



**G9722.01-113-11-R2
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90**

Rendered to:

**METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION**

TEST SPECIMEN: W-1, Wall Assembly

DATA FILE NO: G9722.01A

STC: 34

OITC: 23

Test Specimen Identification (Source Room to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.375 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-25 FG Insulation
Vapor Retarder

Reference should be made to Intertek-ATI Report No. G9722.01-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.01-113-11
Revision 2	08/28/17
Test Date	05/01/17
Report Date	06/06/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.375 Foam Isolator	3 by 96	0.152	N/A	2	0.025 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	8 Nominal	R-25 Fiberglass Insulation	3 blankets	0.40 lbs/ft ²
	<i>Note: N/A</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				

Comments

The total weight of the wall system was 150 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (3)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	06/06/17	N/A	Original Report Issue
R1	07/07/17	Page 3	Changed insulation thickness from 8 nominal to 8 (approx.) and average weight from 0.535 to 0.40 lbs/ft ² .
R1	07/07/17	Page 3	Test Specimen Materials header row changed from Manufacturer and Series to Description.
R2	08/28/17	Appendix B	Datasheet – Changed source room temperature from 9.9°C to 22.5°C
R2	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.01-113-11-R2

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17						
Data File No.	G9722.01A						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-1, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder)						
Specimen Area	5.95 m ²	Receive Temp.	21.7 °C		Source Temp.	22.5 °C	
Technician	Sean G. Close	Receive Humidity	70%		Source Humidity	49%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	38.9	9.4	103	91	10	1.81	-
100	35.1	9.7	105	89	13	1.26	-
125	33.0	11.3	104	89	13	1.84	5
160	31.2	11.9	104	86	15	0.63	6
200	28.1	11.0	106	84	20	0.68	4
250	27.2	11.3	105	80	22	0.60	5
315	23.6	11.8	100	71	26	0.62	4
400	19.7	11.6	98	66	29	0.57	4
500	16.1	11.7	99	63	32	0.40	2
630	15.7	11.4	101	63	35	0.36	0
800	12.9	11.2	101	61	37	0.45	0
1000	10.7	11.0	98	55	40	0.50	0
1250	12.5	11.2	98	52	44	0.39	0
1600	7.8	10.9	102	52	47	0.44	0
2000	6.4	10.8	96	44	50	0.36	0
2500	6.7	11.3	94	40	52	0.43	0
3150	7.4	12.6	97	38	56	0.46	0
4000	7.6	14.4	96	37	54	0.37	0
5000	8.4	17.7	95	32	58	0.38	-

STC Rating **34** *(Sound Transmission Class)*
Deficiencies **30** *(Sum of Deficiencies)*
OITC Rating **23** *(Outdoor-Indoor Transmission Class)*

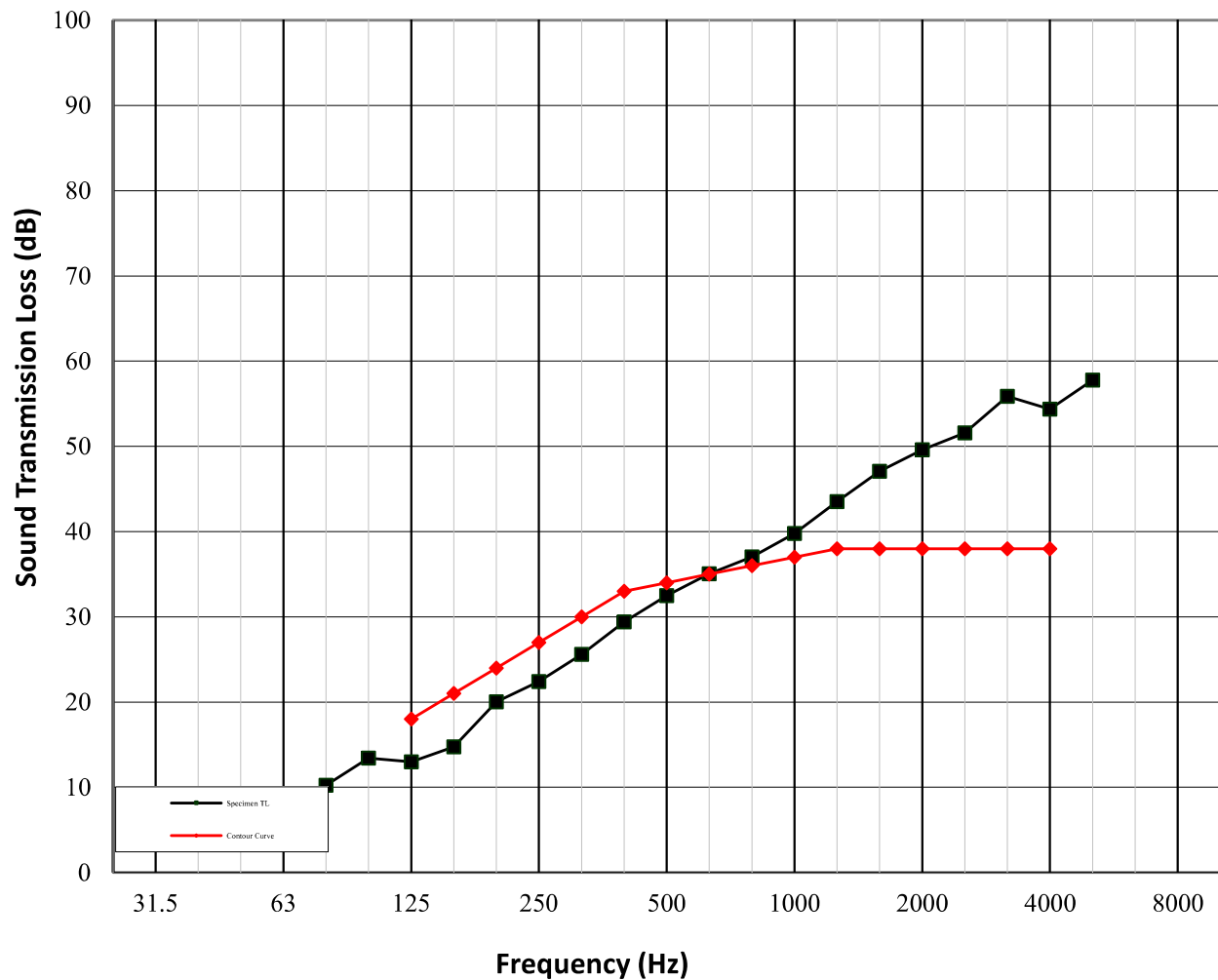
Notes: 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17					
Data File No.	G9722.01A					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Assoc					
Description	W-1, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder)					
Specimen Area	5.95 m ²	Receive Temp.	21.7 °C	Source Temp.	22.5 °C	
Technician	Sean G. Close	Receive Humidity	70%	Source Humidity	49%	

Airborne Sound Transmission Loss



Appendix C

Photographs



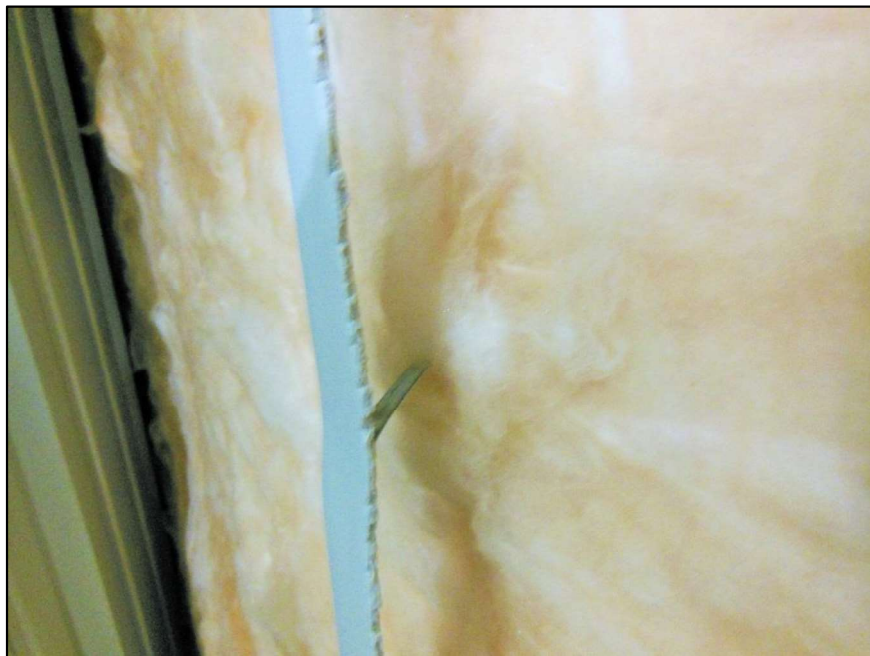
Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket



