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An ALION Technical Center

Test Report

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FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **a-light Architectural Lighting**
Oceanside, CA

Sound Absorption
RAL™-A19-090

CONDUCTED: 2019-03-06

ON: ABV-4', spaced 24 in. on center, 33.5 in. from test surface

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 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 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.

INFORMATION PROVIDED BY SPONSOR

The test specimen was designated by the sponsor as ABV-4', spaced 24 in. on center, 33.5 in. from test surface. 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

Trade Name:	ABV-4' – ABSORB Vertical luminaire - 4'
Materials:	Extruded aluminum, polyethylene terephthalate felt, acrylic

SPECIMEN MEASUREMENTS & TEST CONDITIONS

Through a full internal inspection performed on the test specimen, Riverbank personnel verified the following information:

Test Specimen

Materials:	Aluminum, felt, acrylic
Dimensions:	8 @ 1177.92 mm (46.375 in.) x 608.08 mm (23.94 in.)
Overall Thickness:	82.55 mm (3.25 in.)
Construction:	9 mm (0.354 in.) thick felt panels on both sides of aluminum frame Approximately 65 mm (2.559 in.) thick airspace between panels 87 mm (3.425 in.) deep x 58 mm (2.283 in.) wide aluminum channels along long edges, each capped with an acrylic lens
Overall Weight:	85.5 kg (188.5 lbs)

Physical Measurements (per unit)

Dimensions:	0.61 m (23.937 in) wide by 1.18 m (46.375 in) long
Thickness:	0.08 m (3.25 in)
Weight:	85.5 kg (188.5 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.2 °C ± 0.1 °C
Relative Humidity:	63.85 % ± 0.5 %
Barometric Pressure:	99.8 kPa

Each sound absorbing unit had an absorptive area (all exposed surfaces) of 1.73 m^2 (18.59 ft^2). The total absorptive area (all exposed surfaces) of all sound-absorbing units was 13.82 m^2 (148.74 ft^2). The array of units covered 5.56 m^2 (59.84 ft^2) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 8 spaced sound absorbing baffles suspended from cables such that the bottom face of the baffles is located approximately 850.9 mm (33.5 in.) above the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The baffles were evenly distributed in two rows, with constituent baffles flush between rows. The rows were spaced 533.4 mm (21 in.) apart. Baffles within each row were spaced 609.6 mm (24 in.) on center.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Detail of individual baffle materials

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	Total Absorption		Absorption per Unit	
(Hz)	(m^2)	(Sabins)	(m^2 / Unit)	(Sabins / Unit)
100	1.15	12.41	0.14	1.55
** 125	1.75	18.82	0.22	2.35
160	3.18	34.24	0.40	4.28
200	3.25	34.96	0.41	4.37
** 250	3.97	42.72	0.50	5.34
315	4.39	47.21	0.55	5.90
400	4.74	51.02	0.59	6.38
** 500	5.70	61.32	0.71	7.67
630	6.13	65.98	0.77	8.25
800	6.75	72.69	0.84	9.09
** 1000	7.40	79.66	0.93	9.96
1250	7.87	84.68	0.98	10.59
1600	8.31	89.49	1.04	11.19
** 2000	8.47	91.20	1.06	11.40
2500	8.53	91.77	1.07	11.47
3150	8.97	96.50	1.12	12.06
** 4000	8.86	95.32	1.11	11.92
5000	8.59	92.42	1.07	11.55

Tested by Marc Sciaky
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Report by Malcolm Kelly
Test Engineer, Acoustician

