NORTH ORBIT ACOUSTIC LABORATORIES

REPORT NUMBER	NOAL 23-08045
TEST METHOD	ASTM E90-09 (2016): Laboratory Measurement of Airborne Sound Transmission of Building Partitions and Elements
TEST SPONSOR	Hyperframe, 904 Pardee Street, Berkeley, CA 94710
ISSUED TO	Hyperframe, 904 Pardee Street, Berkeley, CA 94710
TEST SPECIMEN	Wall Assembly
RESULT SUMMARY	STC 54
TEST DATE	August 31, 2023
REPORT DATE	September 12, 2023
TEST SITE	North Orbit Acoustic Laboratory Facility, 917 Rice Street, Saint Paul, MN 55117
TECHNICIAN	E. Dick

CONTENTS

ELECTRONICALLY REPRODUCED SIGNATURE

ELLIOTT B. DICK – DEPUTY LABORATORY MANAGER

ELECTRONICALLY REPRODUCED SIGNATURE

HEIDE GROSS – LABORATORY QUALITY MANAGER

ilac-MRA A2LA ACCREDITED

TEST SPONSOR Hyperframe
904 Pardee Street
Berkeley, CA 94710

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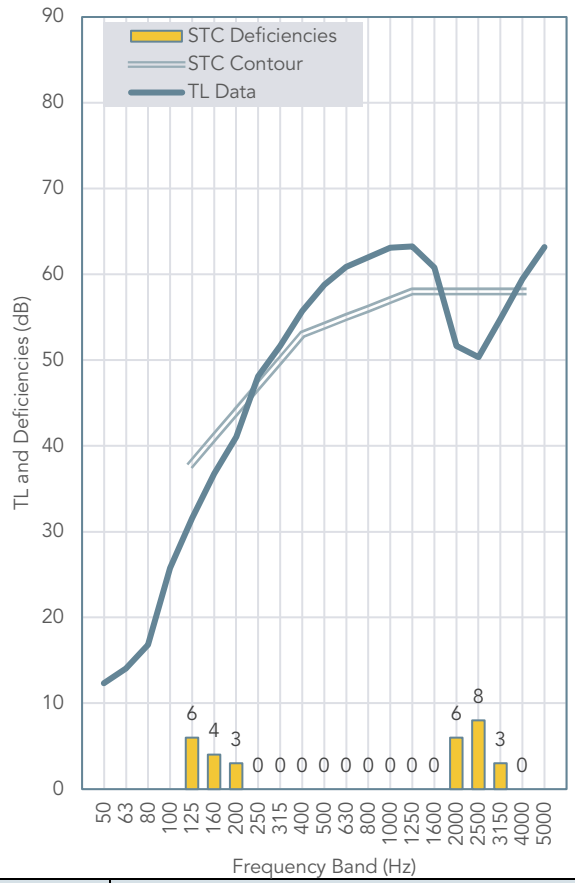
SECTION A – DATA SUMMARY

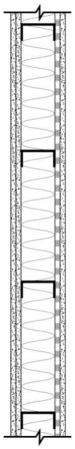
STC 54



FREQUENCY (Hz)	TL (dB)	DEFICIENCIES (dB)
50	12	-
63	14	-
80	17	-
100	26	-
125	32	6
160	37	4
200	41	3
250	48	0
315	52	0
400	56	0
500	59	0
630	61	0
800	62	0
1,000	63	0
1,250	63	0
1,600	61	0
2,000	52	6
2,500	50	8
3,150	55	3
4,000	59	0
5,000	63	-
TOTAL DEFICIENCIES		30

ELEMENTS	FROM SOURCE ROOM SIDE TO RECEIVING ROOM SIDE
Sheathing	5/8" Type X gypsum panel (v); #6 x 1" type S screws spaced 12" OC
Framing	resilient channel spaced 24" OC
Framing	3-5/8" Hyperstud® 33 mil steel studs spaced 16" OC; engaged to Hypertrack® 30 mil steel tracks with integral snap connectors
Insulation	3-1/2" glass fiber batt insulation (R13)
Sheathing	5/8" Type X gypsum panel (vs); #6 x 1" type S-12 screws spaced 12" OC
Sheathing	5/8" Type X gypsum panel (v); #6 x 1-5/8" type S-12 screws spaced 16" OC

SCHEMATIC



See Section C on page 5 and 5 for a full specimen description.

