Acoustic Data

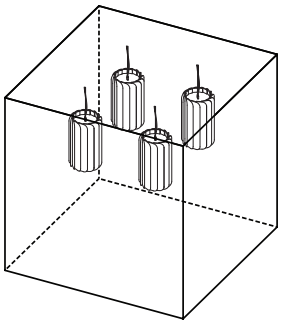
Mill 4X77 / 4X78 / 4X79 / 4X83

EUREKA

Acoustic test results

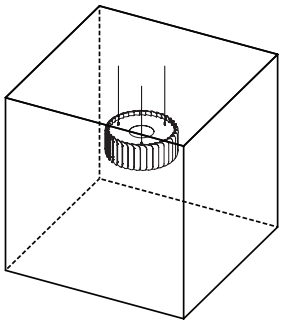
The acoustic testing of our fixtures enables us to get data such as the average Sabins per object and the sound absorbing coefficient (Sabins/ft²). One Sabins is the equivalent of 1ft² of perfect sound absorption.
For the MILL, we tested six variations of the fixture; the MILL 25” & 35”, the MILL XL 14” & 35” and the MILL XXL 14” & 35”.
These were tested on a square spacing grid of 45” and placed 36” from the test surface (ceiling).

MILL 25” test



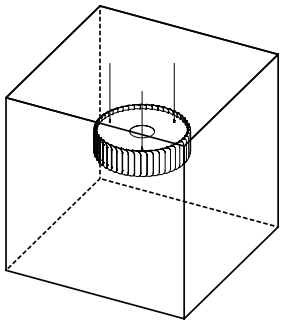
Absorption per fixture: **6.65 Sabins**

MILL XL 14” test



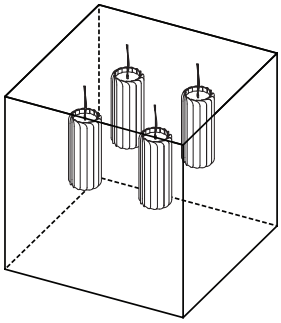
Absorption per fixture: **11.36 Sabins**

MILL XXL 14” test



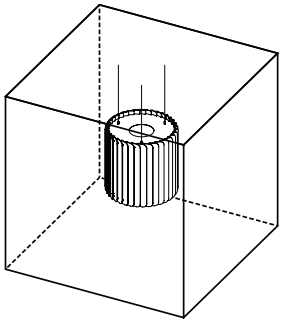
Absorption per fixture: **15.54 Sabins**

MILL 35” test



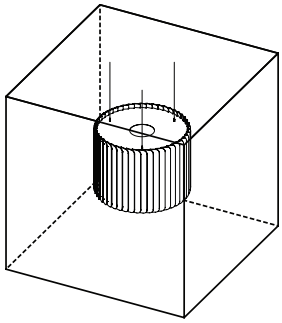
Absorption per fixture: **9.02 Sabins**

MILL XL 35” test



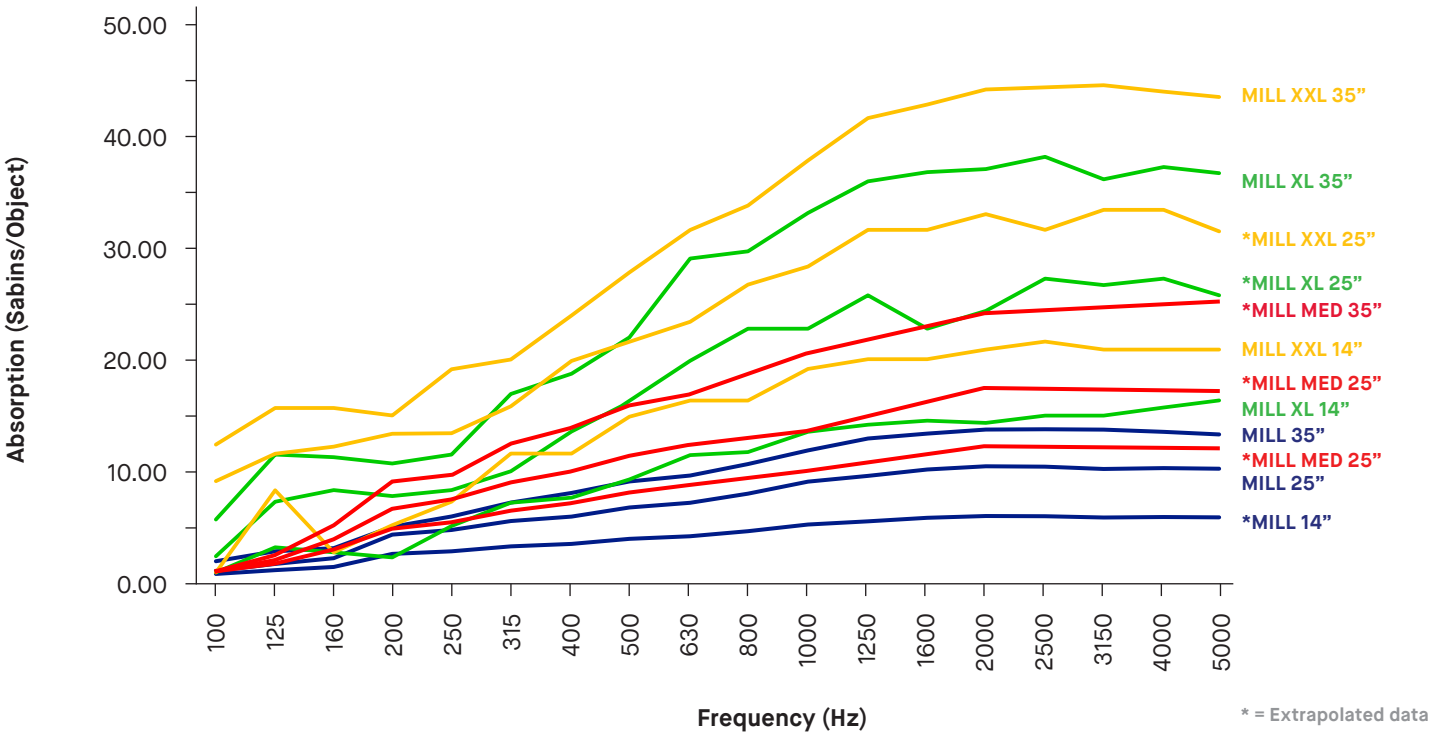
Absorption per fixture: **23.56 Sabins**