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Laboratory Manager

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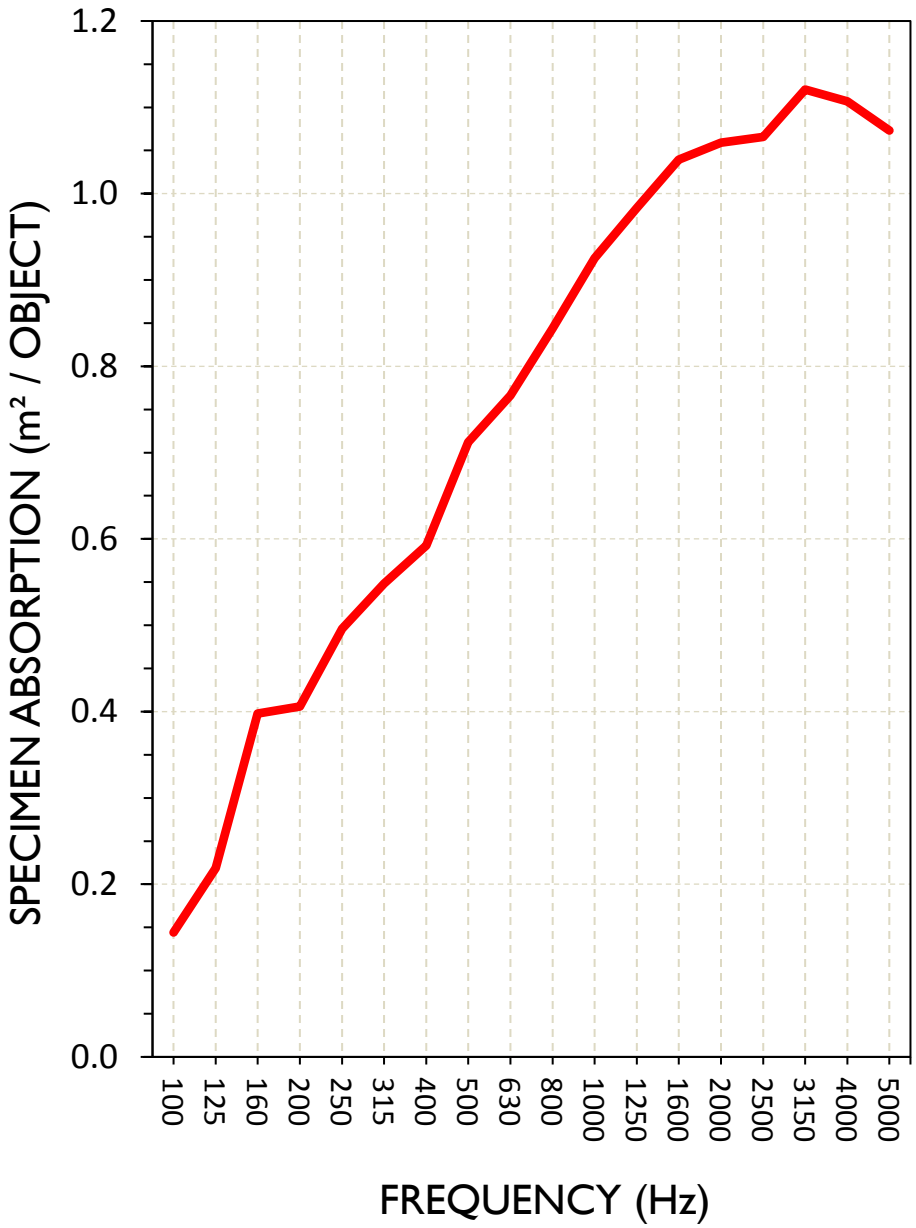
Date: 2019.03.08 13:25:55 -06'00'

SOUND ABSORPTION REPORT

ABV-4', spaced 24 in. on center, 33.5 in. from test surface



APPENDIX A: Extended Frequency Range Data

Specimen: ABV-4', spaced 24 in. on center, 33.5 in. from test surface (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 (m^2)	Total Absorption (Sabins)	Absorption per Unit (m^2 / Unit)	Absorption per Unit (Sabins / Unit)
31.5	2.50	26.91	0.31	3.36
40	0.08	0.85	0.01	0.11
50	-1.01	-10.85	-0.13	-1.36
63	-0.29	-3.11	-0.04	-0.39
80	1.30	13.99	0.16	1.75
100	1.15	12.41	0.14	1.55
125	1.75	18.82	0.22	2.35
160	3.18	34.24	0.40	4.28
200	3.25	34.96	0.41	4.37
250	3.97	42.72	0.50	5.34
315	4.39	47.21	0.55	5.90
400	4.74	51.02	0.59	6.38
500	5.70	61.32	0.71	7.67
630	6.13	65.98	0.77	8.25
800	6.75	72.69	0.84	9.09
1000	7.40	79.66	0.93	9.96
1250	7.87	84.68	0.98	10.59
1600	8.31	89.49	1.04	11.19
2000	8.47	91.20	1.06	11.40
2500	8.53	91.77	1.07	11.47
3150	8.97	96.50	1.12	12.06
4000	8.86	95.32	1.11	11.92
5000	8.59	92.42	1.07	11.55
6300	8.46	91.05	1.06	11.38
8000	8.17	87.95	1.02	10.99
10000	8.08	86.93	1.01	10.87
12500	8.57	92.24	1.07	11.53

