRock ES sheeting installed and sealed in the specimen opening

The receiving room side sheeting layer consisted of a two layers of 5/8" thick type X gypsum board. The inner layer of type X gypsum board sheets were fastened parallel to the steel stud frame with 1-1/4" long, type S12 drywall screws spaced at 12" on center. The inner layer was comprised of three sections to provide seams that were staggered from those on the source side. The outer layer of type X gypsum board was fastened parallel to the studs with 1-5/8" type S12 screws driven through the inner layer sheets to the steel studs. The outer layer consisted of two full 4' x 8' sheets. Figure 3 is a photograph of the receiving room side sheeting.

Figure 3: Receiving room side sheeting installed and sealed in the specimen opening

Panels were shimmed at installation so equal gaps were at the top and bottom. Gaps were less than 1/4" in all cases. Shims were removed after sheeting was fastened and the vertical seams were sealed on the source and receiving room sides with QuietSeal Pro acoustical sealant and 1-7/8" wide, 5 mil aluminum foil tape. The perimeter of both sides of the sample were sealed with QuietSeal Pro acoustical sealant, 5 mil aluminum 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	**17.8**						
63	**16.9**						
80	**16.5**						
100	**20.9**	35	14.1	-29.0	-49.9	-20.0	-40.9
125	**29.5**	38	8.5	-26.0	-55.5	-20.0	-49.5
160	**36.7**	41	4.3	-23.0	-59.7	-18.0	-54.7
200	**43.3**	44	0.7	-21.0	-64.3	-18.0	-61.3
250	**47.1**	47	-	-19.0	-66.1	-15.0	-62.1
315	**51.7**	50	-	-17.0	-68.7	-14.0	-65.7
400	**52.5**	53	0.5	-15.0	-67.5	-13.0	-65.5
500	**55.5**	54	-	-13.0	-68.5	-12.0	-67.5
630	**57.2**	55	-	-12.0	-69.2	-11.0	-68.2
800	**58.7**	56	-	-11.0	-69.7	-9.0	-67.7
1000	**61.7**	57	-	-10.0	-71.7	-8.0	-69.7
1250	**62.3**	58	-	-9.0	-71.3	-9.0	-71.3
1600	**60.5**	58	-	-9.0	-69.5	-10.0	-70.5
2000	**56.2**	58	1.8	-9.0	-65.2	-11.0	-67.2
2500	**56.2**	58	1.8	-9.0	-65.2	-13.0	-69.2
3150	**58.6**	58	-	-9.0	-67.6	-15.0	-73.6
4000	**62.9**						
5000	**65.9**						
		Sum =	31.7	$R_{A,1}$ =	47.8	$R_{A,2}$ =	40.0
		R_W =	**54**	**C =**	**-6**	**C_{tr} =**	**-14**

$Rw\ (C\ ;\ Ctr) = 54\ (-6\ ;\ -14)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}3150\ ;\ Ctr,\,50\text{-}3150) = 54\ (-6\ ;\ -14\ ;\ -9\ ;\ -20)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,100\text{-}5000\ ;\ Ctr,100\text{-}5000) = 54\ (-6\ ;\ -14\ ;\ -5\ ;\ -14)$

$Rw\ (C\ ;\ Ctr\ ;\ C\,50\text{-}5000\ ;\ Ctr,\,50\text{-}5000) = 54\ (-6\ ;\ -14\ ;\ -8\ ;\ -20)$

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 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