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

Test Report

SPONSOR: EUREKA

Montréal, QC, Canada

CONDUCTED: 2023-05-03

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Sound Absorption <u>RALTM-A23-121</u>

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ON: 24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12 in.) apart)

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 C423-23: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-23: "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 24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12 in.) apart). 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: A	ACOUSTIC ACCESSORY – DISK -24
Material: F	Telt
Manufacturer: E	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials: Felt baffles Dimensions: 15 baffles @ 606 mm (23.875 in.) diameter Thickness: 9.22 mm (0.363 in.) Overall Weight: 6.46 kg (14.25 lbs)



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Physical Measurements (per object)

Dimensions: 0.61 m (23.875 in) wide by 0.61 m (23.875 in) long Thickness: 0.01 m (0.363 in) Weight: 0.43 kg (0.95 lbs)

Test Environment

Room Volume:	291.98 m ³
Temperature:	17.4 °C \pm 0.0 °C (Requirement: \geq 10 °C and \leq 5 °C change)
Relative Humidity:	$47.9 \% \pm 0.6 \%$ (Requirement: $\ge 40 \%$ and $\le 5 \%$ change)
Barometric Pressure:	98.5 kPa (Requirement not defined)

Each sound absorbing object had an exposed surface area of 0.595 m² (6.41 ft²). The total exposed surface area of all sound-absorbing objects was 8.93 m^2 (96.1 ft²).

MOUNTING METHOD

Type JH-MOD Mounting: The specimen is an array of 15 spaced sound absorbing objects suspended from cables such that the closest face is located approximately 1486 mm (58.5 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The objects were distributed in five (5) rows of three (3) objects each. Rows and the objects in each row were spaced 305 mm (12 in.) apart. The width of the installed object array was 4261 mm (167.75 in.) and the length of the installed object array was 2429 mm (95.625 in.). The area of extended continuous surface attributed to the object array was 12.5 m² (134 ft²).



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Figure 1 – Specimen mounted in test chamber



Figure 2 – Individual specimen baffle



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Figure 3 – Detail of specimen material



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TEST RESULTS

The preferred presentation of sound absorption test results for arrays of spaced objects is sound absorption (m^2) per object and total sound absorption (m^2) at each one-third-octave band

ASTM C423-23 Appendix X2 allows calculation of sound absorption per m^2 (SA/m²) based on the projected horizontal surface area attributable to an array of objects. The extended continuous surface area used in this calculation is to be determined the following procedure:

 $S_{array} = (w + w_1) \times (l + l_1)$ If the set of objects consists of a rectangular array of equal sized objects with equal space between each object in a row and equal space between rows. (ASTM E423-23 X.2.3.1)

Where:

 S_{array} = area of extended continuous surface attributed to the test specimen, m² w = the measured width of the installed object array, in meters w_l = the space between objects in the array along the width, in meters l = the measured length of the installed object array, in meters l_l = the space between objects in the array along the length, in meters

The sound absorption per m^2 (SA/m²) is calculated based on the following formula:

$$\alpha_{array} = (A_2 - A_1)/S_{array}$$

Where:

 α_{array} = sound absorption per m² (SA/m²) of extended continuous surface, no units, A₁ = absorption of the empty reverberation room, m² and A₂ = absorption of the room after the specimen has been installed, m². S_{array} = area of extended continuous surface attributed to the test specimen, m²



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TEST RESULTS (continued)

1/3 Octave Center Frequency	Tatal Absounding		Absorptio	α _{array} (Sabins/ft ²)	
(Hz)	(m ²)	(Sabins)	(m ² /Object)	(Sabins / Object)	(SA/m^2)
100	0.37	3.99	0.02	0.27	0.03
** 125	0.98	10.56	0.07	0.70	0.08
160	1.20	12.91	0.08	0.86	0.10
200	2.04	21.91	0.14	1.46	0.16
** 250	1.85	19.96	0.12	1.33	0.15
315	2.77	29.83	0.18	1.99	0.22
400	2.79	29.98	0.19	2.00	0.22
** 500	3.21	34.59	0.21	2.31	0.26
630	3.48	37.45	0.23	2.50	0.28
800	3.90	41.99	0.26	2.80	0.31
** 1000	4.20	45.26	0.28	3.02	0.34
1250	4.64	49.98	0.31	3.33	0.37
1600	5.05	54.31	0.34	3.62	0.40
** 2000	5.45	58.67	0.36	3.91	0.44
2500	5.91	63.64	0.39	4.24	0.47
3150	6.34	68.29	0.42	4.55	0.51
** 4000	6.57	70.75	0.44	4.72	0.53
5000	7.14	76.84	0.48	5.12	0.57

Array-NRC 0.30 over 12.5 m² of extended continuous surface area Array-SAA 0.30 over 12.5 m² of extended continuous surface area

Tested by Report by Approved by Marc Sciaky Eric P. Wolfram Keith Kimberling Senior Experimentalist Test Engineer Laboratory Manager

Note: Sound absorption per m^2 (SA/ m^2), and therefore the reported Single Number Ratings, are highly dependent on the exact sample shape, size, spacing, and extended continuous surface area present in the test and subsequent calculations. Changes to any of these parameters will change the resulting values. These presented results are valid only for the specific configuration present in this test.