MILL XXL 35” test



Absorption per fixture: **32.13 Sabins**

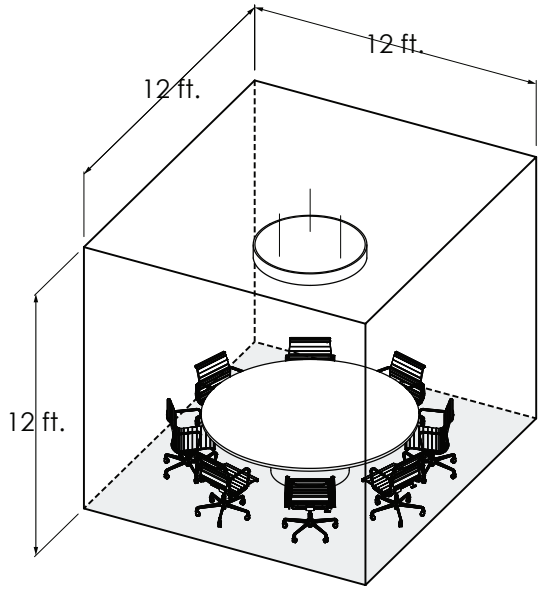
Sound Absorption



* = Extrapolated data

Reverberation time

Based on the test data, we are able to calculate the reverberation time of fixture layouts in a closed room and determine the extra amount (ft^2) of sound absorbing material that would be required for a comfortable level. Reverberation time is the calculation of the time it takes for sound to fade by 60 dB in a closed space in seconds. As a reference, the WELL standard recommends a reverberation time of 0.5 seconds for an open office applications and 0.6 seconds for a conference room. Here are two acoustic scenarios using the AREA & MILL fixtures.

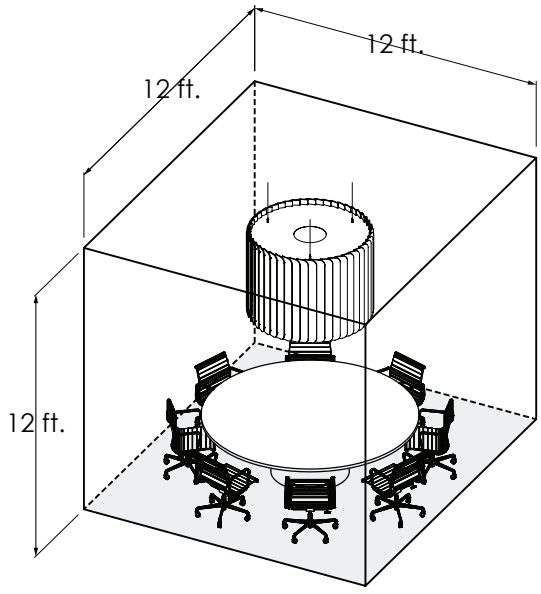


Scenario 1

1x pendant AREA 36” hanging 12” from the ceiling.

Average workplane illuminance
53 fc

Reverberation time
1.052 seconds



Scenario 2

1x pendant MILL XXL 35” hanging 12” from the ceiling.