APPENDIX B: Instruments of Traceability

Specimen: ABV-4', spaced 24 in. on center, 33.5 in. from test surface (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	System 1	2018-08-09	2019-08-09
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2018-09-28	2019-09-28
Bruel & Kjaer Pistonphone	Type 4228	2781248	2018-08-06	2019-08-06
EXTECH Hygro 662	SD700	A083662	2018-11-29	2019-11-29

APPENDIX C: Revisions to Original Test Report

Specimen: ABV-4', spaced 24 in. on center, 33.5 in. from test surface (See Full Report)

Date	Revision
2019-03-07	Original report issued

END

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ON: ABV-4', spaced 24 in. on center, 33.5 in. from test surface (See Full Test Report for Details)

Appendix D 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 software. 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 5.56 m^2 (59.84 ft^2) of horizontal test surface area. With an extra 609.6 mm (24 in.) of width to account for the space between the tested array and what would be the next baffle in a larger array, the surface area comes to 7.32 m^2 (78.80 ft^2) 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. 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. Such approximations rely on the assumptions that baffle spacing is similar to that of the tested array and that the installation occurs over a perfectly reflective ceiling surface.

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 (1.73 m^2 (18.59 ft^2) per baffle x 8 baffles = 13.82 m^2 (148.74 ft^2) total surface area). 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).

Method 3) Apparent Sound Absorption Coefficient calculated from one face per baffle
The total sound absorption yielded by the specimen is divided by the surface area of one side of one large face for each baffle in the specimen (0.72 m^2 (7.71 ft^2) per baffle x 8 baffles = 5.73 m^2 (61.67 ft^2) total surface area). 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 is favored by some material manufacturers since it yields very high NRC figures, but does not provide a fair comparison with other ceiling tile or wall panel products. Riverbank Acoustical Laboratories recommends that results obtained from this method be used for research and comparison purposes only; such results should not be used for marketed claims of product performance.

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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	Method 3
Freq. (Hz)	Sabins	Sabins / Unit	Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area	Apparent Abs. Coefficient From One Face/Baffle
31.5	26.91	3.36	0.34	0.18	0.44
40	0.85	0.11	0.01	0.01	0.01
50	-10.85	-1.36	-0.14	-0.07	-0.18
63	-3.11	-0.39	-0.04	-0.02	-0.05
80	13.99	1.75	0.18	0.09	0.23
100	12.41	1.55	0.16	0.08	0.20
125	18.82	2.35	0.24	0.13	0.31
160	34.24	4.28	0.43	0.23	0.56
200	34.96	4.37	0.44	0.24	0.57
250	42.72	5.34	0.54	0.29	0.69
315	47.21	5.90	0.60	0.32	0.77
400	51.02	6.38	0.65	0.34	0.83
500	61.32	7.67	0.78	0.41	0.99
630	65.98	8.25	0.84	0.44	1.07
800	72.69	9.09	0.92	0.49	1.18
1,000	79.66	9.96	1.01	0.54	1.29
1,250	84.68	10.59	1.07	0.57	1.37
1,600	89.49	11.19	1.14	0.60	1.45
2,000	91.20	11.40	1.16	0.61	1.48
2,500	91.77	11.47	1.16	0.62	1.49
3,150	96.50	12.06	1.22	0.65	1.56
4,000	95.32	11.92	1.21	0.64	1.55
5,000	92.42	11.55	1.17	0.62	1.50
6,300	91.05	11.38	1.16	0.61	1.48
8,000	87.95	10.99	1.12	0.59	1.43
10,000	86.93	10.87	1.10	0.58	1.41
12,500	92.24	11.53	1.17	0.62	1.50
		Apparent NRC:	**0.85**	**0.45**	**1.10**
		Apparent SAA:	**0.86**	**0.46**	**1.10**

Prepared by
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