Foam on Insulation Support and Banding



Isolator Foam with Metal Panel

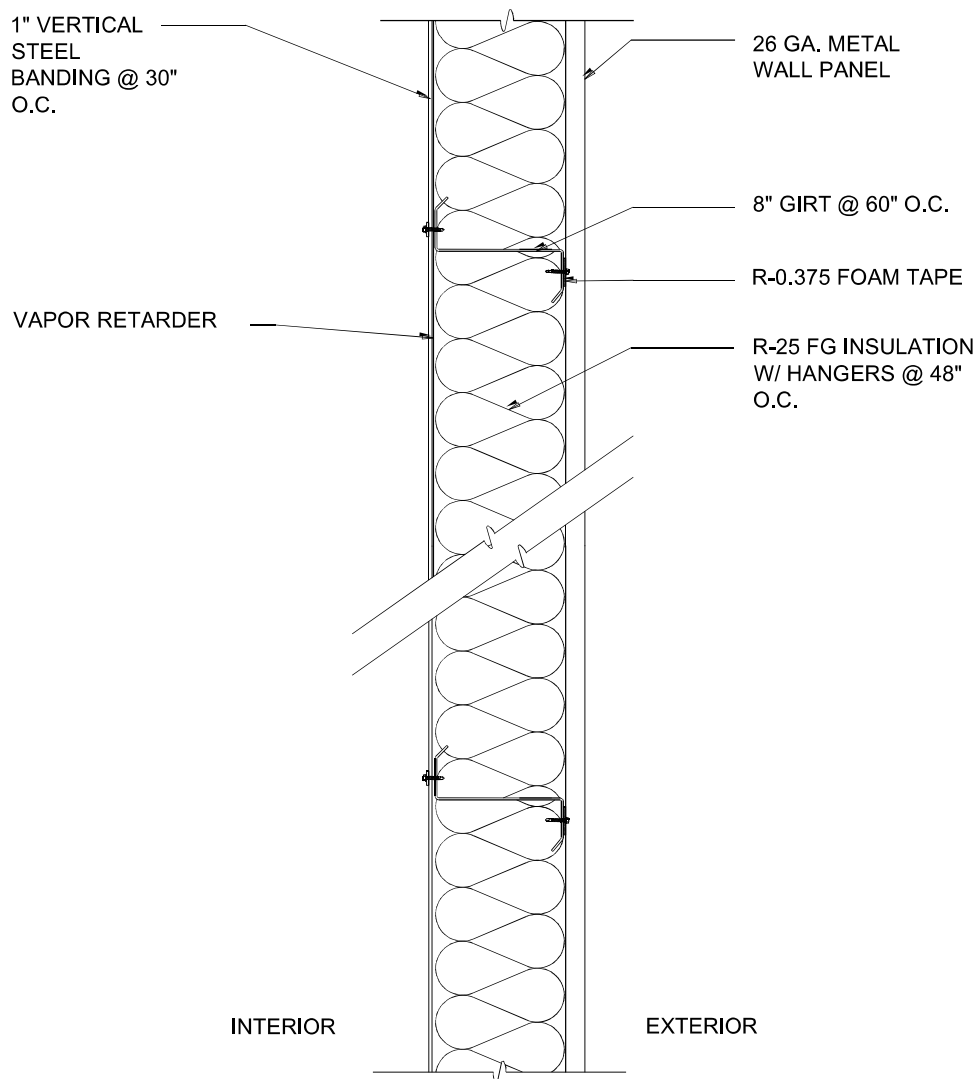


Test A, Drawing W-1, Test Date 05/1/17

Data File No. G9722.01A

STC: 34

OITC: 23



W-1

R-Panel, 8" Girt, R25+R0.375 Tape



**G9722.02-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90**

Rendered to:

**METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION**

TEST SPECIMEN: W-2, Wall Assembly

DATA FILE NO: G9722.01B

STC: 52

OITC: 33

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.375 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-25 FG Insulation
Vapor Retarder
Steel Hat Channel: 20 MSG Galvanized Steel 24" O.C.
Gypsum Board: One Layer, Type X, 5/8" Gypsum Board

Reference should be made to Intertek-ATI Report No. G9722.02-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.02-113-11
Revision 1	09/05/17
Test Date	05/01/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.375 Foam Isolator	3 by 96	0.152	N/A	2	0.025 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	8 (approx.)	R-25 Fiberglass Insulation	3 blankets	0.40 lbs/ft ²
	<i>Note: Insulation was installed between girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				
Steel Hat Channel	3 by 96	0.75	20 MSG Galvanized	5	0.420 lbs/linear ft
	<i>Note: Spaced 24" on center vertically from the center of the wall. Screwed to girts.</i>				
Gypsum Board	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 24" on center vertically and 24" on center horizontally. Center joint caulked and taped. Screw heads taped.</i>				

Comments

The total weight of the wall system was 311 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

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For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

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- Appendix A: Equipment description (1)
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- Appendix C: Photographs (3)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	09/05/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.02-113-11-R1

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17						
Data File No.	G9722.01B						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-2, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, one layer Type X 5/8" gypsum board on receive side)						
Specimen Area	5.95 m ²	Receive Temp.	21.9 °C		Source Temp.	22.5 °C	
Technician	Sean G. Close	Receive Humidity	52%		Source Humidity	49%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	37.5	5.2	103	88	15	1.72	-
100	33.8	5.2	105	82	23	1.56	-
125	36.9	4.9	105	77	29	2.11	7
160	39.8	4.4	104	73	32	0.75	7
200	37.7	4.7	106	71	36	0.77	6
250	31.2	5.1	105	65	41	0.57	4
315	25.7	5.6	100	55	46	0.64	2
400	22.4	5.7	98	50	49	0.58	2
500	19.2	5.9	99	47	53	0.40	0
630	18.1	5.7	102	48	54	0.36	0
800	14.8	6.0	101	44	57	0.36	0
1000	10.4	6.2	98	38	60	0.39	0
1250	9.1	6.7	98	37	61	0.38	0
1600	6.9	7.1	102	41	61	0.42	0
2000	5.7	7.6	96	37	58	0.31	0
2500	6.0	8.6	95	34	59	0.35	0
3150	6.3	10.2	97	32	63	0.40	0
4000	7.2	12.3	96	29	64	0.42	0
5000	8.0	15.8	95	24	67	0.40	-

STC Rating	52	(Sound Transmission Class)
Deficiencies	28	(Sum of Deficiencies)
OITC Rating	33	(Outdoor-Indoor Transmission Class)

Notes:

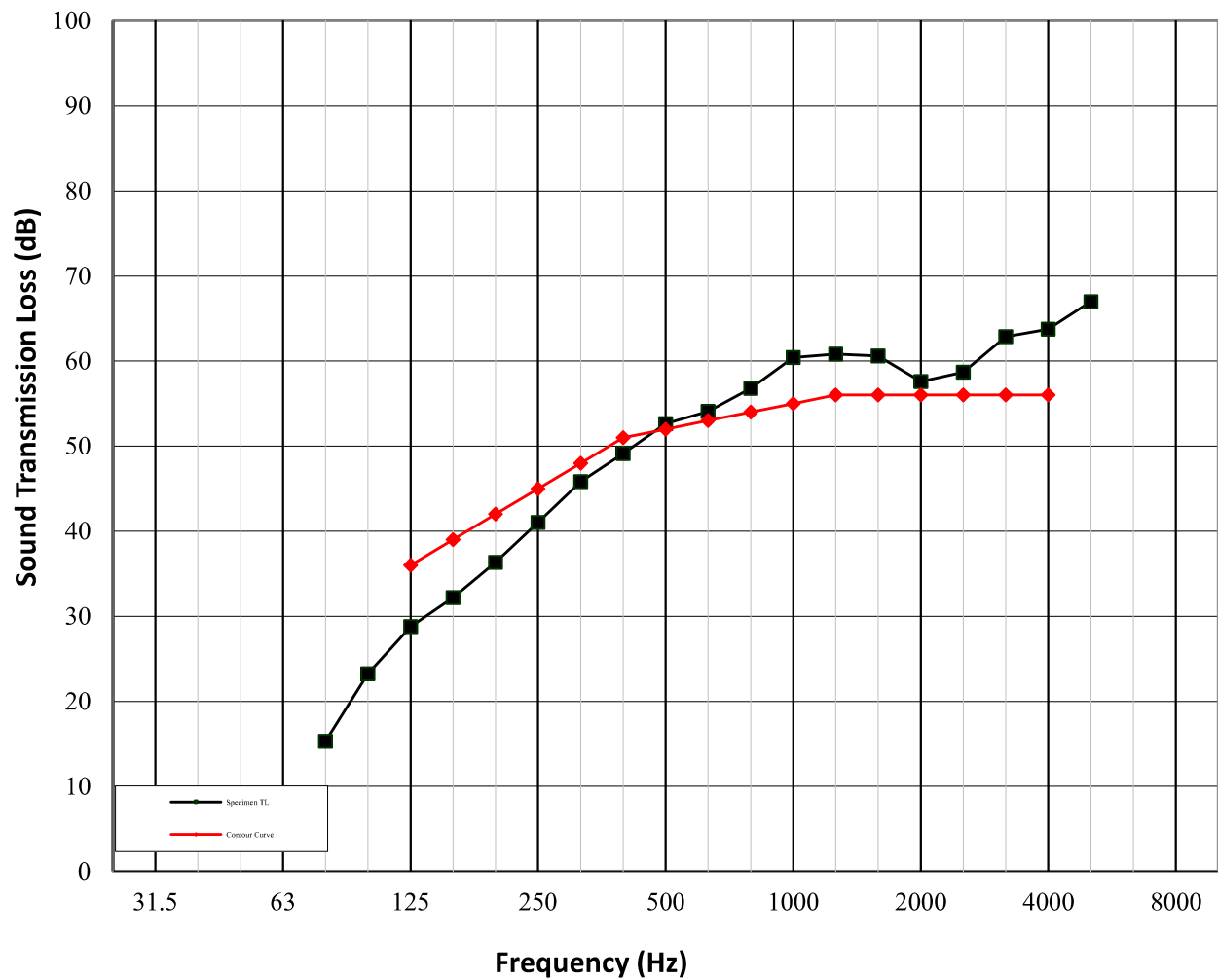
- 1) Receive Room levels less than 5 dB above the Background levels are red.
- 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
- 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17					
Data File No.	G9722.01B					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-2, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, one layer Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	21.9 °C		Source Temp.	22.5 °C
Technician	Sean G. Close	Receive Humidity	52%		Source Humidity	49%