Average workplane illuminance
53 fc

Reverberation time
0.759 seconds
+39% better acoustics

Carpet on concrete floor

1/2” sheetrock walls and ceiling

EUREKA

ANNEXES

Mill 4277-25

RIVERBANK ACOUSTICAL LABORATORIES

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

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

Test Report

SPONSOR: **EUREKA**
Montréal, QC, Canada

Sound Absorption
RAL™-A20-436

CONDUCTED: 2020-10-12

ON: Mill 4277D-25 (4 x 2 square array, 45 in. on center)

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 C423-17: "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 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 Mill 4277D-25 (4 x 2 square array, 45 in. on center). 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:	Mill
Product ID:	4277D-25
Manufacturer:	EUREKA
Exposed Surface Area:	1.73 m^2 (18.62 ft^2) per object

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials:	Semirigid felt fins around coated steel body, acrylic lens
	Fins extend tangentially from cylindrical envelope of body
Dimensions:	8 @ 356 mm (14 in.) diameter x 622 mm (24.5 in.) high
	Felt fins, 15 per object @ 118 mm (4.6 in.) x 622 mm (24.5 in.)
	Fin thickness @ 9 mm (0.354 in.)
	52.5 mm (2.0 in.) deep recession at top and bottom
Overall Weight:	35.83 kg (79 lbs)

Physical Measurements (per object)

Dimensions:	0.36 m (14 in.) diameter by 0.62 m (24.5 in.) high
Weight:	4.48 kg (9.88 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	22.0 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	57.2 % ± 0.4 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.8 kPa (Requirement not defined)

Based on sponsor-provided calculations, each sound absorbing object had an absorptive area (all exposed surfaces) of 1.73 m^2 (18.62 ft^2). The total absorptive area (all exposed surfaces) of all sound-absorbing objects was 13.84 m^2 (148.97 ft^2). The array of objects covered 5.67 m^2 (61.05 ft^2) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 8 spaced sound absorbing objects suspended from cables such that the closest face is located approximately 800 mm (31.5 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The objects were evenly distributed in a 4 x 2 square array, spaced 1143 mm (45 in.) on center.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Acrylic lens at underside of specimen, orientation of felt fins

Figure 3 – Detail of specimen materials

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	0.40	4.27	0.05	0.53
** 125	0.81	8.67	0.10	1.08
160	1.25	13.41	0.16	1.68
200	2.73	29.38	0.34	3.67
** 250	2.99	32.20	0.37	4.02
315	3.58	38.57	0.45	4.82
400	3.87	41.69	0.48	5.21
** 500	4.41	47.51	0.55	5.94
630	4.68	50.33	0.58	6.29
800	5.18	55.71	0.65	6.96
** 1000	6.01	64.72	0.75	8.09
1250	6.34	68.22	0.79	8.53
1600	6.74	72.51	0.84	9.06
** 2000	6.99	75.21	0.87	9.40
2500	6.93	74.54	0.87	9.32
3150	6.80	73.17	0.85	9.15
** 4000	6.85	73.69	0.86	9.21
5000	6.82	73.41	0.85	9.18

Tested by: Marc Sciaky, *Senior Experimentalist*

Report by: Malcolm Kelly, *Test Engineer, Acoustician*

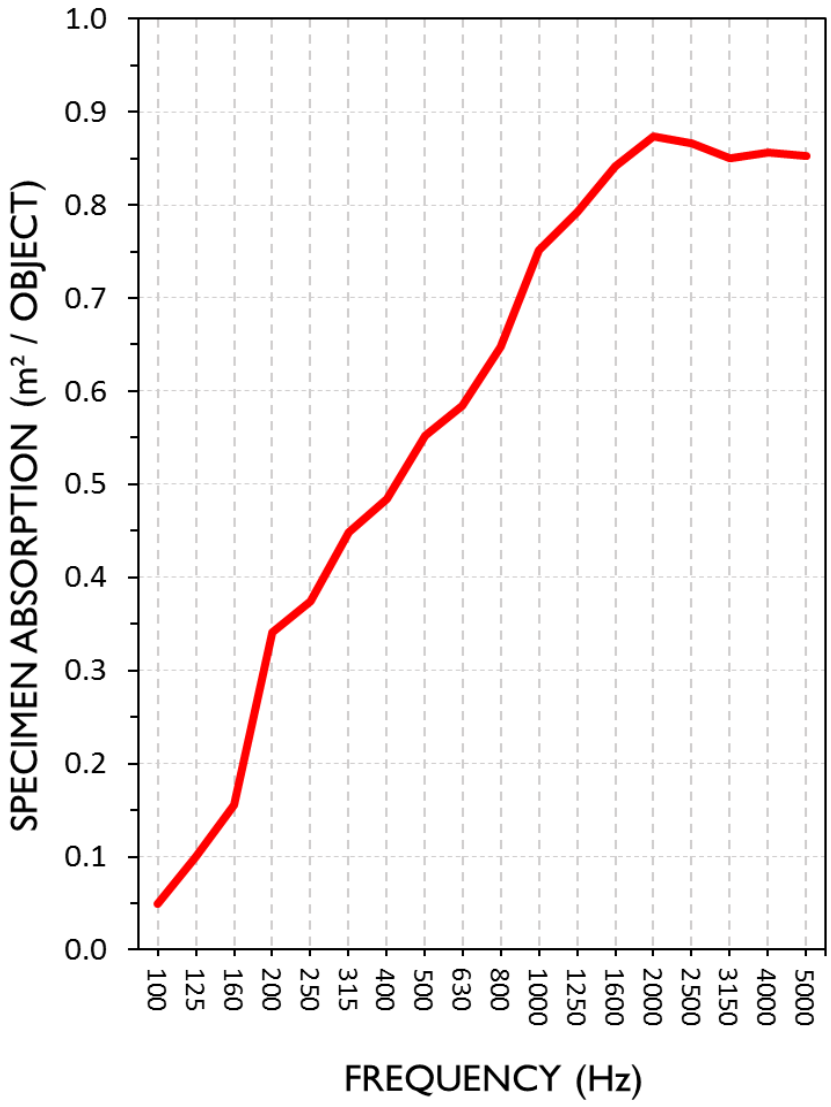
Approved by: Eric P. Wolfram, *Laboratory Manager*

