Utilize Bookmark tab for direct link to certain reports by Test Number (i.e. TL20-491)

STC Table: Head-of-Wall Sound Assemblies with CFS-TTS MD Top Track Seal								
Stud Framing	Top Track	Wall Assembly	Joint Filler	Small Notch Filler	Joint Width	Metal Deck Height	Baseline STC*	Tested STC
3-5/8" 25-ga steel (24 in/OC)	20-ga slotted slip track	1 layer - 5/8" Type X gypsum each side	CFS-TTS MD Top Track Seal & P3 Flute Plugs	Sliver of TTS MD on both sides	1"	3"	49 TL20-224	49 TL20-223
3-5/8" 25-ga steel (24 in/OC)	20-ga slotted slip track	2 layers - 5/8" Type X gypsum each side	CFS-TTS MD Top Track Seal & P3 Flute Plugs	Sliver of TTS MD on one side	1"	3"	54 TL20-491	51 TL20-485
			CFS-TTS MD Top Track Seal & P3 Flute Plugs	Sliver of TTS MD on both sides	1"	3"	54 TL20-491	52 TL20-484
			CFS-TTS MD Top Track Seal & P3 Flute Plugs	CP 506 on one side	1"	3"	54 TL20-491	52 TL20-486
			CFS-TTS MD Top Track Seal & P3 Flute Plugs	CP 506 on both sides	1"	3"	54 TL20-491	52 TL20-487
			CFS-TTS MD Top Track Seal & P3 Flute Plugs	Open	1"	3"	54 TL20-491	45 TL20-479
			CP 777 & CFS-SP WB (See Note 4)	Spray (Test Compaison)	1"	3"	54 TL20-491	52 TL20-490

Notes:

1.) Sound assemblies are certified by Western Electro-Acoustic Laboratory

2.) See STC report for detailed requirements of wall construction assembly

3.) Test were performed in accordance with ASTM E 90-09 (2016)

4.) CP 777 & CFS-SP WB test was performed as "stuff & spray" for comparison to the CFS-TTS MD system

***Baseline STC tested systems comprise of the same wall assembly components as the Tested STC system, but do not contain a head-of-wall joint

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-224

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

23 March 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The flute openings in the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs.

TEST CONFIGURATION

Source Room Layers	Framing	Receiving Room Layers
1 layer 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board and Hilti CFS-TTS MD P FS Top Track Plugs in the flute openings of the metal deck	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, one layer of 16 mm (5/8 inch) Type 'X' gypsum board was screwed to the studs using 32 mm (1-1/4 inch) long #6 drywall screws spaced at 203 mm (8 inches) O.C. at the perimeter and 305 mm (12 inches) in the field.
- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides. The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal. The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings. Small corrugations in the metal decking were filled with pieces of duct seal putty. All products were installed per manufacturer's instructions.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-224

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

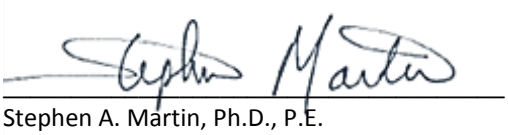
23 March 2020

- All gypsum board was oriented vertically with joints staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
  - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
  - The remainder of the wall assembly that included stud framing was 124 mm (4-7/8 inches) thick.
- The overall weight of the assembly was estimated to be 151.4 kg (333.8 lbs.) for a calculated surface density of 25.5 kg/m^2 (5.2 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

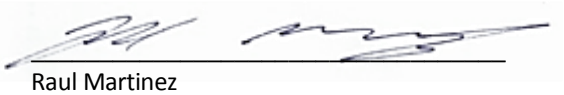
One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 32. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 49.

Approved:



Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory



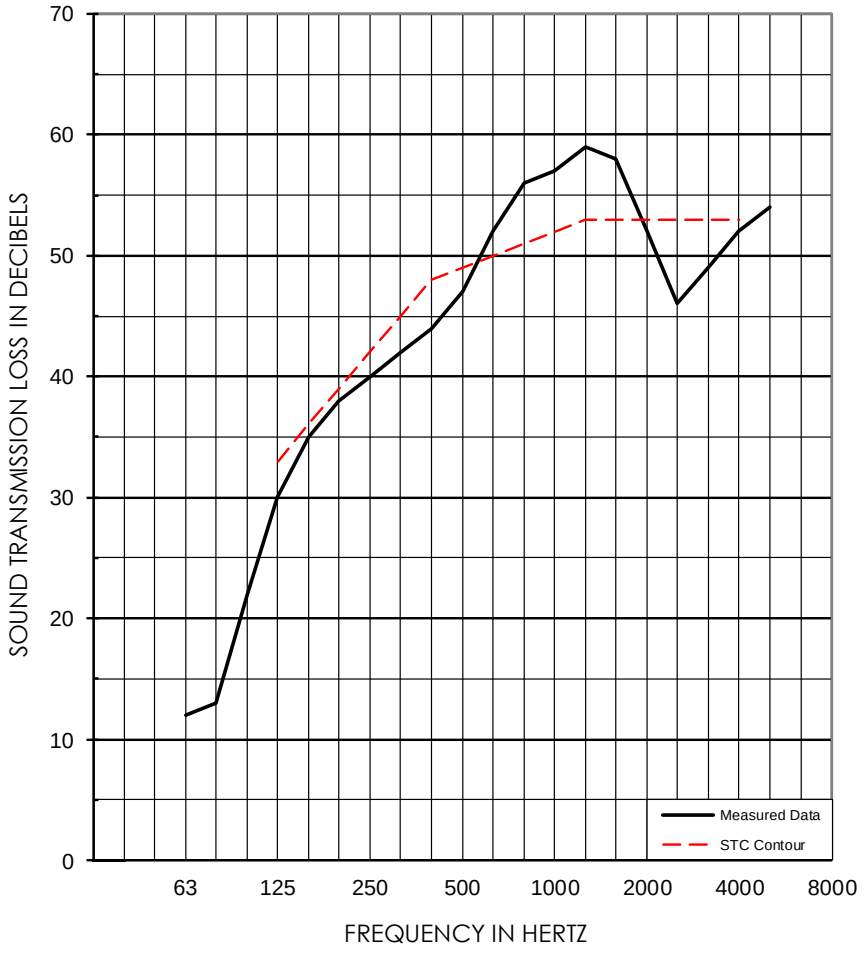
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-224

