

Test Report

SPONSOR: **Pinnacle Architectural Lighting**
Denver, CO

Sound Absorption
RAL™-A19-473

CONDUCTED: 2019-11-20

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ON: Fina Acoustic 33.9375 in. diameter (9 units)

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 Fina Acoustic 33.9375 in. diameter (9 units). 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: Fina Acoustic
Manufacturer: Pinnacle 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: Coated metal body with semirigid felt paneling
Dimensions: 9 @ 862.01 mm (33.9375 in.) diameter
Overall Depth: 4 @ 114.3 mm (4.5 in.)
5 @ 101.6 mm (4 in.)
Thickness: Felt panels, 2 per fixture @ 9 mm (0.354 in.) each
Outer metal wall @ 6 mm (0.236 in.)
Overall Weight: 100.02 kg (220.5 lbs)

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Physical Measurements (per unit)

Dimensions: 0.86 m (33.937 in) wide by 0.86 m (33.937 in) long
Thickness: 0.11 m (4.5 in)
Weight: 11.11 kg (24.5 lbs)

Test Environment

Room Volume: 291.98 m³
Temperature: 21.4 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity: 61.1 % ± 1.0 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure: 99.2 kPa (Requirement not defined)

The total absorptive area (all exposed surfaces) of all sound-absorbing units was 13.12 m² (141.21 ft²).
The array of units covered 12.22 m² (131.52 ft²) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 9 spaced sound absorbing fixtures suspended from cables such that the closest face of the units is located approximately 1162.05 mm (45.75 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The units were evenly distributed in three staggered rows of three. Rows were spaced 981.08 mm (38.625 in.) on center, and units within each row were spaced 1358.9 mm (53.5 in.) on center.

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Figure 1 – Specimen mounted in test chamber



Figure 2 – Detail of individual fixture

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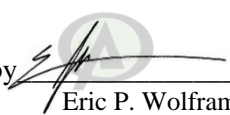
TEST RESULTS

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	2.83	30.42	0.31	3.38
** 125	2.30	24.77	0.26	2.75
160	2.22	23.90	0.25	2.66
200	3.37	36.30	0.37	4.03
** 250	4.51	48.55	0.50	5.39
315	5.41	58.21	0.60	6.47
400	6.24	67.21	0.69	7.47
** 500	6.80	73.17	0.76	8.13
630	7.39	79.53	0.82	8.84
800	7.84	84.39	0.87	9.38
** 1000	8.27	89.02	0.92	9.89
1250	9.07	97.63	1.01	10.85
1600	9.31	100.21	1.03	11.13
** 2000	9.66	103.96	1.07	11.55
2500	9.76	105.09	1.08	11.68
3150	9.54	102.73	1.06	11.41
** 4000	9.70	104.44	1.08	11.60
5000	9.83	105.85	1.09	11.76

Tested by 
Marc Sciaky
Senior Experimentalist

Report by 
Malcolm Kelly
Test Engineer, Acoustician

Approved by 
Eric P. Wolfram
Laboratory Manager

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

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

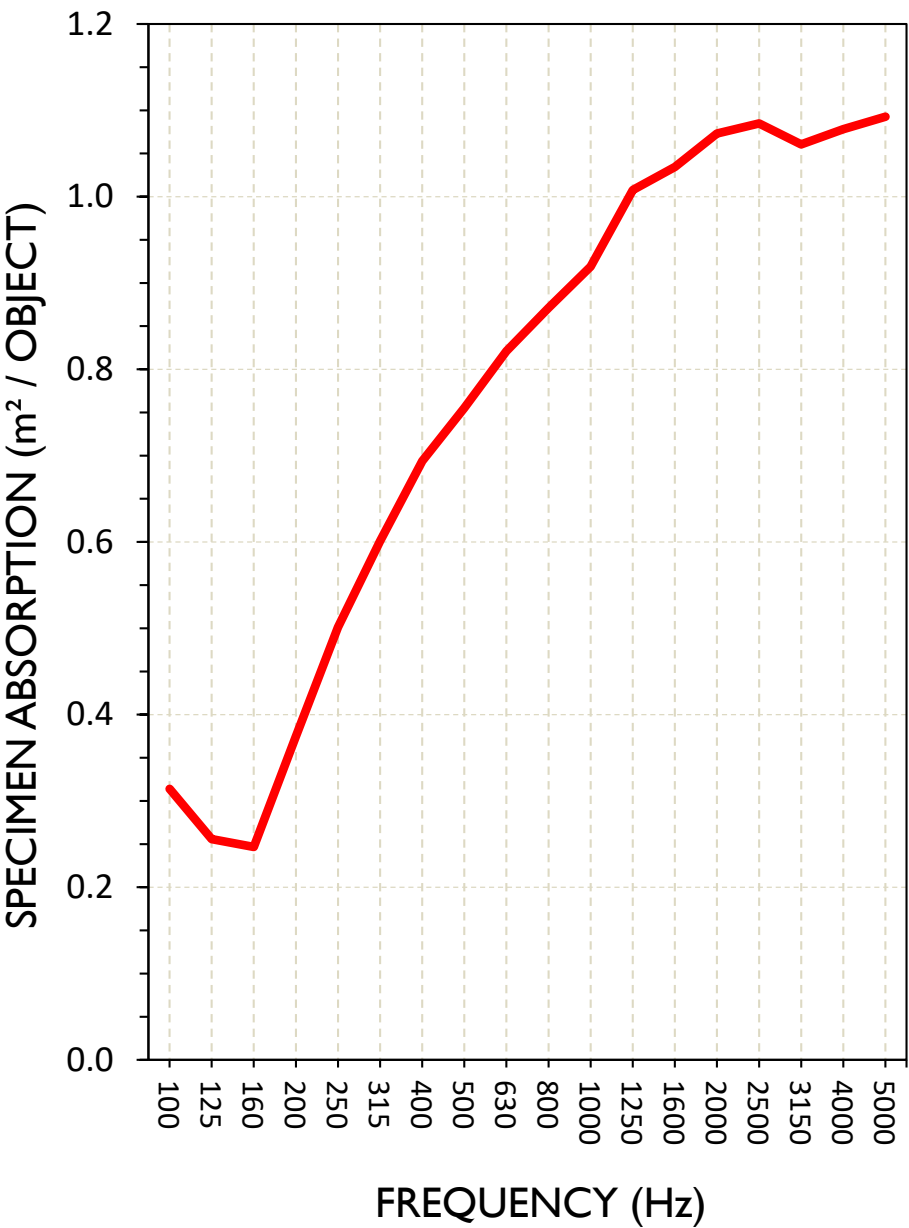
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SOUND ABSORPTION REPORT
Fina Acoustic 33.9375 in. diameter (9 units)