Airborne Sound Transmission Loss



Appendix C

Photographs



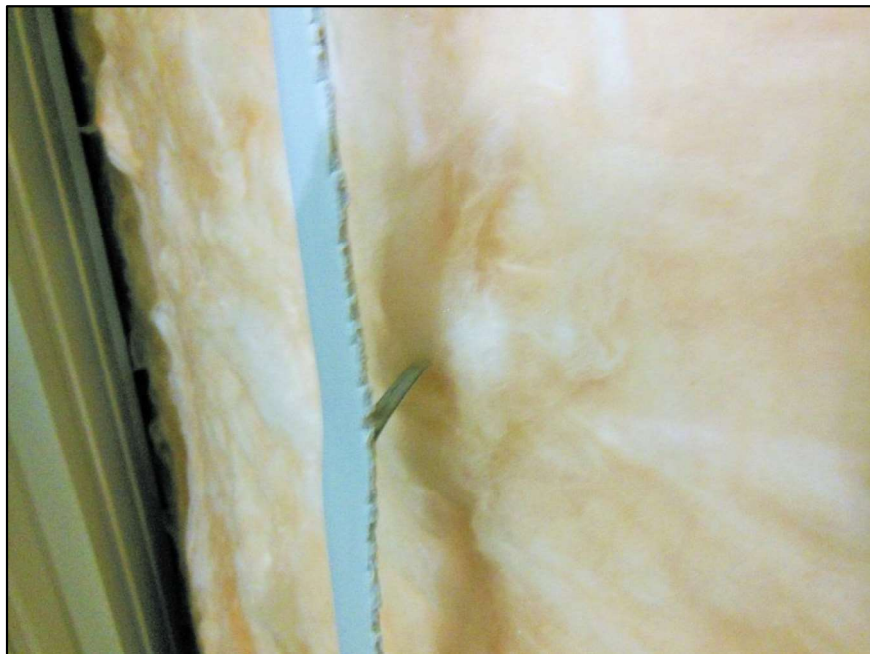
Receive Room View of Installed Specimen



Source Room View of Installed Specimen



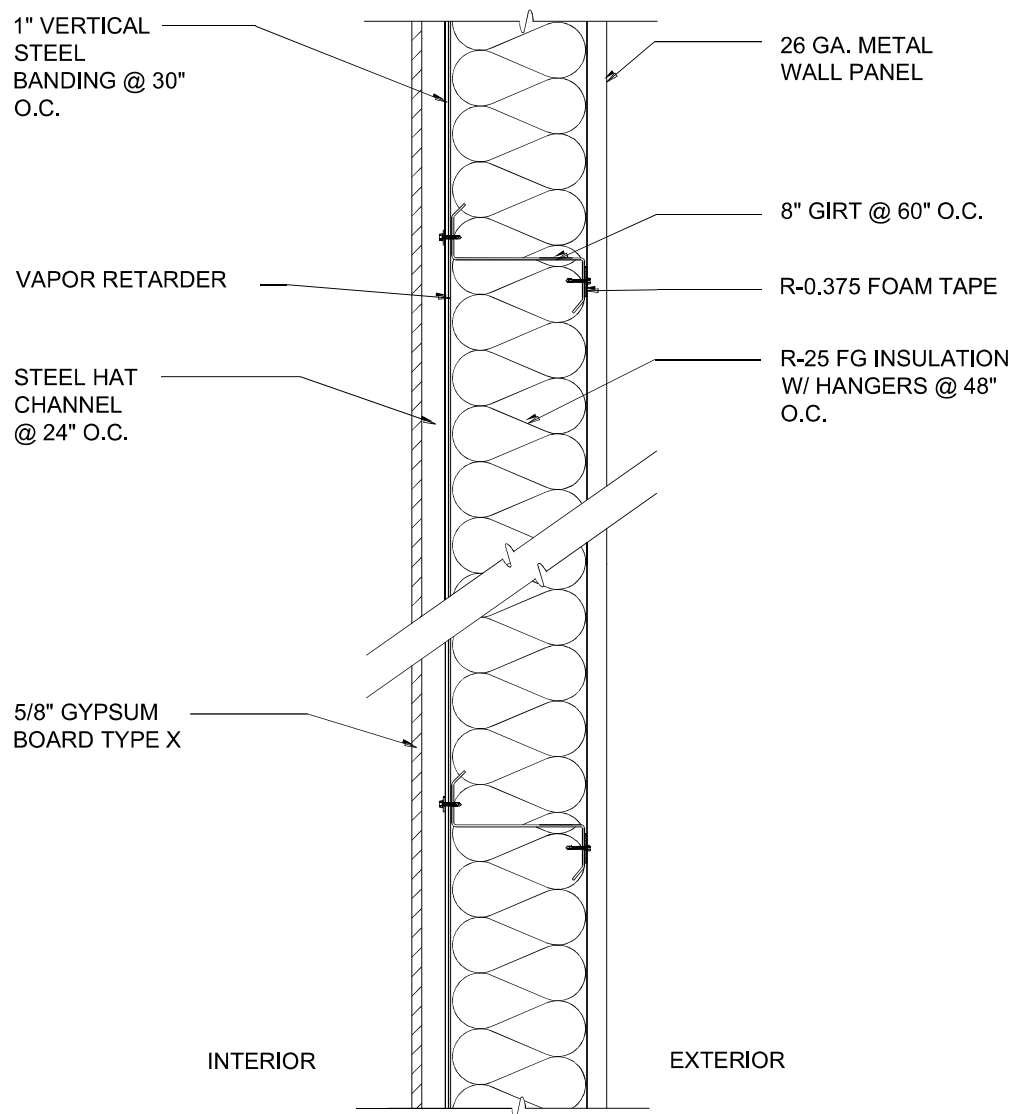
Girt with Support Bracket



Foam on Insulation Support and Banding



Isolator Foam with Metal Panel

Test B, Drawing W-2, Test Date 05/1/17**Data File No. G9722.01B****STC: 52****OITC: 33****W-2**

R-Panel, 8" Girt, R25+R0.375 Tape,
1 Layer Gyp. Bd.



**G9722.03-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90**

Rendered to:

**METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION**

TEST SPECIMEN: W-3, Wall Assembly

DATA FILE NO: G9722.01C

STC: 53

OITC: 37

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.375 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-25 FG Insulation
Vapor Retarder
Steel Hat Channel: 20 MSG Galvanized Steel 24" O.C.
Gypsum Board: Two Layers, Type X, 5/8" Gypsum Board

Reference should be made to Intertek-ATI Report No. G9722.03-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.03-113-11
Revision 1	08/28/17
Test Date	05/01/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.375 Foam Isolator	3 by 96	0.152	N/A	2	0.025 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	8 (approx.)	R-25 Fiberglass Insulation	3 blankets	0.040 lbs/ft ²
	<i>Note: Insulation was installed between girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				
Steel Hat Channel	3 by 96	0.75	20 MSG Galvanized	5	0.420 lbs/linear ft
	<i>Note: Spaced 24" on center vertically from the center of the wall. Screwed to girts.</i>				
Gypsum Board First Layer	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 24" on center vertically and horizontally. Center joint caulked and taped. Screw heads taped.</i>				
Gypsum Board Second Layer	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 12" on center vertically and 24" on center horizontally. Center joint caulked and taped. Screw heads taped.</i>				

Comments

The total weight of the wall system was 457 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

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For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (3)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.03-113-11-R1

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17					
Data File No.	G9722.01C					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-3, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, two layers Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	22.0 °C		Source Temp.	22.8 °C
Technician	Sean G. Close	Receive Humidity	49%		Source Humidity	49%

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	38.9	4.3	103	83	21	2.07	-
100	34.1	5.4	105	79	26	1.17	-
125	36.6	5.3	105	76	29	2.53	8
160	39.3	4.4	104	71	35	0.71	5
200	38.3	4.6	107	69	40	0.58	3
250	32.1	5.2	106	62	44	0.60	2
315	25.2	5.5	100	54	47	0.56	2
400	21.8	5.9	99	48	50	0.52	2
500	17.6	6.0	99	46	54	0.22	0
630	17.4	5.8	102	47	55	0.21	0
800	15.1	6.2	101	44	57	0.27	0
1000	10.2	6.5	98	38	60	0.36	0
1250	8.3	7.0	99	36	62	0.30	0
1600	6.7	7.4	103	40	62	0.38	0
2000	5.7	7.8	96	35	60	0.15	0
2500	5.9	8.7	95	31	63	0.28	0
3150	6.3	10.3	98	28	67	0.29	0
4000	6.9	12.7	96	25	68	0.29	0
5000	7.8	16.1	95	20	71	0.32	-

STC Rating **53** *(Sound Transmission Class)*
Deficiencies **22** *(Sum of Deficiencies)*
OITC Rating **37** *(Outdoor-Indoor Transmission Class)*

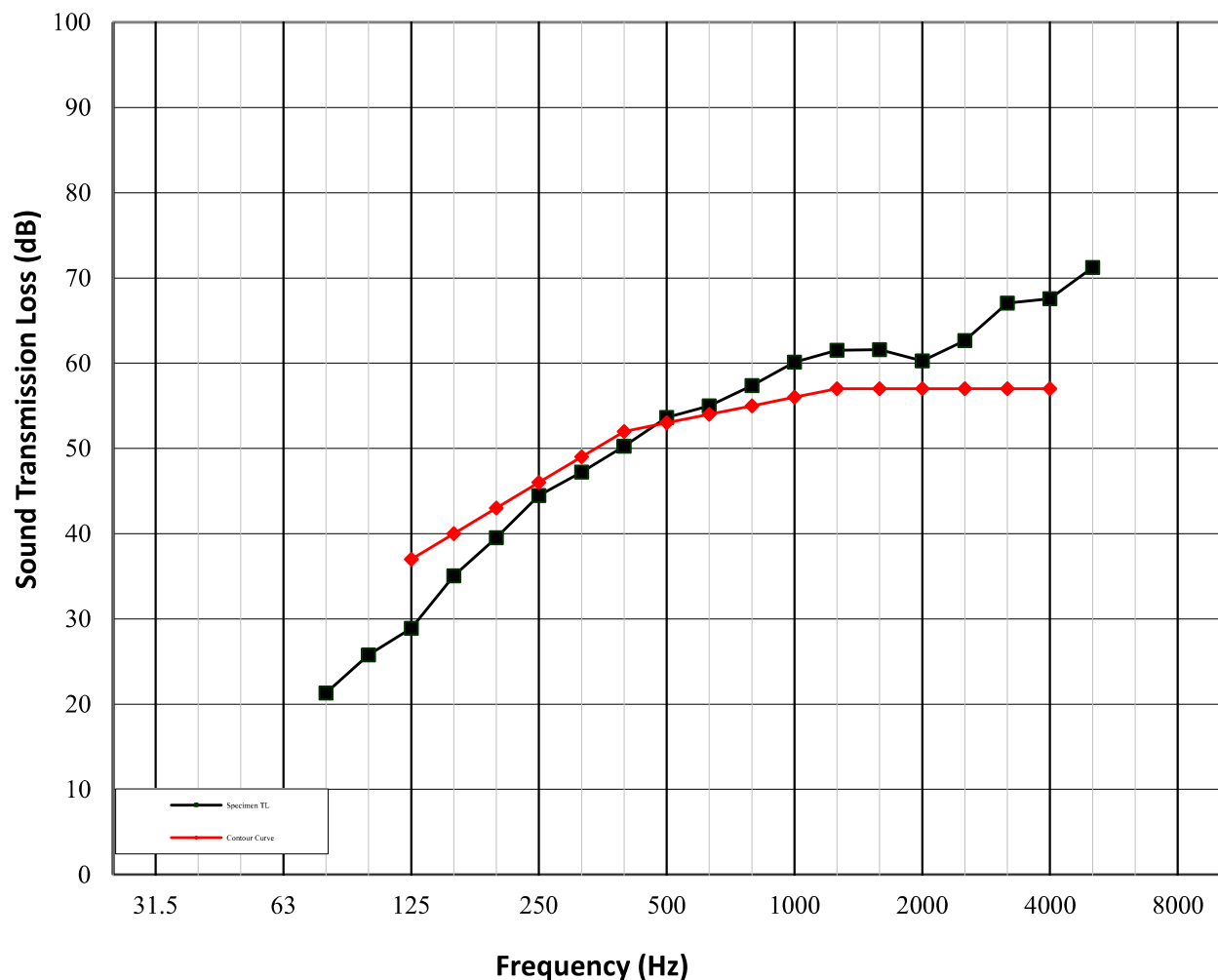
Notes:
 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/01/17					
Data File No.	G9722.01C					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-3, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, two layers Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	22.0 °C	Source Temp.	22.8 °C	
Technician	Sean G. Close	Receive Humidity	49%	Source Humidity	49%	