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**12**	**13**	**22**	**30**	**35**	**38**	**40**	**42**	**44**	**47**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(3)	(1)	(1)	(2)	(3)	(4)	(2)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**57**	**59**	**58**	**52**	**46**	**49**	**52**	**54**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies						(1)	(7)	(4)	(1)	

EWR	OITC
49	32

Test Date: 05 March 2020
Specimen Area: 64 sq.ft.
Temperature: 70.9 deg. F
Relative Humidity: 37 %

STC
49
(29)

NVLAP TESTING
NVLAP LAB CODE 100256-0

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-223

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

23 March 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The flute openings in the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs.

TEST CONFIGURATION

Source Room Layers	Framing	Receiving Room Layers
1 layer 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board and Hilti CFS-TTS MD P FS Top Track Plugs in the flute openings of the metal deck	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, one layer of 16 mm (5/8 inch) Type 'X' gypsum board was screwed to the studs using 32 mm (1-1/4 inch) long #6 drywall screws spaced at 203 mm (8 inches) O.C. at the perimeter and 305 mm (12 inches) in the field.
- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides. The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal. The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings. Small corrugations in the metal decking were filled with pieces of Hilti CFS-TTS Firestop Top Track Seal. All products were installed per manufacturer's instructions.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-223

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121

23 March 2020

TEST DATE: 5 March 2020

- All gypsum board was oriented vertically with joints staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
  - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
  - The remainder of the wall assembly that included stud framing was 124 mm (4-7/8 inches) thick.
- The overall weight of the assembly was estimated to be 151.4 kg (333.8 lbs.) for a calculated surface density of 25.5 kg/m^2 (5.2 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 32. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 49.

Approved:

Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory

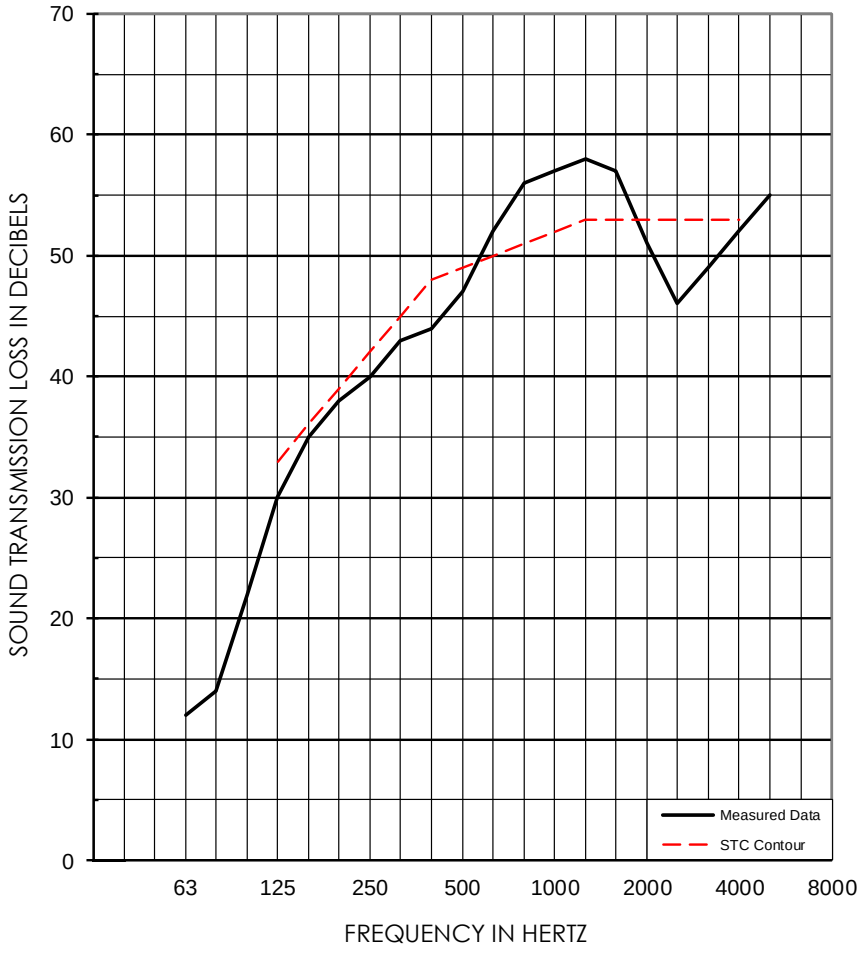
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-223

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**12**	**14**	**22**	**30**	**35**	**38**	**40**	**43**	**44**	**47**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(3)	(1)	(1)	(2)	(2)	(4)	(2)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**57**	**58**	**57**	**51**	**46**	**49**	**52**	**55**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies						(2)	(7)	(4)	(1)	

EWR	OITC
49	32

Test Date: 05 March 2020
Specimen Area: 64 sq.ft.
Temperature: 70.9 deg. F
Relative Humidity: 37 %

STC
49
(29)

NVLAP TESTING
NVLAP LAB CODE 100256-0

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-491

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 28 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, and batt insulation in the stud cavity.

