RIVERBANK ACOUSTICAL LABORATORIES

1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

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WALLACE CLEMENT SABINE

SPONSOR: **ARTIZIN™**

Garland, TX

Sound Absorption
RAL™-A22-486

CONDUCTED: 2022-11-04

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ON: ArtFelt™ Beam Baffle System

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 C423-22: "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 ArtFelt™ Beam Baffle System. 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

Product Name:	ArtFelt™ Beam Baffle System
Core Material:	PET
Thickness:	9mm
Manufacturer:	ARTIZIN™

SPECIMEN MEASUREMENTS & TEST CONDITIONS

Through a full external visual inspection performed on the test specimen, Riverbank personnel verified the following information:

Test Specimen

Product Type:	Baffles
Dimensions:	14 baffles @ by 305 mm (12 in.) by 1099 mm (43.25 in.)
Thickness:	50.89 mm (2.0035 in.)
Overall Weight:	22.34 kg (49.25 lbs)

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Physical Measurements (per object)

Dimensions:	0.05 m (2.003 in) wide by 1.1 m (43.25 in) long
Thickness:	0.3 m (12.0 in)
Weight:	1.6 kg (3.52 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.3 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	56.9 % ± 0.0 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.2 kPa (Requirement not defined)

Each sound absorbing object had an exposed surface area of 0.813 m^2 (8.75 ft^2). The total exposed surface area of all sound-absorbing objects was 11.4 m^2 (122 ft^2). The array of objects covered 9.28 m^2 (99.9 ft^2) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 14 spaced sound absorbing objects suspended from cables such that the closest face is located approximately 1092 mm (43 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The objects were distributed in seven rows of two objects each, with rows spaced 610 mm (24 in.) on center, and objects in each row spaced 305 mm (12 in.) apart.

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Figure 1 – Specimen mounted in test chamber

Figure 2 – Specimen mounted in test chamber

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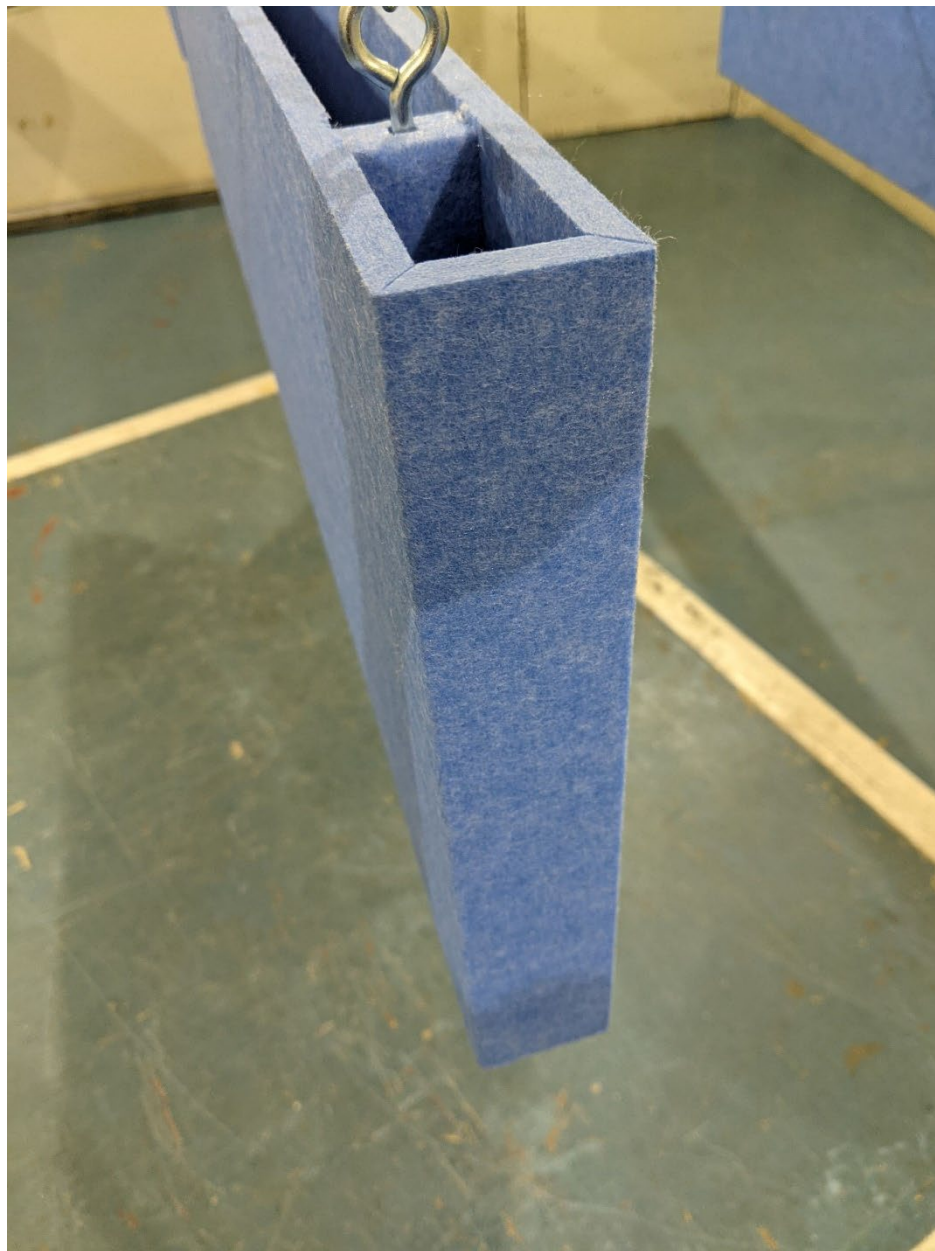WALLACE CLEMENT SABINE