Airborne Sound Transmission Loss



Appendix C

Photographs



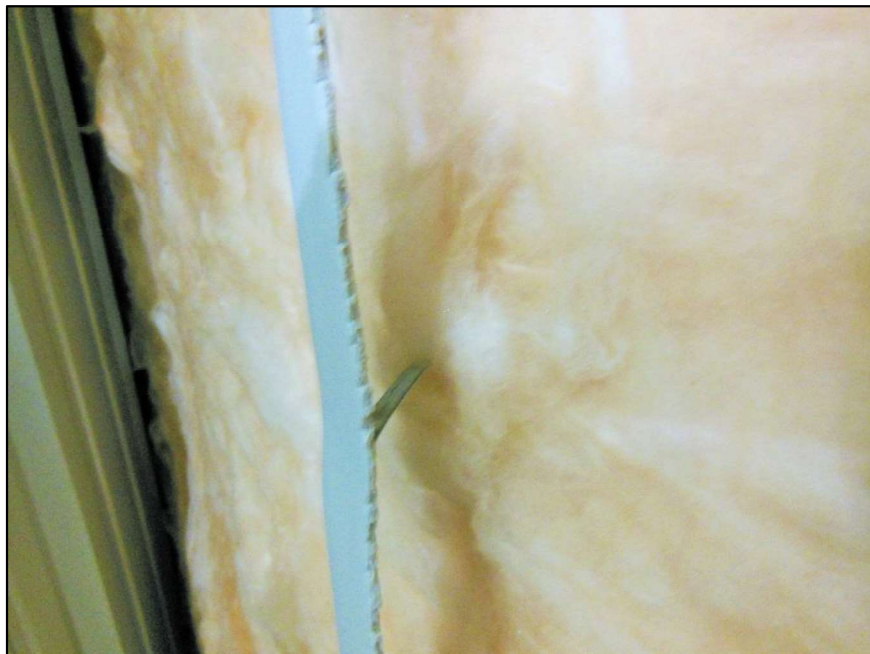
Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket



Foam on Insulation Support and Banding



Isolator Foam with Metal Panel

Test C, Drawing W-3, Test Date 05/1/17

Data File No. G9722.01C

STC: 53

OITC: 37

1" VERTICAL
STEEL
BANDING @ 30"
O.C.

26 GA. METAL
WALL PANEL

8" GIRT @ 60" O.C.

VAPOR RETARDER

R-0.375 FOAM TAPE

STEEL HAT
CHANNEL
@ 24" O.C.

R-25 FG INSULATION
W/ HANGERS @ 48"
O.C.

2 LAYERS 5/8"
GYPSUM
BOARD TYPE X

INTERIOR

EXTERIOR

W-3

R-Panel, 8" Girt, R25+R0.375 Tape,
2Layer Gyp. Bd.

UL W404
EQUIVALENT



G9722.04-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90

Rendered to:

METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

TEST SPECIMEN: W-4A, Wall Assembly

DATA FILE NO: G9722.01D1

STC: 54

OITC: 35

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.375 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-25 FG Insulation
Vapor Retarder
Steel Hat Channel: 20 MSG Galvanized Steel 24" O.C.
Resilient Channel: 24" O.C.
Gypsum Board: One Layer, Type X, 5/8" Gypsum Board

Reference should be made to Intertek-ATI Report No. G9722.04-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.04-113-11
Revision 1	08/28/17
Test Date	05/02/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.375 Foam Isolator	3 by 96	0.152	N/A	2	0.025 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	8 (approx.)	R-25 Fiberglass Insulation	3 blankets	0.040 lbs/ft ²
	<i>Note: Insulation was installed between girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops. at top and bottom.</i>				
Steel Hat Channel	3 by 96	0.75	20 MSG Galvanized	5	0.420 lbs/linear ft
	<i>Note: Spaced 24" on center vertically from the center of the wall. Screwed to girts.</i>				
Resilient Channel	2-5/8 by 96	0.025	N/A	5	0.210 lbs/linear ft
	<i>Note: Spaced 24" on center horizontally. Screwed to hat channel.</i>				
Gypsum Board	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 12" on center horizontally and 24" on center vertically. Center joint caulked and taped. Screw heads taped.</i>				

Comments

The total weight of the wall system was 328 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

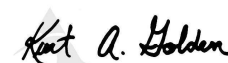
This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (3)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/02/17						
Data File No.	G9722.01D1						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-4A, wall assembly (26 gauge steel R- Panel, R-0.375 foam tape, 8" steel girt, R25 fiberglass insulation, vapor retarder, steel hat channel, resilient channel, one layer Type X 5/8" gypsum board on receive side)						
Specimen Area	5.95 m ²	Receive Temp.	22.3 °C		Source Temp.	21.8 °C	
Technician	Sean G. Close	Receive Humidity	51%		Source Humidity	52%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	39.3	4.9	103	86	17	1.71	-
100	35.0	5.5	105	79	26	1.42	-
125	36.9	5.0	104	75	30	1.85	8
160	37.3	4.3	104	72	34	0.82	7
200	32.1	4.5	106	68	39	0.58	5
250	28.2	5.2	105	63	43	0.67	4
315	25.1	5.6	100	54	46	0.50	4
400	24.2	5.8	98	48	50	0.56	3
500	17.6	5.9	99	45	54	0.24	0
630	17.0	5.7	101	45	57	0.28	0
800	13.8	6.1	101	42	59	0.35	0
1000	9.9	6.2	98	37	61	0.44	0
1250	7.9	6.7	98	35	63	0.34	0
1600	6.1	7.2	102	37	65	0.41	0
2000	4.6	7.8	96	32	63	0.28	0
2500	4.7	8.7	94	29	64	0.31	0
3150	4.7	10.2	97	26	69	0.36	0
4000	5.3	12.4	96	23	70	0.30	0
5000	6.2	15.7	95	18	73	0.31	-

STC Rating **54** *(Sound Transmission Class)*
Deficiencies **31** *(Sum of Deficiencies)*
OITC Rating **35** *(Outdoor-Indoor Transmission Class)*

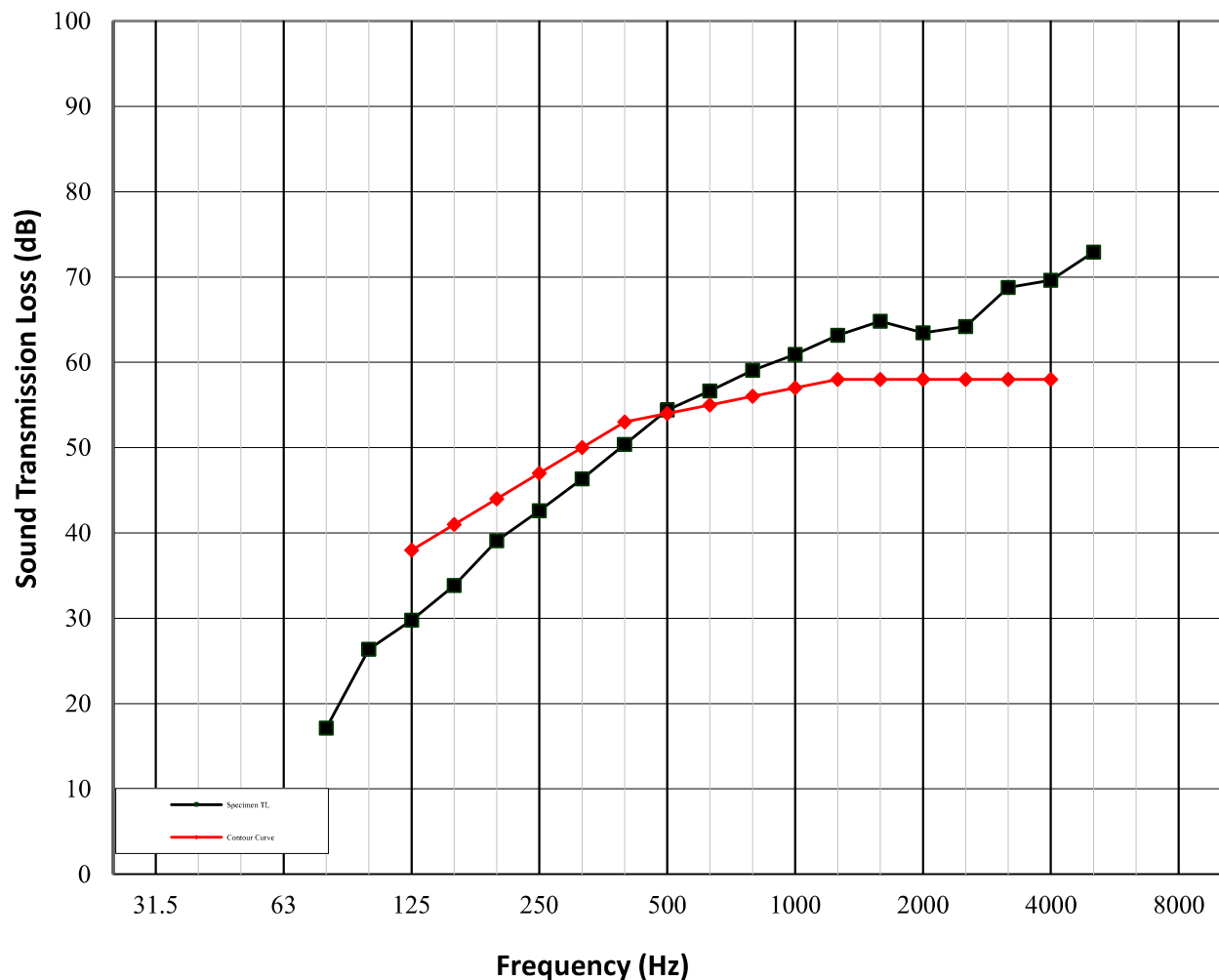
Notes:
 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/02/17					
Data File No.	G9722.01D1					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-4A, wall assembly (26 gauge steel R- Panel, R-0.375 foam tape, 8" steel girt, R25 fiberglass insulation, vapor retarder, steel hat channel, resilient channel, one layer Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	22.3 °C	Source Temp.	21.8 °C	
Technician	Sean G. Close	Receive Humidity	51%	Source Humidity	52%	