TEST CONFIGURATION

Source Room Layers	Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
  - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - Joints for the first and second layer were staggered.
  - All gypsum board was oriented vertically.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high by 156 mm (6-1/8 inches) thick.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-491

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 28 September 2020

09 October 2020

- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 39. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 54.

Approved:

Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory

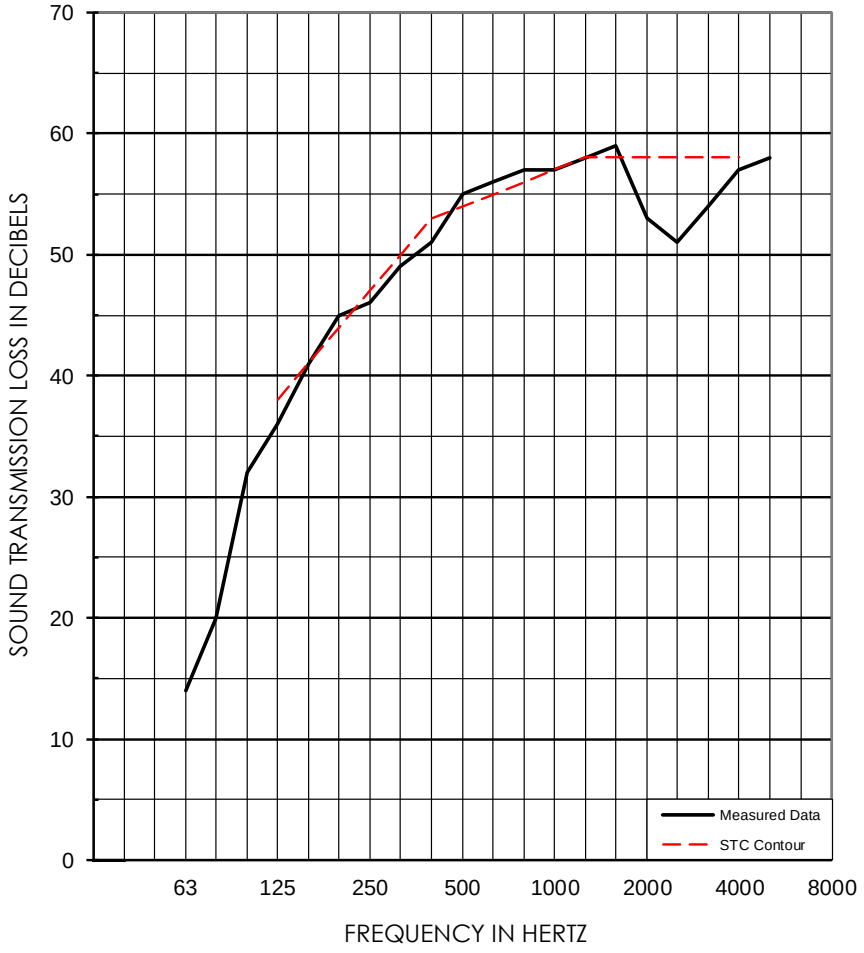
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-491

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 28 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**14**	**20**	**32**	**36**	**41**	**45**	**46**	**49**	**51**	**55**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(2)	(0)		(1)	(1)	(2)	

1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	**56**	**57**	**57**	**58**	**59**	**53**	**51**	**54**	**57**	**58**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies			(0)	(0)		(5)	(7)	(4)	(1)	

EWR	OITC
55	39

Test Date: 28 September 2020
Specimen Area: 64 sq.ft.
Temperature: 77.8 deg. F
Relative Humidity: 33 %

STC
54
(23)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-491

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 28 September 2020

09 October 2020

PHOTO OF TEST SPECIMEN

NVLAP TESTING
NVLAP LAB CODE 100256-0

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-485

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs. The small flute openings of the metal deck were filled with small pieces of Hilti CFS-TTS-MD on one side.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti CFS-TTS MD P FS Top Track Plugs in the large flute openings of the metal deck, and small pieces of Hilti CFS-TTS-MD on one side	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
  - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - Joints for the first and second layer were staggered.
  - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-485

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

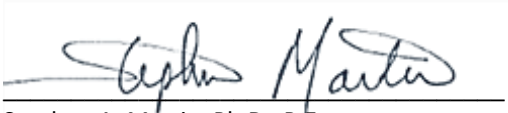
09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
    - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal.
    - The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings.
    - Small corrugations in the metal decking filled with small pieces of Hilti CFS-TTS-MD on one side. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
    - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
    - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

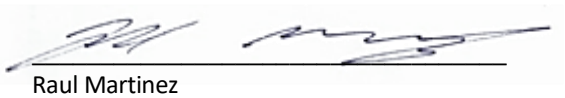
One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 36. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 51.

