



STC Table: Head-of-Wall Sound Assemblies with CFS-TTS Top Track Seal

Stud Framing	Top Track	Wall Assembly	Joint Filler	Joint Width	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 Top Track Seal	1/2"	50 TL20-222	49 TL20-221
3-5/8" 25-ga steel (24 in/OC)	20-ga slotted slip track	2 layers - 5/8" Type X gypsum each side	None - Open Joint	1/2"	53 TL20-218	49 TL20-217
			CFS-TTS Top Track Seal	1/2"	53 TL20-218	53 TL20-220
			CFS-TTS Top Track Seal (backer rod install)	1/2"	53 TL20-218	53 TL20-219
3-5/8" 25-ga steel (24 in/OC) double wall w/ 1" air gap	20-ga slotted slip track	1 layer - 5/8" Type X gypsum each side	CFS-TTS Top Track Seal	1/2"	64 TL20-208	63 TL20-207
3-5/8" 25-ga steel (24 in/OC) double wall w/ 1" air gap	20-ga slotted slip track	2 & 1 layer on other side - 5/8" Type X gypsum	CFS-TTS Top Track Seal	1/2"	66 TL20-210	66 TL20-209
3-5/8" 25-ga steel (24 in/OC) double wall w/ 1" air gap	20-ga slotted slip track	2 layers - 5/8" Type X gypsum each side	None - Open Joint	1/2"	68 TL20-212	52 TL20-213
			CP 606 Sealant (5/8" depth)	1/2"	68 TL20-212	68 TL20-216
			CFS-TTS Top Track Seal	1/2"	68 TL20-212	68 TL20-211
			CFS-TTS Top Track Seal (backer rod install)	1/2"	68 TL20-212	68 TL20-215

Notes:

- 1.) Sound assemblies are certified by Western Electro-Acoustic Laboratory
- 2.) See STC report hyperlinks for detailed requirements of wall construction assembly
- 3.) Test were performed in accordance with ASTM E 90-09 (2016)

*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



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-207

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

TEST DATE: 3 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed per manufacturer's instructions.
- All gypsum board was oriented vertically with joints 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 241 mm (9-1/2 inches) thick.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-207

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 3 March 2020

23 March 2020

- The overall weight of the assembly was estimated to be 161.2 kg (355.5 lbs.) for a calculated surface density of 27.1 kg/m² (5.6 lbs./ft²).

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 47. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 63.

Approved:

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Raul Martinez
Acoustical Test Technician

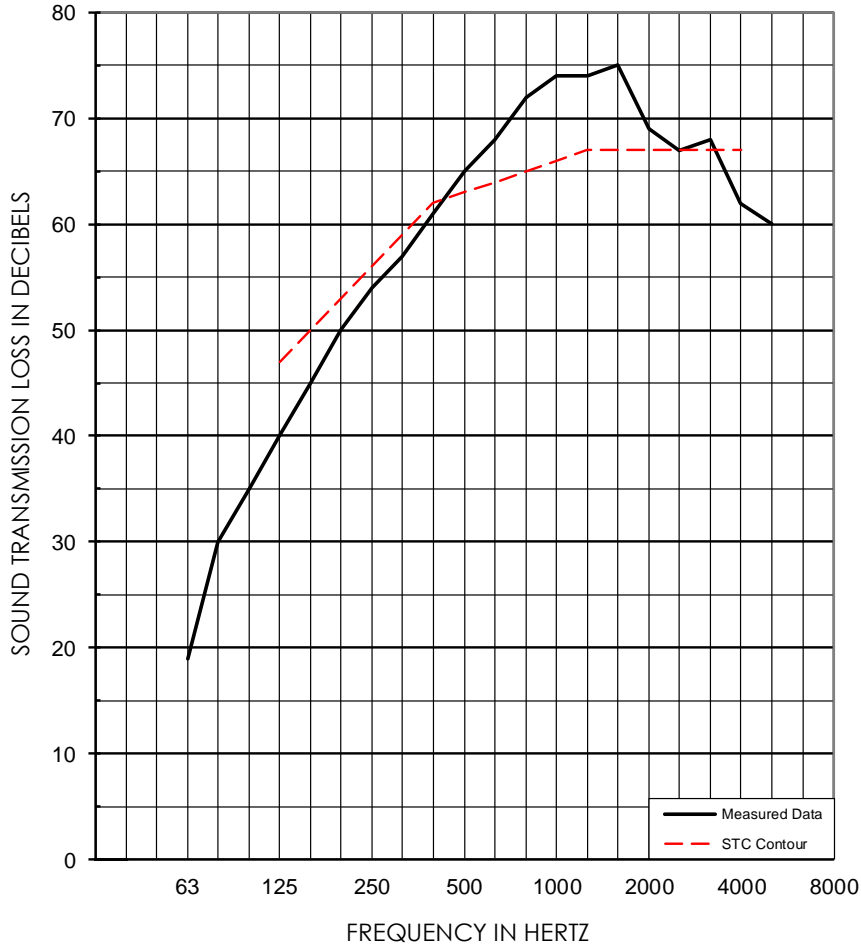


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-207

CLIENT: **Hilti**
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 Tulsa, Oklahoma 74121

TEST DATE: 3 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	19	30	35	40	45	50*	54*	57*	61*	65*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
				(7)	(5)	(3)	(2)	(2)	(1)	
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	68*	72*	74*	74*	75*	69*	67	68	62	60
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
							(0)		(5)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
63	47	Test Date: 03 March 2020 Specimen Area: 64 sq.ft. Temperature: 68.9 deg. F Relative Humidity: 30 %								63 (25)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-208

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and duct seal putty at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with duct seal putty.
- All gypsum board was oriented vertically with joints 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 241 mm (9-1/2 inches) thick.
- The overall weight of the assembly was estimated to be 161.2 kg (355.5 lbs.) for a calculated surface density of 27.1 kg/m² (5.6 lbs./ft²).



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-208

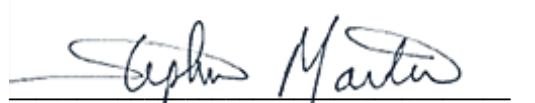
CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

23 March 2020

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 47. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 64.

Approved:



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

Respectfully submitted,
Western Electro-Acoustic Laboratory



Raul Martinez
Acoustical Test Technician

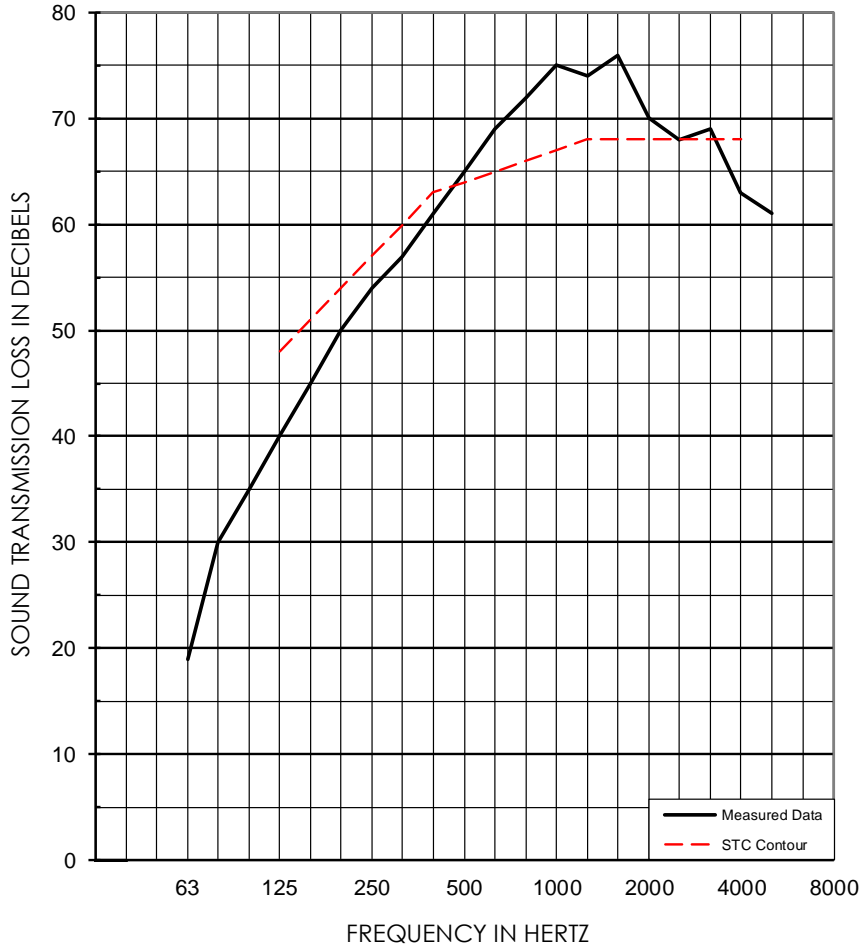


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-208

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	19	30	35	40	45	50	54*	57*	61*	65*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
				(8)	(6)	(4)	(3)	(3)	(2)	
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	69*	72*	75*	74*	76*	70*	68	69	63	61
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
							(0)		(5)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
63	47	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								64 (31)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-209

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On the source side, 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On the receiving side, 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 gypsum board was oriented vertically.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-209

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

23 March 2020

- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed per manufacturer’s instructions.
- 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 257 mm (10-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 225.1 kg (496.3 lbs.) for a calculated surface density of 37.9 kg/m² (7.8 lbs./ft²).

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 51. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 66.

Approved:

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Raul Martinez
Acoustical Test Technician

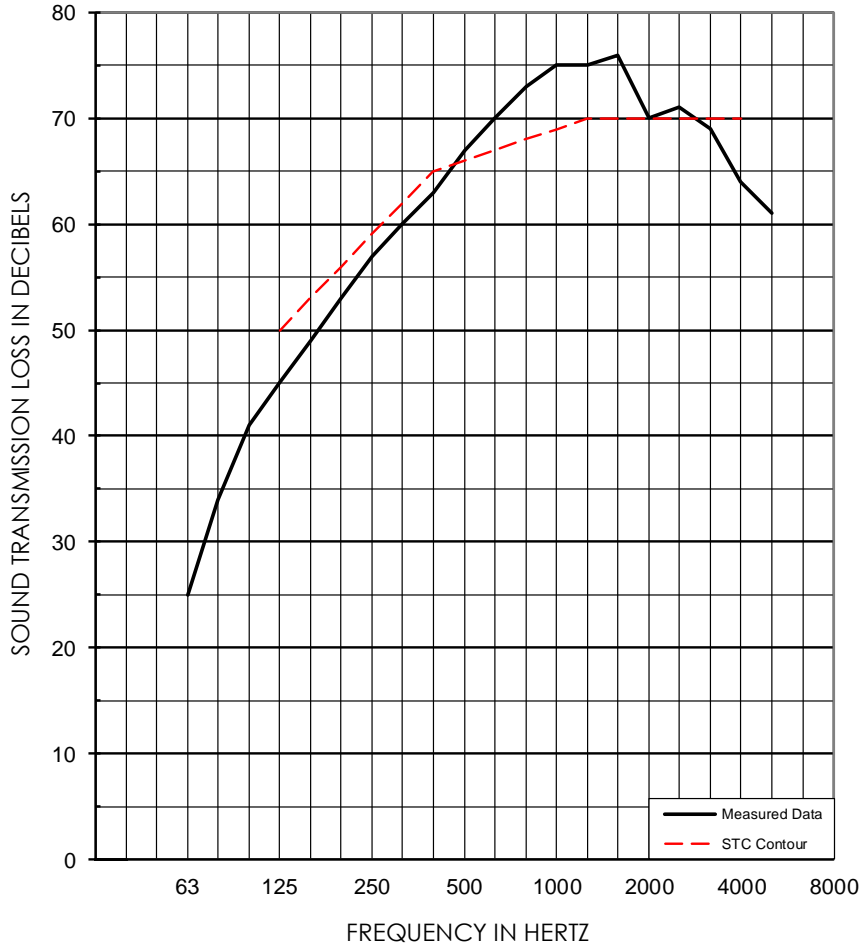


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1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	25	34*	41*	45*	49*	53*	57*	60*	63*	67*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
				(5)	(4)	(3)	(2)	(2)	(2)	
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	70*	73*	75*	75*	76*	70*	71*	69	64	61
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(0)		(1)	(6)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
66	51	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								66 (25)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-210

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and duct seal putty at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	1 layer 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were isolated from the test opening with 6 mm (1/4 inch) neoprene pads.
- On the source side, 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On the receiving side, 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 gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with duct seal putty.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-210

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

TEST DATE: 4 March 2020

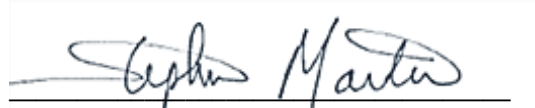
23 March 2020

- 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 257 mm (10-1/8 inches) thick.
- The overall weight of the assembly was estimated to be 225.1 kg (496.3 lbs.) for a calculated surface density of 37.9 kg/m² (7.8 lbs./ft²).

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 51. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 66.

Approved:



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

Respectfully submitted,
 Western Electro-Acoustic Laboratory



Raul Martinez
 Acoustical Test Technician

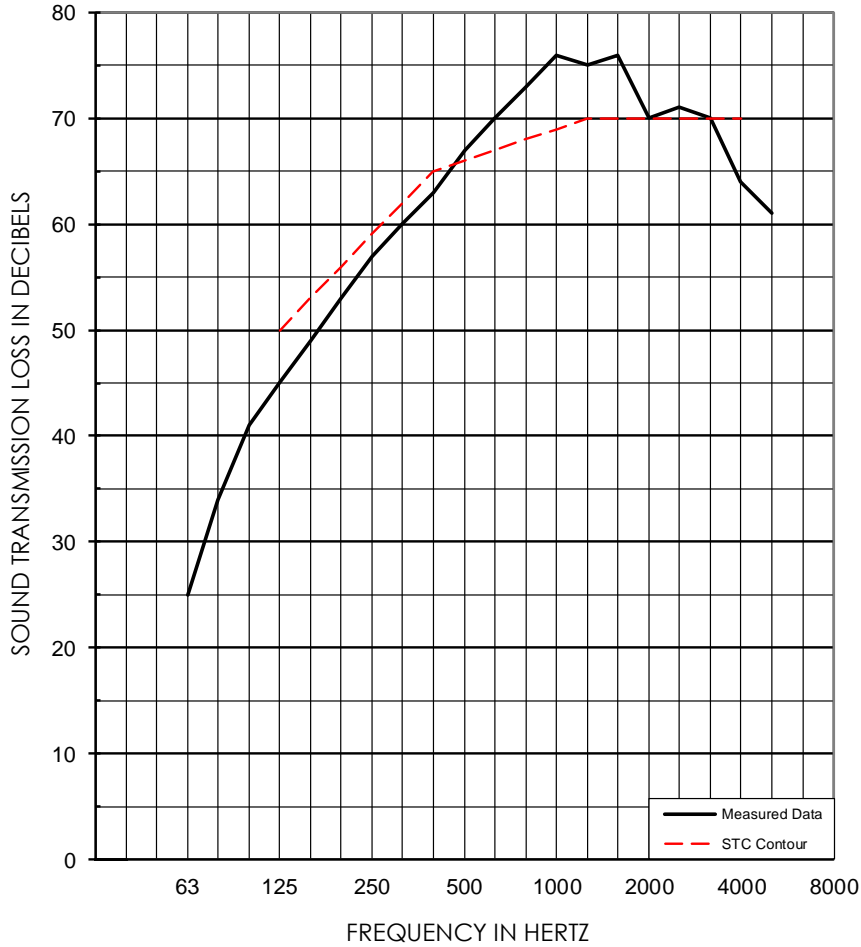


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1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	25	34*	41*	45*	49*	53*	57*	60*	63*	67*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
				(5)	(4)	(3)	(2)	(2)	(2)	
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	70*	73*	76*	75*	76*	70*	71*	70	64	61
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(0)	(0)	(0)	(6)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
66	51	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								66 (24)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-211

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed per manufacturer's instructions.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-211

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

TEST DATE: 4 March 2020

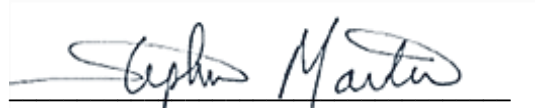
23 March 2020

- 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 2.39 m (94 inches) high by 273 mm (10-3/4 inches) thick.
- The overall weight of the assembly was estimated to be 289.0 kg (637.1 lbs.) for a calculated surface density of 48.6 kg/m² (10.0 lbs./ft²).

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 54. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 68.

Approved:



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

Respectfully submitted,
 Western Electro-Acoustic Laboratory



Raul Martinez
 Acoustical Test Technician

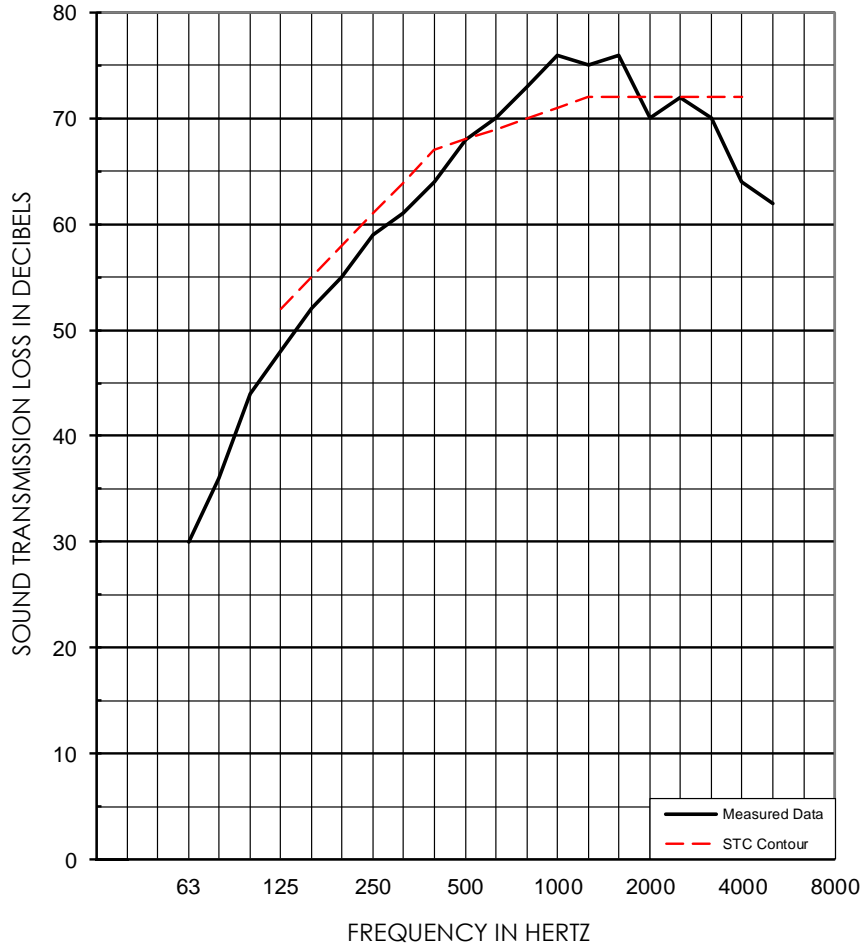


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-211

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	30*	36*	44*	48*	52*	55*	59*	61*	64*	68*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
			(4)	(3)	(3)	(2)	(3)	(3)	(3)	(0)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	70*	73*	76*	75*	76*	70*	72*	70	64	62
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(2)	(0)	(2)	(8)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
68	54	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								68 (30)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-212

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and duct seal putty at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with duct seal putty.
- 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.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-212

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

23 March 2020

- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high by 273 mm (10-3/4 inches) thick.
- The overall weight of the assembly was estimated to be 289.0 kg (637.1 lbs.) for a calculated surface density of 48.6 kg/m² (10.0 lbs./ft²).

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 54. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 68.

Approved:

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Raul Martinez
Acoustical Test Technician