Airborne Sound Transmission Loss



Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket



Hat Channel and Resilient Channel



Foam on Insulation Support and Banding



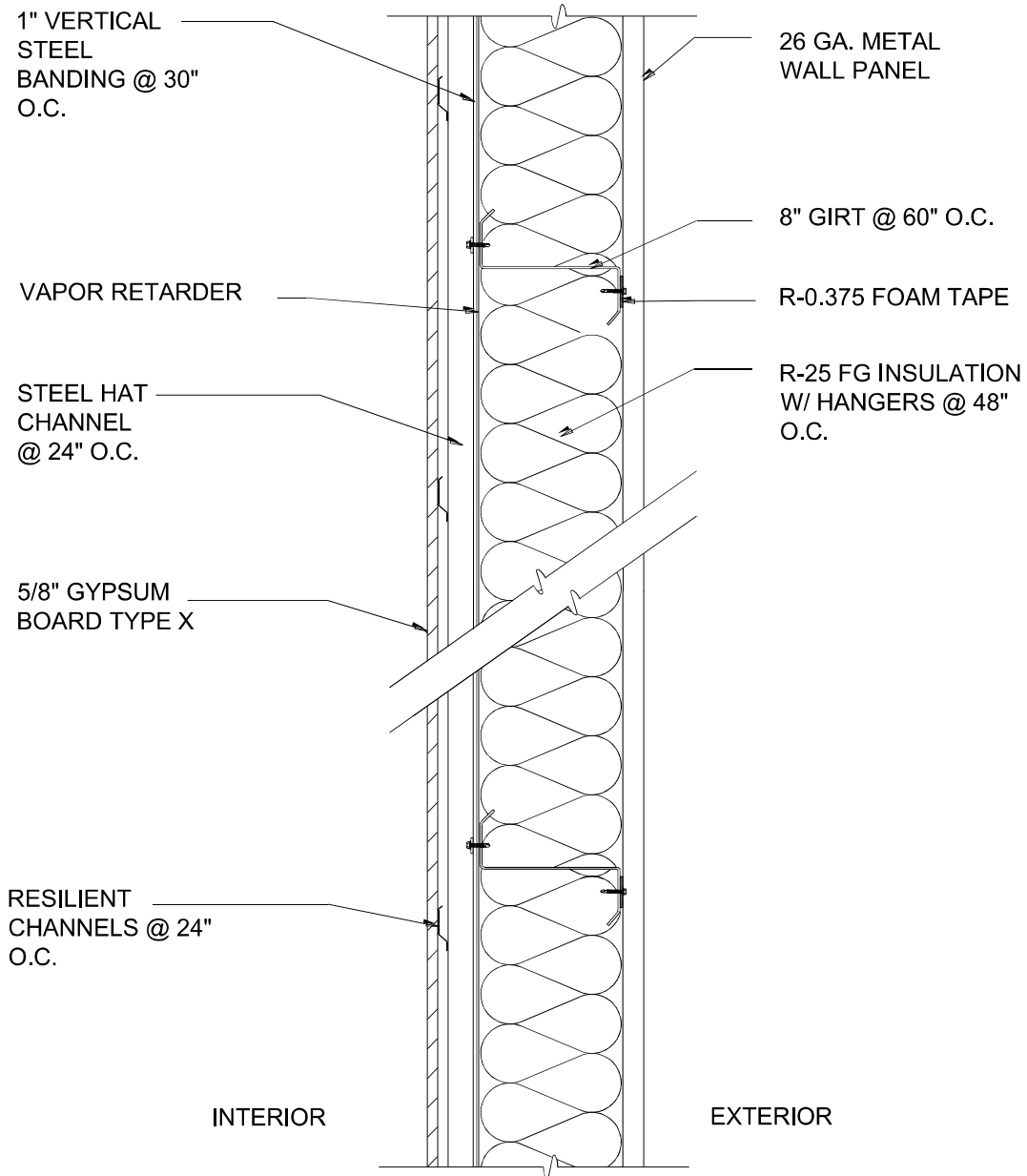
Isolator Foam with Metal Panel

Test D1, Drawing W-4A, Test Date 05/2/17

Data File No. G9722.01D1

STC: 54

OITC: 35



W-4A

R-Panel, 8" Girt, R25+R0.375 Tape, 1 Layer
Gyp. Bd.



G9722.05-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90

Rendered to:

METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

TEST SPECIMEN: W-4B, Wall Assembly

DATA FILE NO: G9722.01D2

STC: 57

OITC: 39

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.375 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-25 FG Insulation
Vapor Retarder
Steel Hat Channel: 20 MSG Galvanized Steel 24" O.C.
Resilient Channel: 24" O.C.
Gypsum Board: Two Layers, Type X, 5/8" Gypsum Board

Reference should be made to Intertek-ATI Report No. G9722.05-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.05-113-11
Revision 1	08/28/17
Test Date	05/02/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.375 Foam Isolator	3 by 96	0.152	N/A	2	0.025 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	8 (approx.)	R-25 Fiberglass Insulation	3 blankets	0.40 lbs/ft ²
	<i>Note: Insulation was installed between girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				
Steel Hat Channel	3 by 96	0.75	20 MSG Galvanized	5	0.420 lbs/linear ft
	<i>Note: Spaced 24" on center vertically from the center of the wall. Screwed to girts.</i>				
Resilient Channel	2-5/8 by 96	0.025	N/A	5	0.210 lbs/linear ft
	<i>Note: Spaced 24" on center horizontally. Screwed to hat channel.</i>				
Gypsum Board First Layer	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 12" on center. Center joint caulked and taped. Screw heads taped.</i>				
Gypsum Board Second Layer	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 12" on center vertically and 24" on center horizontally. Center joint caulked and taped. Screw heads taped.</i>				

Comments

The total weight of the wall system was 474 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (3)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.05-113-11-R1

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/02/17						
Data File No.	G9722.01D2						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-4B, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, resilient channel, two layers Type X 5/8" gypsum board on receive side)						
Specimen Area	5.95 m ²	Receive Temp.	23.7 °C		Source Temp.	23.1 °C	
Technician	Sean G. Close	Receive Humidity	48%		Source Humidity	50%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	45.5	4.7	102	82	21	1.98	-
100	43.3	6.1	105	75	29	1.38	-
125	37.4	5.3	105	71	34	2.07	7
160	38.8	4.3	104	67	39	0.64	5
200	36.1	4.6	106	65	43	0.57	4
250	31.2	5.2	105	60	46	0.56	4
315	25.7	5.4	100	51	50	0.46	3
400	23.1	5.8	98	45	54	0.53	2
500	20.7	5.9	99	43	57	0.32	0
630	19.0	5.8	101	44	58	0.28	0
800	16.0	6.2	101	41	60	0.36	0
1000	12.1	6.4	98	36	62	0.45	0
1250	11.2	7.0	98	34	64	0.30	0
1600	8.5	7.3	102	36	66	0.40	0
2000	6.4	7.8	96	30	66	0.27	0
2500	6.5	8.6	95	25	68	0.38	0
3150	5.6	10.2	97	22	73	0.39	0
4000	5.6	12.4	96	19	74	0.31	0
5000	6.3	15.6	95	13	78	0.33	-

STC Rating **57** *(Sound Transmission Class)*
Deficiencies **25** *(Sum of Deficiencies)*
OITC Rating **39** *(Outdoor-Indoor Transmission Class)*

