627 RIVERBANK DRIVE GENEVA, IL 60134 Test Report

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Sound Transmission Loss

RALTM-TL24-318

630-232-0104 SPONSOR: ClarkDietrich

West Chester, OH

CONDUCTED: 2024-07-18 Page 1 of 14

ON: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer

5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side

### TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E90-09 (2016): "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements." The single number rating of the specimen was calculated according to ASTM E413-22: "Classification for Rating Sound Insulation." A description of the measurement procedure and room specifications is available upon request. The transmission loss values are for a single direction of measurement. The results presented in this report apply to the sample as received from the test sponsor.

### INFORMATION PROVIDED BY SPONSOR

The test specimen was designated by the sponsor as 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side.

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

Through a full external visual inspection performed on the test specimen, Riverbank personnel verified the following specimen properties:

Tracks (Top & Bottom)

Material: ProTRAK 20 / 18mil (20ga EQ)

Dimensions: 2 plates @ 2438 mm (96 in.) wide by 32 mm (1.25 in.) high

Depth: 92 mm (3.625 in.)

Steel Thickness: 0.49 mm (0.0194 in.)

Installation: Friction fit over foam sill sealer

Overall Weight: 2.72 kg (6 lbs)

Mass per Unit Length: 0.56 kg/m (0.38 lbs/ft)



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SPECIMEN MEASUREMENTS & TEST CONDITIONS (continued)

#### **Studs**

Material: ProStud144-20 (18mil)

Dimensions: 5 studs @ 37 mm (1.4375 in.) wide by 2743 mm (108 in.) high

Depth: 92 mm (3.625 in.) Steel Thickness: 0.49 mm (0.0193 in.)

Stud Spacing: Studs spaced 610 mm (24 in.) on center

Installation: Side studs each fastened to test frame at midpoint with 1 screw each

Studs fit into top and bottom tracks, left floating

Fasteners: Type W bugle head drywall screws, length @ 32 mm (1.25 in.)

Overall Weight: 8.96 kg (19.75 lbs)
Mass per Unit Length: 0.65 kg/m (0.44 lbs/ft)

Note: A bead of acoustical sealant was used to seal the source side of the specimen where framing members

met the test frame (1.02 kg (2.25 lbs) total).

### **Insulation**

Material: R-13 unfaced fiberglass

Dimensions: 4 pieces @ 610 mm (24 in.) wide by 2438 mm (96 in.) high

4 pieces @ 610 mm (24 in.) wide by 305 mm (12 in.) high

Depth: 89 mm (3.5 in.)

Installation: Friction fit between studs Overall Weight: 7.37 kg (16.25 lbs) Mass per Unit Volume: 12.4 kg/m³ (0.77 lbs/ft³)

Source Room Side

**Base Layer** 

Material: Type X gypsum board

Dimensions: 2 panels @ 1219 mm (48 in.) wide by 2743 mm (108 in.) high

Thickness: 16 mm (0.625 in.)

Installation: Panels installed vertically and fastened to studs with screws Fasteners: Type S bugle head drywall screws, length @ 32 mm (1.25 in.)

Fastener Spacing: 406 mm (16 in.) on center

If a screw fell on a "stud to track" condition, that screw was offset L or R

by 1" to avoid the track to stud connection

Overall Weight: 73.26 kg (161.5 lbs)
Mass Per Unit Area: 10.95 kg/m² (2.24 lbs/ft²)



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SPECIMEN MEASUREMENTS & TEST CONDITIONS (continued)

**Source Room Side (continued)** 

**Face Layer** 

Material: Type X gypsum board

Dimensions: 1 panel @ 1219 mm (48 in.) wide by 2743 mm (108 in.) high

2 panels @ 610 mm (24 in.) wide by 2743 mm (108 in.) high

Thickness: 16 mm (0.625 in.)

Installation: Panels installed vertically, fastened to study though base layer with screws

Panel joints staggered from source side base layer panel joints

Type S bugle head drywall screws, length @ 41 mm (1.625 in.) Fasteners:

406 mm (16 in.) on center, staggered by 203 mm (8 in.) from base layer Fastener Spacing:

If a screw fell on a "stud to track" condition, that screw was offset L or R

by 1" to avoid the track to stud connection

73.37 kg (161.75 lbs) Overall Weight: Mass Per Unit Area: 10.97 kg/m<sup>2</sup> (2.25 lbs/ft<sup>2</sup>)

**Receive Room Side** 

Material: Type X gypsum board

Dimensions: 1 panel @ 1219 mm (48 in.) wide by 2743 mm (108 in.) high

2 panels @ 610 mm (24 in.) wide by 2743 mm (108 in.) high

Thickness: 16 mm (0.625 in.)