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APPENDIX A: Extended Frequency Range Data

Specimen: Fina Acoustic 33.9375 in. diameter (9 units) (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	0.68	7.36	0.08	0.82
40	-0.13	-1.42	-0.01	-0.16
50	-0.32	-3.44	-0.04	-0.38
63	-0.28	-2.98	-0.03	-0.33
80	1.89	20.39	0.21	2.27
100	2.83	30.42	0.31	3.38
125	2.30	24.77	0.26	2.75
160	2.22	23.90	0.25	2.66
200	3.37	36.30	0.37	4.03
250	4.51	48.55	0.50	5.39
315	5.41	58.21	0.60	6.47
400	6.24	67.21	0.69	7.47
500	6.80	73.17	0.76	8.13
630	7.39	79.53	0.82	8.84
800	7.84	84.39	0.87	9.38
1000	8.27	89.02	0.92	9.89
1250	9.07	97.63	1.01	10.85
1600	9.31	100.21	1.03	11.13
2000	9.66	103.96	1.07	11.55
2500	9.76	105.09	1.08	11.68
3150	9.54	102.73	1.06	11.41
4000	9.70	104.44	1.08	11.60
5000	9.83	105.85	1.09	11.76
6300	10.14	109.10	1.13	12.12
8000	10.22	110.02	1.14	12.22
10000	10.08	108.47	1.12	12.05
12500	11.30	121.63	1.26	13.51

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Specimen: Fina Acoustic 33.9375 in. diameter (9 units) (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	2019-06-25	2020-06-25
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2019-09-27	2020-09-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2019-08-09	2020-08-09
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP- PRHTemp2000	P97844	2019-02-08	2020-02-08

APPENDIX C: Revisions to Original Test Report

Specimen: Fina Acoustic 33.9375 in. diameter (9 units) (See Full Report)

<u>Date</u>	<u>Revision</u>
2019-12-03	Original report issued

END

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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 surface area treated per unit

The sound absorption per unit yielded by the specimen is divided by the theoretical surface area treated by each unit, including intermediate spaces. The fixture rigging covered 12.22 m² (131.52 ft²) of horizontal test surface area. Each unit can be envisioned to occupy 1.33 m² (14.35 ft²) of test 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 may be the most accurate method for comparing fixture 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 fixture array performance. Such approximations rely on the assumptions that fixture 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 (13.12 m² (141.21 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 fixture

The total sound absorption yielded by the specimen is divided by the surface area of one side of one large face for each fixture in the specimen (0.58 m² 6.28 ft²) per fixture x 9 fixtures = 5.25 m² (56.54 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 / 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	7.36	0.82	0.06	0.05	0.13
40	-1.42	-0.16	-0.01	-0.01	-0.03
50	-3.44	-0.38	-0.03	-0.02	-0.06
63	-2.98	-0.33	-0.02	-0.02	-0.05
80	20.39	2.27	0.16	0.14	0.36
100	30.42	3.38	0.24	0.22	0.54
125	24.77	2.75	0.19	0.18	0.44
160	23.90	2.66	0.19	0.17	0.42
200	36.30	4.03	0.28	0.26	0.64
250	48.55	5.39	0.38	0.34	0.86
315	58.21	6.47	0.45	0.41	1.03
400	67.21	7.47	0.52	0.48	1.19
500	73.17	8.13	0.57	0.52	1.29
630	79.53	8.84	0.62	0.56	1.41
800	84.39	9.38	0.65	0.60	1.49
1,000	89.02	9.89	0.69	0.63	1.57
1,250	97.63	10.85	0.76	0.69	1.73
1,600	100.21	11.13	0.78	0.71	1.77
2,000	103.96	11.55	0.80	0.74	1.84
2,500	105.09	11.68	0.81	0.74	1.86
3,150	102.73	11.41	0.80	0.73	1.82
4,000	104.44	11.60	0.81	0.74	1.85
5,000	105.85	11.76	0.82	0.75	1.87
6,300	109.10	12.12	0.84	0.77	1.93
8,000	110.02	12.22	0.85	0.78	1.95
10,000	108.47	12.05	0.84	0.77	1.92
12,500	121.63	13.51	0.94	0.86	2.15
Apparent NRC:			0.60	0.55	1.40
Apparent SAA:			0.61	0.56	1.39

Prepared by 
Malcolm Kelly
Test Engineer, Acoustician