Approved:



Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory



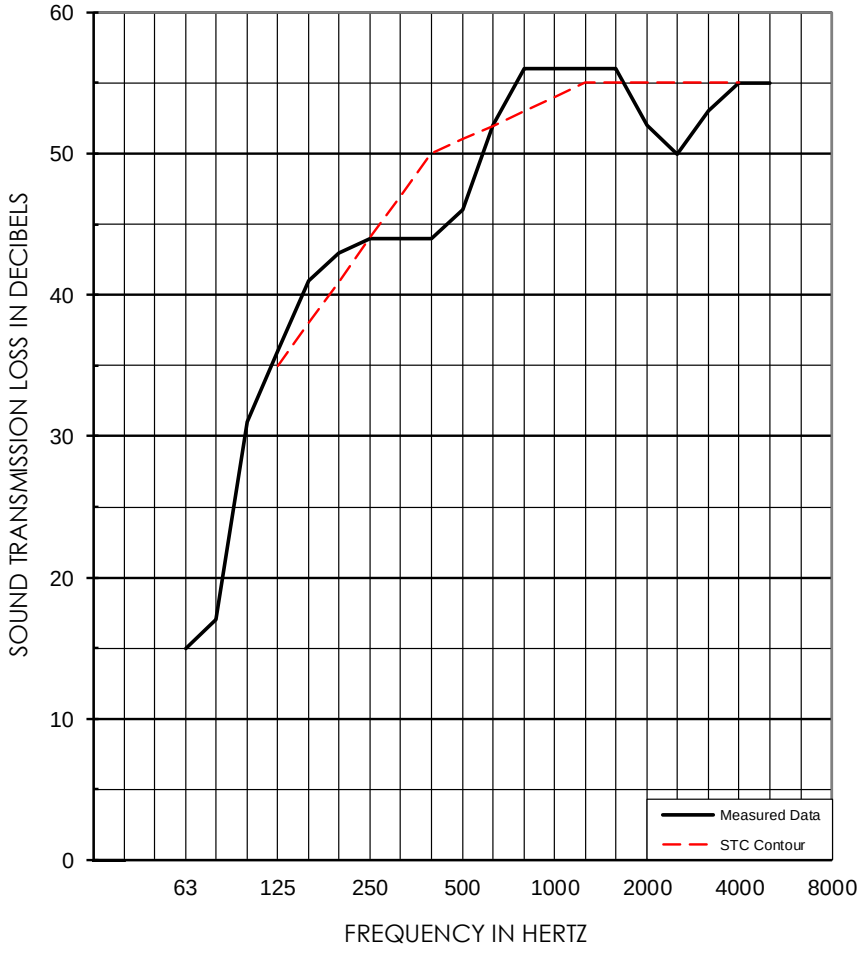
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-485

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**15**	**17**	**31**	**36**	**41**	**43**	**44**	**44**	**44**	**46**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies							(0)	(3)	(6)	(5)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**56**	**56**	**56**	**52**	**50**	**53**	**55**	**55**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(0)					(3)	(5)	(2)	(0)	

EWR	OITC
52	36

Test Date: 24 September 2020
Specimen Area: 64 sq.ft.
Temperature: 79.4 deg. F
Relative Humidity: 31 %

STC
51
(24)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-485

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121

09 October 2020

TEST DATE: 24 September 2020

PHOTOS OF TEST SPECIMEN

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-484

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs. The small flute openings of the metal deck were filled with small pieces of Hilti CFS-TTS-MD on both sides.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti CFS-TTS MD P FS Top Track Plugs in the large flute openings of the metal deck, and small pieces of Hilti CFS-TTS-MD on both sides	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
  - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - Joints for the first and second layer were staggered.
  - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-484

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
  - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal.
  - The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings.
  - Small corrugations in the metal decking filled with small pieces of Hilti CFS-TTS-MD on both sides. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
  - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
  - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 36. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 52.

Approved:

Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory

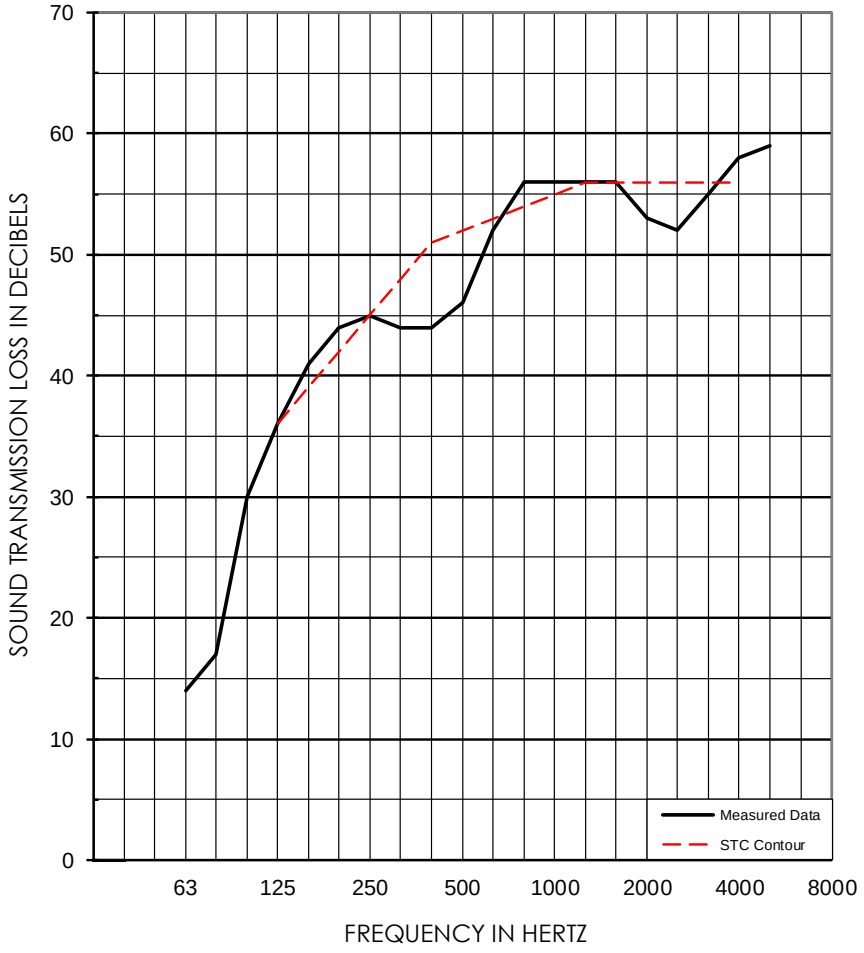
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-484