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Figure 3 – Detail of specimen materials

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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 (m²)	(Sabins)	Absorption per Object (m² / Object)	(Sabins / Object)
100	0.29	3.16	0.02	0.23
** 125	0.72	7.75	0.05	0.55
160	1.06	11.36	0.08	0.81
200	1.59	17.07	0.11	1.22
** 250	2.27	24.45	0.16	1.75
315	3.13	33.64	0.22	2.40
400	3.60	38.74	0.26	2.77
** 500	4.67	50.30	0.33	3.59
630	5.56	59.81	0.40	4.27
800	6.46	69.50	0.46	4.96
** 1000	7.47	80.42	0.53	5.74
1250	8.53	91.79	0.61	6.56
1600	9.29	100.03	0.66	7.15
** 2000	9.82	105.67	0.70	7.55
2500	10.26	110.42	0.73	7.89
3150	10.13	109.05	0.72	7.79
** 4000	10.05	108.13	0.72	7.72
5000	10.09	108.58	0.72	7.76

Tested by _Marc Sciaky_
Marc Sciaky
Senior Experimentalist

Report by _Keith Kimberling_
Keith Kimberling
Test Engineer

Approved by _Eric P. Wolfram_
Eric P. Wolfram
Laboratory Manager

Digitally signed by Eric P Wolfram
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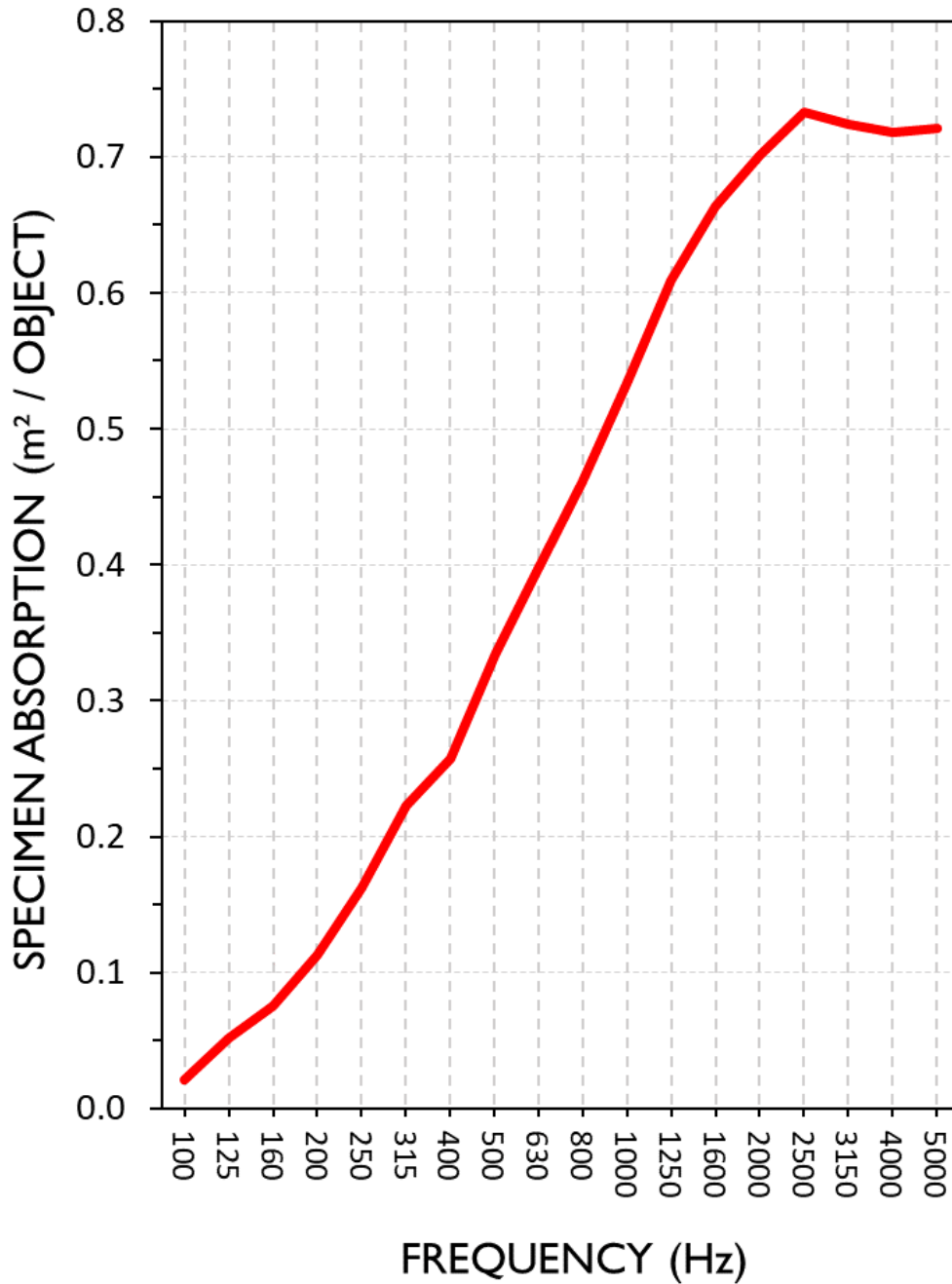
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SOUND ABSORPTION REPORT
ArtFelt™ Beam Baffle System

RIVERBANK ACOUSTICAL LABORATORIES

Test Report

APPENDIX A: Extended Frequency Range Data

Specimen: ArtFelt™ Beam Baffle System (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-22, 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 (m^2)	Total Absorption (Sabins)	Absorption per Object (m^2 / Object)	Absorption per Object (Sabins / Object)
31.5	0.88	9.46	0.06	0.68
