

1512 S BATAVIA AVENUE
GENEVA, IL 60134
630-232-0104

An  ALION Technical Center

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FOUNDED 1918 BY
WALLACE CLEMENT SABINE

Test Report

SPONSOR: **FreMarq Innovations**
Wausau, WI

Sound Transmission Loss
RAL™-TL19-064

CONDUCTED: 2019-03-19

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ON: Van Ness acoustical mockup - window unit with operable section

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 17025:2005 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 E413-16: "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 Van Ness acoustical mockup - window unit with operable section. 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

Reference ID: Series FW2500 with zero sightline vent
Manufacturer: FreMarq Innovations
Glass Composition: Tempered glass with C366LEQ coating on surface #2 @
6.35 mm (0.25 in.)
Air space via aluminum spacer @ 12.7 mm (0.5 in.)
Clear tempered glass @ 9.52 mm (0.375 in.)

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials: Aluminum frame, insulated glass units
Frame Dimensions: 1943.1 mm (76.5 in.) x 2165.35 mm (85.25 in.)
Frame Depth: 161.92 mm (6.375 in.)
Glass Composition*: Source side glass @ 5.7 mm (0.224 in.)
Air space @ 14.2 mm (0.559 in.)
Receive side glass @ 9.3 mm (0.366 in.)

** Note: Glass composition measurements are the arithmetic average of a total of eight interferometer measurements taken at the edge and center of each glazing section.*



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Test Specimen (continued)

Daylight Opening: Bottom sections @ 463.55 mm (18.25 in.) x 876.3 mm (34.5 in.)
Top section, inoperable @ 1514.48 mm (59.625 in.) x 876.3 mm (34.5 in.)
Top section, operable @ 1390.65 mm (54.75 in.) x 749.3 mm (29.5 in.)

Overall Weight: 264.44 kg (583 lbs)

Note: The operable section of the specimen was fully opened and closed five (5) times immediately prior to testing in order to demonstrate operability. No further adjustments were made to the test specimen.

Overall Specimen Measurements

Dimensions: 1.94 m (76.5 in) wide by 2.17 m (85.25 in) high
Thickness: 0.16 m (6.375 in)
Weight: 264.44 kg (583.0 lbs)
Transmission Area: 4.208 m² (45.29 ft²)
Mass per Unit Area: 62.85 kg/m² (12.87 lbs/ft²)

Test Aperture

Size: 2.74 m (9.0 ft.) by 4.27 m (14.0 ft.)
Filler Wall: Yes
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: 50.0 % ± 0.0 %

Receive Room
Volume: 178.33 m³
Temperature: 22.8 °C ± 0.0 °C
Relative Humidity: 49.5 % ± 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 opening, as viewed from receive room



Figure 2 – Operation of operable section of test specimen

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Figure 3 – Test specimen prior to installation