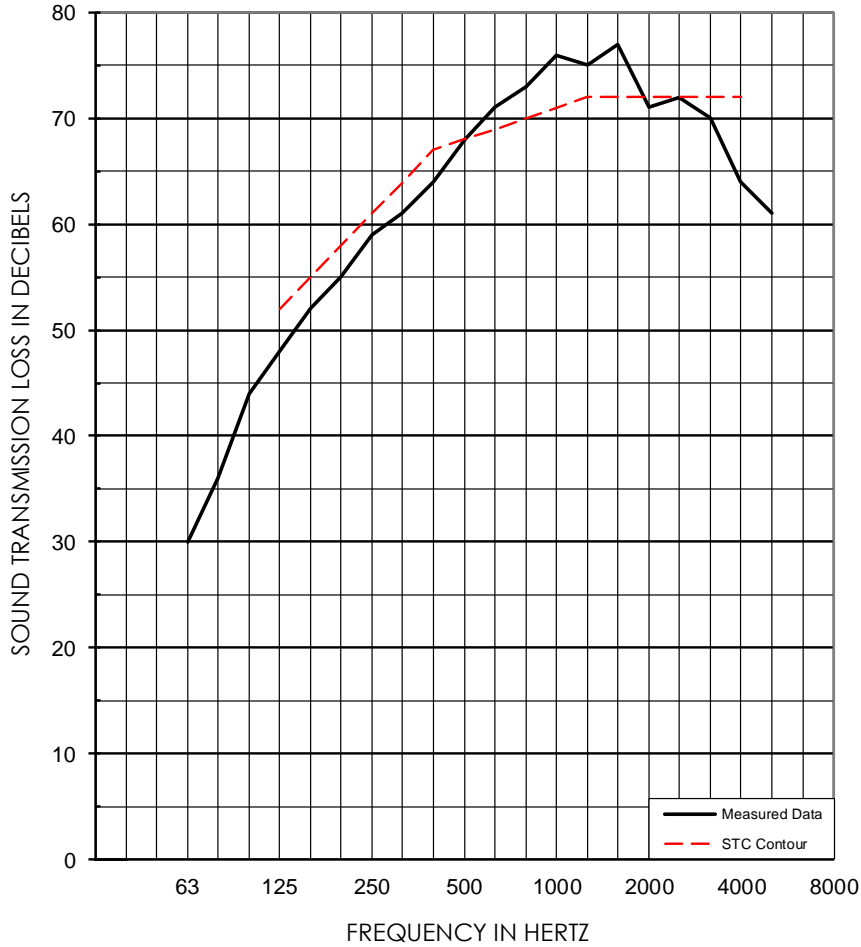


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-212

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	30*	36*	44*	48*	52*	55*	59*	61*	64*	68*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
				(4)	(3)	(3)	(2)	(3)	(3)	(0)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	71*	73*	76*	75*	77*	71*	72*	70	64	61
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(1)	(0)	(2)	(8)	
EWR	OITC	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								STC
68	54									68 (29)

* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-213

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and an open gap at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 an open gap at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 an open gap at the 13 mm (1/2 inch) head-of-wall joint	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was left unsealed.
- 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.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-213

CLIENT: Hilti
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

23 March 2020

- The overall dimensions of the wall assembly were 2.44 m (96 inches) wide by 2.44 m (96 inches) high by 273 mm (10-3/4 inches) thick.
The overall weight of the assembly was estimated to be 289.0 kg (637.1 lbs.) for a calculated surface density of 48.6 kg/m^2 (10.0 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 49. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 52.

Approved:

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Signature of Raul Martinez
Raul Martinez
Acoustical Test Technician



WESTERN ELECTRO - ACOUSTIC LABORATORY

TESTING • CALIBRATION • RESEARCH

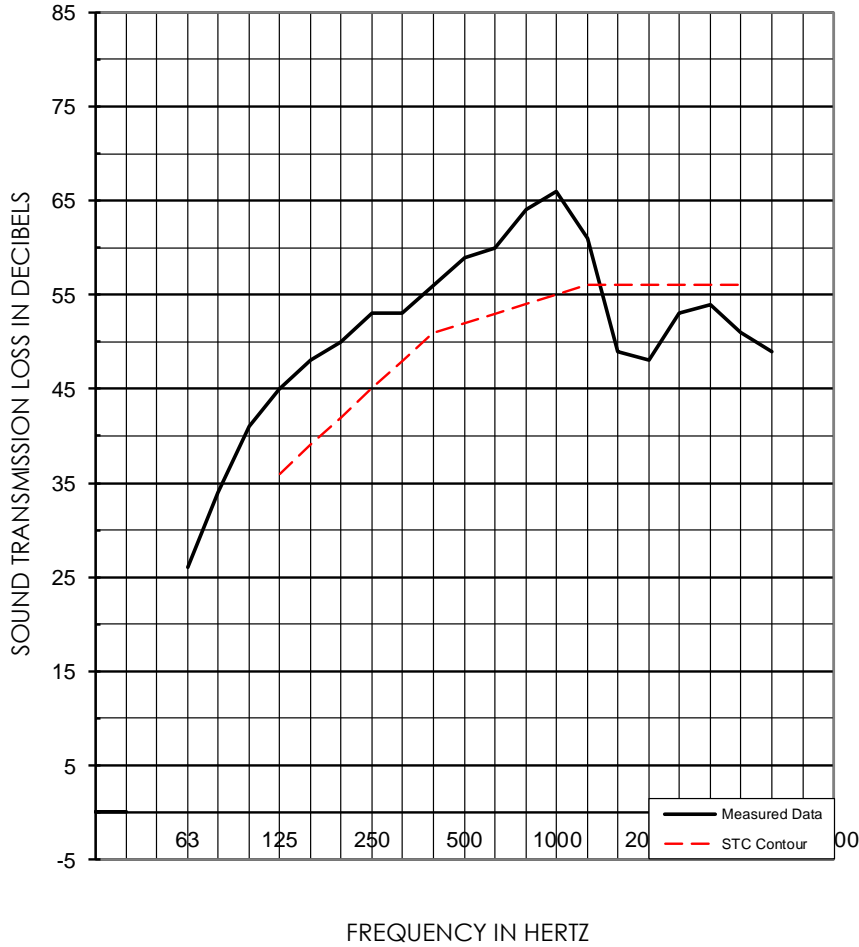
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-213

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	26*	34*	41*	45*	48*	50	53*	53	56	59
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	60	64	66	61	49	48	53	54	51	49
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56 (7)	0.55 (8)	0.31 (3)	0.32 (2)	0.50 (5)
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
58	49	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								52 (25)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-215

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed by rolling the product and friction-fitting it into the head-of-wall joint.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-215

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

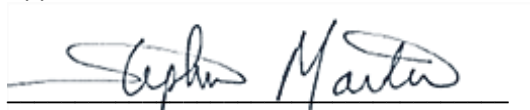
23 March 2020

- 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 273 mm (10-3/4 inches) thick.
- The overall weight of the assembly was estimated to be 289.0 kg (637.1 lbs.) for a calculated surface density of 48.6 kg/m² (10.0 lbs./ft²).

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 54. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 68.

Approved:



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

Respectfully submitted,
Western Electro-Acoustic Laboratory



Raul Martinez
Acoustical Test Technician

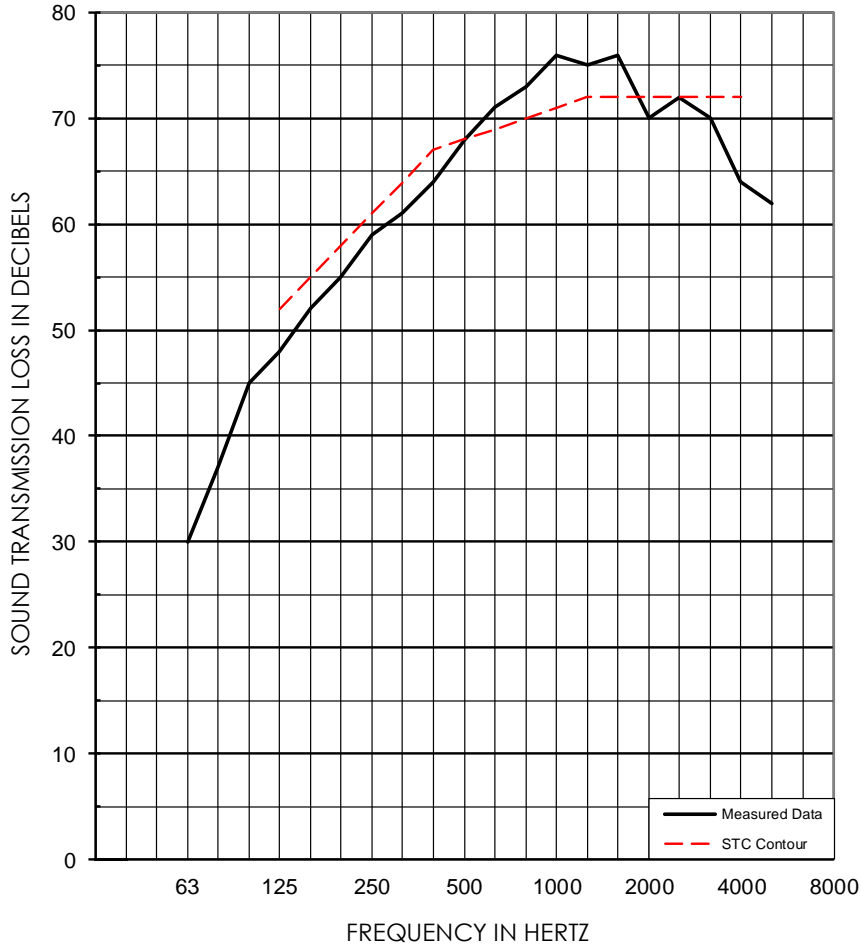


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-215

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	30*	37*	45*	48*	52*	55*	59*	61*	64*	68*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
			(4)	(3)	(3)	(2)	(3)	(3)	(3)	(0)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	71*	73*	76*	75*	76*	70*	72*	70	64	62
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(2)	(0)	(2)	(8)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
68	54	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								68 (30)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-216

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

TEST DATE: 4 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 double steel stud wall assembly with Type 'X' gypsum board installed on both sides of the panel, batt insulation in the stud cavity, and Hilti CP 606 Firestop acrylic sealant at the head-of-wall joint.

TEST CONFIGURATION

Source Room Layers	Source Framing	Air Gap	Receiving 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 Hilti CP 606 Firestop acrylic sealant at the 13 mm (1/2 inch) head-of-wall joint	25 mm (1 inch)	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 Hilti CP 606 Firestop acrylic sealant at the 13 mm (1/2 inch) head-of-wall joint	2 layers 16 mm (5/8 inch) Type 'X' gypsum board

- On both sides, the 92 mm (3-5/8 inch) 25-gauge steel studs 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 frames were 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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CP 606 Firestop acrylic sealant.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-216

CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 4 March 2020

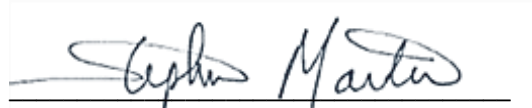
23 March 2020

- 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 273 mm (10-3/4 inches) thick.
- The overall weight of the assembly was estimated to be 289.0 kg (637.1 lbs.) for a calculated surface density of 48.6 kg/m² (10.0 lbs./ft²).

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 54. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 68.

Approved:



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

Respectfully submitted,
Western Electro-Acoustic Laboratory



Raul Martinez
Acoustical Test Technician

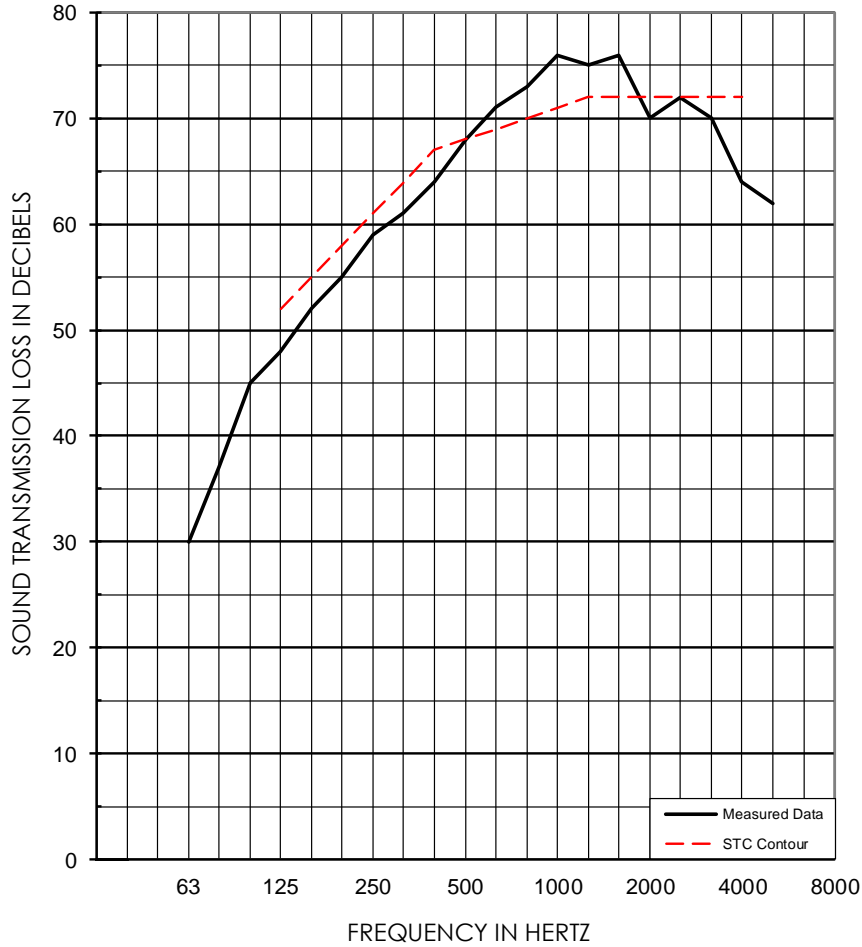


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-216

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

TEST DATE: 4 March 2020

23 March 2020



1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	30*	37*	45*	48*	52*	55*	59*	61*	64*	68*
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
			(4)	(3)	(3)	(2)	(3)	(3)	(3)	(0)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	71*	73*	76*	75*	76*	70*	72*	70	64	62
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(2)	(0)	(2)	(8)	
EWR	OITC	* Minimum estimate of transmission loss. Measurement limited by filler wall. Actual TL will be equal or greater than value reported.								STC
68	54	Test Date: 04 March 2020 Specimen Area: 64 sq.ft. Temperature: 65.8 deg. F Relative Humidity: 30 %								68 (30)



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-217

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, batt insulation in the stud cavity, and an open gap at the head-of-wall joint.

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 and an open gap at the 13 mm (1/2 inch) head-of-wall joint	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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was left unsealed.
- 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.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-217

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

23 March 2020

- 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.
- The overall weight of the assembly was estimated to be 272.1 kg (600.1 lbs.) for a calculated surface density of 45.8 kg/m² (9.4 lbs./ft²).

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 49.