40	0.45	4.79	0.03	0.34
50	-0.89	-9.54	-0.06	-0.68
63	-0.48	-5.13	-0.03	-0.37
80	1.00	10.76	0.07	0.77
100	0.29	3.16	0.02	0.23
125	0.72	7.75	0.05	0.55
160	1.06	11.36	0.08	0.81
200	1.59	17.07	0.11	1.22
250	2.27	24.45	0.16	1.75
315	3.13	33.64	0.22	2.40
400	3.60	38.74	0.26	2.77
500	4.67	50.30	0.33	3.59
630	5.56	59.81	0.40	4.27
800	6.46	69.50	0.46	4.96
1000	7.47	80.42	0.53	5.74
1250	8.53	91.79	0.61	6.56
1600	9.29	100.03	0.66	7.15
2000	9.82	105.67	0.70	7.55
2500	10.26	110.42	0.73	7.89
3150	10.13	109.05	0.72	7.79
4000	10.05	108.13	0.72	7.72
5000	10.09	108.58	0.72	7.76
6300	10.17	109.43	0.73	7.82
8000	9.98	107.42	0.71	7.67
10000	9.94	107.05	0.71	7.65
12500	9.55	102.77	0.68	7.34

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APPENDIX B: Instruments of Traceability

Specimen: ArtFelt™ Beam Baffle System (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2022-07-12	2023-07-12
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2022-05-02	2023-05-02
Bruel & Kjaer Pistonphone	Type 4228	2781248	2022-07-22	2023-07-22
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: ArtFelt™ Beam Baffle System (See Full Report)

Date	Revision
2022-11-11	Original report issued

END

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CONDUCTED: 2022-11-04
ON: ArtFelt™ Beam Baffle System (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. Rating titles for these methods are prepended with the word "Apparent". These rating names and their associated acronyms are provided by RAL and shall not be misconstrued as originating from any current standard.