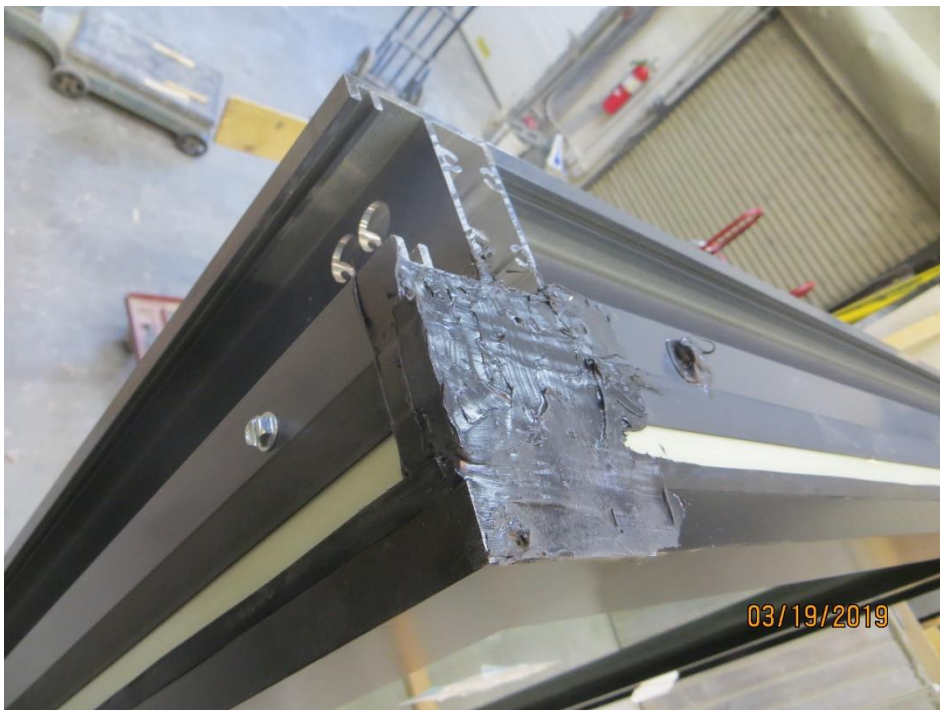


Figure 4 – Detail of specimen frame

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TEST RESULTS

Sound transmission loss values are tabulated at the eighteen standard frequencies. 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).

<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	23	1.02	0	800	37	0.19	2
125	22	0.67	0	1000	35	0.15	5
160	24	0.40	0	1250	35	0.15	6
200	27	0.34	0	1600	37	0.10	4
250	30	0.47	0	2000	37	0.11	4
315	33	0.31	0	2500	39	0.08	2
400	33	0.44	3	3150	43	0.05	0
500	35	0.27	2	4000	47	0.08	0
630	37	0.21	1	5000	51	0.11	0

STC=37

ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ

TL = TRANSMISSION LOSS, dB

ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEAUREMENTS, dB

DEF. = DEFICIENCIES, dB BELOW STC CONTOUR (SUM OF DEF = 29)

STC = SOUND TRANSMISSION CLASS

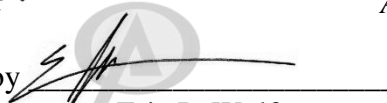
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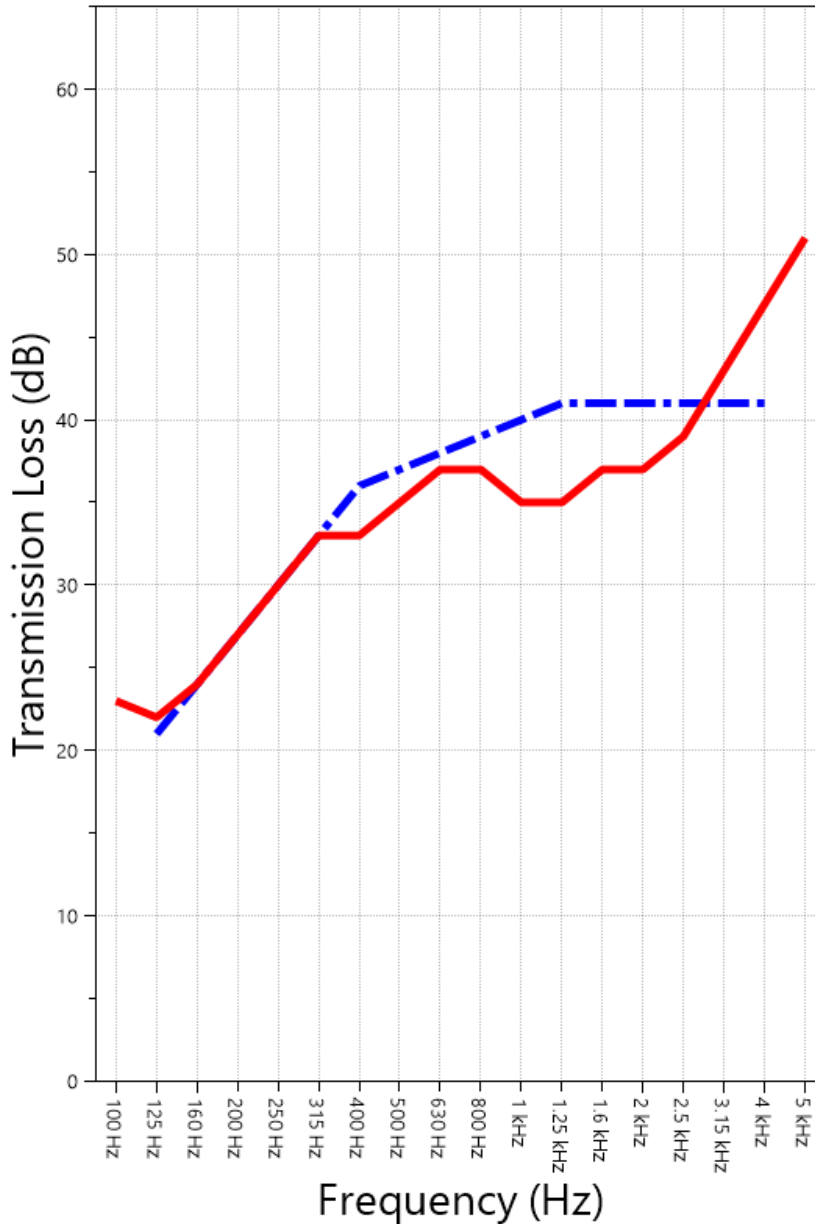
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SOUND TRANSMISSION REPORT

