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TEST REPORT

SPONSOR: RIVERBANK ACOUSTICAL LABORATORIES | GENEVA, IL

PRODUCT NAME:

CLASSIC MID-20TH CENTURY COIN-OPERATED TELEPHONE BOOTH

TEST DATE:

FEBRUARY 6, 2023

TEST METHOD:

ISO 23351-1:2020

ACOUSTICS – MEASUREMENT OF SPEECH LEVEL REDUCTION OF FURNITURE ENSEMBLES AND ENCLOSURES – PART 1: LABORATORY METHOD

RATING:

$D_{S,A}$ = 5.7 dB

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SPONSOR: **Riverbank Acoustical Laboratories**
Geneva, IL

Speech Level Reduction
RAL™-NR23-003

CONDUCTED: 2023-02-07

ON: Classic Mid-20th Century Coin-Operated Telephone Booth

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 measurements reported in this document were made in conformity with methods specified in ISO 23351-1:2020 "Acoustics – Measurement of speech level reduction of furniture ensembles and enclosures – Part 1: Laboratory method". Sound power levels were determined in conformity with the Direct method specified in ANSI/ASA S12.51-2012 / ISO 3741:2010. Reverberation time measurements were conducted in conformity with the Precision method specified in ISO 3382-2:2008. A description of the measurement procedure and room specifications are available upon request. The results presented in this report apply to the sample as received from the test sponsor.

SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as “Classic Mid-20th Century Coin-Operated Telephone Booth”. Through a full internal inspection performed on the test specimen, Riverbank personnel verified the following information:

Enclosure

Product Type:	Mid-20th century aluminum telephone booth
Materials:	Aluminum, steel, plastic, glass
Exterior Dimensions:	895 mm (35.25 in.) by 899 mm (35.375 in.)
Exterior Height	2191 mm (86.25 in.)
Interior Dimensions:	820 mm (32.28 in.) by 830 mm (32.68 in.)
Interior Height:	1960 mm (77.17 in.)
*Glass Thickness:	Average @ 5 mm (0.197 in.)
Overall Weight:	153.09 kg (337.5 lbs)

** Note: Glass thickness is based on the arithmetic average of ten (10) interferometer measurements taken at different locations on the specimen door and wall glass.*

Test Environment

Designation:	RAL Room 0
Room Volume:	291.98 m^3
Air Temperature:	19.5 °C ± 0.5 °C
Relative Humidity:	54.5 % ± 5.1 %
Static Pressure:	98.8 kPa ± 0.3 kPa

Sound pressure levels in the test chamber were measured using a single microphone on a rotating boom arm, with a total circular traverse length of 10.3 m. The test chamber is qualified for broad-band sound power level measurements from 50 Hz through 10 kHz per ISO 3741:2010 Annex C.

SPECIMEN INSTALLATION AND OPERATION

The test specimen was placed at two (2) successive locations within the test chamber, each of which were spaced at least at least 1.0 m from the test chamber surfaces, diffusors, and any point on the rotating microphone traverse. The distance between centers of the specimen locations was at least 1.7 m.

The door panel was fully opened and closed ten (10) times prior to testing, to demonstrate operability. No further adjustments were made to operable components on the specimen.

SOUND SOURCE INSTALLATION AND OPERATION

The sound source is a dodecahedral loudspeaker certified to meet the requirements for an omnidirectional sound source as specified in ISO 3382-1:2008. The sound source was configured with a signal generator to emit broad-band pink noise. For each of the specimen's two (2) user positions, the sound source was positioned at a height of 1.55 m from the specimen floor, the approximate position of a standing user's head. The sound source was connected to power through an outlet on the test chamber wall, with the power cable routed through a gap underneath the specimen booth door.

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Figure 1 – Test specimen in test chamber prior to being moved to test locations 1 and 2 in the test chamber

Figure 2 – Detail of gap underneath specimen door

Figure 3 – Detail of vent openings at bottom of specimen

Figure 4 – Detail of specimen top

Figure 5 – Detail of specimen phone

Figure 6 – Omnidirectional sound source installed within specimen, position 1 of 2

Figure 7 – Omnidirectional sound source installed within specimen, position 2 of 2

Figure 8 – Omnidirectional sound source installed after specimen removed from test chamber, position 1 of 2

Figure 9 – Omnidirectional sound source installed after specimen removed from test chamber, position 2 of 2