Digitally signed by Eric P Wolfram
Location: Geneva, IL
Date: 2020.11.11 13:13:15 -06'00'

NVLAP TESTING
NVLAP LAB CODE 100227-0

SOUND ABSORPTION REPORT

Mill 4277D-25 (4 x 2 square array, 45 in. on center)



APPENDIX A: Extended Frequency Range Data

Specimen: Mill 4277D-25 (4 x 2 square array, 45 in. on center) (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 (m^2)	Total Absorption (Sabins)	Absorption per Object (m^2 / Object)	Absorption per Object (Sabins / Object)
31.5	0.43	4.68	0.05	0.58
40	0.12	1.27	0.01	0.16
50	-0.17	-1.81	-0.02	-0.23
63	0.13	1.36	0.02	0.17
80	0.86	9.22	0.11	1.15
100	0.40	4.27	0.05	0.53
125	0.81	8.67	0.10	1.08
160	1.25	13.41	0.16	1.68
200	2.73	29.38	0.34	3.67
250	2.99	32.20	0.37	4.02
315	3.58	38.57	0.45	4.82
400	3.87	41.69	0.48	5.21
500	4.41	47.51	0.55	5.94
630	4.68	50.33	0.58	6.29
800	5.18	55.71	0.65	6.96
1000	6.01	64.72	0.75	8.09
1250	6.34	68.22	0.79	8.53
1600	6.74	72.51	0.84	9.06
2000	6.99	75.21	0.87	9.4
2500	6.93	74.54	0.87	9.32
3150	6.80	73.17	0.85	9.15
4000	6.85	73.69	0.86	9.21
5000	6.82	73.41	0.85	9.18
6300	6.94	74.70	0.87	9.34
8000	7.05	75.91	0.88	9.49
10000	7.34	78.97	0.92	9.87
12500	7.02	75.56	0.88	9.45

APPENDIX B: Instruments of Traceability

Specimen: Mill 4277D-25 (4 x 2 square array, 45 in. on center) (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2020-06-26	2021-06-26
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2020-09-30	2021-09-30
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	P97844	2020-02-18	2021-02-18

APPENDIX C: Revisions to Original Test Report

Specimen: Mill 4277D-25 (4 x 2 square array, 45 in. on center) (See Full Report)

Date	Revision
2020-11-10	Original report issued

END

Riverbank Acoustical Laboratories
An ALION Technical Center

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

SPONSOR: **EUREKA**
Montréal, QC, Canada

Report Referenced: **RAL™-A20-436**

CONDUCTED: 2020-10-12

ON: Mill 4277D-25 (4 x 2 square array, 45 in. on center) (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; ratings yielded from this method have titles with the prepended word “Equivalent”. Rating titles for the remaining 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) Equivalent 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 5.67 m^2 (61.05 ft^2) of horizontal test surface area. With an extra 787.4 mm (31 in.) of length and width to account for the space between the tested array and what would be the next objects in a larger array, the surface area comes to 10.45 m^2 (112.5 ft^2). Equivalent sound absorption coefficients, and subsequently the Equivalent Noise Reduction Coefficient (E*NRC) and Equivalent Sound Absorption Average (E*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 equivalent 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, as determined from sponsor-provided calculations (1.73 m^2 (18.62 ft^2) per object x 8 objects = 13.84 m^2 (148.97 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 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).

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

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. 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. This method is deemed not useful or applicable to the specimen under test.

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 5.67 m^2 (61.05 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.

