

## Test Report

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

**Sound Absorption**  
**RAL™-A19-472**

CONDUCTED: 2019-11-18

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ON: Fina Acoustic 45.875 in. diameter (5 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 45.875 in. diameter (5 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: 5 @ 1165.22 mm (45.875 in.) diameter x 101.6 mm (4 in.) deep  
Thickness: Felt panels, 2 per fixture @ 9 mm (0.354 in.) each  
Outer metal wall @ 6 mm (0.236 in.)  
Overall Weight: 74.96 kg (165.25 lbs)

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### Physical Measurements (per unit)

Dimensions: 1.17 m (45.875 in) wide by 1.17 m (45.875 in) long  
Thickness: 0.1 m (4.0 in)  
Weight: 14.97 kg (33.0 lbs)

### Test Environment

Room Volume: 291.98 m<sup>3</sup>  
Temperature: 21.4 °C ± 0.2 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)  
Relative Humidity: 55.15 % ± 0.3 % (Requirement: ≥ 40 % and ≤ 5 % change)  
Barometric Pressure: 98.0 kPa (Requirement not defined)

Each sound absorbing unit had an absorptive area (all exposed surfaces) of 2.50 m<sup>2</sup> (26.96 ft<sup>2</sup>). The total absorptive area (all exposed surfaces) of all sound-absorbing units was 12.52 m<sup>2</sup> (134.8 ft<sup>2</sup>). The array of units covered 10.53 m<sup>2</sup> (113.31 ft<sup>2</sup>) of the horizontal test surface (total treated area).

### MOUNTING METHOD

Type J Mounting: The specimen is an array of 5 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 fixtures were placed in three staggered rows, with a row of one unit between two rows of two units. Rows were spaced 1371.6 mm (54 in.) on center, and units in the rows of two were spaced 1651 mm (65 in.) on center.

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Figure 1 – Specimen mounted in test chamber



Figure 2 – Detail of individual fixture

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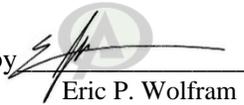
### TEST RESULTS

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 <sup>2</sup> )	(Sabins)	(m <sup>2</sup> / Unit)	(Sabins / Unit)
100	1.35	14.58	0.27	2.92
** 125	2.69	28.96	0.54	5.79
160	3.18	34.25	0.64	6.85
200	3.18	34.20	0.64	6.84
** 250	3.58	38.57	0.72	7.71
315	4.75	51.12	0.95	10.22
400	5.34	57.47	1.07	11.49
** 500	5.98	64.34	1.20	12.87
630	6.46	69.58	1.29	13.92
800	7.47	80.38	1.49	16.08
** 1000	8.00	86.14	1.60	17.23
1250	8.72	93.82	1.74	18.76
1600	9.13	98.28	1.83	19.66
** 2000	9.48	102.06	1.90	20.41
2500	9.38	101.00	1.88	20.20
3150	9.06	97.51	1.81	19.50
** 4000	9.43	101.55	1.89	20.31
5000	9.60	103.37	1.92	20.67

