

Test Report

SPONSOR: **OCL Architectural Lighting**
St. Louis, MO

Sound Absorption
RAL™-A20-421

CONDUCTED: 2020-10-01

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ON: Stealth Acoustic Fixtures (2x2 staggered array)

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 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 Stealth Acoustic Fixtures (2x2 staggered array). 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

Material: Stealth Acoustic
Manufacturer: OCL Architectural Lighting

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials: Semirigid felt panels loose laid over aluminum perimeter frames
Dimensions: Felt panels, 4 @ 1206.5 mm (47.5 in.) x 1206.5 mm (47.5 in.)
Aluminum frames, 4 @ 1206.5 mm (47.5 in.) x 1206.5 mm (47.5 in.)
Frames formed from 44.45 mm (1.75 in.) square tubing
Thickness: Felt panels @ 9.55 mm (0.376 in.)
Frames @ 44.45 mm (1.75 in.)
Overall Weight: 36.06 kg (79.5 lbs)

Test Report**OCL Architectural Lighting**
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Dimensions: 1.21 m (47.5 in) wide by 1.21 m (47.5 in) long
Thickness: 0.1 m (3.75 in)
Weight: 9.02 kg (19.87 lbs)

Test Environment

Room Volume: 291.98 m³
Temperature: 22.5 °C ± 0.2 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity: 56.35 % ± 0.3 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure: 98.7 kPa (Requirement not defined)

Each sound absorbing object had an absorptive area (all exposed surfaces) of 3.37 m² (36.28 ft²). The total absorptive area (all exposed surfaces) of all sound-absorbing objects was 13.48 m² (145.14 ft²). The array of objects covered 11.60 m² (124.86 ft²) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 4 spaced sound absorbing fixtures suspended atop an array of cables such that the closest face of the baffles is located approximately 1511 mm (59.5 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The installation were arranged in two rows of two. The rows were spaced 1524 mm (60 in.) on center. Fixtures within each row were spaced 2438.4 mm (96 in.) on center. The spacing of the rows was staggered by 698.5 mm (27.5 in.).

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Figure 1 – Specimen mounted in test chamber



Figure 2 – Underside of individual specimen object

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Figure 3 – Detail of specimen materials

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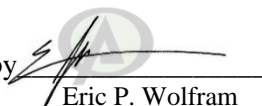
TEST RESULTS

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 Object	
	(m ²)	(Sabins)	(m ² / Object)	(Sabins / Object)
100	2.04	22.00	0.51	5.50
** 125	3.16	34.05	0.79	8.51
160	2.65	28.49	0.66	7.12
200	3.27	35.20	0.82	8.80
** 250	3.44	37.03	0.86	9.26
315	4.44	47.82	1.11	11.96
400	4.32	46.55	1.08	11.64
** 500	4.92	53.01	1.23	13.25
630	4.93	53.06	1.23	13.27
800	5.32	57.27	1.33	14.32
** 1000	5.75	61.91	1.44	15.48
1250	6.11	65.77	1.53	16.44
1600	6.41	68.95	1.60	17.24
** 2000	6.96	74.96	1.74	18.74
2500	7.25	78.06	1.81	19.51
3150	7.64	82.26	1.91	20.57
** 4000	7.68	82.71	1.92	20.68
5000	8.22	88.47	2.05	22.12