Riverbank Acoustical LABORATORIES™
An ALION Technical Center

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

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 (ft^2)			Method 1	Method 2	Method 3	Method 4
			Equivalent Abs. Coefficient From Area of Extended Specimen Envelope (112.5 ft^2)	**Apparent** Abs. Coefficient From Total Exposed Surface Area (148.97 ft^2)	**Apparent** Abs. Coefficient From One Face Per Object (Not Applicable)	**Apparent** Abs. Coefficient From Unextended Envelope Area (61.05 ft^2)
Freq. (Hz)	**Sabins**	**Sabins / Object**				
31.5	4.68	0.58	0.04	0.03		0.08
40	1.27	0.16	0.01	0.01		0.02
50	-1.81	-0.23	-0.02	-0.01		-0.03
63	1.36	0.17	0.01	0.01		0.02
80	9.22	1.15	0.08	0.06		0.15
100	4.27	0.53	0.04	0.03		0.07
125	8.67	1.08	0.08	0.06		0.14
160	13.41	1.68	0.12	0.09		0.22
200	29.38	3.67	0.26	0.20		0.48
250	32.20	4.02	0.29	0.22		0.53
315	38.57	4.82	0.34	0.26		0.63
400	41.69	5.21	0.37	0.28		0.68
500	47.51	5.94	0.42	0.32		0.78
630	50.33	6.29	0.45	0.34		0.82
800	55.71	6.96	0.50	0.37		0.91
1,000	64.72	8.09	0.58	0.43		1.06
1,250	68.22	8.53	0.61	0.46		1.12
1,600	72.51	9.06	0.64	0.49		1.19
2,000	75.21	9.40	0.67	0.50		1.23
2,500	74.54	9.32	0.66	0.50		1.22
3,150	73.17	9.15	0.65	0.49		1.20
4,000	73.69	9.21	0.66	0.49		1.21
5,000	73.41	9.18	0.65	0.49		1.20
6,300	74.70	9.34	0.66	0.50		1.22
8,000	75.91	9.49	0.67	0.51		1.24
10,000	78.97	9.87	0.70	0.53		1.29
12,500	75.56	9.45	0.67	0.51		1.24
		Equivalent NRC:	**0.50**	**N/A**		**N/A**
		Apparent NRC:	**N/A**	**0.35**		**0.90**
		Equivalent/Apparent SAA:	**0.48**	**0.36**		**0.89**

Prepared by
Malcolm Kelly
Test Engineer, Acoustician

ANNEXES

Mill 4277-35

RIVERBANK ACOUSTICAL LABORATORIES

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

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

Test Report

SPONSOR: **EUREKA**
Montréal, QC, Canada

Sound Absorption
RAL™-A20-437

CONDUCTED: 2020-10-12

ON: Mill 4277D-35 (4 x 2 square array, 45 in. on center)

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 C423-17: "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 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 Mill 4277D-35 (4 x 2 square array, 45 in. on center). 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:	Mill
Product ID:	4277D-35
Manufacturer:	EUREKA
Exposed Surface Area:	2.34 m^2 (25.19 ft^2) per object

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Test Specimen

Materials:	Semirigid felt fins around coated steel body, acrylic lens
	Fins extend tangentially from cylindrical envelope of body
Dimensions:	8 @ 356 mm (14 in.) diameter x 889 mm (35 in.) high
	Felt fins, 15 per object @ 118 mm (4.6 in.) x 889 mm (35 in.)
	Fin thickness @ 9 mm (0.354 in.)
	52.5 mm (2.0 in.) deep recession at top and bottom
Overall Weight:	43.2 kg (95.25 lbs)

Physical Measurements (per object)

Dimensions:	0.36 m (14 in.) diameter by 0.89 m (35 in.) high
Weight:	5.4 kg (11.91 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.9 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	56.5 % ± 0.4 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.7 kPa (Requirement not defined)

Based on sponsor-provided calculations, each sound absorbing object had an absorptive area (all exposed surfaces) of 2.34 m^2 (25.19 ft^2). The total absorptive area (all exposed surfaces) of all sound-absorbing objects was 18.72 m^2 (201.50 ft^2). The array of objects covered 5.67 m^2 (61.05 ft^2) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 8 spaced sound absorbing objects suspended from cables such that the closest face is located approximately 533 mm (21 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The objects were evenly distributed in a 4 x 2 square array, spaced 1143 mm (45 in.) on center.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Detail of specimen material, recessed acrylic lens, felt fins

Figure 3 – Detail of specimen materials

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	0.99	10.69	0.12	1.34
** 125	1.63	17.57	0.20	2.20
160	1.80	19.35	0.22	2.42
200	3.14	33.80	0.39	4.23
** 250	3.80	40.88	0.47	5.11
315	4.65	50.08	0.58	6.26
400	5.23	56.30	0.65	7.04
** 500	5.95	64.08	0.74	8.01
630	6.30	67.86	0.79	8.48
800	7.00	75.40	0.88	9.42
** 1000	7.83	84.32	0.98	10.54
1250	8.58	92.30	1.07	11.54
1600	8.89	95.70	1.11	11.96
** 2000	9.23	99.33	1.15	12.42
2500	9.26	99.65	1.16	12.46
3150	9.22	99.28	1.15	12.41
** 4000	9.09	97.80	1.14	12.22
5000	8.93	96.14	1.12	12.02