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**14**	**17**	**30**	**36**	**41**	**44**	**45**	**44**	**44**	**46**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(0)			(0)	(4)	(7)	(6)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**56**	**56**	**56**	**53**	**52**	**55**	**58**	**59**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(1)			(0)	(0)	(3)	(4)	(1)		

EWR	OITC
53	36

Test Date: 24 September 2020
Specimen Area: 64 sq.ft.
Temperature: 78.6 deg. F
Relative Humidity: 33 %

STC
52
(26)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-484

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

PHOTOS OF TEST SPECIMEN

NVLAP TESTING
NVLAP LAB CODE 100256-0

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-486

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs. The small flute openings of the metal deck were filled with Hilti CP 506 Smoke and Acoustic Sealant on one side.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti CFS-TTS MD P FS Top Track Plugs in the large flute openings of the metal deck, and Hilti CP 506 Smoke and Acoustic Sealant on one side in the small flute openings of the metal deck	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
    - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
    - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
    - Joints for the first and second layer were staggered.
    - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-486

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

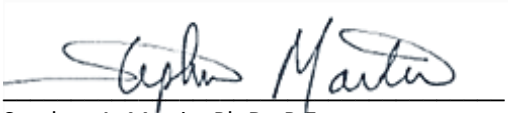
09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
  - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal.
  - The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings.
  - Small corrugations in the metal decking filled with Hilti CP 506 Smoke and Acoustic Sealant on one side. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
  - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
  - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

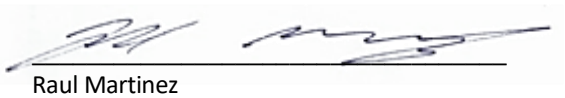
One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 35. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 52.

Approved:



Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory



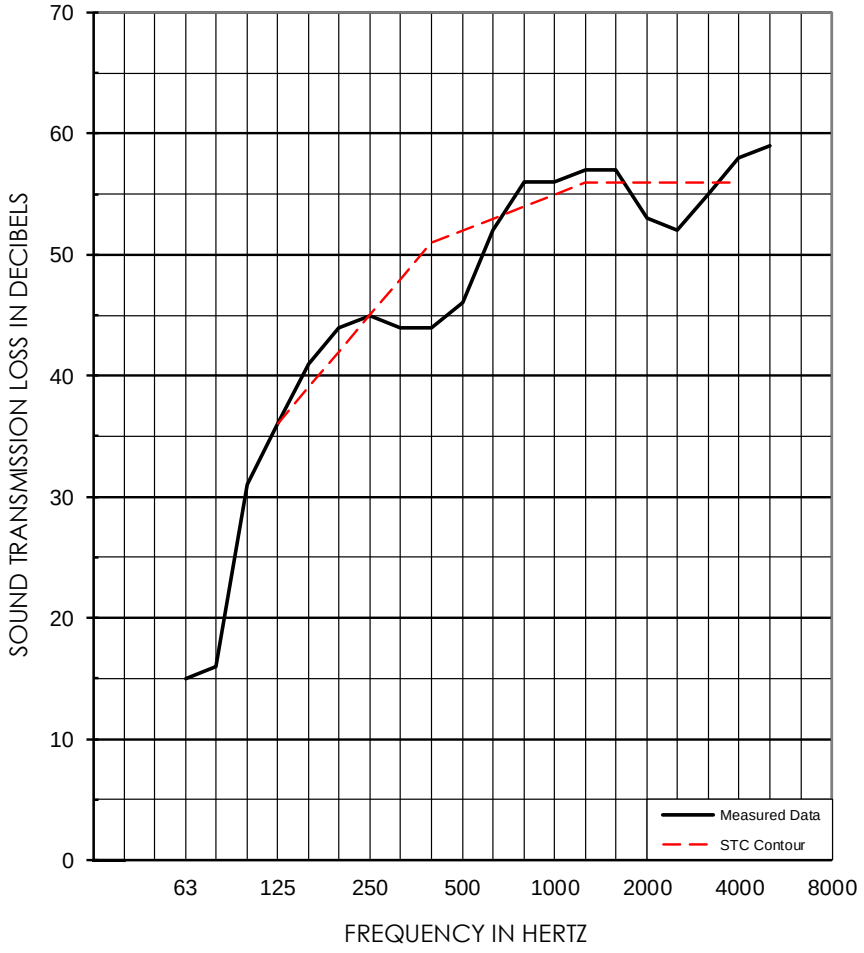
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-486