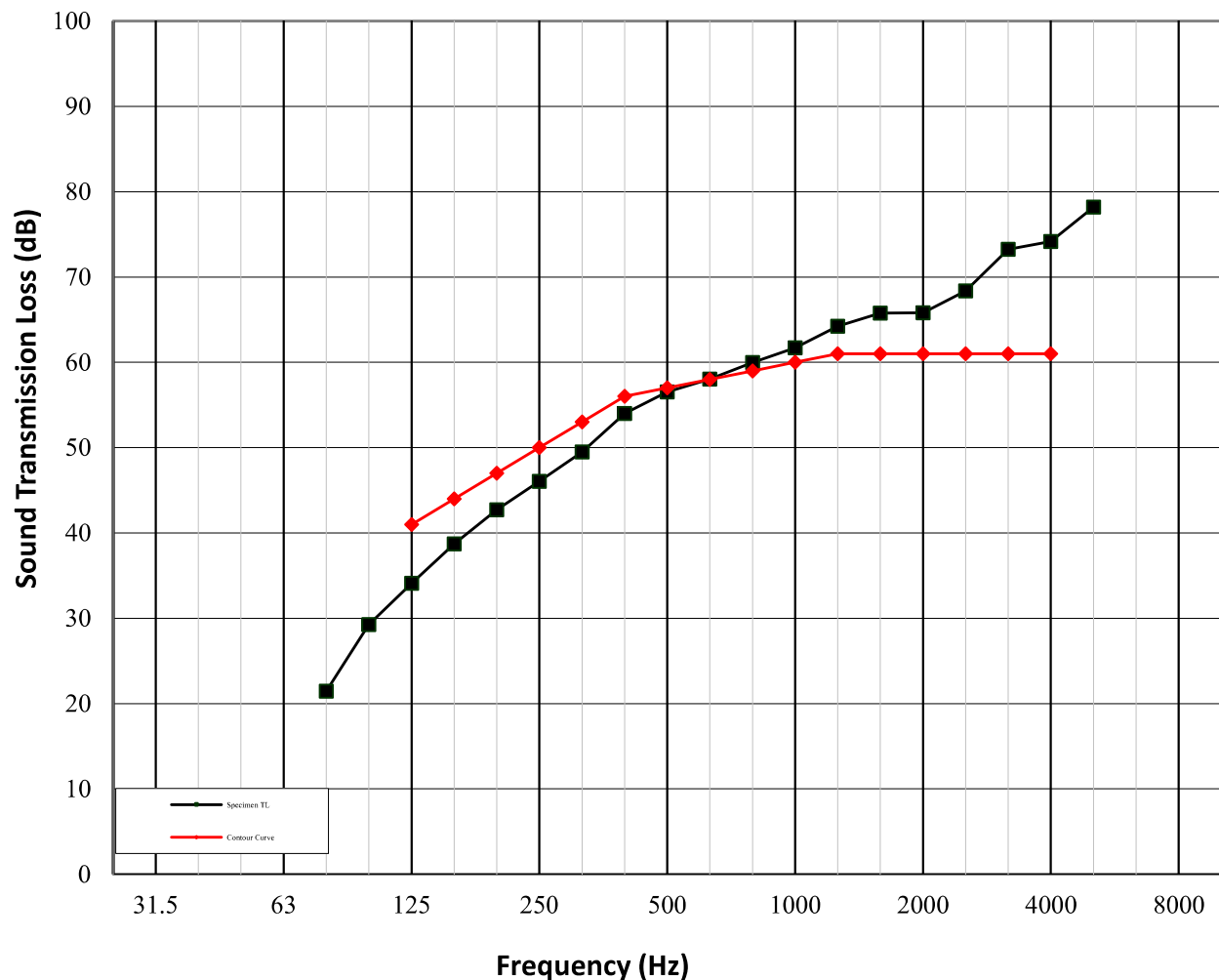
Notes:
 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

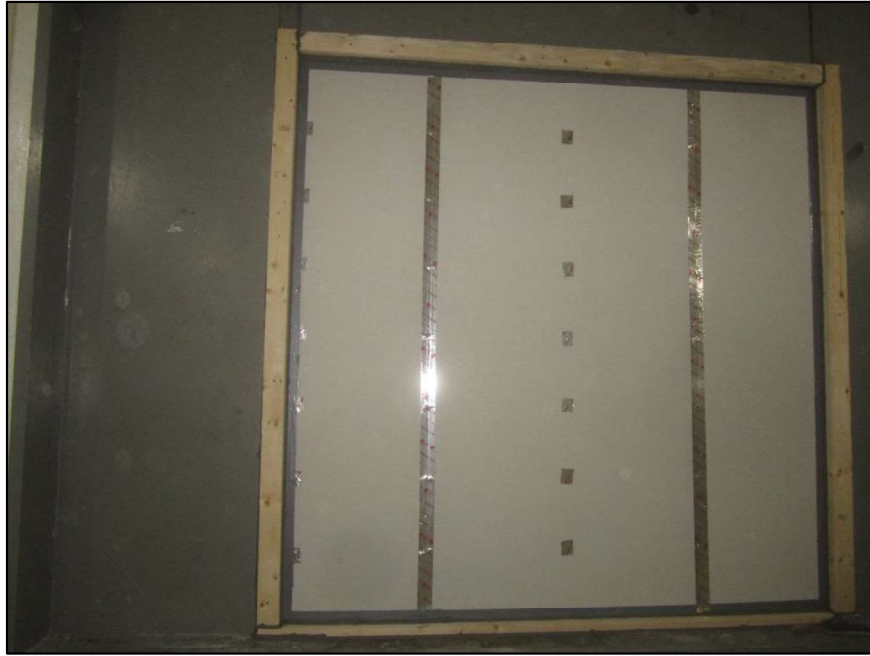
Test Date	05/02/17					
Data File No.	G9722.01D2					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-4B, wall assembly (26 gauge steel R-Panel, R-0.375 foam tape, 8" steel girt, R-25 fiberglass insulation, vapor retarder, steel hat channel, resilient channel, two layers Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	23.7 °C	Source Temp.	23.1 °C	
Technician	Sean G. Close	Receive Humidity	48%	Source Humidity	50%	

Airborne Sound Transmission Loss



Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket



Hat Channel and Resilient Channel



Foam on Insulation Support and Banding



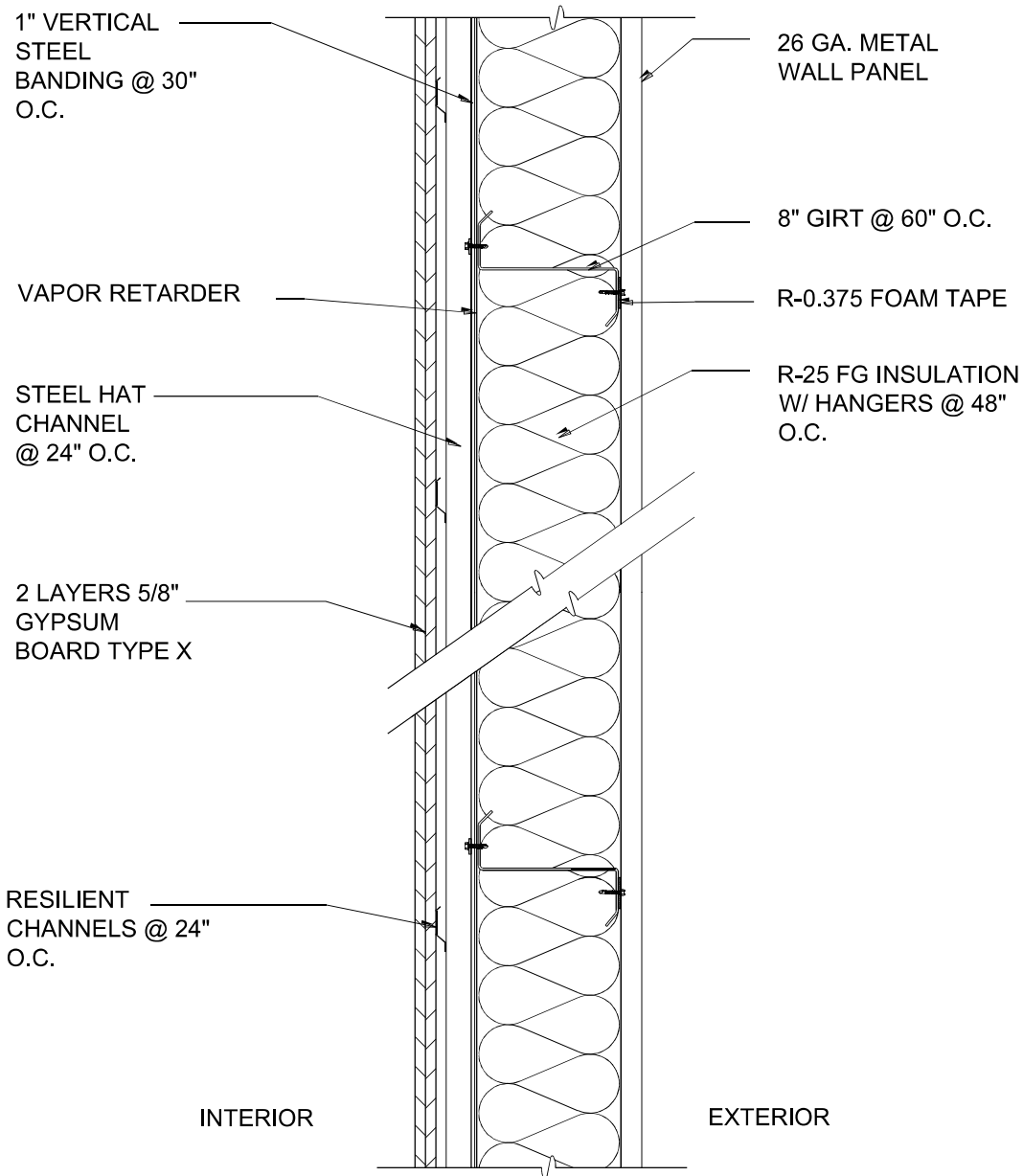
Isolator Foam with Metal Panel

Test D2, Drawing W-4B, Test Date 05/2/17

Data File No. G9722.01D2

STC: 57

OITC: 39



W-4B

R-Panel, 8" Girt, R25+R0.375 Tape, 2 LayerS
Gyp. Bd.