Tested by   
Marc Sciaky  
Senior Experimentalist

Report by   
Malcolm Kelly  
Test Engineer, Acoustician

Approved by   
Eric P. Wolfram  
Laboratory Manager

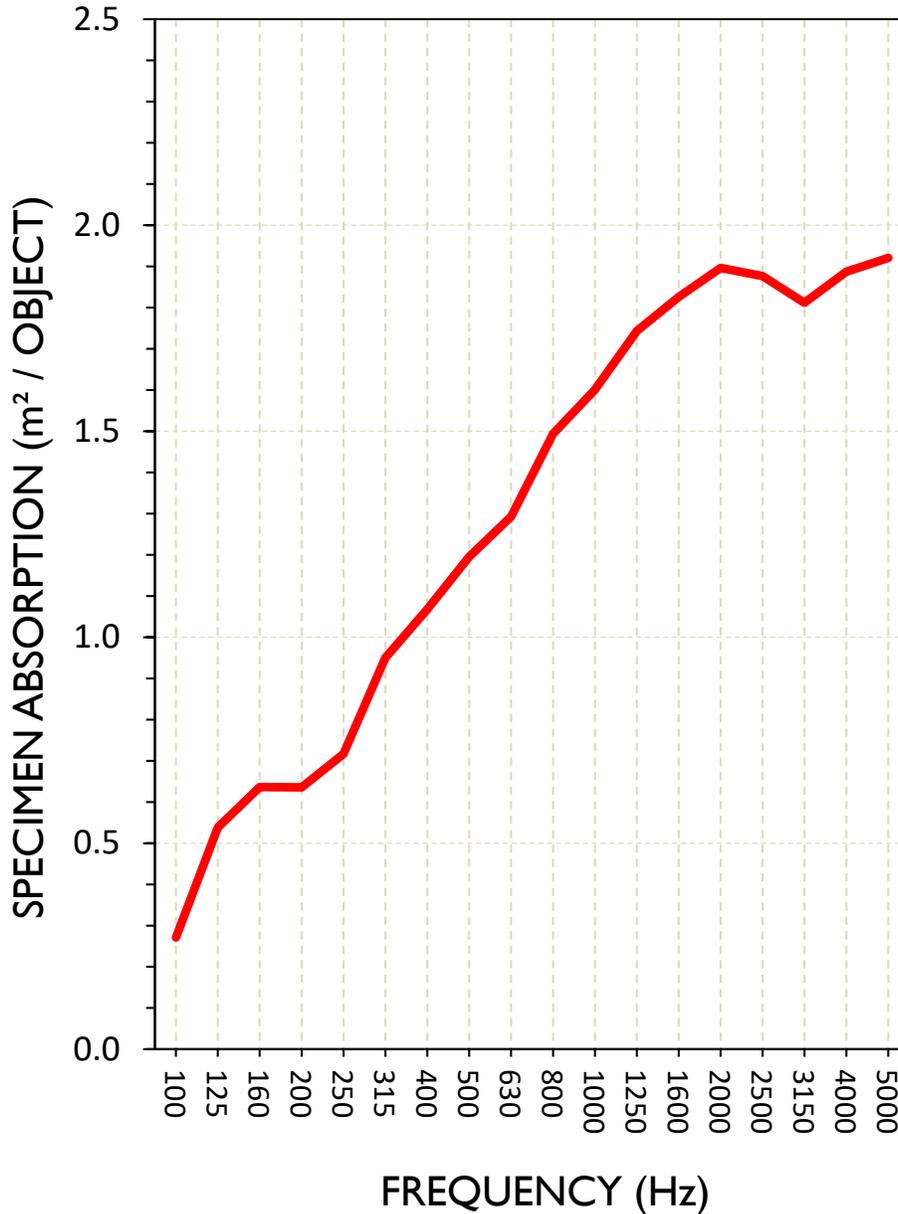
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**SOUND ABSORPTION REPORT**  
Fina Acoustic 45.875 in. diameter (5 units)



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### APPENDIX A: Extended Frequency Range Data