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**15**	**16**	**31**	**36**	**41**	**44**	**45**	**44**	**44**	**46**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(0)			(0)	(4)	(7)	(6)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**56**	**57**	**57**	**53**	**52**	**55**	**58**	**59**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(1)					(3)	(4)	(1)		

EWR	OITC
53	35

Test Date: 24 September 2020
Specimen Area: 64 sq.ft.
Temperature: 79.1 deg. F
Relative Humidity: 35 %

STC
52
(26)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-486

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

PHOTOS OF TEST SPECIMEN

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-487

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs. The small flute openings of the metal deck were filled with Hilti CP 506 Smoke and Acoustic Sealant on both sides.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti CFS-TTS MD P FS Top Track Plugs in the large flute openings of the metal deck, and Hilti CP 506 Smoke and Acoustic Sealant on both sides in the small flute openings of the metal deck	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
    - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
    - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
    - Joints for the first and second layer were staggered.
    - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-487

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
    - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal.
    - The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings.
    - Small corrugations in the metal decking filled with Hilti CP 506 Smoke and Acoustic Sealant on both sides. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
    - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
    - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 36. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 52.

Approved:

Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory

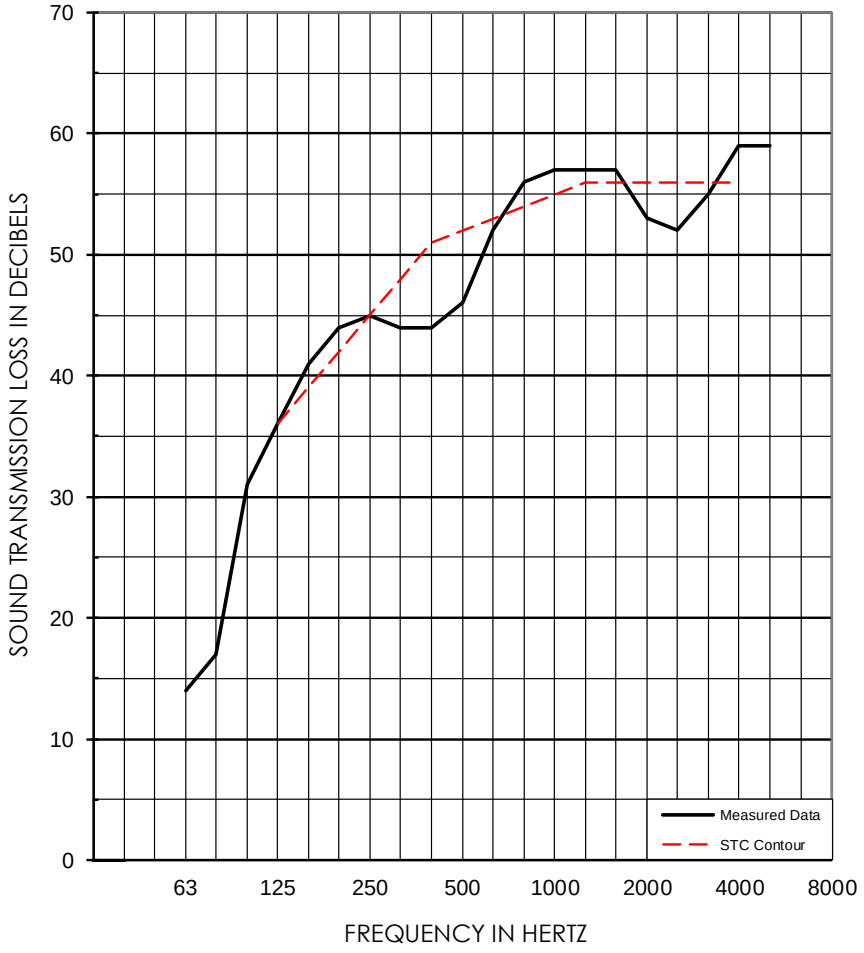
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-487

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**14**	**17**	**31**	**36**	**41**	**44**	**45**	**44**	**44**	**46**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(0)			(0)	(4)	(7)	(6)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**52**	**56**	**57**	**57**	**57**	**53**	**52**	**55**	**59**	**59**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(1)					(3)	(4)	(1)		

EWR	OITC
53	36

Test Date: 24 September 2020
Specimen Area: 64 sq.ft.
Temperature: 79.2 deg. F
Relative Humidity: 32 %

STC
52
(26)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-487

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

PHOTO OF TEST SPECIMEN

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-479

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Atop the track, the Hilti CFS-TTS MD Firestop Top Track Seal was installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti CFS-TTS MD P FS Top Track Plugs. The small flute openings of the metal deck were left open.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti CFS-TTS MD Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti CFS-TTS MD P FS Top Track Plugs in the large flute openings of the metal deck, and nothing installed in the small flute openings of the metal deck	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
  - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - Joints for the first and second layer were staggered.
  - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-479

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

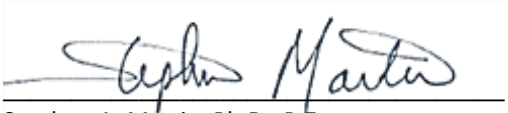
09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
    - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Hilti CFS-TTS MD TTS Firestop Top Track Seal.
    - The flute openings that were exposed were filled Hilti CFS-TTS MD P FS Top Track Plugs, which are trapezoidal foam bricks which fill the openings.
    - Small corrugations in the metal decking were left open. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
    - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
    - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

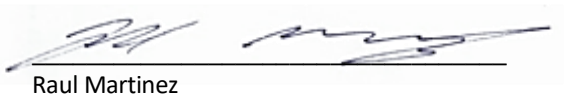
One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 35. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 45.