Installation: Panels installed vertically, fastened to study with screws

Panel joints staggered from source side base layer panel joints

Type S bugle head drywall screws, length @ 32 mm (1.25 in.) Fasteners:

Fastener Spacing: 203 mm (8 in.) on center perimeter, 305 mm (12 in.) on center field If a screw fell on a "stud to track" condition, that screw was offset L or R

by 1" to avoid the track to stud connection

73.03 kg (161 lbs) Overall Weight:

Mass Per Unit Area:  $10.92 \text{ kg/m}^2 (2.24 \text{ lbs/ft}^2)$ 

Note: Joints between gypsum board panels, and screw heads on both sides of the partition were treated with a thin bead of acoustical sealant and metal tape (0.45 kg (1 lbs) total).



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SPECIMEN MEASUREMENTS & TEST CONDITIONS (continued)

**Overall Specimen Measurements** 

Dimensions: 2.44 m (96.0 in) wide by 2.74 m (108.0 in) high

Thickness: 0.14 m (5.5 in)

Weight: 240.29 kg (529.75 lbs) Overall Area: 6.689 m² (72. ft²)

Mass per Unit Area: 35.92 kg/m<sup>2</sup> (7.36 lbs/ft<sup>2</sup>)

**Test Aperture** 

Opening Size: 2.74 m (9.0 ft.) by 4.27 m (14.0 ft.)

Filler Wall: Yes

Aperture Size: 2.44 m (96.0 in) wide by 2.74 m (108.0 in) high

Transmission Area: 6.689 m<sup>2</sup> (72. ft<sup>2</sup>)

Sealed: Entire periphery (both sides) with dense mastic

**Test Environment** 

Source Room

Volume: 177.11 m<sup>3</sup>

Temperature:  $23.1 \, ^{\circ}\text{C} \pm 0.6 \, ^{\circ}\text{C}$ Relative Humidity:  $52.5 \, \% \pm 1.0 \, \%$ 

Receive Room

Volume: 178.33 m<sup>3</sup>

Temperature:  $21.9 \,^{\circ}\text{C} \pm 0.6 \,^{\circ}\text{C}$ Relative Humidity:  $54.5 \,\% \pm 1.0 \,\%$ 

Requirements

Temperature:  $22^{\circ}$  C +/-  $2^{\circ}$  C, not more than  $3^{\circ}$  C change over all tests.

Relative Humidity:  $\geq$  30%, not more than +/- 3% change over all tests.



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Figure 1 – Specimen mounted in test aperture, as viewed from source room



Figure 2 – Specimen mounted in test aperture, as viewed from receive room



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Figure 3 – Detail of side stud fastened to test frame



Figure 4 – Detail of stud and track



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Figure 5 – Insulation installed in stud cavities, viewed from receive room



Figure 6 – Receive room side gypsum board partially installed



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Figure 7 – Source room side base layer gypsum board partially installed



Figure 8 – Source room side face layer gypsum board partially installed



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### TEST RESULTS

Sound transmission loss values are tabulated at the eighteen standard frequency bands. A graphic presentation of the data and additional information appear on the following pages. The precision of the transmission loss test data is within the limits set by the ASTM Standard E90-09 (2016). See Appendix A for identification of corrections applied to the reported data.

FREQ.	<u>TL</u>	$\Delta TL$	<u>DEF.</u>	FREQ.	<u>TL</u>	$\Delta TL$	DEF.
100	20	0.67	0	800	54	0.18	0
125	34	0.73	0	1000	56	0.13	0
160	36	0.43	0	1250	58	0.10	0
200	41	0.33	0	1600	56	0.17	0
250	41	0.30	1	2000	48	0.10	5
315	42	0.30	3	2500	45	0.10	8
400	46	0.24	2	3150	50	0.06	3
500	48	0.16	1	4000	55	0.06	0
630	51	0.21	0	5000	58	0.05	0

STC=49

#### ABBREVIATION INDEX

FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz

TL = TRANSMISSION LOSS, dB

 $\Delta TL = 95\%$  CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB

DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 23)

STC = SOUND TRANSMISSION CLASS

Tested by

Report by

Keith Kimberling

Test Engineer

Senior Experimentalist

Marc Sciaky

Approved by

Eric P. Wolfram

Laboratory Manager



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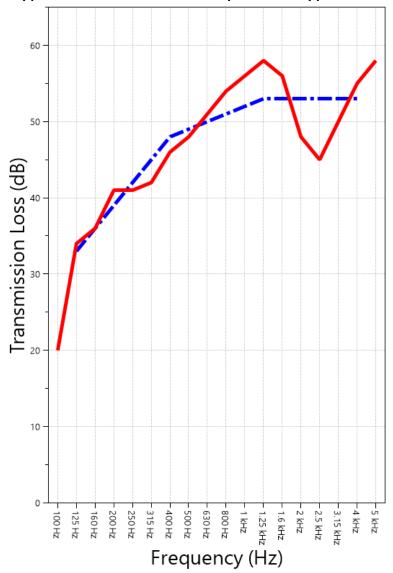
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## SOUND TRANSMISSION REPORT

3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and I layer 5/8" Gypsum Receive side



**STC=49** OITC=32

TRANSMISSION LOSS SOUND TRANSMISSION CLASS CONTOUR



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### **APPENDIX A: Extended Frequency Range Data**

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

The following non-accredited data were obtained in accordance with ASTM E90-09 (2016), but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes. Sampling precision observed during this procedure is reported below. Corrections are detailed in Appendix B.

