

Test ReportFOR: **Turf Design**
Elgin, IL**Sound Absorption**
RAL-A17-092

CONDUCTED: 2017-03-10

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ON: Slab Baffle

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 C423-17: "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 measuring procedure and room qualifications is available upon request. Due to the size of the specimen array, the minimum distance from any wall was .406 m which is less than the standard's required distance of 0.75 m. The distance between the specimen array and the floor was 1.2 m which is different from the suggested 0.609 m.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as Slab Baffle. A full internal inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

Test Specimen

Material: 99% PET Felt
Material Thickness: 9.4 mm (0.37 in.)
Dimensions: 8 @ 2260.6 mm (89 in.) x 222.25 mm (8.75 in.)
Overall Thickness: 59.46 mm (2.341 in.)
Average Unit Weight: 2.49 kg (5.5 lbs.)
Overall Weight: 19.96 kg (44 lbs.)

Physical Measures (per unit)

Dimensions: 222.25 mm (8.75 in.) wide by 2.26 m (89.00 in.) long
Thickness: 59.44 mm (2.34 in.)
Weight: 2.49 kg (5.50 lbs.)
Area: 0.74 m² (8.00 ft²)
Mass per Unit Area: 4.98 kg/m² (1.02 lbs/ft²)

Test Environment

Volume: 292.0 m³ (10,311.0 ft³)
Temperature: 21.4±0.0°C (70.6±0.0°F) (Requirement: ≥10° C and ≤ 5° C change)
Humidity: 64.2±0.4% (Requirement: ≥40% RH and ≤ 5% change)
Barometric Pressure: 100.2 kPa. (Requirement not defined)



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Each sound absorbing unit had an absorptive area (all exposed surfaces) of 1.30 m^2 (13.99 ft^2). The total absorptive area (all exposed surfaces) of all sound-absorbing units was 10.40 m^2 (111.95 ft^2). The array of units covered 11.36 m^2 (122.2 ft^2) 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 1206.5 mm (47.5 in.) above the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The baffles were evenly distributed in four rows four units each. Baffles were spaced 305 mm (12 in.) apart. Rows were spaced 762 mm (30 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 ²)	Total Absorption (IP) (Sabins)	Absorption (Sabins/Unit)
100	1.22	13.17	1.65
** 125	0.84	9.03	1.13
160	0.90	9.71	1.21
200	1.69	18.24	2.28
** 250	2.27	24.46	3.06
315	3.15	33.91	4.24
400	3.95	42.55	5.32
** 500	4.90	52.69	6.59
630	5.70	61.40	7.68
800	6.54	70.40	8.80
** 1000	7.58	81.55	10.19
1250	8.63	92.90	11.61
1600	9.33	100.39	12.55
** 2000	9.97	107.36	13.42
2500	10.36	111.52	13.94
3150	10.28	110.61	13.83
** 4000	10.27	110.56	13.82
5000	10.60	114.13	14.27

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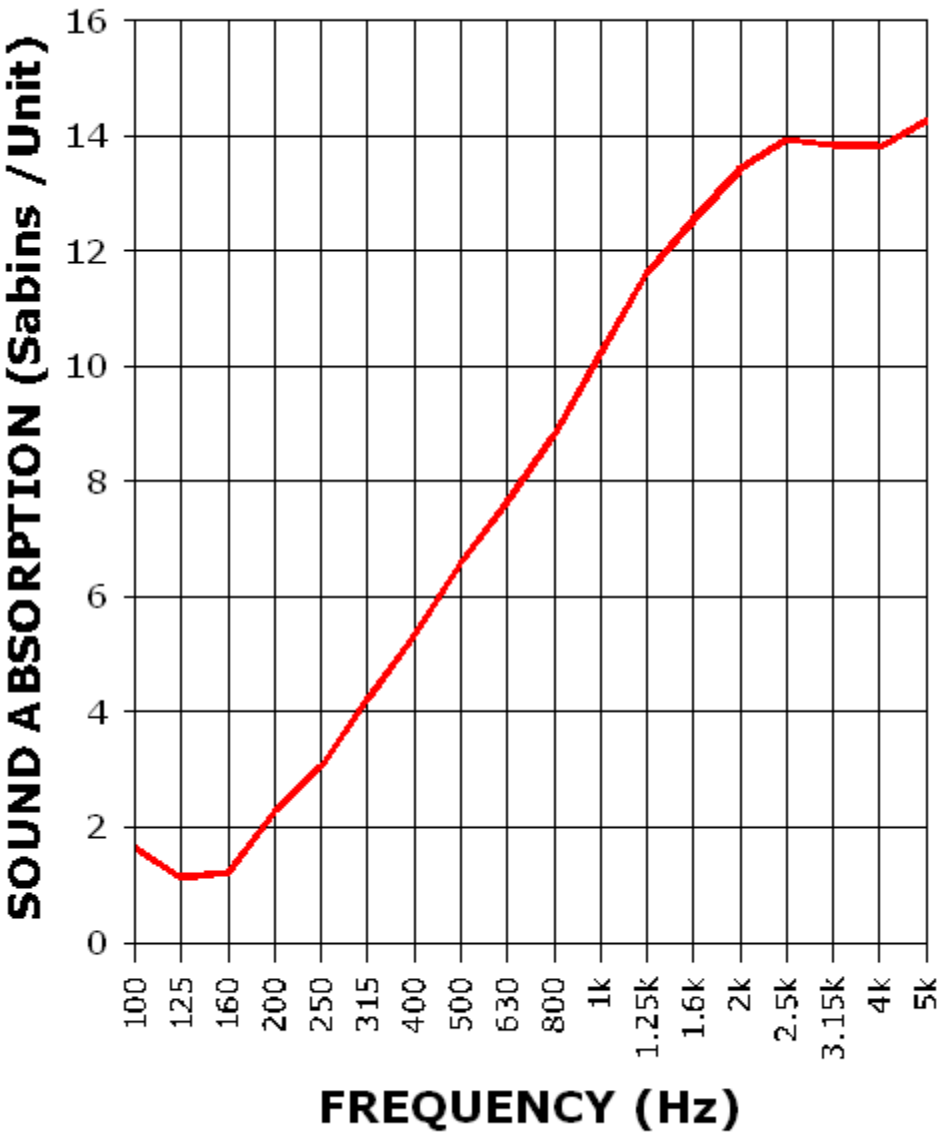
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SOUND ABSORPTION REPORT
Slab Baffle



