

Test Report

FOR: **ezoBord**
Elgin, IL

Sound Absorption
RAL-A18-332

CONDUCTED: 2018-10-04

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ON: Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna

TEST METHOD

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 C423-17: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-16: "Standard Practices for Mounting Test Specimens During Sound Absorption Tests." A description of the measuring procedure and room qualifications is available upon request.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna. A full internal inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

Baffles

Material: Polyethylene terephthalate, metal
Dimensions: 10 @ 2409.82 mm (94.875 in.) x 307.97 mm (12.125 in.)
Composition: Polyethylene terephthalate panels, metal channel covering top edge
Thickness: 8.89 mm (0.35 in.)
Overall Weight: 13.49 kg (29.75 lbs)

Mounting Rails

Material: Metal
Dimensions: 3 @ 2438.4 mm (96 in.) x 19.05 mm (0.75 in.)
Thickness: 12.7 mm (0.5 in.)
Installation: Hung from test chamber cable array, spaced 609.6 mm (24 in.) on center
Baffles mounted perpendicular to rails via threaded rods on baffles,
matching holes on rails
Baffles spaced 269.88 mm (10.625 in.) on center
Overall Weight: 1.7 kg (3.75 lbs)

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Physical Measures

Dimensions: 2.44 m (96.0 in) wide by 2.41 m (94.875 in) long
Thickness: 0.32 m (12.625 in)
Weight: 15.2 kg (33.5 lbs)

Test Environment

Room Volume: 291.98 m³
Temperature: 20.6 °C ± 0.1 °C
Relative Humidity: 58.9 % ± 1.0 %
Barometric Pressure: 99.4 kPa

The total absorptive area (all exposed surfaces) of all sound-absorbing units was 14.94 m² (160.79 ft²).
The array of units covered 5.88 m² (63.25 ft²) of chamber floor surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of ten (10) sound-absorbing baffles suspended from an array of cables such that the bottom surface of the baffles is located approximately 889 mm (35 in.) above the horizontal test surface. The baffles were arranged in a single row, horizontally spaced 269.88 mm (10.625 in.) on center. This approximates the mounting method of a typical ceiling baffle installation.

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Figure 1 - Specimen mounted in test chamber



Figure 2 – Detail of specimen material, mounting method

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TEST RESULTS

Note: There is currently no standardized method for calculating Absorption Coefficients from spaced object absorbers. The sound absorption performance of spaced object absorbers should not be compared directly with specimens tested as a single rectangular area (e.g. mounting types A, E, etc.).

1/3 Octave Center Frequency (Hz)	Total Absorption		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
100	0.69	7.42	0.07	0.74
** 125	1.97	21.16	0.20	2.12
160	1.51	16.29	0.15	1.63
200	2.09	22.48	0.21	2.25
** 250	1.99	21.42	0.20	2.14
315	2.44	26.22	0.24	2.62
400	2.82	30.39	0.28	3.04
** 500	3.27	35.23	0.33	3.52
630	3.50	37.69	0.35	3.77
800	3.61	38.89	0.36	3.89
** 1000	4.01	43.15	0.40	4.32
1250	4.83	52.03	0.48	5.20
1600	5.32	57.31	0.53	5.73
** 2000	6.02	64.84	0.60	6.48
2500	6.54	70.41	0.65	7.04
3150	7.15	76.96	0.72	7.70
** 4000	7.25	78.07	0.73	7.81
5000	7.25	78.04	0.73	7.80