Approved:



Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory



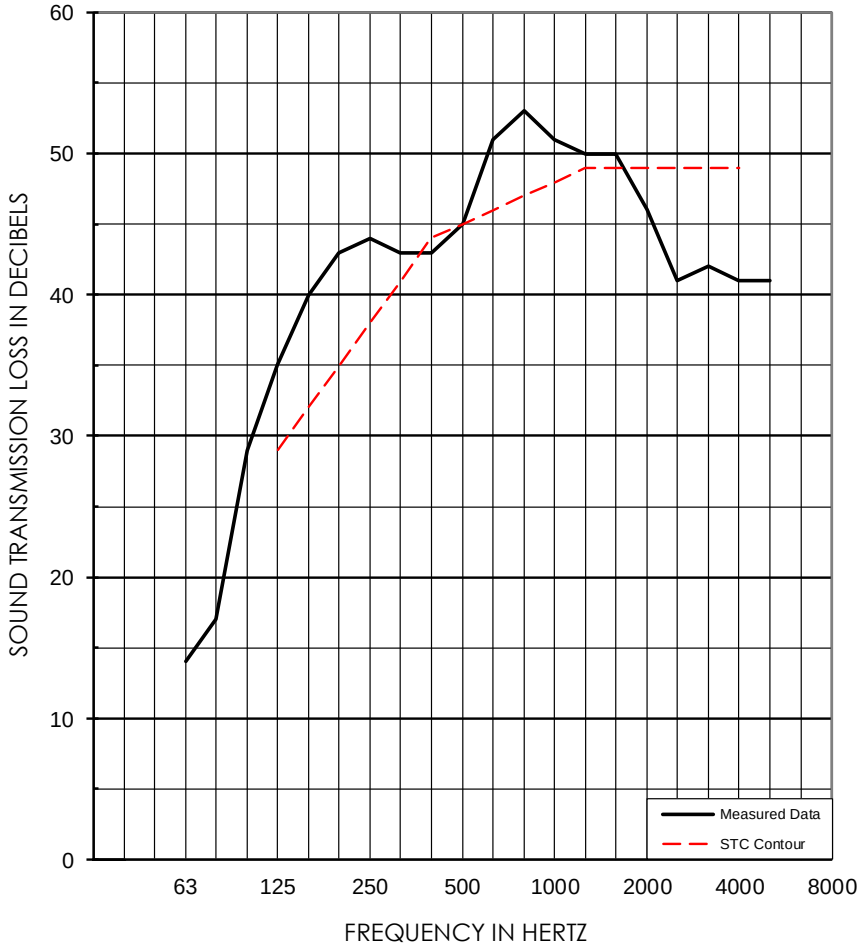
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-479

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**14**	**17**	**29**	**35**	**40**	**43**	**44**	**43**	**43**	**45**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies									(1)	(0)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**51**	**53**	**51**	**50**	**50**	**46**	**41**	**42**	**41**	**41**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies						(3)	(8)	(7)	(8)	

EWR	OITC
49	35

Test Date: 24 September 2020
Specimen Area: 64 sq.ft.
Temperature: 79.2 deg. F
Relative Humidity: 32 %

STC
45
(27)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-479

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 24 September 2020

09 October 2020

PHOTOS OF TEST SPECIMEN

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-490

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 25 September 2020

09 October 2020

INTRODUCTION

The test was performed in accordance with ASTM E 90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions* and ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by the United States Department of Commerce, National Institute of Standards and Technology under the National Voluntary Accreditation Program (NVLAP) Lab Code 100256-0 for this test procedure. This test report relates only to the item(s) tested. This report must not be used to claim product certification, approval, or endorsement by WEAL, NVLAP, NIST or any agency of the federal government.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of a single steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel and batt insulation in the stud cavity. The top of the wall assembly mimicked a concrete metal deck structure, and the framing was mounted to it. Hilti Speed strips CP 767 mineral wool strips were installed to seal the head-of-wall joint. The large flute openings of the metal deck were filled with Hilti Speed plugs CP 777 mineral wool plugs. The mineral wool on each side of the assembly was painted with Hilti CFS-SP WB acrylic paint-on sealant on both sides.

TEST CONFIGURATION

Source Room Layers	Source Framing	Receiving Room Layers
2 layers 16 mm (5/8 inch) Type 'X' gypsum board	92 mm (3-5/8 inch) 25-gauge steel studs and 20-gauge slotted slip track spaced 610 mm (24 inches) on center with R-13 batt insulation in the cavity and top of the wall to mimic a concrete metal deck structure. Hilti Speed strips CP 767 mineral wool strips at the 13 mm (1/2 inch) head-of-wall joint for the gypsum board, Hilti Speed plugs CP 777 mineral wool plugs in the large flute openings of the metal deck, and Hilti CFS-SP WB acrylic paint-on sealant over the mineral wool on both sides	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- The framing consisted of 92 mm (3-5/8 inch) 25-gauge steel studs that were spaced 610 mm (24 inches) on center (O.C.) and were screwed to the 20-gauge slotted slip track with 12 mm (1/2 inch) truss screws. Unfaced R-13 fiberglass insulation was installed in the stud cavities. The frame was isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On both sides, two layers of 16 mm (5/8 inch) Type 'X' gypsum board were screwed to the studs.
  - The first layer was screwed using 32 mm (1-1/4 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 406 mm (16 inches) O.C. along the perimeter and 406 mm (16 inches) O.C. in the field.
  - Joints for the first and second layer were staggered.
  - All gypsum board was oriented vertically.

