

1512 S BATAVIA AVENUE
GENEVA, IL 60134

Test Report

www.riverbankacoustics.com

630-232-0104

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **Tublite Inc.**
Walker, MI

Sound Transmission Loss
RAL™-TL22-267

CONDUCTED: 2022-12-07

Page 1 of 10

ON: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed)

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 INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed). The following nominal product information was provided by the sponsor prior to testing. The accuracy of such sponsor-provided information can affect the validity of the test results.

Product Under Test

Product Name: INT14, 2" x 4 1/2" System
Glass/Model: LCUST2E – Custom Laminated 2-Lite E
Manufacturer: Tubelite, Inc.

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Product Type: Insulated glazing units (IGU) in metal frames
Frame Dimensions: 2032 mm (80 in.) by 2032 mm (80 in.)
Frame Depth: 114 mm (4.5 in.)
Glazing Thickness*: 12.9 mm (0.508 in.)
Daylight Opening: 2 DLOs @ 954 mm (37.5625 in.) by 1943 mm (76.5 in.)
Overall Weight: 139.71 kg (308 lbs)

**Note: Glass thickness measurements are the arithmetic average of two (2) interferometer measurements, one taken at each glazing assembly.*



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Overall Specimen Measurements

Dimensions: 2.03 m (80.0 in) wide by 2.03 m (80.0 in) high
Thickness: 0.11 m (4.5 in)
Weight: 139.71 kg (308.0 lbs)
Overall Area: 4.129 m² (44.44 ft²)
Mass per Unit Area: 33.84 kg/m² (6.93 lbs/ft²)

Test Aperture

Opening Size: 2.74 m (9.0 ft.) by 4.27 m (14.0 ft.)
Filler Wall: Yes
Aperture Size: 2.03 m (80.0 in) wide by 2.03 m (80.0 in) high
Transmission Area: 4.129 m² (44.44 ft²)
Sealed: Entire periphery (both sides) with dense mastic

Test Environment

Source Room

Volume: 177.11 m³
Temperature: 22.8 °C ± 0.0 °C
Relative Humidity: 52.0 % ± 0.0 %

Receive Room

Volume: 178.33 m³
Temperature: 22.2 °C ± 0.0 °C
Relative Humidity: 54.5 % ± 1.0 %

Requirements

Temperature: 22° C +/- 2° C, not more than 3° C change over all tests.
Relative Humidity: ≥ 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 – One of two specimen IGUs prior to installation in test aperture



Figure 4 – Specimen partially installed in test aperture

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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.

<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>	<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>
100	26	0.70	0	800	38	0.15	0
125	28	0.62	0	1000	39	0.16	0
160	29	0.56	0	1250	39	0.10	0
200	29	0.50	0	1600	37	0.16	1
250	30	0.30	0	2000	34	0.11	4
315	32	0.29	0	2500	30	0.13	8
400	33	0.30	0	3150	35	0.09	3
500	35	0.23	0	4000	39	0.11	0
630	36	0.20	0	5000	42	0.12	0

STC=34

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 = 16)
- STC = SOUND TRANSMISSION CLASS