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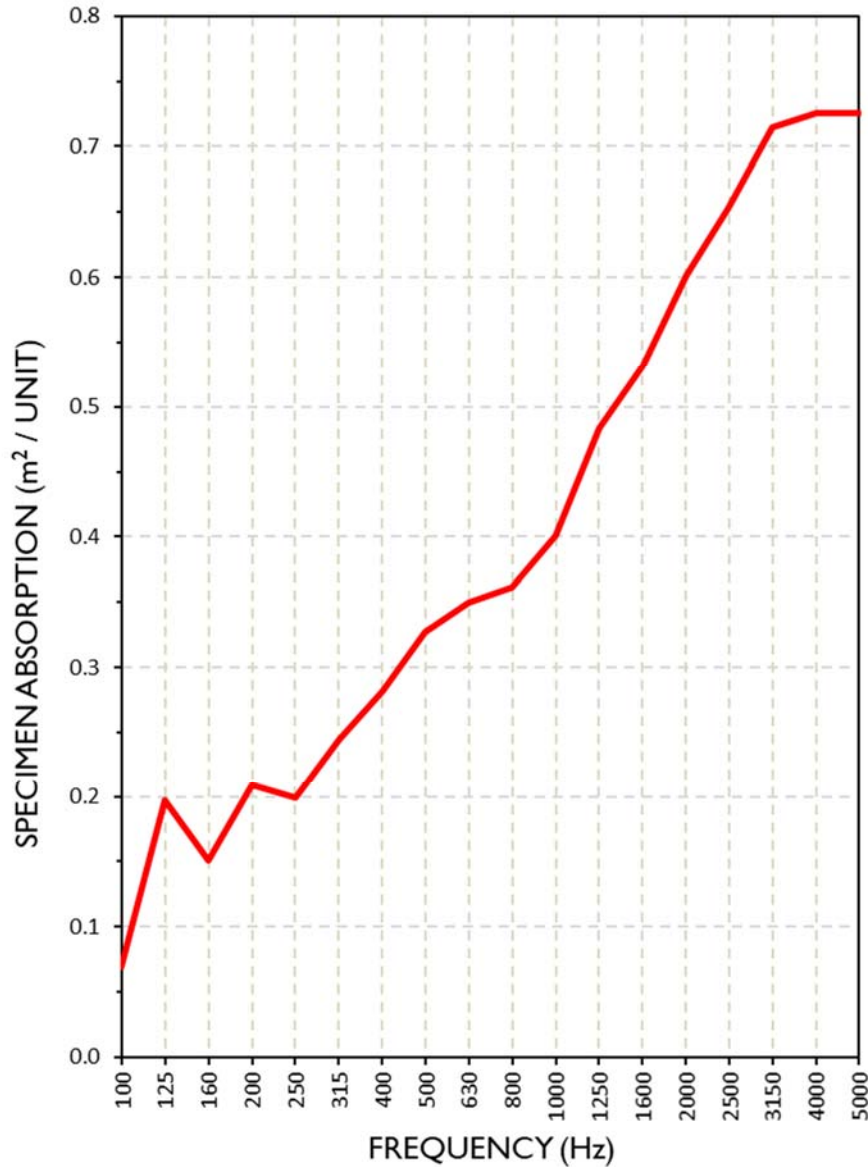
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SOUND ABSORPTION REPORT
Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna



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APPENDIX A: Extended Frequency Range Data

Specimen: Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-17, 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.

1/3 Octave Band Center Frequency (Hz)	Total Absorption		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
31.5	0.97	10.46	0.10	1.05
40	0.77	8.33	0.08	0.83
50	0.94	10.11	0.09	1.01
63	0.12	1.29	0.01	0.13
80	0.93	10.01	0.09	1.00
100	0.69	7.42	0.07	0.74
125	1.97	21.16	0.20	2.12
160	1.51	16.29	0.15	1.63
200	2.09	22.48	0.21	2.25
250	1.99	21.42	0.20	2.14
315	2.44	26.22	0.24	2.62
400	2.82	30.39	0.28	3.04
500	3.27	35.23	0.33	3.52
630	3.50	37.69	0.35	3.77
800	3.61	38.89	0.36	3.89
1000	4.01	43.15	0.40	4.32
1250	4.83	52.03	0.48	5.20
1600	5.32	57.31	0.53	5.73
2000	6.02	64.84	0.60	6.48
2500	6.54	70.41	0.65	7.04
3150	7.15	76.96	0.72	7.70
4000	7.25	78.07	0.73	7.81
5000	7.25	78.04	0.73	7.80
6300	7.37	79.33	0.74	7.93
8000	7.53	81.08	0.75	8.11
10000	7.77	83.61	0.78	8.36
12500	7.51	80.83	0.75	8.08

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APPENDIX B: Instruments of Traceability

Specimen: Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 1	Type 3160-A-4/2	System 1	2018-08-09	2019-08-09
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2018-03-27	2019-03-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2018-08-06	2019-08-06
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	P97844	2018-02-03	2019-02-03

END

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ON: Ceiling Baffle system 3/8 in. (9 mm) Aalto/Vesi/Luna (See Full Test Report for Details)

Appendix C to ASTM C423 Sound Absorption Test

Non-standard calculation of equivalent NRC Rating and Absorption Coefficients from spaced absorbers.