Tested by: Marc Sciaky
Senior Experimentalist

Report by: Malcolm Kelly
Test Engineer, Acoustician

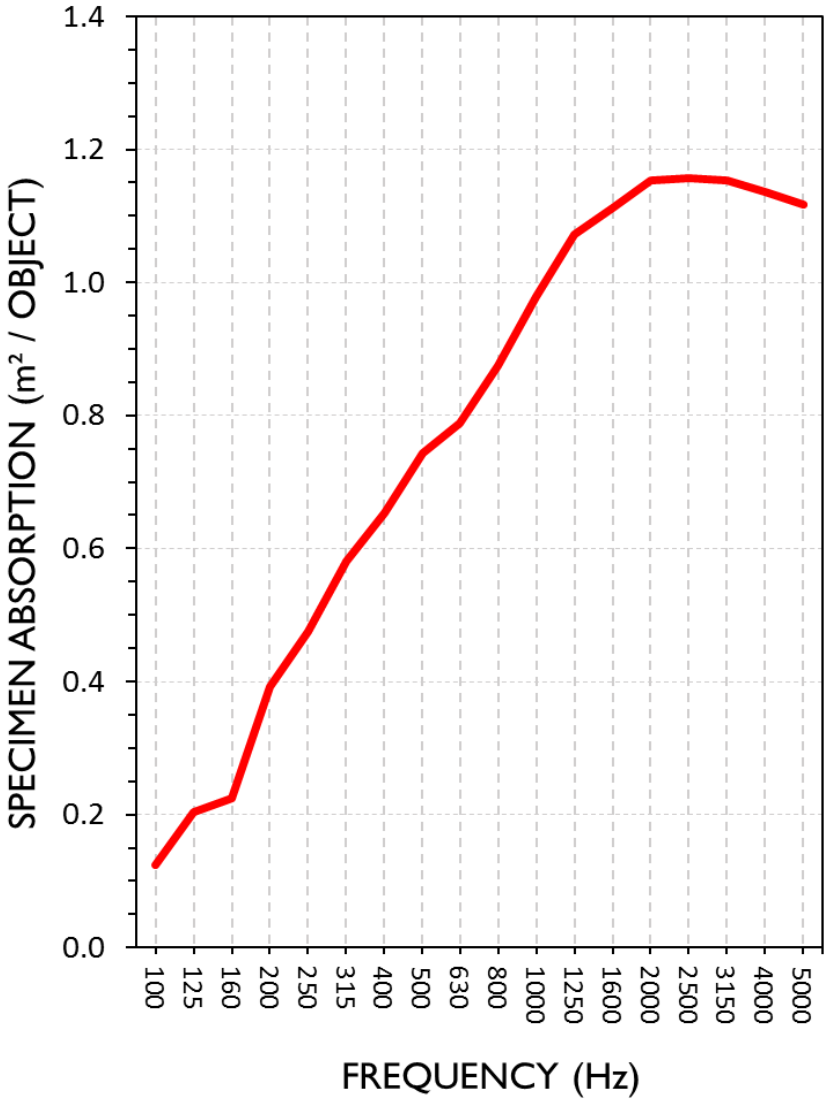
Approved by: Eric P. Wolfram
Laboratory Manager

Digitally signed by Eric P Wolfram
Location: Geneva, IL
Date: 2020.11.11 13:13:31 -06'00'

NVLAP TESTING
NVLAP LAB CODE 100227-0

SOUND ABSORPTION REPORT

Mill 4277D-35 (4 x 2 square array, 45 in. on center)



APPENDIX A: Extended Frequency Range Data

Specimen: Mill 4277D-35 (4 x 2 square array, 45 in. on center) (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 (m^2)	Total Absorption (Sabins)	Absorption per Object (m^2 / Object)	Absorption per Object (Sabins / Object)
31.5	0.14	1.46	0.02	0.18
40	0.45	4.89	0.06	0.61
50	-0.21	-2.25	-0.03	-0.28
63	0.72	7.75	0.09	0.97
80	1.19	12.81	0.15	1.6
100	0.99	10.69	0.12	1.34
125	1.63	17.57	0.20	2.2
160	1.80	19.35	0.22	2.42
200	3.14	33.80	0.39	4.23
250	3.80	40.88	0.47	5.11
315	4.65	50.08	0.58	6.26
400	5.23	56.30	0.65	7.04
500	5.95	64.08	0.74	8.01
630	6.30	67.86	0.79	8.48
800	7.00	75.40	0.88	9.42
1000	7.83	84.32	0.98	10.54
1250	8.58	92.30	1.07	11.54
1600	8.89	95.70	1.11	11.96
2000	9.23	99.33	1.15	12.42
2500	9.26	99.65	1.16	12.46
3150	9.22	99.28	1.15	12.41
4000	9.09	97.80	1.14	12.22
5000	8.93	96.14	1.12	12.02
6300	9.04	97.32	1.13	12.17
8000	9.24	99.47	1.16	12.43
10000	9.41	101.29	1.18	12.66
12500	9.28	99.84	1.16	12.48

APPENDIX B: Instruments of Traceability

Specimen: Mill 4277D-35 (4 x 2 square array, 45 in. on center) (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2020-06-26	2021-06-26
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2020-09-30	2021-09-30
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP-PRHTemp2000	P97844	2020-02-18	2021-02-18

APPENDIX C: Revisions to Original Test Report

Specimen: Mill 4277D-35 (4 x 2 square array, 45 in. on center) (See Full Report)