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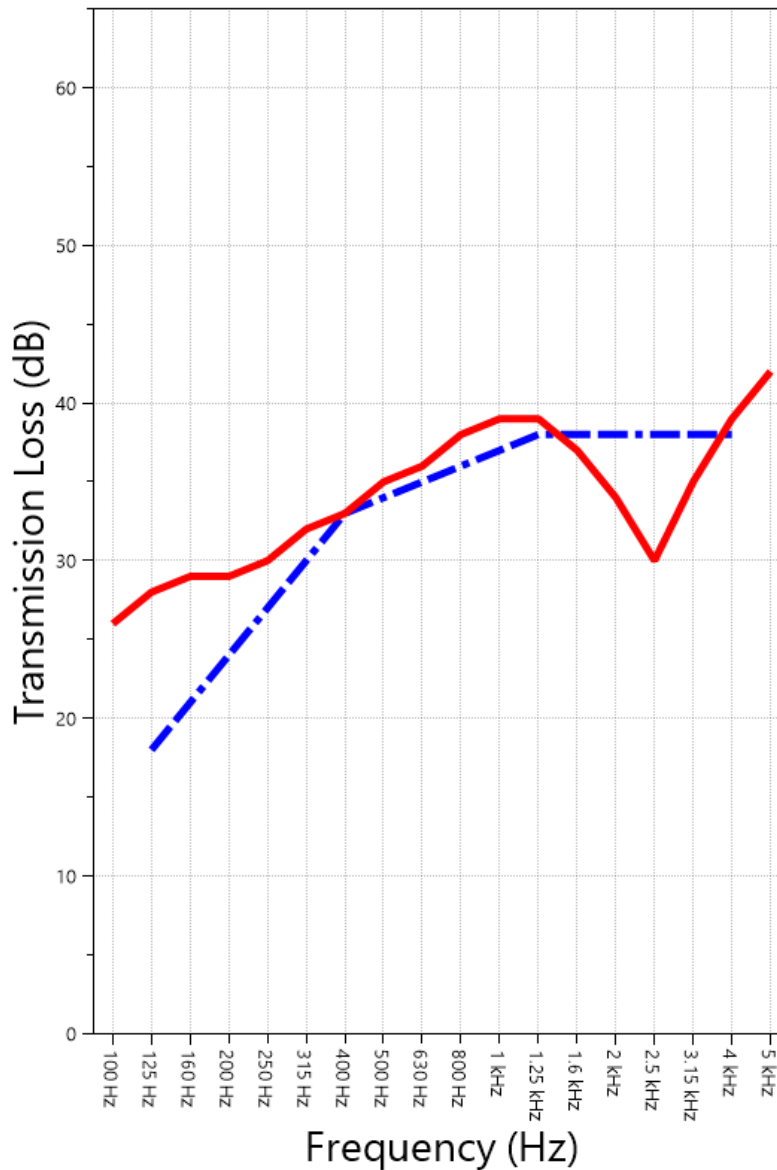
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SOUND TRANSMISSION REPORT

INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed)



STC=34
OITC=32



TRANSMISSION LOSS
SOUND TRANSMISSION CLASS CONTOUR



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APPENDIX A: Extended Frequency Range Data

Specimen: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (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	Δ TL (Eq. A2.5) (dB)	Repeatability (dB)
31.5	20	Z F	1.14	1.01
40	31	ZZ F	0.81	2.26
50	23	ZZ F	0.54	1.52
63	20	Z	0.77	1.47
80	22	Z	0.84	0.60
100	26	Z	0.70	0.67
125	28	Z	0.62	0.71
160	29		0.56	0.35
200	29		0.50	0.33
250	30		0.30	0.42
315	32		0.29	0.41
400	33		0.30	0.46
500	35		0.23	0.18
630	36		0.20	0.26
800	38		0.15	0.24
1000	39		0.16	0.27
1250	39		0.10	0.15
1600	37		0.16	0.12
2000	34		0.11	0.13
2500	30		0.13	0.19
3150	35		0.09	0.14
4000	39		0.11	0.17
5000	42		0.12	0.17
6300	44		0.12	0.21
8000	46		0.22	0.50
10000	46	Z	0.37	1.21
12500	47	Z	0.42	1.74



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APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (See Full Report)

<u>Mark</u>	<u>Interpretation</u>
<i>A</i>	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.
<i>AA</i>	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.
<i>F</i>	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.
<i>Z</i>	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.
<i>ZZ</i>	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: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (See Full Report)

Δ TL, 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: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (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	22
100	102	26
125	101	28
160	98	29
200	97	29
250	95	30
315	94	32
400	93	33
500	93	35
630	91	36
800	90	38
1000	89	39
1250	89	39
1600	88	37
2000	88	34
2500	87	30
3150	85	35
4000	84	39

OITC = 32

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APPENDIX E: Instruments of Traceability

Specimen: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2022-08-10	2023-08-10
Bruel & Kjaer Mic And Preamp E	Type 4943-B-001	2311441	2022-05-02	2023-05-02
Bruel & Kjaer Pistonphone	Type 4228	2781248	2022-07-22	2023-07-22
EXTECH Hygro 662	SD700	A083662	2021-12-28	2022-12-28
EXTECH Hygro 999	SD700	A.106999	2022-05-22	2023-05-23

APPENDIX F: Revisions to Original Test Report

Specimen: INT 14, 2"x4-1/2" System Glass; (1/4" CLR Annealed LAMI 4 Layers .060 EVA Clear, 1/4" CLR Annealed) (See Full Report)

<u>Date</u>	<u>Revision</u>
2022-12-12	Original report issued

END