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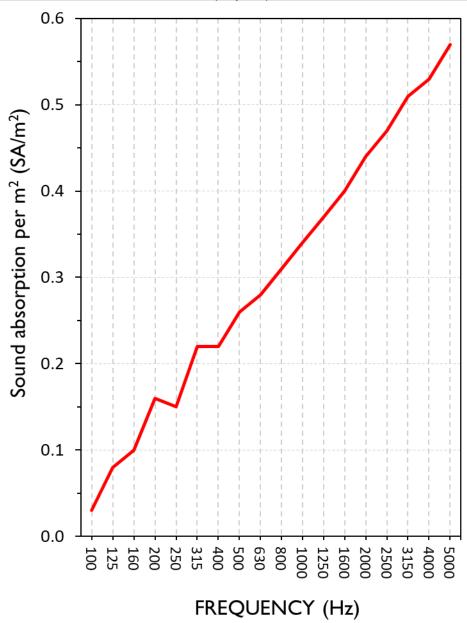
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SOUND ABSORPTION REPORT

24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12

in.) apart)



Array-NRC 0.30 over 12.5 m^2 of extended continuous surface area **Array-SAA 0.30** over 12.5 m^2 of extended continuous surface area



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APPENDIX A: Extended Frequency Range Data

Specimen: 24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12 in.) apart) (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-23, 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	Total A	bsorption	Absorptio	Absorption per Object		
(Hz)	(m ²)	(Sabins)	(m ² /Object)	(Sabins / Object)	(Sabins/ft ²) (SA/m ²)	
31.5	0.32	3.44	0.02	0.23	0.03	
40	0.51	5.48	0.03	0.37	0.04	
50	1.01	10.92	0.07	0.73	0.08	
63	0.67	7.23	0.04	0.48	0.05	
80	0.95	10.26	0.06	0.68	0.08	
100	0.37	3.99	0.02	0.27	0.03	
125	0.98	10.56	0.07	0.70	0.08	
160	1.20	12.91	0.08	0.86	0.10	
200	2.04	21.91	0.14	1.46	0.16	
250	1.85	19.96	0.12	1.33	0.15	
315	2.77	29.83	0.18	1.99	0.22	
400	2.79	29.98	0.19	2.00	0.22	
500	3.21	34.59	0.21	2.31	0.26	
630	3.48	37.45	0.23	2.50	0.28	
800	3.90	41.99	0.26	2.80	0.31	
1000	4.20	45.26	0.28	3.02	0.34	
1250	4.64	49.98	0.31	3.33	0.37	
1600	5.05	54.31	0.34	3.62	0.40	
2000	5.45	58.67	0.36	3.91	0.44	
2500	5.91	63.64	0.39	4.24	0.47	
3150	6.34	68.29	0.42	4.55	0.51	
4000	6.57	70.75	0.44	4.72	0.53	
5000	7.14	76.84	0.48	5.12	0.57	
6300	7.25	78.08	0.48	5.21	0.58	
8000	7.68	82.63	0.51	5.51	0.62	
10000	7.57	81.50	0.50	5.43	0.61	
12500	8.18	88.01	0.55	5.87	0.66	



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APPENDIX B: Instruments of Traceability

Specimen: 24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12 in.) apart) (See Full Report)

		Serial	Date of	Calibration
Description	<u>Model</u>	Number	Certification	<u>Due</u>
System 1	Type 3160-A-042	3160- 106968	2022-07-12	2023-07-12
Bruel & Kjaer Mic And Preamp D	Type 4943-B-001	2311440	2022-09-28	2023-09-28
Bruel & Kjaer Pistonphone EXTECH Hygro 639	Type 4228 SD700	2781248 A.103639	2022-07-22 2022-12-07	2023-07-22 2023-12-07

APPENDIX C: Revisions to Original Test Report

Specimen: 24" Diameter Felt Disc (5 rows of 3 baffles each, rows and baffles spaced 305 mm (12 in.) apart) (See Full Report)

Date	Revision
2023-05-15	Original report issued
2023-05-23	Page 1: Product name changed from "SLIM RING 4851-24" to "ACOUSTIC ACCESSORY – DISK -24" -EPW

