

## Test Report

FOR: **Eureka Lighting**  
Montreal, Québec

**Sound Absorption**  
**RAL™-A15-387**

CONDUCTED: 2015-12-16

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ON: 30" Thick Mute

### 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 30" Thick Mute. A full internal inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

#### **Acoustical Mute**

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Top Metal Plate:

Diameter: 355.60 mm (14.0 in.)

Thickness: 1.50 mm (0.06 in.)

Inner Composite Plate:

Diameter: 381.0 mm (15.0 in.)

Thickness: 2.46 mm (0.10 in.)

Bottom Plastic Plate:

Diameter: 596.90 mm (23.50 in.)

Thickness: 3.10 mm (0.12 in.)

Felt Shade Components:

Thickness: 9.45 mm (0.37 in.)

*The top, middle and bottom plate were secured together by a metal rod. The felt shades were secured to the top plate and rested on the ridges of the bottom plate.*

#### **Physical Measures (per unit)**

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Minimum Diameter: 355.60 mm (14.00 in.)

Maximum Diameter: 609.60 mm (24.00 in.)

Thickness: 762.00 mm (30.00 in.)

Weight: 4.76 kg (10.50 lbs.)



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### Test Environment

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Volume: 292.0 m<sup>3</sup> (10,311.0 ft<sup>3</sup>)  
Temperature: 22.9±0.0°C (73.3±0.0°F)  
Humidity: 64.3±0.0%  
Barometric Pressure: 97.5 kPa.

Each sound absorbing unit had an approximate absorptive area (all exposed surfaces) of 3.14 m<sup>2</sup> (33.79 ft<sup>2</sup>). The total absorptive area (all exposed surfaces) of all sound-absorbing units was 12.56 m<sup>2</sup> (135.16 ft<sup>2</sup>). The array of units covered 5.28 m<sup>2</sup> (56.88 ft<sup>2</sup>) of chamber floor surface (total treated area).

### MOUNTING METHOD

Type J Mounting: The specimen is an array of spaced sound absorbing baffles suspended from a cable approximately 609.60 mm (24.0 in.) above the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The baffles were staggered rows of two units each. Baffles were spaced 1.14 m (45.0 in.) apart. Rows were spaced 1.22 m (48.0 in.) apart.



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Figure 1 - Specimen mounted in the test chamber.



Figure 2 - Detail of the test specimen.



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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 (SI) (m <sup>2</sup> )	Total Absorption (IP) (Sabins)	Absorption Sabins/Unit
100	1.27	13.69	3.42
** 125	1.97	21.20	5.30
160	2.05	22.03	5.51
200	1.92	20.63	5.16
** 250	2.25	24.26	6.07
315	2.74	29.48	7.37
400	2.58	27.82	6.95
** 500	2.83	30.50	7.62
630	3.04	32.71	8.18
800	3.05	32.82	8.21
** 1000	3.30	35.51	8.88
1250	3.56	38.29	9.57
1600	3.78	40.65	10.16
** 2000	4.05	43.60	10.90
2500	4.30	46.30	11.57
3150	4.43	47.70	11.93
** 4000	4.66	50.17	12.54
5000	4.95	53.29	13.32

Tested by   
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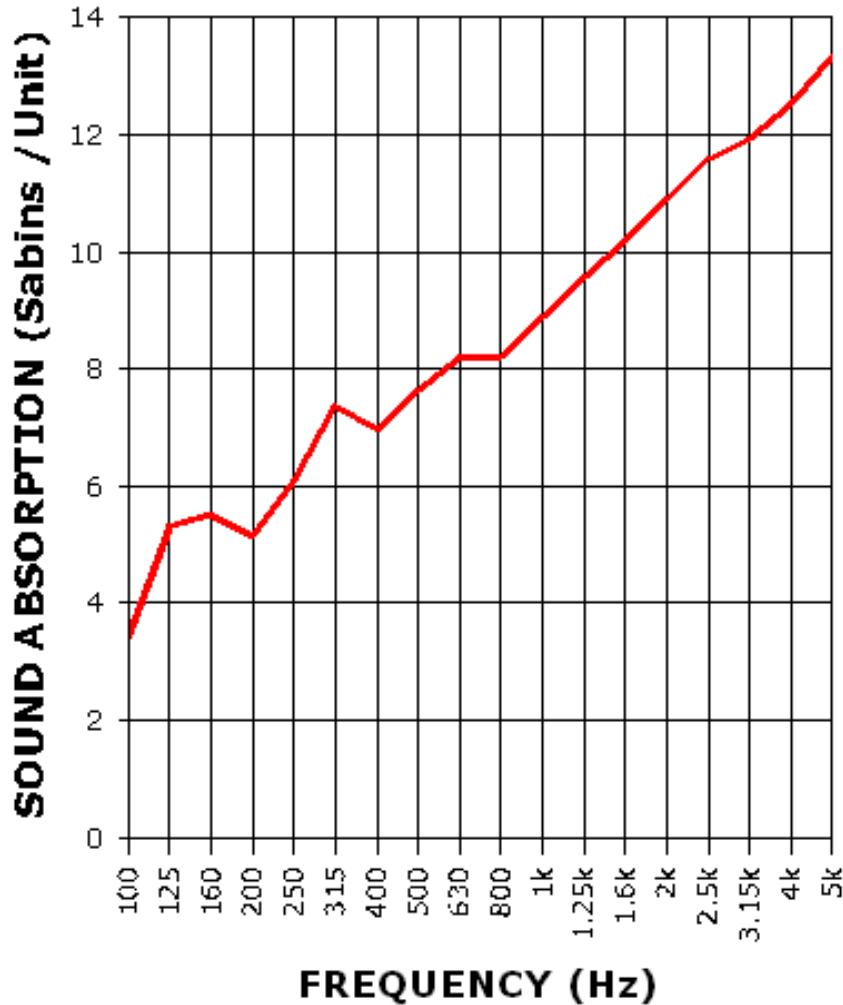
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SOUND ABSORPTION REPORT  
30" Thick Mute