Van Ness acoustical mockup - window unit with operable section



STC=37

OITC=31



TRANSMISSION LOSS

SOUND TRANSMISSION CLASS CONTOUR



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APPENDIX A: Extended Frequency Range Data

Specimen: Van Ness acoustical mockup - window unit with operable section (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.

1/3 Octave Band Center Frequency (Hz)	Sound Transmission Loss (dB)	Δ TL (Eq. A2.5) (dB)
31.5	27	1.56
40	26	0.91
50	22	0.85
63	21	0.56
80	23	0.61
100	23	1.02
125	22	0.67
160	24	0.40
200	27	0.34
250	30	0.47
315	33	0.31
400	33	0.44
500	35	0.27
630	37	0.21
800	37	0.19
1000	35	0.15
1250	35	0.15
1600	37	0.10
2000	37	0.11
2500	39	0.08
3150	43	0.05
4000	47	0.08
5000	51	0.11
6300	55	0.08
8000	58	0.16
10000	57	0.11
12500	52	0.12



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APPENDIX B: Determination of Outdoor Indoor Transmission Class (OITC)

Specimen: Van Ness acoustical mockup - window unit with operable section (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 E1332-16 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	23
100	102	23
125	101	22
160	98	24
200	97	27
250	95	30
315	94	33
400	93	33
500	93	35
630	91	37
800	90	37
1000	89	35
1250	89	35
1600	88	37
2000	88	37
2500	87	39
3150	85	43
4000	84	47

OITC = 31



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APPENDIX C: Instruments of Traceability

Specimen: Van Ness acoustical mockup - window unit with operable section (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	2018-08-09	2019-08-09
Bruel & Kjaer Mic And Preamp D	Type 4943-B-001	2311440	2018-09-28	2019-09-28
Bruel & Kjaer Pistonphone	Type 4228	2781248	2018-08-06	2019-08-06
EXTECH Hygro 330	SD700	A083330	2018-09-07	2019-09-07
EXTECH Hygro 322	SD700	A083322	2018-09-07	2019-09-07

APPENDIX D: Revisions to Original Test Report

Specimen: Van Ness acoustical mockup - window unit with operable section (See Full Report)

<u>Date</u>	<u>Revision</u>
2019-03-28	Original report issued

END