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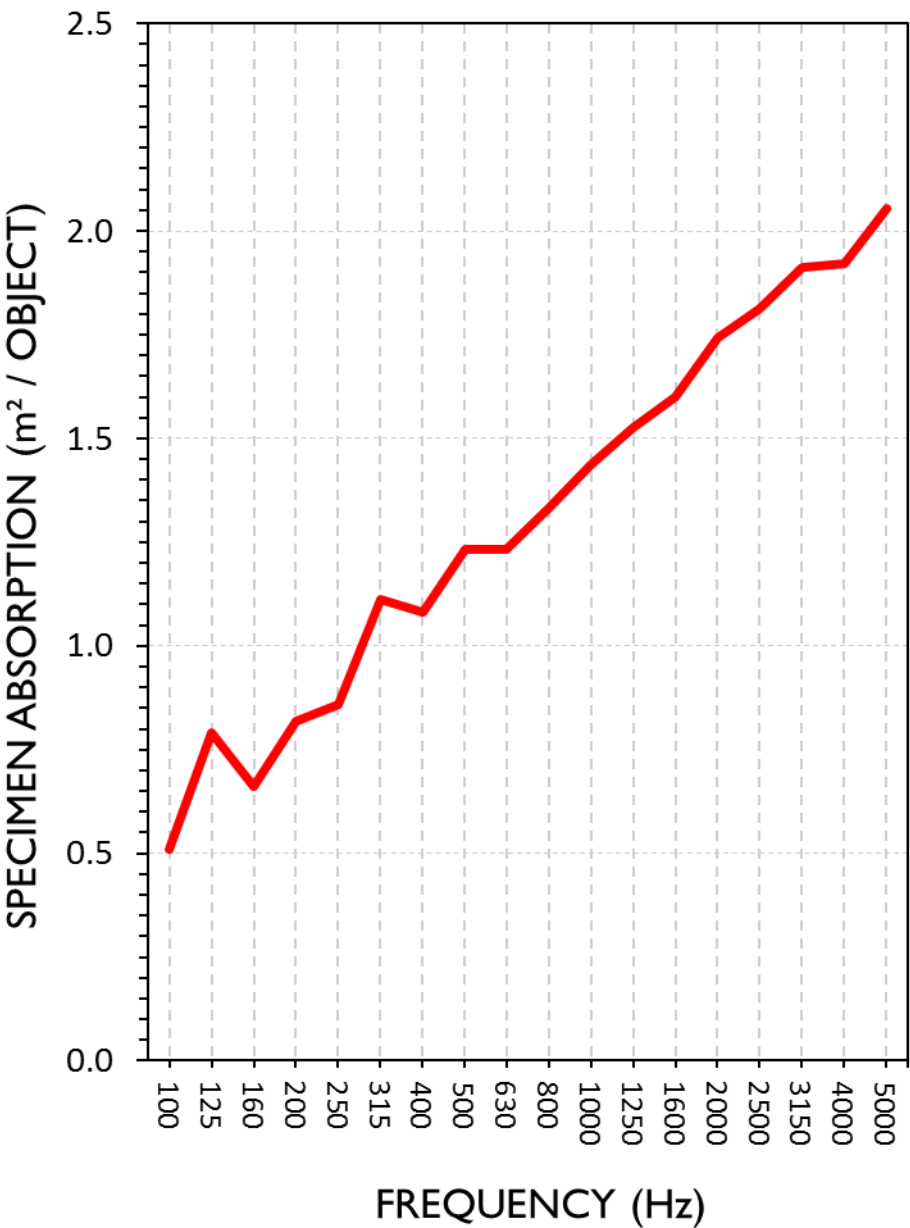
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SOUND ABSORPTION REPORT
Stealth Acoustic Fixtures (2x2 staggered array)



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APPENDIX A: Extended Frequency Range Data

Specimen: Stealth Acoustic Fixtures (2x2 staggered array) (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 Object	
	(m ²)	(Sabins)	(m ² / Object)	(Sabins / Object)
31.5	0.39	4.22	0.10	1.06
40	-0.23	-2.47	-0.06	-0.62
50	1.22	13.12	0.30	3.28
63	1.00	10.76	0.25	2.69
80	2.30	24.81	0.58	6.20
100	2.04	22.00	0.51	5.50
125	3.16	34.05	0.79	8.51
160	2.65	28.49	0.66	7.12
200	3.27	35.20	0.82	8.80
250	3.44	37.03	0.86	9.26
315	4.44	47.82	1.11	11.96
400	4.32	46.55	1.08	11.64
500	4.92	53.01	1.23	13.25
630	4.93	53.06	1.23	13.27
800	5.32	57.27	1.33	14.32
1000	5.75	61.91	1.44	15.48
1250	6.11	65.77	1.53	16.44
1600	6.41	68.95	1.60	17.24
2000	6.96	74.96	1.74	18.74
2500	7.25	78.06	1.81	19.51
3150	7.64	82.26	1.91	20.57
4000	7.68	82.71	1.92	20.68
5000	8.22	88.47	2.05	22.12
6300	8.50	91.55	2.13	22.89
8000	8.45	90.94	2.11	22.74
10000	8.62	92.81	2.16	23.20
12500	8.73	93.98	2.18	23.49