Approved:

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Chris Kezon
Acoustical Test Technician

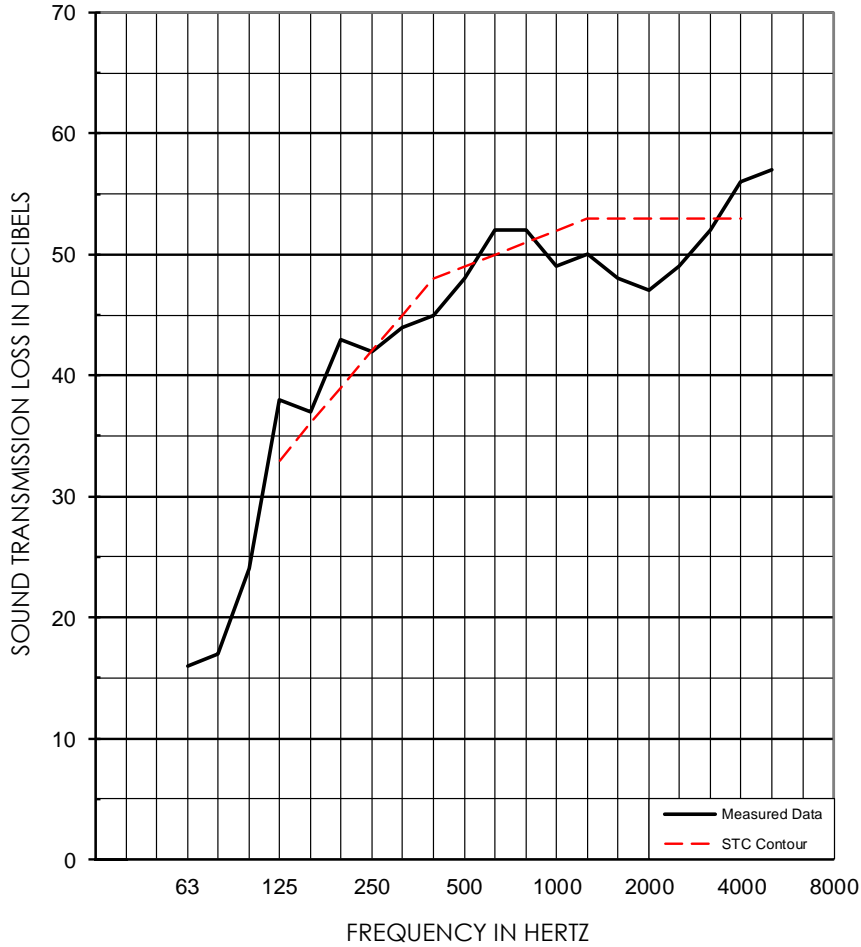


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-217

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	16	17	24	38	37	43	42	44	45	48
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
							(0)	(1)	(3)	(1)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	52	52	49	50	48	47	49	52	56	57
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
			(3)	(3)	(5)	(6)	(4)	(1)		
EWR	OITC	Test Date: 05 March 2020								STC
51	35	Specimen Area: 64 sq.ft.								49
		Temperature: 69.4 deg. F								(27)
		Relative Humidity: 39 %								



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-218

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, batt insulation in the stud cavity, and duct seal putty at the head-of-wall joint.

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 and duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with duct seal putty.
- 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.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-218

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

23 March 2020

- 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.
The overall weight of the assembly was estimated to be 272.1 kg (600.1 lbs.) for a calculated surface density of 45.8 kg/m^2 (9.4 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 53.

Approved:

Handwritten signature of Stephen A. Martin

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

Respectfully submitted,
Western Electro-Acoustic Laboratory

Handwritten signature of Raul Martinez

Raul Martinez
Acoustical Test Technician

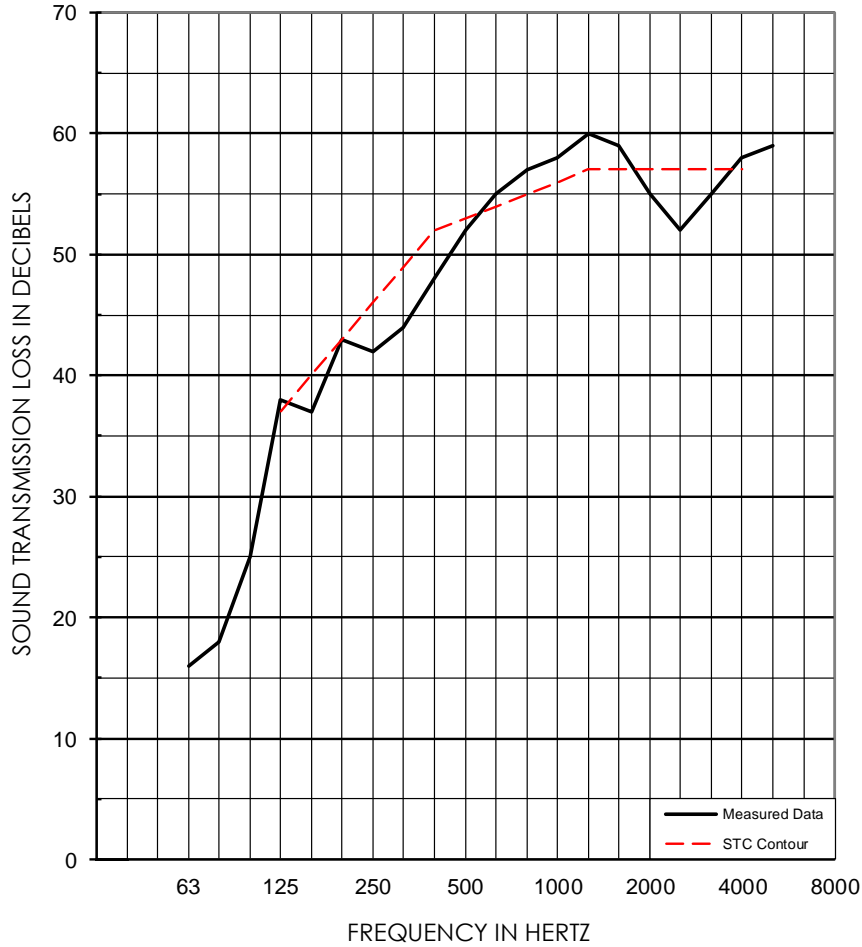


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-218

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	16	18	25	38	37	43	42	44	48	52
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89 (3)	0.76 (0)	0.80 (4)	0.52 (5)	0.36 (4)	0.38 (1)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	55	57	58	60	59	55	52	55	58	59
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56 (2)	0.55 (5)	0.31 (2)	0.32	0.50
EWR	OITC	Test Date: 05 March 2020								STC
54	36	Specimen Area: 64 sq.ft.								53
		Temperature: 69.4 deg. F								(26)
		Relative Humidity: 39 %								



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-219

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, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

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 and Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed by rolling the product and friction-fitting it into the head-of-wall joint.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-219

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

TEST DATE: 5 March 2020

23 March 2020

- 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.
- The overall weight of the assembly was estimated to be 272.1 kg (600.1 lbs.) for a calculated surface density of 45.8 kg/m² (9.4 lbs./ft²).

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 53.