**G9722.10-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90**

Rendered to:

**METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION**

TEST SPECIMEN: W-6, Wall Assembly

DATA FILE NO: G9722.01I

STC: 34

OITC: 23

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.75 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-30 FG Insulation
Vapor Retarder

Reference should be made to Intertek-ATI Report No. G9722.10-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.10-113-11
Revision 1	08/28/17
Test Date	05/03/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.75 Foam Isolator	3 by 96	0.266	N/A	2	0.040 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	9 (approx.)	R-30 Fiberglass Insulation	3 blankets	0.45 lbs/ft ²
	<i>Note: Insulation was installed between the girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				

Comments

The total weight of the wall system was 152 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

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This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (2)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.10-113-11-R1

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/03/17						
Data File No.	G9722.01I						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-6, wall assembly (26 gauge steel R-Panel, R-0.75 foam tape, 8" steel girt, R-30 fiberglass insulation, vapor retarder)						
Specimen Area	5.95 m ²	Receive Temp.	22.2 °C		Source Temp.	22.8 °C	
Technician	Sean G. Close	Receive Humidity	51%		Source Humidity	48%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	35.5	9.9	104	91	11	1.66	-
100	31.9	10.6	106	89	14	1.50	-
125	31.8	11.6	104	90	12	1.84	6
160	34.8	10.7	104	87	15	0.61	6
200	32.7	10.7	107	84	20	0.93	4
250	26.6	11.9	106	80	23	0.68	4
315	21.6	12.1	100	71	26	0.48	4
400	19.2	12.2	98	65	30	0.60	3
500	15.7	11.8	99	62	33	0.33	1
630	14.6	11.6	102	62	36	0.38	0
800	12.1	11.6	101	60	38	0.30	0
1000	7.7	11.1	98	54	41	0.53	0
1250	6.7	11.0	98	51	45	0.36	0
1600	5.7	11.0	102	51	49	0.37	0
2000	5.2	10.9	96	42	51	0.34	0
2500	5.7	11.4	95	39	53	0.36	0
3150	6.2	12.6	97	36	58	0.35	0
4000	6.9	14.6	96	36	56	0.37	0
5000	7.8	18.0	95	31	59	0.37	-

STC Rating **34** *(Sound Transmission Class)*
Deficiencies **28** *(Sum of Deficiencies)*
OITC Rating **23** *(Outdoor-Indoor Transmission Class)*

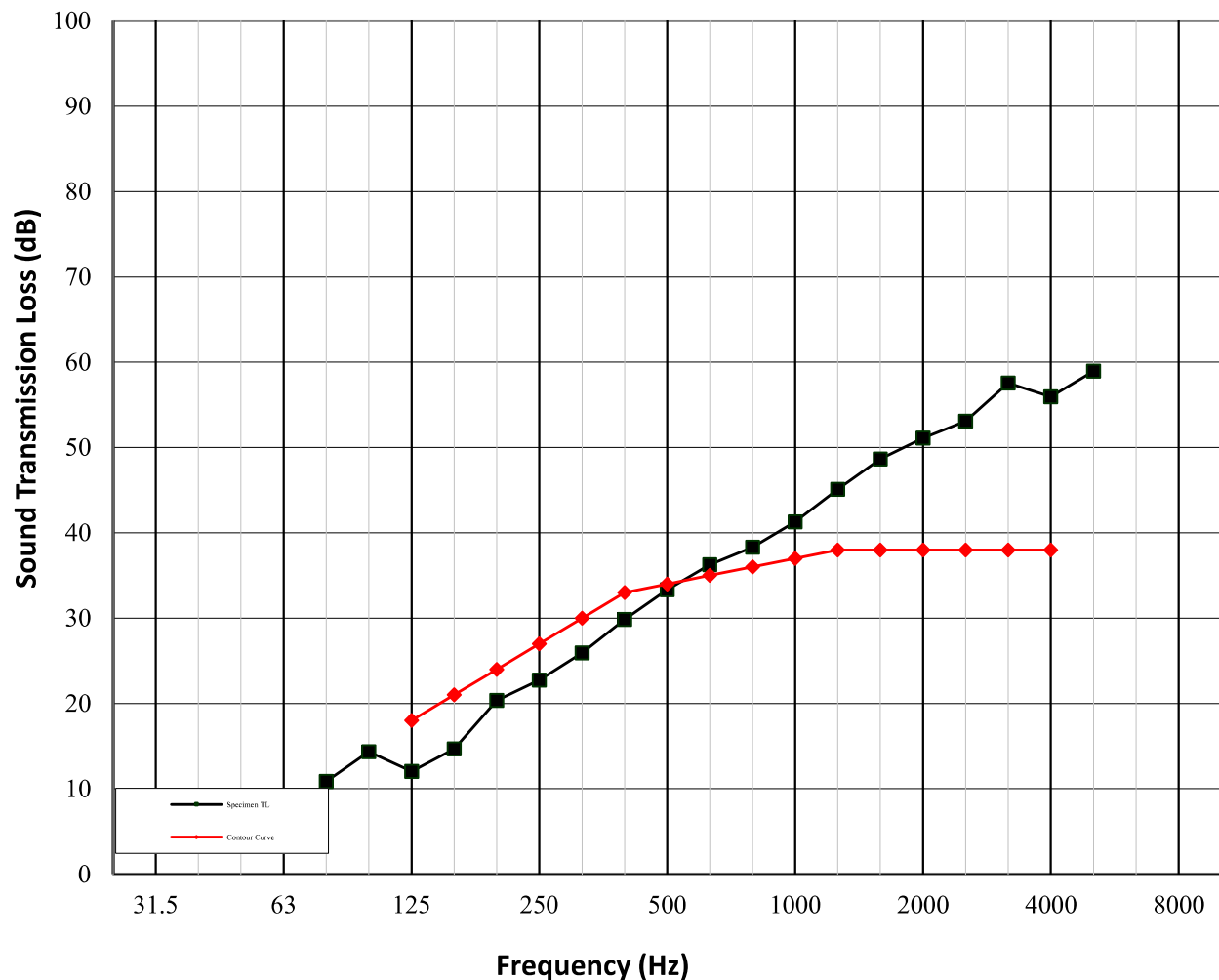
Notes:
 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/03/17					
Data File No.	G9722.01I					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-6, wall assembly (26 gauge steel R-Panel, R-0.75 foam tape, 8" steel girt, R-30 fiberglass insulation, vapor retarder)					
Specimen Area	5.95 m ²	Receive Temp.	22.2 °C	Source Temp.	22.8 °C	
Technician	Sean G. Close	Receive Humidity	51%	Source Humidity	48%	

Airborne Sound Transmission Loss



Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket

Test I, Drawing W-6, Test Date 05/3/17

Data File No. G9722.01I

STC: 34

OITC: 23

1" VERTICAL
STEEL
BANDING @ 30"
O.C.

VAPOR RETARDER

26 GA. METAL
WALL PANEL

8" GIRT @ 60" O.C.

R-0.75 FOAM TAPE

R-30 FG INSULATION

INTERIOR

EXTERIOR

W-6

R-Panel, 8" Girt, R30+R0.75 Tape



G9722.09-113-11-R1
ACOUSTICAL PERFORMANCE TEST REPORT
ASTM E90

Rendered to:

METAL BUILDING MANUFACTURERS ASSOCIATION
AND
NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION

TEST SPECIMEN: W-7, Wall Assembly

DATA FILE NO: G9722.01H

STC: 49

OITC: 33

Test Specimen Identification (Source to Receive Room)

Steel Wall Panel: 26 Gauge R-Panel
Isolator: R-0.75 Foam Tape
Girt: 8" 16 Gauge Steel 60" O.C.
Insulation: R-30 FG Insulation
Vapor Retarder
Steel Hat Channel: 20 MSG Galvanized Steel 24" O.C.
Gypsum Board: One Layer, Type X, 5/8" Gypsum Board

Reference should be made to Intertek-ATI Report No. G9722.09-113-11 for complete test specimen description. This page alone is not a complete report. Flanking limit tests and reference specimen tests are available upon request.



Acoustical Performance Test Report

METAL BUILDING MANUFACTURERS ASSOCIATION
1300 Sumner Avenue
Cleveland, Ohio 44115

AND

NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION
11 Canal Center, Suite 103
Alexandria, Virginia 22310

Report No	G9722.09-113-11
Revision 1	08/28/17
Test Date	05/03/17
Report Date	07/07/17
Specimen Construction Date	05/01/17

Project Scope

Architectural Testing, Inc., an Intertek company ("Intertek-ATI"), was contracted to conduct a sound transmission loss test. The complete test data is included as Appendix B of this report.

Test Methods

Testing for this project was conducted in accordance with the following standards. The equipment listed in the attachments meets the requirements of the following standards.

ASTM E90-09(2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E1332-16, *Standard Classification for Rating Outdoor-Indoor Sound Attenuation*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

Test Procedure

All measurements were conducted in the HT test chambers at Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

Test Procedure (Continued)

The transmission loss values were obtained for a single direction of measurement. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions.

Two sound pressure level measurements were made simultaneously in the receive and source rooms at each of five microphone positions.

The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Specimen Installation

A sound transmission loss test was initially performed on a filler wall. The 96" wide by 96" high specimen plug was removed from the filler wall assembly. All materials were provided by the client. The specimen was constructed by Intertek-ATI personnel in the test opening (see the test materials list and Appendices C and D for photographs and illustrations). Duct seal was used to seal the perimeter of the specimen to the test opening on both sides. The interior side of the specimen, when installed, was approximately 1/4" from being flush with the receive room side of the filler wall. A stethoscope was used to check for any abnormal air leaks around the test specimen prior to testing.

Test Calculations

Transmission loss (TL) at each 1/3 octave frequency is the average source room sound pressure level minus the average receive room sound pressure level, plus 10 times the log of the specimen area divided by the sound absorption of the receive room with the sample in place.

STC Rating

To obtain the Sound Transmission Class (STC), read the TL of the contour curve at 500 Hz. The sum of the deficiencies below the contour curve must not exceed 32. The maximum deficiency at any one frequency must not exceed 8.

OITC Rating

The Outdoor-Indoor Transmission Class (OITC) is calculated by subtracting the logarithmic summation of the TL values from the logarithmic summation of the A-weighted transportation noise spectrum stated in ASTM E1332.

