

## Test Report

FOR: **Eureka Lighting**  
Montreal, Québec

**Sound Absorption**  
**RAL™-A15-347**

CONDUCTED: 2015-11-16

Page 1 of 7

ON: Acoustic Cycle

### 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 C423-09a: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-05(2012): "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 Acoustic Cycle. A full internal inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

#### Acoustic Cycle

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Inner Aluminum Ring:

Diameter: 1.76 m (69.25 in.)

Thickness: 50.80 mm (2.0 in.)

Inner Felt Platform:

Diameter: 1.68 m (66.0 in.)

Thickness: 9.0 mm (0.35 in.)

Outer Aluminum Ring:

Diameter: 1.83 m (72.0 in.)

Thickness: 102.62 mm (4.04 in.)

Outer Felt Platform:

Width: 285.75 mm (11.25 in.)

Thickness: 9.0 mm (0.35 in.)

*9.0 mm (0.35 in.) thick felt fins (varied in sizes) were used to secure the outer and inner felt platforms to the outer and inner aluminum rings, respectfully. Two felt pieces across of the top of the inner felt platform were measured as 152.40 mm (6.0 in.) and 101.60 mm (4.0 in.) thick.*

#### Physical Measures

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Size: 2.41 m (95.00 in.) diameter

Thickness: 203.20 mm (8.0 in.)

Weight: 18.71 kg (41.25 lbs.)

Mass per Unit Area: 4.09 kg/m<sup>2</sup> (0.84 lbs./ft<sup>2</sup>)

Area: 4.57 m<sup>2</sup> (49.22 ft<sup>2</sup>)



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## Test Report

**Eureka Lighting**  
2015-11-16

**RAL™-A15-347**  
Page 2 of 7

### Test Environment

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Volume: 292.0 m<sup>3</sup> (10,311.0 ft<sup>3</sup>)  
Temperature: 22.7±0.0°C (72.8±0.1°F)  
Humidity: 62.6±0.2%  
Barometric Pressure: 99.0 kPa.

The total absorptive area (all exposed surfaces) of all sound-absorbing units was approximately 11.07 m<sup>2</sup> (119.20 ft<sup>2</sup>). The suspended specimen covered 4.57 m<sup>2</sup> (49.22 ft<sup>2</sup>) of chamber floor surface (total treated area).

### MOUNTING METHOD

Type J Mounting: The specimen was suspended from cable approximately 1.43 m (56.25 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation.



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**Test Report**

**Eureka Lighting**  
2015-11-16

**RAL™-A15-347**  
Page 3 of 7



Figure 1 - Specimen mounted in the test chamber.



Figure 2 - Bottom of test specimen.



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**Test Report**

**Eureka Lighting**  
 2015-11-16


**RAL™-A15-347**  
 Page 4 of 7


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 (SI) (m <sup>2</sup> )	Total Absorption (IP) (Sabins)
100	0.72	7.73
** 125	0.94	10.11
160	0.80	8.61
200	1.94	20.93
** 250	1.79	19.27
315	2.24	24.16
400	2.24	24.11
** 500	2.43	26.20
630	2.76	29.71
800	3.03	32.62
** 1000	3.33	35.85
1250	3.80	40.87
1600	3.97	42.79
** 2000	4.49	48.28
2500	4.65	50.10
3150	5.01	53.97
** 4000	5.06	54.47
5000	5.45	58.62

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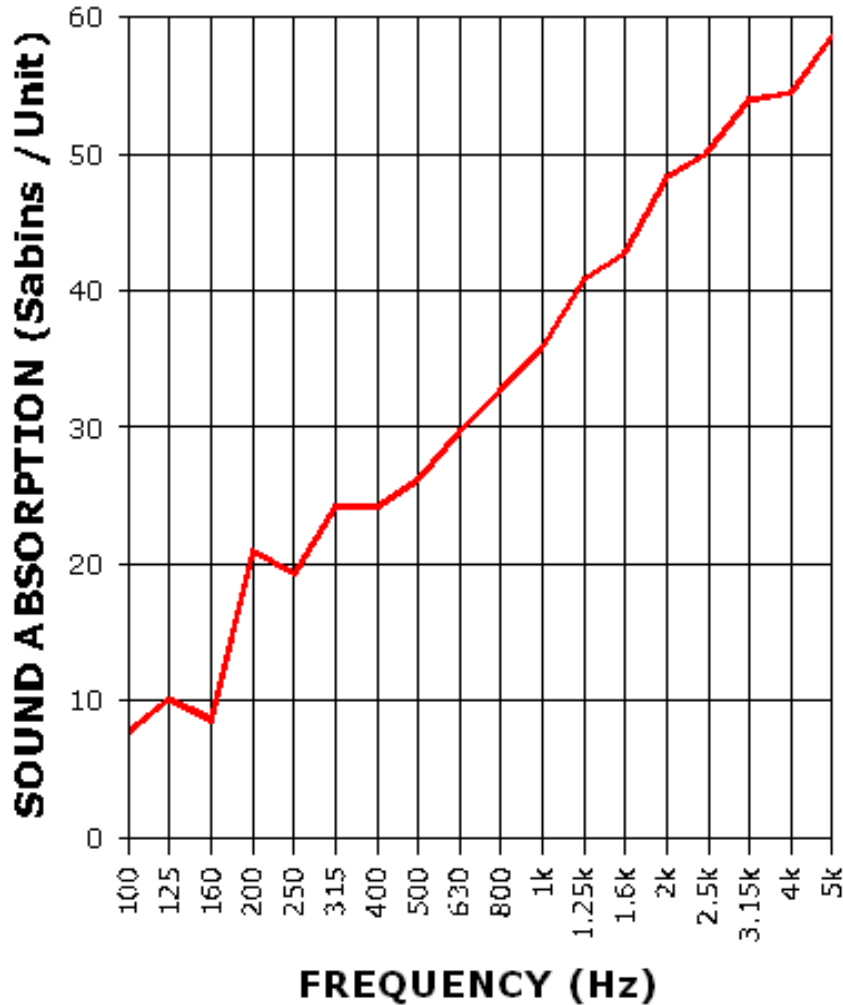
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Test Report