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

Specimen: 30" Thick Mute (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)	Sabins per Unit
31.5	8.84	2.21
40	9.56	2.39
50	5.42	1.35
63	4.93	1.23
80	18.12	4.53
100	13.69	3.42
125	21.20	5.30
160	22.03	5.51
200	20.63	5.16
250	24.26	6.07
315	29.48	7.37
400	27.82	6.95
500	30.50	7.62
630	32.71	8.18
800	32.82	8.21
1000	35.51	8.88
1250	38.29	9.57
1600	40.65	10.16
2000	43.60	10.90
2500	46.30	11.57
3150	47.70	11.93
4000	50.17	12.54
5000	53.29	13.32
6300	53.75	13.44
8000	59.85	14.96
10000	63.67	15.92
12500	63.37	15.84



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**APPENDIX B: Instruments of Traceability**

Specimen: 30" Thick Mute (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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ON: 30" Thick Mute (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 baffles, including intermediate spaces. The baffle rigging covered 5.28 m<sup>2</sup> (56.88 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 surface area of all exposed specimen faces (3.14 m<sup>2</sup> (33.79 ft<sup>2</sup>) per baffle x 4 baffles = 12.56 m<sup>2</sup> (135.16 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 C423-09a. 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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**Appendix C: 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
Freq. (Hz)	Sabins	Sabins/baffle	Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area
<b>31.5</b>	<b>8.84</b>	<b>2.21</b>	<b>0.16</b>	<b>0.07</b>
40	9.56	2.39	0.17	0.07
50	5.42	1.35	0.10	0.04
<b>63</b>	<b>4.93</b>	<b>1.23</b>	<b>0.09</b>	<b>0.04</b>
80	18.12	4.53	0.32	0.13
100	13.69	3.42	0.24	0.10
<b>125</b>	<b>21.20</b>	<b>5.30</b>	<b>0.37</b>	<b>0.16</b>
160	22.03	5.51	0.39	0.16
200	20.63	5.16	0.36	0.15
<b>250</b>	<b>24.26</b>	<b>6.07</b>	<b>0.43</b>	<b>0.18</b>
315	29.48	7.37	0.52	0.22
400	27.82	6.95	0.49	0.21
<b>500</b>	<b>30.50</b>	<b>7.62</b>	<b>0.54</b>	<b>0.23</b>
630	32.71	8.18	0.58	0.24
800	32.82	8.21	0.58	0.24
<b>1,000</b>	<b>35.51</b>	<b>8.88</b>	<b>0.62</b>	<b>0.26</b>
1,250	38.29	9.57	0.67	0.28
1,600	40.65	10.16	0.71	0.30
<b>2,000</b>	<b>43.60</b>	<b>10.90</b>	<b>0.77</b>	<b>0.32</b>
2,500	46.30	11.57	0.81	0.34
3,150	47.70	11.93	0.84	0.35
<b>4,000</b>	<b>50.17</b>	<b>12.54</b>	<b>0.88</b>	<b>0.37</b>
5,000	53.29	13.32	0.94	0.39
6,300	53.75	13.44	0.94	0.40
<b>8,000</b>	<b>59.85</b>	<b>14.96</b>	<b>1.05</b>	<b>0.44</b>
10,000	63.67	15.92	1.12	0.47
12,500	63.37	15.84	1.11	0.47
<b>Apparent NRC:</b>			<b>0.60</b>	<b>0.25</b>
<b>Apparent SAA:</b>			<b>0.59</b>	<b>0.25</b>

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