RIVERBANK ACOUSTICAL LABORATORIES

627 RIVERBANK DRIVE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **ClarkDietrich**
West Chester, OH

Sound Transmission Loss
RAL™-TL24-323

CONDUCTED: 2024-07-19

ON: 3-5/8” ProdStud144-22 (22mil) Steel Stud 24” o.c. on 22 mil tracks, 3.5” R-13 Insulation 2 layers 5/8” Gypsum each 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” ProdStud144-22 (22mil) Steel Stud 24” o.c. on 22 mil tracks, 3.5” R-13 Insulation 2 layers 5/8” Gypsum each 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:	ProTrak144-22 (22mil)
Dimensions:	2 plates @ 2438 mm (96 in.) wide by 32 mm (1.25 in.) high
Depth:	92 mm (3.625 in.)
Steel Thickness:	0.58 mm (0.02295 in.)
Installation:	Friction fit over foam sill sealer
Overall Weight:	3.52 kg (7.75 lbs)
Mass per Unit Length:	0.72 kg/m (0.48 lbs/ft)

SPECIMEN MEASUREMENTS & TEST CONDITIONS (continued)

Studs

Material:	ProStud144-22 (22mil)
Dimensions:	5 studs @ 37 mm (1.4375 in.) wide by 2743 mm (108 in.) high
Depth:	92 mm (3.625 in.)
Steel Thickness:	0.61 mm (0.02385 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:	11.11 kg (24.5 lbs)
Mass per Unit Length:	0.81 kg/m (0.54 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 (0.91 kg (2 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/m^3 (0.77 lbs/ft^3)

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:	73.37 kg (161.75 lbs)
Mass Per Unit Area:	10.97 kg/m^2 (2.25 lbs/ft^2)

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 studs through base layer with screws Panel joints staggered from source side base layer panel joints
Fasteners:	Type S bugle head drywall screws, length @ 41 mm (1.625 in.)
Fastener Spacing:	406 mm (16 in.) on center, offset by 203 mm (8 in.) from base layer 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:	73.14 kg (161.25 lbs)
Mass Per Unit Area:	10.93 kg/m^2 (2.24 lbs/ft^2)

Receive Room Side

Base 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 studs with screws Panel joints staggered from source side base layer panel joints
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/m^2 (2.24 lbs/ft^2)

SPECIMEN MEASUREMENTS & TEST CONDITIONS (continued)

Receive Room Side (continued)

Face 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, fastened to studs through base layer with screws Panel joints staggered from receive side base layer panel joints
Fasteners:	Type S bugle head drywall screws, length @ 41 mm (1.625 in.)
Fastener Spacing:	406 mm (16 in.) on center, offset by 203 mm (8 in.) from base layer 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:	73.48 kg (162 lbs)
Mass Per Unit Area:	10.99 kg/m^2 (2.25 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).

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:	0.16 m (6.125 in)
Weight:	316.61 kg (698.0 lbs)
Overall Area:	6.689 m² (72. ft²)
Mass per Unit Area:	47.33 kg/m² (9.69 lbs/ft²)

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 m² (72. ft²)
Sealed:	Entire periphery (both sides) with dense mastic

Test Environment

Source Room

Volume:	177.11 m³
Temperature:	22.5 °C ± 0.6 °C
Relative Humidity:	56.5 % ± 3.0 %

Receive Room

Volume:	178.33 m³
Temperature:	22.2 °C ± 0.0 °C
Relative Humidity:	58.0 % ± 0.0 %

Requirements

Temperature:	22º C +/- 2° C, not more than 3° C change over all tests.
Relative Humidity:	≥ 30%, not more than +/- 3% change over all tests.

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

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

Figure 3 – Tracks and studs installed in test aperture

Figure 4 – Detail of side stud fastened to test frame

Figure 5 – Source room side base layer gypsum board installed

Figure 6 – Source room side face layer gypsum board partially installed

Figure 7 – Receive side base layer gypsum board installed, face layer gypsum board partially installed

Figure 8 – Receive side base layer gypsum board installed, 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.	TL	ΔTL	DEF.	FREQ.	TL	ΔTL	DEF.
100	24	0.76	0	800	56	0.14	0
125	38	0.48	0	1000	57	0.16	0
160	40	0.82	0	1250	60	0.15	0
200	44	0.34	0	1600	60	0.12	0
250	43	0.50	3	2000	51	0.12	6
315	48	0.39	1	2500	49	0.11	8
400	50	0.23	2	3150	52	0.10	5
500	53	0.18	0	4000	58	0.09	0
630	54	0.19	0	5000	63	0.06	0

STC=53

ABBREVIATION INDEX

FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz
TL = TRANSMISSION LOSS, dB
ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB
DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 25)
STC = SOUND TRANSMISSION CLASS

Tested by _____
Marc Sciaky
Senior Experimentalist

Report by _____
Keith Kimberling
Test Engineer

Approved by _____
Eric P. Wolfram
Laboratory Manager

Digitally signed by Eric P Wolfram
Date: 2024.08.23 11:02:54 -05'00'