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APPENDIX B: Instruments of Traceability

Specimen: Stealth Acoustic Fixtures (2x2 staggered array) (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-042	3160-106968	2020-06-26	2021-06-26
Brue! & Kjaer Mic And Preamp E	Type 4943-B-001	2311441	2020-04-07	2021-04-07
Brue! & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	P97844	2020-02-18	2021-02-18

APPENDIX C: Revisions to Original Test Report

Specimen: Stealth Acoustic Fixtures (2x2 staggered array) (See Full Report)

<u>Date</u>	<u>Revision</u>
2020-10-05	Original report issued

END

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ON: Stealth Acoustic Fixtures (2x2 staggered array) (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 test surface area covered per object

The sound absorption per object yielded by the specimen is divided by the array area per object, a rectangular section that includes the area covered by one object and the intermediate space between adjacent objects. Given the spacing of the test specimen and assuming a similar object spacing for larger arrays, each object can be envisioned as occupying a 1524 mm (60 in.) by 2438.4 mm (96 in.) rectangular area. This surface area of 3.72 m² (40.0 ft²) is used with the measured absorption per object to calculate the Apparent Noise Reduction Coefficient (NRC) rating and Apparent Sound Absorption Average (SAA), based on the methods described in ASTM C423-17. This may be the most accurate method for comparing spaced object 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 object array performance. Such approximations rely on the assumptions that object spacing is similar to that of the tested array across the entire surface and that the installation occurs over a perfectly reflective surface material.

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 (3.37 m² (36.28 ft²) per object x 4 objects = 13.48 m² (145.14 ft²) 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 object

The total sound absorption yielded by the specimen is divided by the surface area of one side of one large face for each object in the specimen (1.46 m² (15.67 ft²) per object x 4 objects = 5.82 m² (62.67 ft²) 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 / Object	Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area	Apparent Abs. Coefficient From One Face/Baffle
31.5	4.22	1.06	0.03	0.03	0.07
40	-2.47	-0.62	-0.02	-0.02	-0.04
50	13.12	3.28	0.08	0.09	0.21
63	10.76	2.69	0.07	0.07	0.17
80	24.81	6.20	0.16	0.17	0.40
100	22.00	5.50	0.14	0.15	0.35
125	34.05	8.51	0.21	0.23	0.54
160	28.49	7.12	0.18	0.20	0.45
200	35.20	8.80	0.22	0.24	0.56
250	37.03	9.26	0.23	0.26	0.59
315	47.82	11.96	0.30	0.33	0.76
400	46.55	11.64	0.29	0.32	0.74
500	53.01	13.25	0.33	0.37	0.85
630	53.06	13.27	0.33	0.37	0.85
800	57.27	14.32	0.36	0.39	0.91
1,000	61.91	15.48	0.39	0.43	0.99
1,250	65.77	16.44	0.41	0.45	1.05
1,600	68.95	17.24	0.43	0.48	1.10
2,000	74.96	18.74	0.47	0.52	1.20
2,500	78.06	19.51	0.49	0.54	1.25
3,150	82.26	20.57	0.51	0.57	1.31
4,000	82.71	20.68	0.52	0.57	1.32
5,000	88.47	22.12	0.55	0.61	1.41
6,300	91.55	22.89	0.57	0.63	1.46
8,000	90.94	22.74	0.57	0.63	1.45
10,000	92.81	23.20	0.58	0.64	1.48
12,500	93.98	23.49	0.59	0.65	1.50
Apparent NRC:			0.35	0.40	0.90
Apparent SAA:			0.35	0.39	0.90

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