Date	Revision
2020-11-10	Original report issued

END

Riverbank Acoustical Laboratories
An ALION Technical Center

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

SPONSOR: **EUREKA**
Montréal, QC, Canada

Report Referenced: **RAL™-A20-437**

CONDUCTED: 2020-10-12

ON: Mill 4277D-35 (4 x 2 square array, 45 in. on center) (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; ratings yielded from this method have titles with the prepended word “Equivalent”. Rating titles for the remaining 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) Equivalent 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 5.67 m^2 (61.05 ft^2) of horizontal test surface area. With an extra 787.4 mm (31 in.) of length and width to account for the space between the tested array and what would be the next objects in a larger array, the surface area comes to 10.45 m^2 (112.5 ft^2). Equivalent sound absorption coefficients, and subsequently the Equivalent Noise Reduction Coefficient (E*NRC) and Equivalent Sound Absorption Average (E*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 equivalent 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, as determined from sponsor-provided calculations (2.34 m^2 (25.19 ft^2) per object x 8 objects = 18.72 m^2 (201.50 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 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).

Riverbank Acoustical Laboratories
An ALION Technical Center

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

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. 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. This method is deemed not useful or applicable to the specimen under test.

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 5.67 m^2 (61.05 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.

Riverbank Acoustical LABORATORIES™
An ALION Technical Center

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@alionscience.com

EUREKA
2020-10-12

Report Referenced: **RAL™-A20-437**

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 (ft^2)			Method 1	Method 2	Method 3	Method 4
Freq. (Hz)	Sabins	Sabins / Object	**Equivalent** Abs. Coefficient From Area of Extended Specimen Envelope (112.5 ft^2)	**Apparent** Abs. Coefficient From Total Exposed Surface Area (201.5 ft^2)	**Apparent** Abs. Coefficient From One Face Per Object (Not Applicable)	**Apparent** Abs. Coefficient From Unextended Envelope Area (61.05 ft^2)
31.5	1.46	0.18	0.01	0.01		0.02
40	4.89	0.61	0.04	0.02		0.08
50	-2.25	-0.28	-0.02	-0.01		-0.04
63	7.75	0.97	0.07	0.04		0.13
80	12.81	1.60	0.11	0.06		0.21
100	10.69	1.34	0.10	0.05		0.18
125	17.57	2.20	0.16	0.09		0.29
160	19.35	2.42	0.17	0.10		0.32
200	33.80	4.23	0.30	0.17		0.55
250	40.88	5.11	0.36	0.20		0.67
315	50.08	6.26	0.45	0.25		0.82
400	56.30	7.04	0.50	0.28		0.92
500	64.08	8.01	0.57	0.32		1.05
630	67.86	8.48	0.60	0.34		1.11
800	75.40	9.42	0.67	0.37		1.24
1,000	84.32	10.54	0.75	0.42		1.38
1,250	92.30	11.54	0.82	0.46		1.51
1,600	95.70	11.96	0.85	0.47		1.57
2,000	99.33	12.42	0.88	0.49		1.63
2,500	99.65	12.46	0.89	0.49		1.63
3,150	99.28	12.41	0.88	0.49		1.63
4,000	97.80	12.22	0.87	0.49		1.60
5,000	96.14	12.02	0.85	0.48		1.57
6,300	97.32	12.17	0.87	0.48		1.59
8,000	99.47	12.43	0.88	0.49		1.63
10,000	101.29	12.66	0.90	0.50		1.66
12,500	99.84	12.48	0.89	0.50		1.64
		Equivalent NRC:	**0.65**	**N/A**		**N/A**
		Apparent NRC:	**N/A**	**0.35**		**1.20**
		Equivalent/Apparent SAA:	**0.64**	**0.36**		**1.17**

Prepared by
Malcolm Kelly
Test Engineer, Acoustician

ANNEXES

Mill 4278U-14

RIVERBANK ACOUSTICAL LABORATORIES

1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Sound Absorption
RAL™-A22-264

CONDUCTED: 2022-06-21

ON: MILL-XL 4278U-14

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." 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 MILL-XL 4278U-14. 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:	MILL-XL
Product Code:	4278U-14
Nominal Dimensions:	Diameter @ 889 mm (35 in.)
	Thickness @ 356 mm (14 in.)
Total Surfaces:	6.96 m^2 (74.89 ft^2)
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Top Hubs

Diameter:	2 top hubs per object @ 864 mm (34 in.)
Thickness:	1.94 mm (0.0765 in.)
Overall Weight:	7.82 kg (17.25 lbs)

Bottom Hubs

Diameter:	2 bottom hubs per object @ 864 mm (34 in.)
Depth:	140 mm (5.5 in.)
Overall Weight:	7.03 kg (15.5 lbs)

Structural Columns

Dimensions:	6 columns per object @ 25 mm (1 in.) wide by 25 mm (1 in.) long
Depth:	76 mm (3 in.)
Overall Weight:	0.45 kg (1 lbs)