SECTION B – APPROACH

INSTALLATION

The specimen is a wall assembly that was originally constructed on August 31, 2023, at the Saint Paul, MN acoustic laboratory facility. The assembly and building element descriptions can be found in Section C on pages 4 & 5 of this report. Some details of the specimen design are proprietary and have been withheld at the request of the test sponsor.

Qualified representatives from North Orbit Acoustic Laboratories observed or performed the installation and inspected all major building elements when completed and prior to testing.

TEST METHODS

North Orbit Acoustic Laboratory (NOAL) is accredited through A2LA certificate number 4240.01 for this test method.

Test methods follow the published standards listed below.

> **ASTM E90-09 (2016):** *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements*
>
> **ASTM E413-22:** *Classification for Rating Sound Insulation*

All results reported herein were derived from tests performed in full accordance with test method ASTM E90. The laboratory and measurement systems fully meet all requirements of the test standard and the requirements of ASTM E90 Annex A2: Qualification of room sound fields and microphone systems used for sampling. All values stated are derived from single-direction transmission loss measurements.

The standard deviation of reproducibility is stated in ASTM E90 as <2 dB for frequencies from 125 Hz to 4 kHz. Detailed test procedures for this test method, the flanking limit report, repeatability measurements and reference specimen tests are available upon request.

The Sound Transmission Class (STC) value was obtained by applying the Transmission Loss (TL) values to the STC reference contour of ASTM E413 which was used to calculate a single number rating.

TEST REPORTS

This report does not constitute certification of the assembly or test item nor an opinion or endorsement by this laboratory. The report applies only to the specimen tested and may not be reproduced, except in full, without the permission of the client or test sponsor. It is the exclusive property of the test sponsor so named herein.

CONFIDENTIALITY

The test sponsor has full control over this information. Any release of information will be only to the test sponsor. The specific testing results are deemed to be confidential exclusively for the test sponsor's use. Reproduction of this report, except in full, is prohibited.

SECTION C – SPECIMEN DESCRIPTION

Hyperstud® steel studs, Hypertrack® steel tracks, and gypsum panels were supplied by the test sponsor. All other materials were purchased through regional retail or wholesale channels.

FRAMING

Framing was constructed on August 31, 2023, and was retained from previous tests in the series.

A steel stud frame was constructed within the perimeter of the laboratory test specimen opening. The frame consisted of Hypertrack® 30 mil designated thickness 3-5/8" x 1-1/2" steel bottom track, Hypertrack® 30 mil designated thickness 3-5/8" x 3-1/4" steel top track, and ten Hyperstud® 33 mil designated thickness 3-5/8" x 1-1/4" non-structural steel studs installed vertically 16" on centers (OC). The studs were engaged to the tracks with integral snap connectors. The perimeter of the frame was sealed at the specimen opening with non-hardening acoustic sealant.

INSULATION

Glass fiber insulation batts were friction fit into the stud cavities. The batts were 16" wide and 3-1/2" thick with an R-Value of R-13.

RESILIENT CHANNELS

Single-leg resilient channels were fastened to the source side of the framing. The channels consisted of five 22 mil designation thickness, 2-1/2" wide x 1/2" deep, with 1-1/2" screw flange, and were installed horizontally, perpendicular to the studs, spaced 24" OC. The top and bottom channels were installed 4" from the top and bottom of the framing. Channels were fastened to the frame with #8 x 1/2" type S-12 screws at intersections.

SHEATHING

Source Side: One layer of 5/8" gypsum panels was applied parallel to the studs (perpendicular to the channels). The panels were attached to the channels with #6 x 1" type S drywall screws spaced 12" OC.

Receiving Side: Two layers of gypsum panels were applied to the framing.

Base layer: 5/8" Type X gypsum panels was applied parallel to the studs. The panels were attached to the frame with #6 x 1" type S-12 drywall screws, spaced 12" OC. Joints were staggered one stud cavity to offset each side.