END



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Montréal, QC, Canada

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Sound Absorption <u>RALTM-A23-122</u>

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ON: 48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24 in.) apart)

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 C423-23: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-23: "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 48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24 in.) apart). 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

Material:	
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials: Felt baffles Dimensions: 4 baffles @ 1216 mm (47.875 in.) diameter Thickness: 9.5 mm (0.374 in.) Overall Weight: 6.92 kg (15.25 lbs)



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Physical Measurements (per object)

Dimensions:	1.22 m (47.875 in) wide by 1.22 m (47.875 in) long
Thickness:	0.01 m (0.374 in)
Weight:	1.73 kg (3.81 lbs)

Test Environment

Room Volume:	291.98 m ³
Temperature:	16.6 °C \pm 0.1 °C (Requirement: \geq 10 °C and \leq 5 °C change)
Relative Humidity:	$49.15 \% \pm 0.5 \%$ (Requirement: $\ge 40 \%$ and $\le 5 \%$ change)
Barometric Pressure:	98.9 kPa (Requirement not defined)

Each sound absorbing object had an exposed surface area of 2.36 m² (25.4 ft²). The total exposed surface area of all sound-absorbing objects was 9.44 m² (102 ft²).

MOUNTING METHOD

Type JH-MOD Mounting: The specimen is an array of 4 spaced sound absorbing objects suspended from cables such that the closest face is located approximately 1480 mm (58.25 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The objects were distributed in two (2) rows of two (2) objects each. Rows and the objects in each row were spaced 610 mm (24 in.) apart. The width of the installed object array was 3042 mm (119.75 in.) and the length of the installed object array was 3042 mm (119.75 in.). The area of extended continuous surface attributed to the object array was 13.3 m² (144 ft²).



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Figure 1 – Specimen mounted in test chamber

Figure 2 – Individual specimen baffle

TESTING

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Figure 3 – Detail of specimen material



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TEST RESULTS

The preferred presentation of sound absorption test results for arrays of spaced objects is sound absorption (m^2) per object and total sound absorption (m^2) at each one-third-octave band

ASTM C423-23 Appendix X2 allows calculation of sound absorption per m^2 (SA/m²) based on the projected horizontal surface area attributable to an array of objects. The extended continuous surface area used in this calculation is to be determined the following procedure:

 $S_{array} = (w + w_1) \times (l + l_1)$ If the set of objects consists of a rectangular array of equal sized objects with equal space between each object in a row and equal space between rows. (ASTM E423-23 X.2.3.1)

Where:

 S_{array} = area of extended continuous surface attributed to the test specimen, m² w = the measured width of the installed object array, in meters w_l = the space between objects in the array along the width, in meters l = the measured length of the installed object array, in meters l_l = the space between objects in the array along the length, in meters

The sound absorption per m^2 (SA/m²) is calculated based on the following formula:

$$\alpha_{array} = (A_2 - A_1)/S_{array}$$

Where:

 α_{array} = sound absorption per m² (SA/m²) of extended continuous surface, no units, A₁ = absorption of the empty reverberation room, m² and A₂ = absorption of the room after the specimen has been installed, m². S_{array} = area of extended continuous surface attributed to the test specimen, m²



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TEST RESULTS (continued)

1/3 Octave Center Frequency	$\mathbf{T}_{\mathbf{r}} \mathbf{t}_{\mathbf{r}} \mathbf{t}$					α _{array} (Sabins/ft ²)
(Hz)	(m ²)	(Sabins)	(m ² /Object)	(Sabins / Object)	(SA/m^2)	
100	1.39	14.95	0.35	3.74	0.10	
** 125	1.80	19.36	0.45	4.84	0.13	
160	1.80	19.40	0.45	4.85	0.14	
200	2.67	28.79	0.67	7.20	0.20	
** 250	2.57	27.69	0.64	6.92	0.19	
315	3.21	34.55	0.80	8.64	0.24	
400	3.28	35.28	0.82	8.82	0.25	
** 500	3.65	39.34	0.91	9.83	0.27	
630	3.89	41.92	0.97	10.48	0.29	
800	3.99	42.93	1.00	10.73	0.30	
** 1000	4.34	46.67	1.08	11.67	0.33	
1250	4.82	51.93	1.21	12.98	0.36	
1600	5.41	58.23	1.35	14.56	0.41	
** 2000	5.73	61.67	1.43	15.42	0.43	
2500	6.29	67.65	1.57	16.91	0.47	
3150	6.35	68.39	1.59	17.10	0.48	
** 4000	6.80	73.16	1.70	18.29	0.51	
5000	7.07	76.06	1.77	19.01	0.53	

Array-NRC 0.30 over 13.3 m² of extended continuous surface area **Array-SAA 0.31** over 13.3 m² of extended continuous surface area

Tested by Report by Approved by Marc Sciaky Eric P. Wolfram Keith Kimberling Senior Experimentalist Test Engineer Laboratory Manager

Note: Sound absorption per m^2 (SA/ m^2), and therefore the reported Single Number Ratings, are highly dependent on the exact sample shape, size, spacing, and extended continuous surface area present in the test and subsequent calculations. Changes to any of these parameters will change the resulting values. These presented results are valid only for the specific configuration present in this test.