Test Specimen Materials (Source Room to Receive Room)

Material	Actual Dimensions (inches)	Actual Thickness (inches)	Description	Quantity	Average Weight
Steel Wall Panel	38-3/4 by 96	0.50	R-Panel, 26 Gauge	2.5 sheets	0.795 lbs/ft ²
	<i>Note: Screws spaced 30" on centers along overlap, 12" on center along steel girt.</i>				
Insulation Support Banding	1 by 96	0.037	N/A	4	0.125 lbs/linear ft
	<i>Note: Held insulation in place from source side, 48" apart from the center of the wall and 3-1/2" from each end, fastened to wood stops at top and bottom.</i>				
R-0.75 Foam Isolator	3 by 96	0.266	N/A	2	0.040 lbs/linear ft
	<i>Note: Adhered to the edge of steel girt, wood perimeter blocks, and vertical straps on the source side.</i>				
Steel Girt	8 by 96	8	16 Gauge	2	4 lbs/linear ft
	<i>Note: Attached to L-Bracket for support at both ends. Spaced 60" on center. The measured thickness of the metal was 0.111".</i>				
Insulation	60 by 96 18 by 96 18 by 96	9 (approx.)	R-30 Fiberglass Insulation	3 blankets	0.45 lbs/ft ²
	<i>Note: Insulation was installed between girts and test frame box.</i>				
Vapor Retarder	96 by 96	0.005	Polypropylene with tri-directional fiberglass	1	0.015 lbs/ft ²
	<i>Note: N/A</i>				
Steel Banding	1 by 96	0.024	N/A	4	0.085 lbs/linear ft
	<i>Note: Spaced 30" on center from the center of the wall. Screwed to girts and wood stops at top and bottom.</i>				
Steel Hat Channel	3 by 96	0.75	20 MSG Galvanized	5	0.420 lbs/linear ft
	<i>Note: Spaced 24" on center vertically from the center of the wall. Screwed to girts.</i>				
Gypsum Board	48 by 96	0.625	Type X	2	2.28 lbs/ft ²
	<i>Note: Screw spacing 12" on center vertically and 24" on center horizontally. Center joint caulked and taped. Screw heads taped.</i>				

Comments

The total weight of the wall system was 315 lbs. A drawing of the test specimen is included in Appendix D. Intertek-ATI will store samples of test specimens for four years.

Intertek-ATI will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

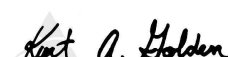
This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:


Digitally Signed by: Sean Close

Sean G. Close
Technician - Acoustical Testing


Digitally Signed by: Kurt A. Golden

Kurt A. Golden
Project Lead – Acoustical Testing

SGC:jmc

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix A: Equipment description (1)
- Appendix B: Complete test results (2)
- Appendix C: Photographs (2)
- Appendix D: Drawing (1)

Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	07/07/17	N/A	Original Report Issue
R1	08/28/17	Entire report	Changes to ensure consistency between roof assembly and wall test reports per clients' request.

Appendix A

Instrumentation:

Instrument	Manufacturer	Model	Description	ATI Number	Date of Calibration
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	1643A62	04/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126	05/16 *
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	065125	05/16 *
Source Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64902	07/16
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64903	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65103	02/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	64905	02/17
Source Room Microphone	PCB piezotronics	378C20	Microphone and Preamplifier	64906	02/17
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	01/17
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	03/17
Source Room Environmental Indicator	Comet	T7510	Source Room	64914	03/17
Microphone Calibrator	Norsonic	1251	Pistonphone Calibrator	65105	05/16

*- Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

Test Chamber:

	Volume	Description
Receive Room	234 m ³	Rotating vane and stationary diffusers Temperature and humidity controlled Isolation pads under the floor
Source Room	207 m ³	Stationary diffusers only Temperature and humidity controlled

	Maximum Size	Description
TL Test Opening	4.27 m wide by 3.05 m high	Vibration break between source and receive rooms

N/A-Not Applicable



G9722.09-113-11-R1

Appendix B

Complete Test Results

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/03/17						
Data File No.	G9722.01H						
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association						
Description	W-7, wall assembly (26 gauge steel R-Panel, R-0.75 foam tape, 8" steel girt, R-30 fiberglass insulation, vapor retarder, steel hat channel, one layer Type X 5/8" gypsum board on receive side)						
Specimen Area	5.95 m ²	Receive Temp.	23.1 °C		Source Temp.	22.4 °C	
Technician	Sean G. Close	Receive Humidity	49%		Source Humidity	49%	

Freq (Hz)	Background SPL (dB)	Absorption (m ²)	Source SPL (dB)	Receive SPL (dB)	Specimen TL (dB)	95% Confidence Limit	Number of Deficiencies
80	36.8	5.6	103	87	16	1.59	-
100	33.5	5.0	105	84	21	1.48	-
125	34.2	5.4	105	80	25	2.09	8
160	37.7	4.8	104	75	30	0.78	6
200	35.9	4.6	107	71	37	0.72	2
250	32.7	5.2	106	65	41	0.56	1
315	27.7	5.5	100	56	45	0.58	0
400	25.9	5.8	99	51	48	0.62	0
500	22.1	6.1	99	47	52	0.27	0
630	19.0	5.7	102	48	54	0.24	0
800	16.8	6.1	101	45	56	0.26	0
1000	11.5	6.3	98	38	60	0.46	0
1250	13.3	6.8	98	38	60	0.23	0
1600	10.2	7.3	102	43	59	0.28	0
2000	6.6	7.8	96	40	55	0.24	0
2500	6.4	8.7	95	37	56	0.23	0
3150	6.2	10.4	98	34	61	0.21	0
4000	7.0	12.7	96	30	63	0.26	0
5000	7.9	16.3	95	25	66	0.33	-

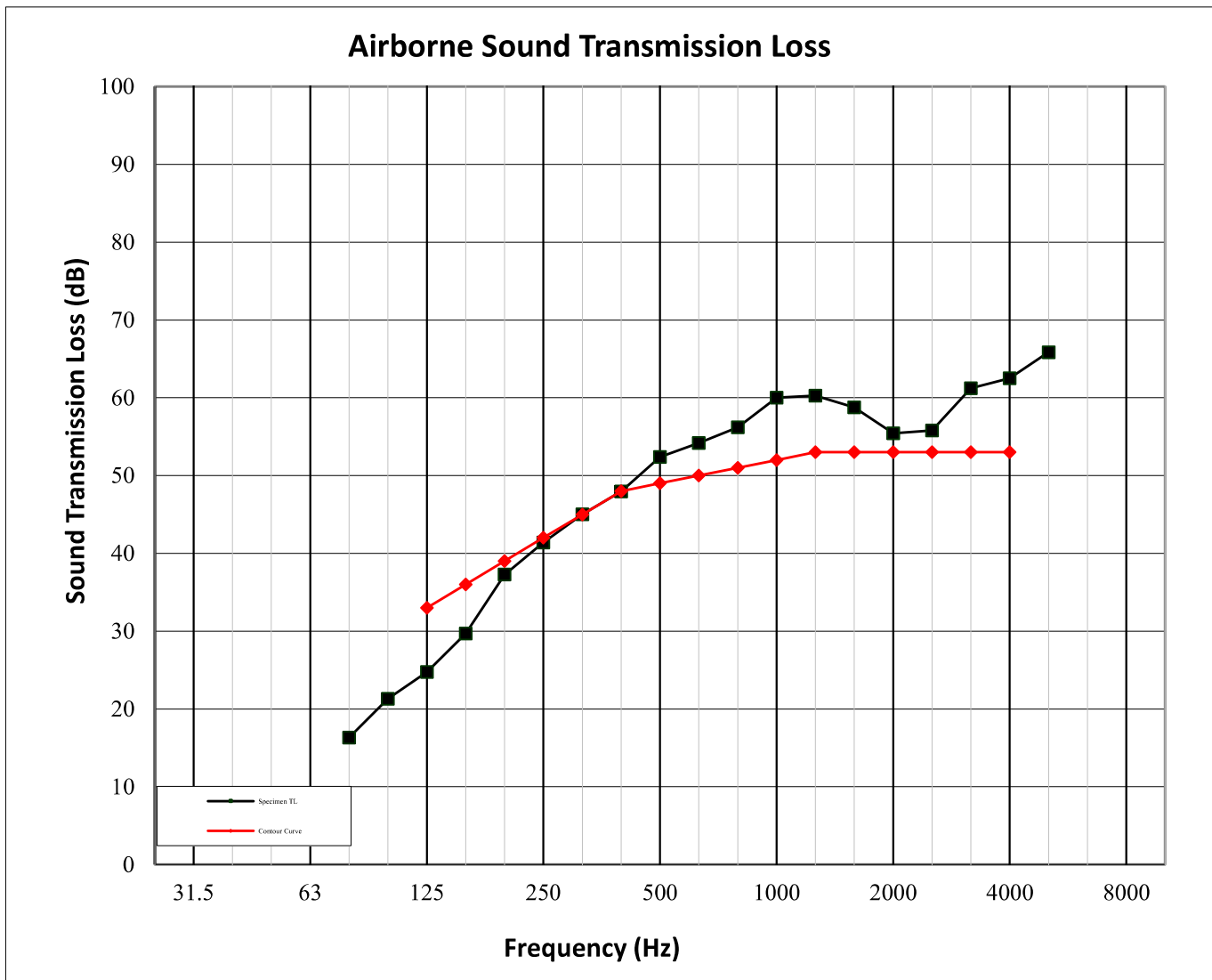
STC Rating **49** *(Sound Transmission Class)*
Deficiencies **17** *(Sum of Deficiencies)*
OITC Rating **33** *(Outdoor-Indoor Transmission Class)*

Notes:
 1) Receive Room levels less than 5 dB above the Background levels are red.
 2) Specimen TL levels listed in red indicate the lower limit of the transmission loss.
 3) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

AIRBORNE SOUND TRANSMISSION LOSS

ASTM E90

Test Date	05/03/17					
Data File No.	G9722.01H					
Client	Metal Building Manufacturers Association and North American Insulation Manufacturers Association					
Description	W-7, wall assembly (26 gauge steel R-Panel, R-0.75 foam tape, 8" steel girt, R-30 fiberglass insulation, vapor retarder, steel hat channel, one layer Type X 5/8" gypsum board on receive side)					
Specimen Area	5.95 m ²	Receive Temp.	23.1 °C	Source Temp.	22.4 °C	
Technician	Sean G. Close	Receive Humidity	49%	Source Humidity	49%	



Appendix C

Photographs



Receive Room View of Installed Specimen



Source Room View of Installed Specimen



Girt with Support Bracket

**Test H, Drawing W-7, Test Date 05/3/17****Data File No. G9722.01H****STC: 49****OITC: 33**

1" VERTICAL
STEEL
BANDING @ 30"
O.C.

26 GA. METAL WALL
PANEL

8" GIRT @ 60" O.C.

VAPOR RETARDER

R-0.75 FOAM TAPE

STEEL HAT
CHANNEL
@ 24" O.C.

R-30 FG INSULATION
W/ HANGERS @ 48"
O.C.

5/8" GYPSUM
BOARD TYPE X

INTERIOR

EXTERIOR

W-7

R-Panel, 8" Girt, R30+R0.75 Tape,
1 Layer Gyp. Bd.