Face layer: 5/8" Type X gypsum panels was applied parallel to the studs. The panels were attached to the frame with #6 x 1-5/8" type S-12 drywall screws spaced 16" OC. Joints were staggered one stud cavity to offset each layer.

All fasteners in the assembly installation were mechanically installed.

The panels were shimmed at installation so equal gaps were maintained at the top and bottom. Gaps were less than 3/8" in all cases. Shims were removed after the panels were fastened and the perimeter and seams were sealed on the source and receiving room sides with non-hardening acoustical sealant. In addition, the perimeter of both sides of the specimen was sealed with 2" wide polypropylene tape and 7/8" dense putty tape.

SPECIMEN DETAIL	
Specimen Face Dimensions	12.0 ft [3.66 m] x 8.0 ft [2.44 m]
Specimen Thickness	6.0 in [15.2 cm]
Specimen Face Area	96.0 SF [8.92 m²]
Overall Mass	758.0 lb [343.8 kg]
Overall Surface Density	7.9 PSF [38.6 kg/m²]

Mass of fasteners, tape and sealant is not represented in the above totals.

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SECTION C – SPECIMEN DESCRIPTION (CONT.)

SHEATHING	**SOURCE SIDE**		
Material	Type X gypsum panel	Mass	213.0 lb [96.62 kg]
Thickness	0.63" [1.6 cm]	Net Area	96.0 SF [8.92 m²]
Face Dimensions	3 @ 48.00" [121.9 cm] x 96.00" [243.8 cm]	Surface Density	2.22 PSF [10.8 kg/m²]
FRAMING			
Material	resilient channel	Mass	13.0 lb [5.90 kg]
Steel Thickness	0.0232" [589 µm]	Net Length	60.0' [18.29 m]
Dimensions	0.50" [1.3 cm] x 2.50" [6.4 cm]	Linear Density	0.22 lb/ft [0.3 kg/m]
Lengths	5 @ 144.00" [365.8 cm]		
FRAMING			
Material	Hypertrack® 30 mil steel top track	Mass	13.0 lb [5.90 kg]
Steel Thickness	0.0312" [792 µm]	Net Length	12.0' [3.64 m]
Dimensions	3.63" [9.2 cm] x 3.25" [8.3 cm]	Linear Density	1.09 lb/ft [1.6 kg/m]
Lengths	1 @ 143.50" [364.5 cm]		
FRAMING			
Material	Hypertrack® 30 mil steel bottom track	Mass	9.0 lb [4.08 kg]
Steel Thickness	0.0312" [792 µm]	Net Length	12.0' [3.64 m]
Dimensions	3.63" [9.2 cm] x 1.50" [3.8 cm]	Linear Density	0.75 lb/ft [1.1 kg/m]
Lengths	1 @ 143.50" [364.5 cm]		
FRAMING			
Material	Hyperstud® 33 mil steel studs	Mass	62.0 lb [28.12 kg]
Steel Thickness	0.0346" [879 µm]	Net Length	78.8' [24.00 m]
Dimensions	3.63" [9.2 cm] x 1.25" [3.2 cm]	Linear Density	0.79 lb/ft [1.2 kg/m]
Lengths	10 @ 94.50" [240.0 cm]		
INSULATION			
Material	glass fiber batt insulation	Mass	24.0 lb [10.89 kg]
Thickness	3.50" [8.9 cm]	Net Volume	28 CF [0.79 m³]
Face Dimensions	9 @ 16.00" [40.6 cm] x 96.00" [243.8 cm]	Density	0.86 PCF [13.7 kg/m³]
SHEATHING	**RECEIVING SIDE BASE LAYER**		
Material	Type X gypsum panel	Mass	212.0 lb [96.16 kg]
Thickness	0.63" [1.6 cm]	Net Area	96.0 SF [8.92 m²]
Face Dimensions	1 @ 16.00" [40.6 cm] x 96.00" [243.8 cm] 2 @ 48.00" [121.9 cm] x 96.00" [243.8 cm] 1 @ 32.00" [81.3 cm] x 96.00" [243.8 cm]	Surface Density	2.21 PSF [10.8 kg/m²]

SECTION C – SPECIMEN DESCRIPTION (CONT.)