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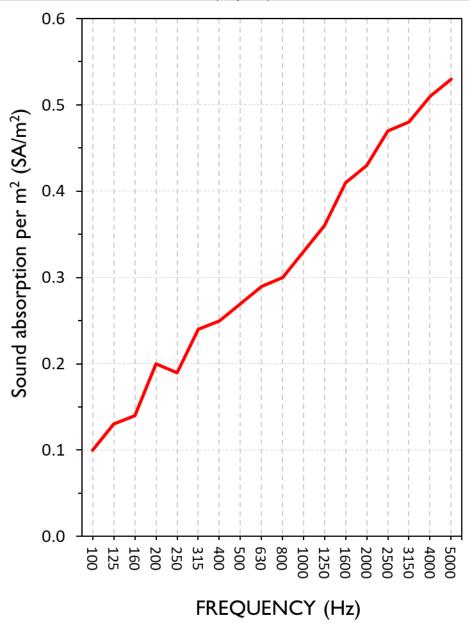
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SOUND ABSORPTION REPORT

48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24

in.) apart)



Array-NRC 0.30 over 13.3 m^2 of extended continuous surface area Array-SAA 0.31 over 13.3 m^2 of extended continuous surface area



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APPENDIX A: Extended Frequency Range Data

Specimen: 48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24 in.) apart) (See Full Report)

The following non-accredited data were obtained in accordance with ASTM C423-23, 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	Total Absorption		Absorptio	Absorption per Object		
(Hz)	(m ²)	(Sabins)	(m ² /Object)	(Sabins / Object)	(Sabins/ft ²) (SA/m ²)	
31.5	-0.29	-3.09	-0.07	-0.77	-0.02	
40	-0.14	-1.52	-0.04	-0.38	-0.01	
50	0.20	2.11	0.05	0.53	0.01	
63	1.11	11.91	0.28	2.98	0.08	
80	0.87	9.35	0.22	2.34	0.07	
100	1.39	14.95	0.35	3.74	0.10	
125	1.80	19.36	0.45	4.84	0.13	
160	1.80	19.40	0.45	4.85	0.14	
200	2.67	28.79	0.67	7.20	0.20	
250	2.57	27.69	0.64	6.92	0.19	
315	3.21	34.55	0.80	8.64	0.24	
400	3.28	35.28	0.82	8.82	0.25	
500	3.65	39.34	0.91	9.83	0.27	
630	3.89	41.92	0.97	10.48	0.29	
800	3.99	42.93	1.00	10.73	0.30	
1000	4.34	46.67	1.08	11.67	0.33	
1250	4.82	51.93	1.21	12.98	0.36	
1600	5.41	58.23	1.35	14.56	0.41	
2000	5.73	61.67	1.43	15.42	0.43	
2500	6.29	67.65	1.57	16.91	0.47	
3150	6.35	68.39	1.59	17.10	0.48	
4000	6.80	73.16	1.70	18.29	0.51	
5000	7.07	76.06	1.77	19.01	0.53	
6300	7.49	80.66	1.87	20.16	0.56	
8000	7.80	84.01	1.95	21.00	0.59	
10000	7.75	83.46	1.94	20.86	0.58	
12500	7.82	84.15	1.95	21.04	0.59	



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APPENDIX B: Instruments of Traceability

Specimen: 48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24 in.) apart) (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 D	Туре 4943-В-001	2311440	2022-09-28	2023-09-28
Bruel & Kjaer Pistonphone EXTECH Hygro 639	Type 4228 SD700	2781248 A.103639	2022-07-22 2022-12-07	2023-07-22 2023-12-07

APPENDIX C: Revisions to Original Test Report

Specimen: 48" Diameter Felt Disc (2 rows of 2 baffles each, rows and baffles spaced 610 mm (24 in.) apart) (See Full Report)

Date	Revision
2023-05-15	Original report issued
2023-05-23	Page 1: Product name changed from "SLIM RING 4851-48" to "ACOUSTIC ACCESSORY – DISK -48" -EPW

END



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