Specimen: Fina Acoustic 45.875 in. diameter (5 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 <sup>2</sup> )	(Sabins)	(m <sup>2</sup> / Unit)	(Sabins / Unit)
31.5	0.29	3.15	0.06	0.63
40	0.25	2.71	0.05	0.54
50	-1.55	-16.68	-0.31	-3.34
63	0.23	2.49	0.05	0.50
80	1.83	19.73	0.37	3.95
100	1.35	14.58	0.27	2.92
125	2.69	28.96	0.54	5.79
160	3.18	34.25	0.64	6.85
200	3.18	34.20	0.64	6.84
250	3.58	38.57	0.72	7.71
315	4.75	51.12	0.95	10.22
400	5.34	57.47	1.07	11.49
500	5.98	64.34	1.20	12.87
630	6.46	69.58	1.29	13.92
800	7.47	80.38	1.49	16.08
1000	8.00	86.14	1.60	17.23
1250	8.72	93.82	1.74	18.76
1600	9.13	98.28	1.83	19.66
2000	9.48	102.06	1.90	20.41
2500	9.38	101.00	1.88	20.20
3150	9.06	97.51	1.81	19.50
4000	9.43	101.55	1.89	20.31
5000	9.60	103.37	1.92	20.67
6300	9.39	101.11	1.88	20.22
8000	9.78	105.23	1.96	21.05
10000	9.82	105.70	1.96	21.14
12500	10.04	108.11	2.01	21.62

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

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### APPENDIX B: Instruments of Traceability

Specimen: Fina Acoustic 45.875 in. diameter (5 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 S# 3160-106968	Type 3160-A-042	System 1 S# 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 45.875 in. diameter (5 units) (See Full Report)

<u>Date</u>	<u>Revision</u>
2019-12-02	Original report issued

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END

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ON: Fina Acoustic 45.875 in. diameter (5 units) (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 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 baffle rigging covered 10.53 m<sup>2</sup> (113.31 ft<sup>2</sup>) of horizontal test surface area. Each unit can be envisioned as occupying a surface area of 2.26 m<sup>2</sup> (24.38 ft<sup>2</sup>). 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 (2.50 m<sup>2</sup> (26.96 ft<sup>2</sup>) per baffle x 5 baffles = 12.52 m<sup>2</sup> (134.8 ft<sup>2</sup>) 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 (1.07 m<sup>2</sup> (11.48 ft<sup>2</sup>) per baffle x 5 baffles = 5.33 m<sup>2</sup> (57.39 ft<sup>2</sup>) 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	3.15	0.63	0.03	0.02	0.05	
40	2.71	0.54	0.02	0.02	0.05	
50	-16.68	-3.34	-0.14	-0.12	-0.29	
<b>63</b>	2.49	0.50	0.02	0.02	0.04	
80	19.73	3.95	0.16	0.15	0.34	
100	14.58	2.92	0.12	0.11	0.25	
<b>125</b>	28.96	5.79	0.24	0.21	0.50	
160	34.25	6.85	0.28	0.25	0.60	
200	34.20	6.84	0.28	0.25	0.60	
<b>250</b>	38.57	7.71	0.32	0.29	0.67	
315	51.12	10.22	0.42	0.38	0.89	
400	57.47	11.49	0.47	0.43	1.00	
<b>500</b>	64.34	12.87	0.53	0.48	1.12	
630	69.58	13.92	0.57	0.52	1.21	
800	80.38	16.08	0.66	0.60	1.40	
<b>1,000</b>	86.14	17.23	0.71	0.64	1.50	
1,250	93.82	18.76	0.77	0.70	1.63	
1,600	98.28	19.66	0.81	0.73	1.71	
<b>2,000</b>	102.06	20.41	0.84	0.76	1.78	
2,500	101.00	20.20	0.83	0.75	1.76	
3,150	97.51	19.50	0.80	0.72	1.70	
<b>4,000</b>	101.55	20.31	0.83	0.75	1.77	
5,000	103.37	20.67	0.85	0.77	1.80	
6,300	101.11	20.22	0.83	0.75	1.76	
<b>8,000</b>	105.23	21.05	0.86	0.78	1.83	
10,000	105.70	21.14	0.87	0.78	1.84	
12,500	108.11	21.62	0.89	0.80	1.88	
			<b>Apparent NRC:</b>	<b>0.60</b>	<b>0.55</b>	<b>1.25</b>
			<b>Apparent SAA:</b>	<b>0.60</b>	<b>0.54</b>	<b>1.27</b>

Prepared by   
Malcolm Kelly  
Test Engineer, Acoustician