SHEATHING		RECEIVING SIDE FACE LAYER	
Material	Type X gypsum panel	Mass	212.0 lb [96.16 kg]
Thickness	0.63" [1.6 cm]	Net Area	96.0 SF [8.92 m²]
Face Dimensions	3 @ 48.00" [121.9 cm] x 96.00" [243.8 cm]	Surface Density	2.21 PSF [10.8 kg/m²]

All materials were weighed prior to installation. The nominal dimensions and product information were provided by the test sponsor or obtained from manufacturer data sheets. Mass of Hyperstud® and Hypertrack® includes mass of integral connectors, therefore linear density includes those the average mass of those connectors along the lengths.

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SECTION D – MEASUREMENT SET-UP

ENVIRONMENTAL CONDITIONS	
Source Room Temperature	70.9 °F [21.6 °C]
Source Room Relative Humidity	51.3%
Receiving Room Temperature	73.2 °F [22.9 °C]
Receiving Room Relative Humidity	53.1%

CHAMBER VOLUME	
Source Room	7690.0 CF [217.8 m³]
Receiving Room	12306.5 CF [348.5 m³]
Source Niche Depth	16.5 in [41.9 cm]
Receiving Niche Depth	2.8 in [7.0 cm]

INSTRUMENTATION

DESCRIPTION	BRAND	MODEL	SERIAL
Analyzer	Sinus	Apollo	75110
Software	Sinus	Samurai	ver. 2.8.3
Microphone	Brüel & Kjær	4166	1727021
Microphone	Brüel & Kjær	4166	1727058
Preamplifier	Brüel & Kjær	2669C	2148242
Preamplifier	Brüel & Kjær	2669C	2300986
Calibrator	Brüel & Kjær	4231	2416109
Thermohygrometer	Kestrel	D2	2781724
Thermohygrometer	Kestrel	5200	2311344

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SECTION E – TEST RESULTS

FREQUENCY BAND (Hz)	TL (dB)	DATA FLAGS (see below)	95% C.I. (dB)	FLANKING LIMIT (dB)	DEFICIENCIES (dB)
25	14.7	*	±3.43	28.4	-
31.5	18.0		±4.56	35.6	-
40	19.0		±3.18	40.5	-
50	12.4		±3.85	44.8	-
63	14.1		±4.21	46.8	-
80	16.8		±2.87	52.8	-
100	25.8		±1.57	59.2	-
125	31.6		±0.90	65.2	6
160	36.8		±1.49	69.7	4
200	41.0		±1.07	72.8	3
250	48.1		±0.97	77.7	0
315	51.7		±0.76	82.6	0
400	55.7		±0.62	88.3	0
500	58.8		±0.49	93.4	0
630	60.9		±0.46	95.6	0
800	62.0		±0.49	100.5	0
1,000	63.1		±0.43	105.0	0
1,250	63.2		±0.51	107.9	0
1,600	60.8		±0.33	105.9	0
2,000	51.7		±0.53	106.0	6
2,500	50.4		±0.45	105.7	8
3,150	54.8		±0.38	105.2	3
4,000	59.5		±0.32	103.4	0
5,000	63.2		±0.46	100.7	-
6,300	67.1		±0.51	99.0	-
8,000	71.2		±0.67	95.8	-
10,000	74.3	*	±0.58	92.5	-
				TOTAL DEFICIENCIES BELOW CONTOUR [dB]	**30**
				STC RATING [ASTM E413]	**54**

Note: Composite 95% confidence intervals from room qualification testing. Extended frequency results below 80Hz and above 5000Hz are for reference only. Specimen TL rounded to 0.1 dB provided in this table for reference. Specimen TL rounded to whole decibels found on page 2.

Data Flags:

* Actual transmission loss of specimen may be higher than measured at this frequency band. Signal-to-noise in the receiving room less than 5 dB, therefore the result is "an estimate of the lower limit".