At this time ASTM C423 does not provide a standard method for determining absorption coefficients of spaced object absorbers. Tests of a set of sound absorbing objects spaced apart from each other will yield higher absorption rates than a specimen joined together as a single patch (A-Mount or E-Mount). For this reason it is unfair to provide NRC or absorption coefficient ratings for specimens that consist of a spaced set of absorbers. Despite this, the architectural industry has expressed great demand for a simple "single number" rating for these treatments. Likewise, acoustical consultants desire equivalent absorption coefficient data for use in acoustical modeling programs. The following is an attempt to appease these demands until ASTM develops a standard method for calculation. Several alternate non-standard calculation methods are provided. Riverbank Acoustical Laboratories prefers method 1.

Method 1) Apparent Sound Absorption Coefficient calculated from total test surface area covered.

The total sound absorption yielded by the specimen is divided by the total surface area of the test surface covered by the suspended baffles, including intermediate spaces. The baffle rigging covered 5.88 m² (63.25 ft²) of horizontal test surface area. With an additional 269.88 mm (10.625 in.) of width to account for the space between these baffles and what would be the next baffle in a larger array, the area comes to 6.53 m² (70.25 ft²) Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This may be the most accurate method for comparing baffle arrays to ceiling tile products. In acoustical modeling applications, the apparent sound absorption coefficient data can be assigned to a single horizontal surface or plane in acoustical modeling software for approximation of baffle array performance (assuming baffle spacing is similar to that tested).

Method 2) Apparent Sound Absorption Coefficient calculated from total exposed surface area of specimen.

The total sound absorption yielded by the specimen is divided by the total surface area of all exposed specimen faces, as obtained from client CAD drawings (14.94 m² (160.79 ft²)). Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This method shows the actual absorption occurring at the exposed surfaces, but does not provide a fair comparison with materials mounted as a uniform patch (in A-mount or E-mount).

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Appendix D: Data Note: See full test report for details of mounting position, spacing and configuration as these parameters greatly affect sound absorption performance.

Specimen Absorption			Method 1	Method 2
Freq. (Hz)	Sabins	Sabins / Unit	Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area
31.5	10.46	1.05	0.15	0.06
40	8.33	0.83	0.12	0.05
50	10.11	1.01	0.14	0.06
63	1.29	0.13	0.02	0.01
80	10.01	1.00	0.14	0.06
100	7.42	0.74	0.11	0.05
125	21.16	2.12	0.30	0.13
160	16.29	1.63	0.23	0.10
200	22.48	2.25	0.32	0.14
250	21.42	2.14	0.30	0.13
315	26.22	2.62	0.37	0.16
400	30.39	3.04	0.43	0.19
500	35.23	3.52	0.50	0.22
630	37.69	3.77	0.53	0.23
800	38.89	3.89	0.55	0.24
1,000	43.15	4.32	0.61	0.27
1,250	52.03	5.20	0.74	0.32
1,600	57.31	5.73	0.81	0.36
2,000	64.84	6.48	0.92	0.40
2,500	70.41	7.04	1.00	0.44
3,150	76.96	7.70	1.09	0.48
4,000	78.07	7.81	1.11	0.49
5,000	78.04	7.80	1.11	0.49
6,300	79.33	7.93	1.12	0.49
8,000	81.08	8.11	1.15	0.50
10,000	83.61	8.36	1.19	0.52
12,500	80.83	8.08	1.15	0.50
Apparent NRC:			0.60	0.25
Apparent SAA:			0.59	0.26

Prepared by 
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