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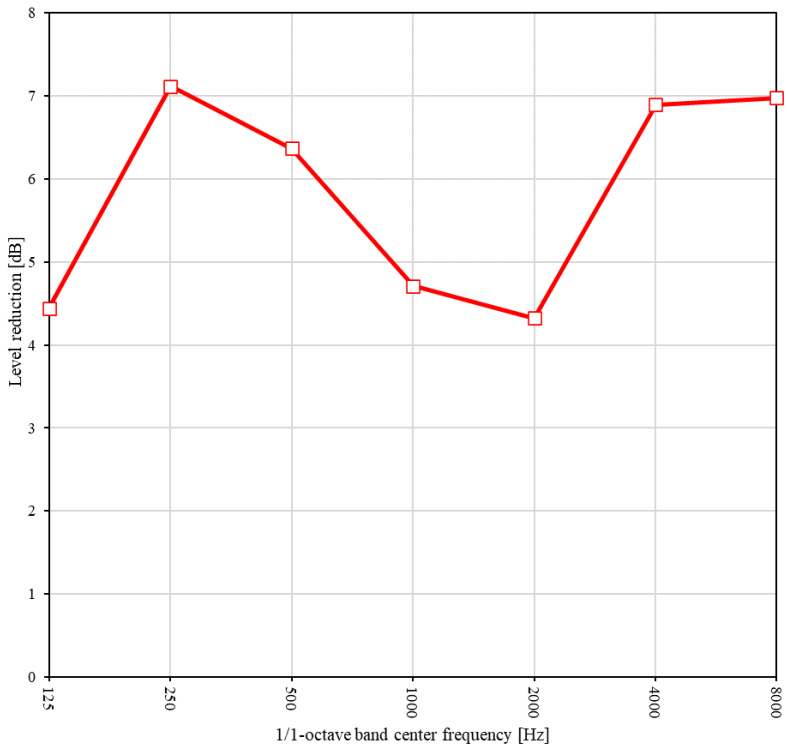
TEST RESULTS

Specimen level reduction is tabulated below for 1/1 octave frequency bands centered from 125 Hz through 8 kHz. Speech level reduction ($D_{S,A}$), expressed in decibels, is the reduction in A-weighted sound power level of normal effort genderless speech caused by the test specimen. The results are only valid for the tested specimen configuration. Changes in size, geometry, or materials can lead to significant changes in reported results.

1/1 Octave Band Center Frequency	**Level reduction**
f	*D*
Hz	**dB**
125	4.4
250	7.1
500	6.4
1000	4.7
2000	4.3
4000	6.9
8000	7.0
$D_{S,A}$	**5.7**



Tested by _____
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ANNEX A: Intermediate Calculations

Specimen: Classic Mid-20th Century Coin-Operated Telephone Booth (See Full Report)

The test results and intermediate calculated values given below are formatted according to the example given in ISO 23351-1:2020 Table A.1. Sound power levels are expressed in dB ref 1 pW. Speech level reduction ($D_{S,A}$) is the reduction in A-weighted sound power level of standardized speech within the entire frequency range from 125 Hz to 8000 Hz due to installation of the test specimen.

Index i	f	$L_{W,P,1,i}$	$L_{W,P,2,i}$	D_i	$L_{W,S,1,i}$	$L_{W,S,2,i}$	A_i	$L_{W,S,A,1,i}$	$L_{W,S,A,2,i}$
	Hz	dB	dB	dB	dB	dB	dB	dB	dB
1	125	112.1	107.7	**4.4**	60.9	56.5	-16.1	44.8	40.4
2	250	120.8	113.7	**7.1**	65.3	58.2	-8.6	56.7	49.6
3	500	115.1	108.7	**6.4**	69	62.6	-3.2	65.8	59.4
4	1000	110.9	106.2	**4.7**	63	58.3	0	63	58.3
5	2000	108.9	104.6	**4.3**	55.8	51.5	1.2	57	52.7
6	4000	105.0	98.1	**6.9**	49.8	42.9	1	50.8	43.9
7	8000	90.9	83.9	**7.0**	44.5	37.5	-1.1	43.4	36.4
							SUM:	**68.4**	**62.7**

INDEX OF VARIABLES

f = 1/1-octave band center frequency

$L_{W,P,1,i}$ = Sound power level of omnidirectional sound source, specimen removed from chamber

$L_{W,P,2,i}$ = Sound power level of omnidirectional sound source, specimen installed

D_i = Level reduction ($L_{W,P,1,i}$ - $L_{W,P,2,i}$)

$L_{W,S,1,i}$ = Sound power level of standardized speech (ISO 23351-1:2020, Table 1)

$L_{W,S,2,i}$ = Sound power level of standardized speech, specimen installed ($L_{W,S,1,i}$ - D_i)

A_i = A-weighting attenuation (ISO 23351-1:2020, Table A.1)

$L_{W,S,A,1,i}$ = A-weighted sound power level of standardized speech ($L_{W,S,1,i}$ + A_i)

$L_{W,S,A,2,i}$ = A-weighted sound power level of standardized speech, specimen installed ($L_{W,S,2,i}$ + A_i)

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APPENDIX A: Instruments of Traceability

Specimen: Classic Mid-20th Century Coin-Operated Telephone Booth (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2022-07-12	2023-07-12
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2525857	2023-01-12	2024-01-12
Bruel & Kjaer Pistonphone	Type 4228	2781248	2022-07-22	2023-07-22
Extech Temp., Humid. And Pressure Recorder	SD700	A099959	2022-03-22	2023-03-22
Norsonic Dodecahedronal Loudspeaker	Nor276	2766374	2022-08-25	2023-08-25
Norsonic Power Amplifier	Nor280	2804796	2022-08-25	2023-08-25

APPENDIX B: Revisions to Original Test Report

Specimen: Classic Mid-20th Century Coin-Operated Telephone Booth (See Full Report)

Date	Revision
2023-02-23	Original report issued

END