Approved:

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

Respectfully submitted,
 Western Electro-Acoustic Laboratory

Raul Martinez
 Acoustical Test Technician

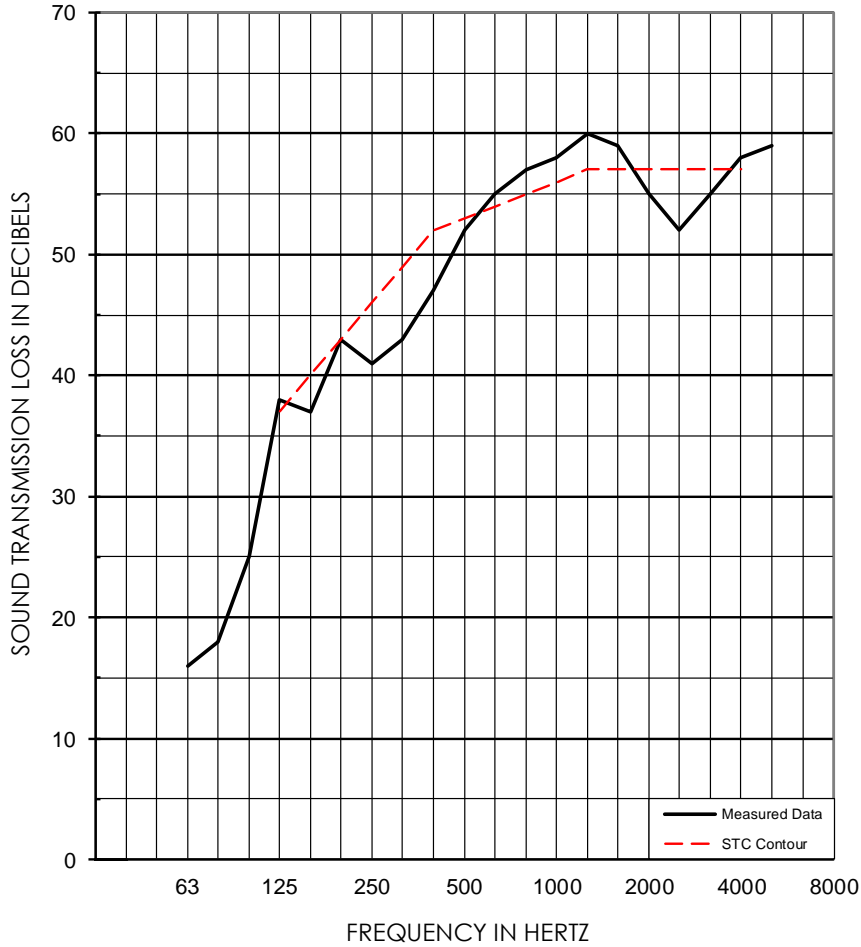


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-219

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	16	18	25	38	37	43	41	43	47	52
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
					(3)	(0)	(5)	(6)	(5)	(1)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	55	57	58	60	59	55	52	55	58	59
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(2)	(5)	(2)		
EWR	OITC	Test Date: 05 March 2020								STC
53	36	Specimen Area: 64 sq.ft.								53
		Temperature: 69.4 deg. F								(29)
		Relative Humidity: 39 %								



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-220

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, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

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 and Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	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 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - The second layer was screwed using 41 mm (1-5/8 inch) long #6 drywall screws spaced 203 mm (8 inches) O.C. along the perimeter and 305 mm (12 inches) O.C. in the field.
 - Joints for the first and second layer were staggered.
 - All gypsum board was oriented vertically.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed per manufacturer's instructions.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-220

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

23 March 2020

- 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.
- The overall weight of the assembly was estimated to be 272.1 kg (600.1 lbs.) for a calculated surface density of 45.8 kg/m² (9.4 lbs./ft²).

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 53.

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

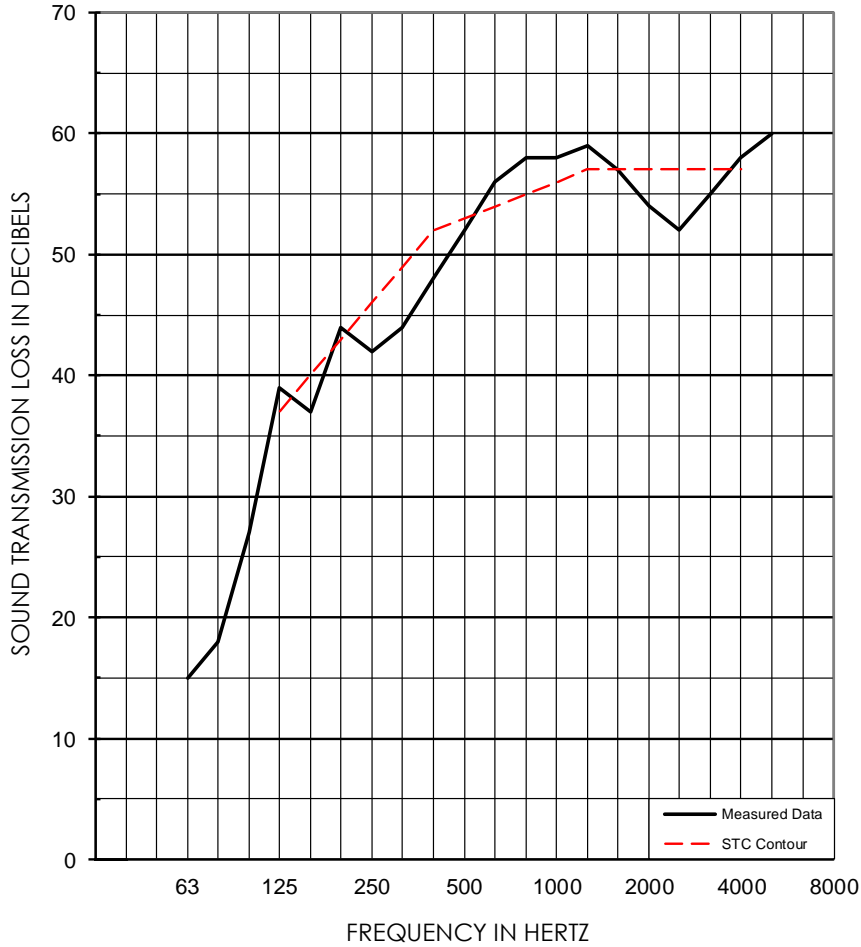
25132 Rye Canyon Loop Santa Clarita, California 91355 Tel: (661) 775-3741 Fax: (661) 775-3742 www.weal.com

SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-220

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	15	18	27	39	37	44	42	44	48	52
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89 (3)	0.76	0.80 (4)	0.52 (5)	0.36 (4)	0.38 (1)
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	56	58	58	59	57	54	52	55	58	60
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36 (0)	0.56 (3)	0.55 (5)	0.31 (2)	0.32	0.50
EWR	OITC	Test Date: 05 March 2020								STC
54	36	Specimen Area: 64 sq.ft.								53
		Temperature: 69.4 deg. F								(27)
		Relative Humidity: 39 %								



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-221

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, batt insulation in the stud cavity, and Hilti CFS-TTS Firestop Top Track Seal at the head-of-wall joint.

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 Hilti CFS-TTS Firestop Top Track Seal at the 13 mm (1/2 inch) head-of-wall joint	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.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with Hilti CFS-TTS Firestop Top Track Seal. The Hilti CFS-TTS Firestop Top Track Seal was installed per manufacturer's instructions.
- All gypsum board was oriented vertically with joints 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 124 mm (4-7/8 inches) thick.



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-221

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

23 March 2020

- The overall weight of the assembly was estimated to be 144.5 kg (318.5 lbs.) for a calculated surface density of 24.3 kg/m² (5.0 lbs./ft²).