Method 1) Apparent Sound Absorption Coefficient calculated from extended test specimen envelope
The total sound absorption yielded by the specimen is divided by the surface area of the test surface covered by the suspended objects, including intermediate spaces, with additional added area to allow theoretical extrapolation for larger arrays. The object rigging covered 9.28 m^2 (99.9 ft^2) of horizontal test surface area. With an extra 305 mm (12 in.) of width and 559 mm (22 in.) of length to account for the space between the tested array and what would be the next objects in a larger array, the total covered surface area comes to 12.0 m^2 (129 ft^2). Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. This may be the most accurate method for comparing object 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 object array performance. Such approximations rely on the assumptions that object spacing is similar to that of the tested array across the entire surface, that gaps are negligibly small between adjacent rows of objects if the test specimen consists of a single row, and that the installation occurs over a perfectly reflective surface material.

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 (0.813 m^2 (8.75 ft^2) per object x 14 objects = 11.4 m^2 (122 ft^2) total surface area). In this case, the surface area of each object was based on the smallest rectangular prism fully encompassing the object. Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area 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).

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Appendix D (continued)

Method 3) Apparent Sound Absorption Coefficient calculated from one face per object
The total sound absorption yielded by the specimen is divided by the surface area of one side of one large face for each object in the specimen (0.335 m^2 (3.60 ft^2) per object x 14 objects = 4.69 m^2 (50.5 ft^2) total surface area). Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area 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.

Method 4) Apparent Sound Absorption Coefficient calculated from specimen envelope without extension
The total sound absorption yielded by the specimen is divided by the rectangular test surface area covered by the suspended objects, including intermediate spaces. The object rigging covered 9.28 m^2 (99.9 ft^2) of horizontal test surface area. Apparent sound absorption coefficients, and subsequently the Apparent Noise Reduction Coefficient (A*NRC) and Apparent Sound Absorption Average (A*SAA) ratings, are calculated using this surface area based on the methods described in ASTM C423-17. While similar in concept to Method 1, attempting to model any array larger than the tested specimen using these results would imply instances of adjacent objects with zero spacing scattered throughout the extrapolated array. 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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Report Referenced: **RAL™-A22-486**
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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 (ft²)			Method 1 Apparent Abs. Coefficient From Total Coverage Area (129 ft²)	Method 2 Apparent Abs. Coefficient From Total Exposed Surface Area (122 ft²)	Method 3 Apparent Abs. Coefficient From One Face per Object (50.5 ft²)	Method 4 Apparent Abs. Coefficient From Unextended Envelope Area (99.9 ft²)
Freq. (Hz)	Sabins	Sabins / Object				
31.5	9.46	0.68	0.07	0.08	0.19	0.09
40	4.79	0.34	0.04	0.04	0.10	0.05
50	-9.54	-0.68	-0.07	-0.08	-0.19	-0.10
63	-5.13	-0.37	-0.04	-0.04	-0.10	-0.05
80	10.76	0.77	0.08	0.09	0.21	0.11
100	3.16	0.23	0.02	0.03	0.06	0.03
125	7.75	0.55	0.06	0.06	0.15	0.08
160	11.36	0.81	0.09	0.09	0.23	0.11
200	17.07	1.22	0.13	0.14	0.34	0.17
250	24.45	1.75	0.19	0.20	0.48	0.24
315	33.64	2.40	0.26	0.27	0.67	0.34
400	38.74	2.77	0.30	0.32	0.77	0.39
500	50.30	3.59	0.39	0.41	1.00	0.50
630	59.81	4.27	0.46	0.49	1.19	0.60
800	69.50	4.96	0.54	0.57	1.38	0.70
1,000	80.42	5.74	0.62	0.66	1.59	0.81
1,250	91.79	6.56	0.71	0.75	1.82	0.92
1,600	100.03	7.15	0.78	0.82	1.98	1.00
2,000	105.67	7.55	0.82	0.86	2.09	1.06
2,500	110.42	7.89	0.86	0.90	2.19	1.11
3,150	109.05	7.79	0.85	0.89	2.16	1.09
4,000	108.13	7.72	0.84	0.88	2.14	1.08
5,000	108.58	7.76	0.84	0.89	2.15	1.09
6,300	109.43	7.82	0.85	0.89	2.17	1.10
8,000	107.42	7.67	0.83	0.88	2.13	1.08
10,000	107.05	7.65	0.83	0.87	2.12	1.07
12,500	102.77	7.34	0.80	0.84	2.04	1.03
Apparent NRC:			**0.50**	**0.55**	**1.30**	**0.65**
Apparent SAA:			**0.51**	**0.53**	**1.29**	**0.65**

Prepared by _Keith Kimberling_
Keith Kimberling
Test Engineer