1/3 Octave Band	Sound			
Center Frequency	<b>Transmission Loss</b>	<b>Applicable</b>	$\Delta TL$ (Eq. A2.5)	Repeatability
(Hz)	(dB)	Corrections	(dB)	(dB)
21.5	22		1.20	4.04
31.5	22	ZZF	1.39	1.01
40	22	Z F	0.57	2.26
50	19		0.80	1.52
63	15		0.78	1.47
80	15		0.62	0.60
100	20		0.67	0.67
125	34		0.73	0.71
160	36		0.43	0.35
200	41		0.33	0.33
250	41		0.30	0.42
315	42		0.30	0.41
400	46		0.24	0.46
500	48		0.16	0.18
630	51		0.21	0.26
800	54		0.18	0.24
1000	56		0.13	0.27
1250	58		0.10	0.15
1600	56		0.17	0.12
2000	48		0.10	0.13
2500	45		0.10	0.19
3150	50		0.06	0.14
4000	55		0.06	0.17
5000	58		0.05	0.17
6300	61		0.07	0.21
8000	63	Z	0.06	0.50
10000	61	Z F	0.07	1.21
12500	56	Z F	0.12	1.74



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**APPENDIX B: Glossary of Standardized Corrections and Adjustments** 

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

### **Mark** Interpretation

- A Measured sound pressure levels in the receive room are within 10 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.
- Measured sound pressure levels in the receive room are within 5 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.1. Transmission Loss values calculated from levels corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and a receive room with idealized ambient sound levels of (-\infty) dB.
- F The reported Transmission Loss is within 10 dB of the laboratory flanking limit at the marked frequency band. The measured performance of the specimen may be limited by the performance of the laboratory building structure at this frequency band.
- Z The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.7 to account for possible sound transmission through the filler assembly.
- The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.8 to account for possible sound transmission through the filler assembly. Transmission Loss values corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and an idealized filler assembly with a Sound Transmission Class rating of  $(\infty)$ .

### **APPENDIX C: Glossary of Variability Metrics**

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

**ΔTL**, the 95% confidence interval for reported transmission loss values, is calculated from the standard deviation of the sets of measurements for source room sound pressure level, receive room sound pressure level, and receive room sound absorption. This metric is calculated in an effort to quantify the combined influences of room geometry, microphone positioning, and other varying environmental conditions on reported results.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation of transmission loss as obtained from a set of six (6) consecutive tests conducted according to this test method by RAL on 2020-02-13. The tests were performed on a specimen composed of 24 gauge steel paneling, using the same test opening as used in this report. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.



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### **APPENDIX D: Determination of Outdoor Indoor Transmission Class (OITC)**

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

The determination of the Outdoor Indoor Transmission Class (OITC) as reported below was made with explicit conformity to the procedures described in the ASTM E1332-22 test standard. Test Method ASTM E90-09 (2016) was used to obtain the sound transmission loss data. This rating is based on an average transportation noise source spectrum and an A-weighted sound level reduction, either of which may be inappropriate for some applications.

One-third Octave Band	Reference Sound Spectrum,	Test Specimen		
Center Frequency, Hz	dB	Transmission Loss, dB		
80	103	15		
100	102	20		
125	101	34		
160	98	36		
200	97	41		
250	95	41		
315	94	42		
400	93	46		
500	93	48		
630	91	51		
800	90	54		
1000	89	56		
1250	89	58		
1600	88	56		
2000	88	48		
2500	87	45		
3150	85	50		
4000	84	55		

OITC = 32



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## **APPENDIX E: Instruments of Traceability**

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

		Serial	Date of	Calibration
<b>Description</b>	<b>Model</b>	<u>Number</u>	<b>Certification</b>	<u>Due</u>
System 2	Type 3160-A-042	3160- 106974	2023-08-11	2024-08-11
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2024-03-29	2025-03-29
EXTECH Hygro 663 EXTECH Hygro 639	SD700 SD700	A083663 A.103639	2023-12-28 2023-12-01	2024-12-28 2024-12-01

### **APPENDIX F: Revisions to Original Test Report**

Specimen: 3-5/8" ProStud144-20 (18mil) Steel Stud 24"o.c. on 18 mil tracks, 3.5" R-13 Insulation 2 layer 5/8" Gypsum Source side and 1 layer 5/8" Gypsum Receive side (See Full Report)

<u>Date</u>	<b>Revision</b>			
2024 00 22	0 1			

Original report issued 2024-08-22