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-490

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 25 September 2020

09 October 2020

- The top 152 mm (6 inches) of the wall assembly was constructed to mimic a metal deck structure with flute openings exposed on both sides.
    - The head-of-wall joint where the gypsum board terminated at the top track was 13 mm (1/2 inch) in size and was sealed with Speed strips CP 767 mineral wool strips.
    - The flute openings that were exposed were filled Hilti Speed plugs CP 777 mineral wool plugs, which are trapezoidal foam bricks which fill the openings.
    - Hilti CFS-SP WB acrylic paint-on sealant was painted over the mineral wool on both sides. All products were installed per manufacturer's instructions.
- All gypsum board joints were staggered on opposite sides. Aside from the head-of-wall joint and areas where the metal deck was left exposed, the remaining gypsum board joints were sealed with a bead of latex caulking and metal foil tape. All screw heads were covered with metal foil tape.
- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high. The thickness is described below:
    - The metal deck configuration was 203 mm (8 inches) thick for the top 152 mm (6 inches) of the wall assembly.
    - The remainder of the wall assembly that included stud framing was 156 mm (6-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 270.4 kg (596.0 lbs.) for a calculated surface density of 45.5 kg/m^2 (9.3 lbs./ft^2).

RESULTS OF THE MEASUREMENTS

One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Outdoor-Indoor Transmission Class rating determined in accordance with ASTM E 1332-10a was OITC 37. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 52.

Approved:

Stephen A. Martin, Ph.D., P.E.
Laboratory Director

Respectfully submitted,
Western Electro-Acoustic Laboratory

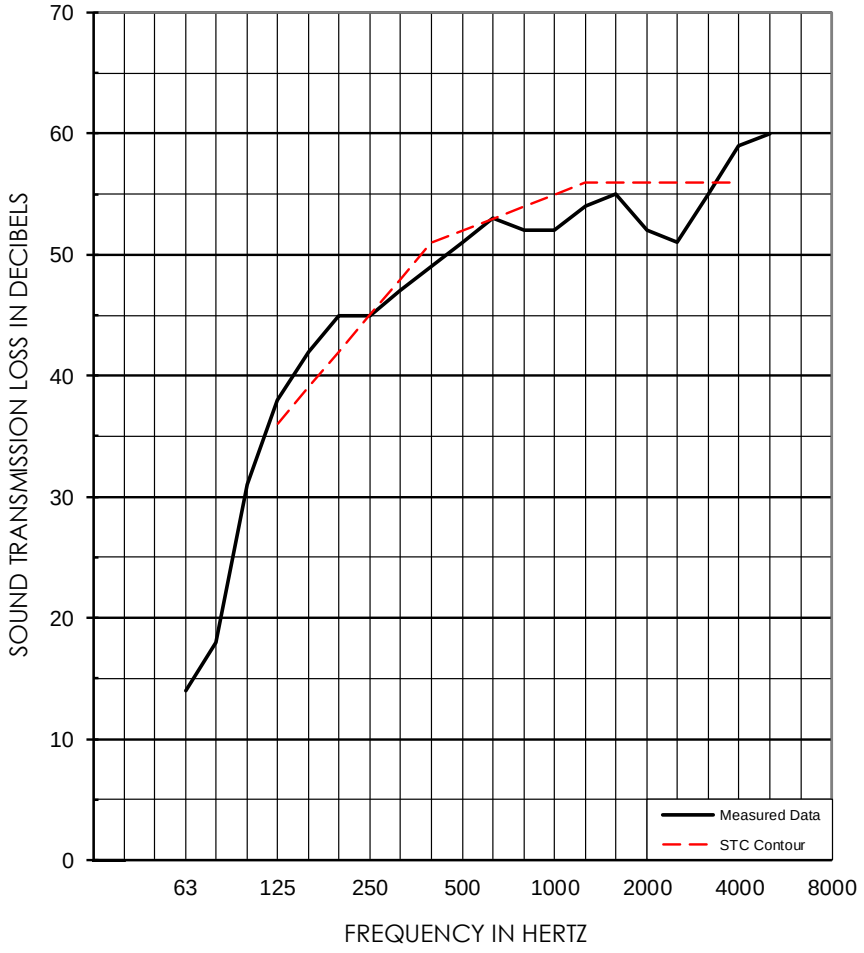
Raul Martinez
Acoustical Test Technician

WESTERN ELECTRO - ACOUSTIC LABORATORY
TESTING • CALIBRATION • RESEARCH
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-490

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 25 September 2020

09 October 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	**14**	**18**	**31**	**38**	**42**	**45**	**45**	**47**	**49**	**51**
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies							(0)	(1)	(2)	(1)
1/3 OCT BAND CNTR FREQ	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**	**4000**	**5000**
TL in dB	**53**	**52**	**52**	**54**	**55**	**52**	**51**	**55**	**59**	**60**
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(0)	(2)	(3)	(2)	(1)	(4)	(5)	(1)		

EWR	OITC
54	37

Test Date: 25 September 2020
Specimen Area: 64 sq.ft.
Temperature: 79.2 deg. F
Relative Humidity: 32 %

STC
52
(22)

NVLAP TESTING
NVLAP LAB CODE 100256-0

25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-490

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 25 September 2020

09 October 2020

PHOTO OF TEST SPECIMEN