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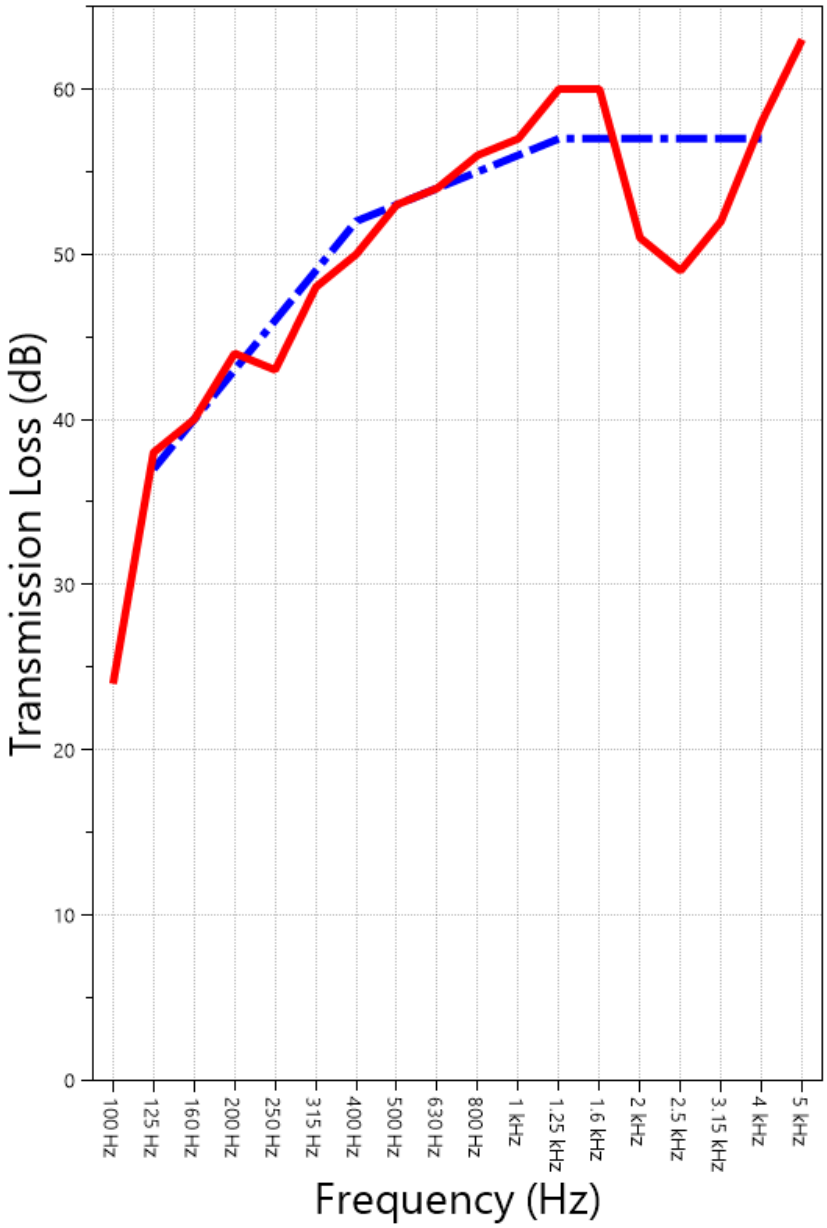
SOUND TRANSMISSION REPORT

3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation
2 layers 5/8" Gypsum each side



STC=53
OITC=35

TRANSMISSION LOSS
SOUND TRANSMISSION CLASS CONTOUR

NVLAP TESTING
NVLAP LAB CODE 100227-0

APPENDIX A: Extended Frequency Range Data

Specimen: 3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each 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 Center Frequency (Hz)	**Sound Transmission Loss** (dB)	**Applicable Corrections**	**ΔTL (Eq. A2.5)** (dB)	**Repeatability** (dB)
31.5	22	*ZZ F*	1.47	1.01
40	23	*Z F*	0.84	2.26
50	19		0.80	1.52
63	16		0.60	1.47
80	17		0.56	0.60
100	24		0.76	0.67
125	38	*Z F*	0.48	0.71
160	40	*Z*	0.82	0.35
200	44	*Z F*	0.34	0.33
250	43		0.50	0.42
315	48		0.39	0.41
400	50		0.23	0.46
500	53		0.18	0.18
630	54		0.19	0.26
800	56		0.14	0.24
1000	57		0.16	0.27
1250	60		0.15	0.15
1600	60		0.12	0.12
2000	51		0.12	0.13
2500	49		0.11	0.19
3150	52		0.10	0.14
4000	58		0.09	0.17
5000	63		0.06	0.17
6300	66	*Z*	0.06	0.21
8000	68	*Z F*	0.04	0.50
10000	63	*Z F*	0.07	1.21
12500	57	*Z F*	0.10	1.74

APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: 3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each 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.
AA	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 (-∞) 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.
ZZ	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 (∞)**.**

APPENDIX C: Glossary of Variability Metrics

Specimen: 3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each 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" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each 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 Center Frequency, Hz	Reference Sound Spectrum, dB	Test Specimen Transmission Loss, dB
80	103	17
100	102	24
125	101	38
160	98	40
200	97	44
250	95	43
315	94	48
400	93	50
500	93	53
630	91	54
800	90	56
1000	89	57
1250	89	60
1600	88	60
2000	88	51
2500	87	49
3150	85	52
4000	84	58

OITC = 35

APPENDIX E: Instruments of Traceability

Specimen: 3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each side (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
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	SD700	A083663	2023-12-28	2024-12-28
EXTECH Hygro 639	SD700	A.103639	2023-12-01	2024-12-01

APPENDIX F: Revisions to Original Test Report

Specimen: 3-5/8" ProdStud144-22 (22mil) Steel Stud 24" o.c. on 22 mil tracks, 3.5" R-13 Insulation 2 layers 5/8" Gypsum each side (See Full Report)

Date	Revision
2024-08-22	Original report issued

END