Eureka Lighting  
2015-11-16

RAL™-A15-347  
Page 5 of 7

SOUND ABSORPTION REPORT  
Acoustic Cycle



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**Eureka Lighting**  
2015-11-16

**RAL™-A15-347**  
Page 6 of 7

### **APPENDIX A: Extended Frequency Range Data**

Specimen: Acoustic Cycle (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM C423-09a, 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 (Sabins)
31.5	-0.71
40	-2.11
50	-1.19
63	-0.10
80	7.44
<hr/>	
100	7.73
125	10.11
160	8.61
200	20.93
250	19.27
315	24.16
400	24.11
500	26.20
630	29.71
800	32.62
1000	35.85
1250	40.87
1600	42.79
2000	48.28
2500	50.10
3150	53.97
4000	54.47
5000	58.62
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6300	59.94
8000	60.30
10000	61.51
12500	65.28



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**RAL™-A15-347**  
Page 7 of 7

**APPENDIX B: Instruments of Traceability**

Specimen: Acoustic Cycle (See Full Report)

<b><u>Description</u></b>	<b><u>Model</u></b>	<b><u>Serial Number</u></b>	<b><u>Date of Certification</u></b>	<b><u>Calibration Due</u></b>
Bruel & Kjaer Pulse Analyzer	Type 3560-C	2647140	2015-04-08	2016-04-08
Bruel & Kjaer Mic And Preamp	Type 4943-B-001	2311427	2015-07-27	2016-07-27
G.R.A.S Pistonphone	Type42AF-1	80001	2015-08-14	2016-08-14
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	N11105	2015-09-30	2016-09-30

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Page 1 of 2

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ON: Acoustic Cycle (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 baffle. The baffle rigging covered 4.57 m<sup>2</sup> (49.22 ft<sup>2</sup>) of horizontal 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 C423-09a. 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 exposed surface area of the specimen, approximately 11.07 m<sup>2</sup> (119.20 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 C423-09a. 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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Report Referenced: **RAL™-A15-347**  
Page 2 of 2

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

Specimen Absorption (US)		Method 1	Method 2
		Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area
Freq. (Hz)	Sabins		
<b>31.5</b>	<b>-0.71</b>	<b>-0.01</b>	<b>-0.01</b>
40	-2.11	-0.04	-0.02
50	-1.19	-0.02	-0.01
<b>63</b>	<b>-0.10</b>	<b>0.00</b>	<b>0.00</b>
80	7.44	0.15	0.06
100	7.73	0.16	0.06
<b>125</b>	<b>10.11</b>	<b>0.21</b>	<b>0.08</b>
160	8.61	0.17	0.07
200	20.93	0.43	0.18
<b>250</b>	<b>19.27</b>	<b>0.39</b>	<b>0.16</b>
315	24.16	0.49	0.20
400	24.11	0.49	0.20
<b>500</b>	<b>26.20</b>	<b>0.53</b>	<b>0.22</b>
630	29.71	0.60	0.25
800	32.62	0.66	0.27
<b>1,000</b>	<b>35.85</b>	<b>0.73</b>	<b>0.30</b>
1,250	40.87	0.83	0.34
1,600	42.79	0.87	0.36
<b>2,000</b>	<b>48.28</b>	<b>0.98</b>	<b>0.41</b>
2,500	50.10	1.02	0.42
3,150	53.97	1.10	0.45
<b>4,000</b>	<b>54.47</b>	<b>1.11</b>	<b>0.46</b>
5,000	58.62	1.19	0.49
6,300	59.94	1.22	0.50
<b>8,000</b>	<b>60.30</b>	<b>1.23</b>	<b>0.51</b>
10,000	61.51	1.25	0.52
12,500	65.28	1.33	0.55
<b>Apparent NRC:</b>		<b>0.65</b>	<b>0.25</b>
<b>Apparent SAA:</b>		<b>0.67</b>	<b>0.28</b>

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