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

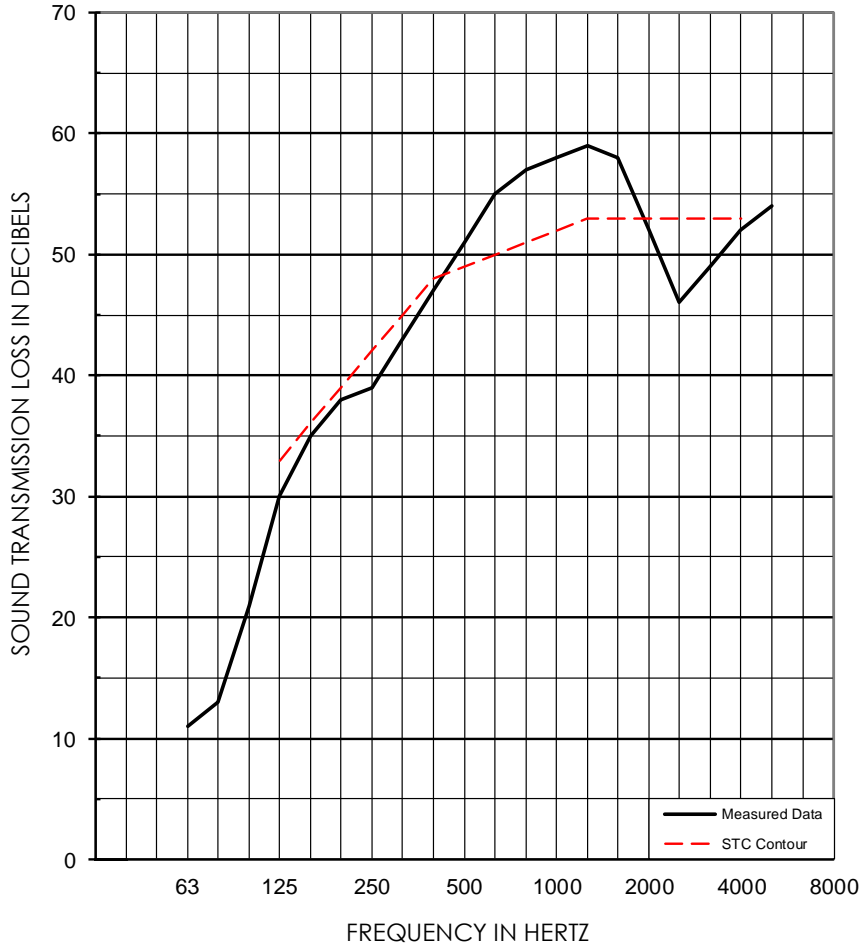


SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-221

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	11	13	21	30	35	38	39	43	47	51
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
			(3)	(1)	(1)	(3)	(2)	(1)		
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	55	57	58	59	58	52	46	49	52	54
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
						(1)	(7)	(4)	(1)	
EWR	OITC	Test Date: 05 March 2020								STC
50	32	Specimen Area: 64 sq.ft.								49
		Temperature: 70.5 deg. F								(24)
		Relative Humidity: 35 %								



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-222

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, batt insulation in the stud cavity, and duct seal putty at the head-of-wall joint.

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 duct seal putty at the 13 mm (1/2 inch) head-of-wall joint	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.
- On both sides, a gap at the head-of-wall joint was left. The gap size was 13 mm (1/2 inch) and was sealed with duct seal putty.
- All gypsum board was oriented vertically with joints 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 124 mm (4-7/8 inches) thick.
- The overall weight of the assembly was estimated to be 144.5 kg (318.5 lbs.) for a calculated surface density of 24.3 kg/m² (5.0 lbs./ft²).



SOUND TRANSMISSION LOSS TEST REPORT NO. TL20-222

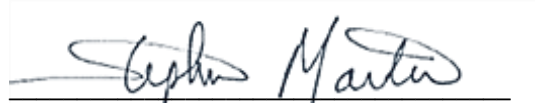
CLIENT: **Hilti**
P.O. Box 21148
Tulsa, Oklahoma 74121
TEST DATE: 5 March 2020

23 March 2020

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 31. The Sound Transmission Class rating determined in accordance with ASTM E 413-10 was STC 50.

Approved:



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

Respectfully submitted,
Western Electro-Acoustic Laboratory



Raul Martinez
Acoustical Test Technician

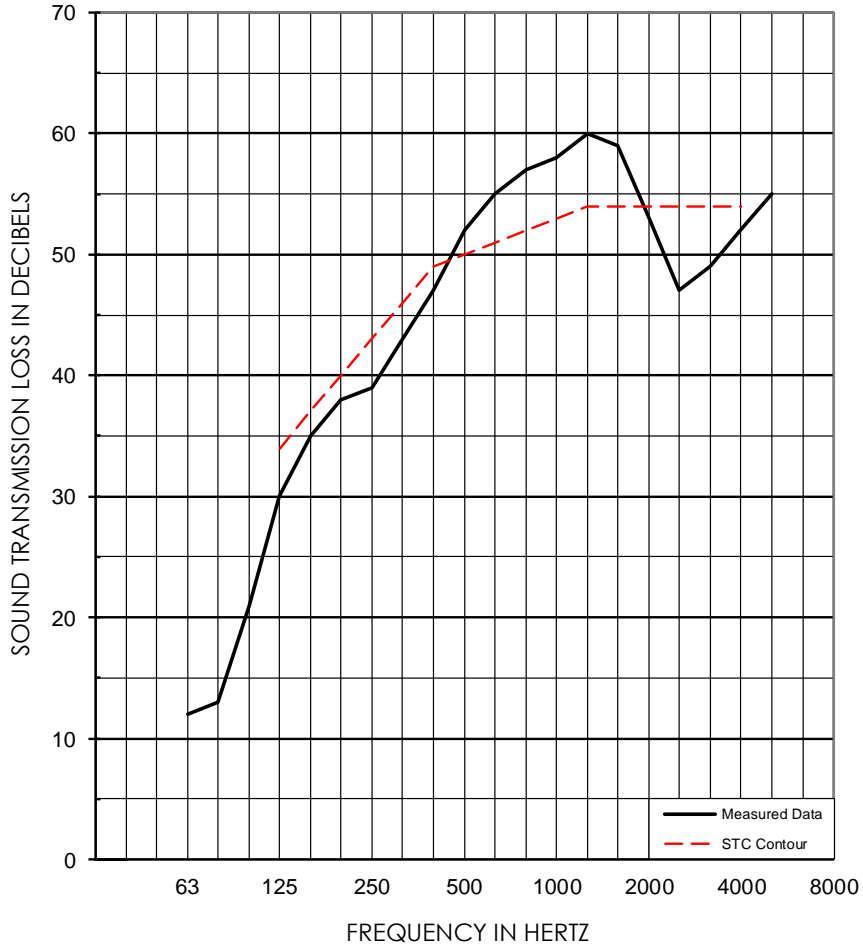


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CLIENT: **Hilti**
P.O. Box 21148
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1/3 OCT BAND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	12	13	21	30	35	38	39	43	47	52
95% Confidence in dB deficiencies	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
1/3 OCT BAND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	55	57	58	60	59	53	47	49	52	55
95% Confidence in dB deficiencies	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
EWR	OITC	Test Date: 05 March 2020								STC
50	31	Specimen Area: 64 sq.ft.								50
		Temperature: 70.5 deg. F								(32)
		Relative Humidity: 35 %								