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APPENDIX A: Extended Frequency Range Data

Specimen: Slab Baffle (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 (Sabins)	Sabins per Unit
31.5	1.81	0.23
40	-0.63	-0.08
50	-5.42	-0.68
63	21.00	2.62
80	18.68	2.33
100	13.17	1.65
125	9.03	1.13
160	9.71	1.21
200	18.24	2.28
250	24.46	3.06
315	33.91	4.24
400	42.55	5.32
500	52.69	6.59
630	61.40	7.68
800	70.40	8.80
1000	81.55	10.19
1250	92.90	11.61
1600	100.39	12.55
2000	107.36	13.42
2500	111.52	13.94
3150	110.61	13.83
4000	110.56	13.82
5000	114.13	14.27
6300	113.09	14.14
8000	113.93	14.24
10000	112.63	14.08
12500	104.13	13.02

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APPENDIX B: Instruments of Traceability

Specimen: Slab Baffle (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
Bruel & Kjaer Pulse Analyzer - System3	Type 3560-C	2647140	2016-04-12	2017-04-12
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2016-03-17	2017-03-17
Bruel & Kjaer Pistonphone	Type 4228	2781248	2016-07-25	2017-07-25
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP- PRHTemp2000	P97844	2017-01-16	2018-01-16

END



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ON: Slab Baffle (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 11.36 m^2 (122.2 ft^2) 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 C423-17. 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 (1.3 m^2 (13.99 ft^2) per baffle x 8 baffles = 10.40 m^2 (111.95 ft^2) 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 (0.50 m^2 (5.4 ft^2) per baffle x 8 baffles = 4.02 m^2 (43.26 ft^2) 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.

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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 (US)			Method 1	Method 2	Method 3
			Apparent Abs. Coefficient From Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area	Apparent Abs. Coefficient From One Face/Baffle
Freq. (Hz)	Sabins	Sabins/Unit			
31.5	1.81	0.23	0.01	0.02	0.04
40	-0.63	-0.08	-0.01	-0.01	-0.01
50	-5.42	-0.68	-0.04	-0.05	-0.13
63	21.00	2.62	0.17	0.19	0.49
80	18.68	2.33	0.15	0.17	0.43
100	13.17	1.65	0.11	0.12	0.30
125	9.03	1.13	0.07	0.08	0.21
160	9.71	1.21	0.08	0.09	0.22
200	18.24	2.28	0.15	0.16	0.42
250	24.46	3.06	0.20	0.22	0.57
315	33.91	4.24	0.28	0.30	0.78
400	42.55	5.32	0.35	0.38	0.98
500	52.69	6.59	0.43	0.47	1.22
630	61.40	7.68	0.50	0.55	1.42
800	70.40	8.80	0.58	0.63	1.63
1,000	81.55	10.19	0.67	0.73	1.88
1,250	92.90	11.61	0.76	0.83	2.15
1,600	100.39	12.55	0.82	0.90	2.32
2,000	107.36	13.42	0.88	0.96	2.48
2,500	111.52	13.94	0.91	1.00	2.58
3,150	110.61	13.83	0.90	0.99	2.56
4,000	110.56	13.82	0.90	0.99	2.56
5,000	114.13	14.27	0.93	1.02	2.64
6,300	113.09	14.14	0.93	1.01	2.61
8,000	113.93	14.24	0.93	1.02	2.63
10,000	112.63	14.08	0.92	1.01	2.60
12,500	104.13	13.02	0.85	0.93	2.41
Apparent NRC:			0.55	0.60	1.55
Apparent SAA:			0.54	0.59	1.54

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