Felt Panels

Dimensions:	36 fins per object @ 117.48 mm (4.625 in.) wide by 356 mm (14 in.) deep
Thickness:	9.27 mm (0.365 in.)
Overall Weight:	4.08 kg (9 lbs)

Physical Measurements (per object)

Dimensions:	0.89 m (35.0 in) wide by 0.89 m (35.0 in) long
Thickness:	0.36 m (14.0 in)
Weight:	13.61 kg (30.0 lbs)

Test Environment

Room Volume:	291.98 m^3
Temperature:	21.7 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	55.05 % ± 1.9 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.8 kPa (Requirement not defined)

Each sound absorbing object had an exposed surface area of 2.23 m^2 (24.1 ft^2). The total exposed surface area of all sound-absorbing objects was 4.47 m^2 (48.1 ft^2).

MOUNTING METHOD

Non-Standard Mounting: The specimen is an array of 2 sound absorbing objects suspended from cables such that the closest face is located approximately 965 mm (38 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling installation. The objects were distributed in a single row, spaced 1143 mm (45 in.) apart.

Figure 1 – Specimen mounted in test chamber

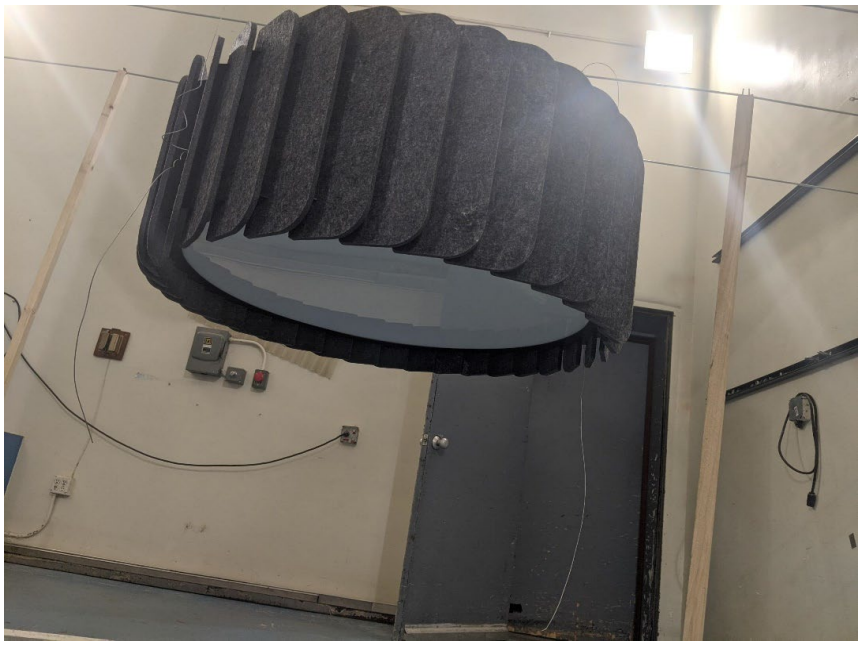


Figure 2 – Specimen mounted in test chamber

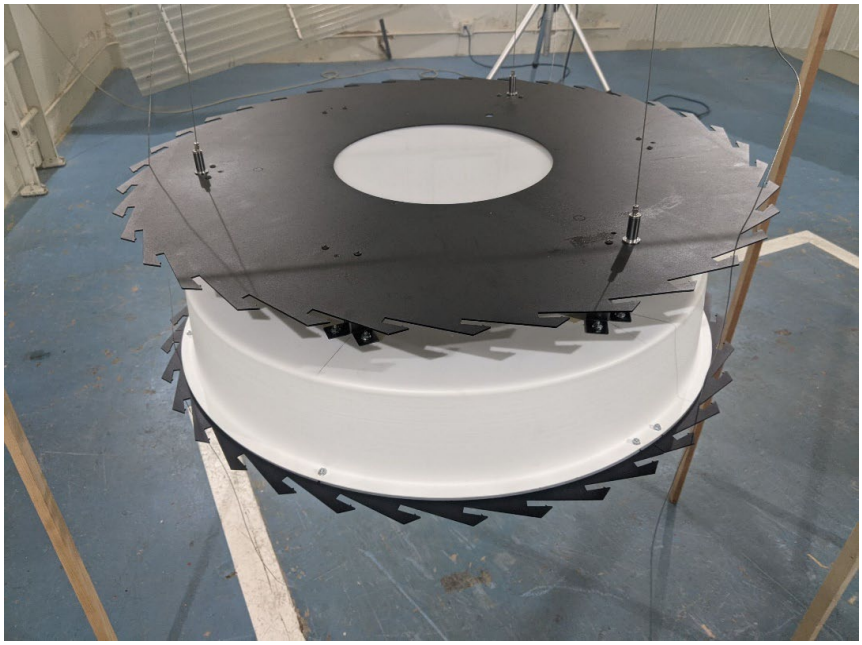


Figure 3 – Specimen top and bottom hubs connected by “V” columns

Figure 4 – Individual specimen fin prior to installation to hub

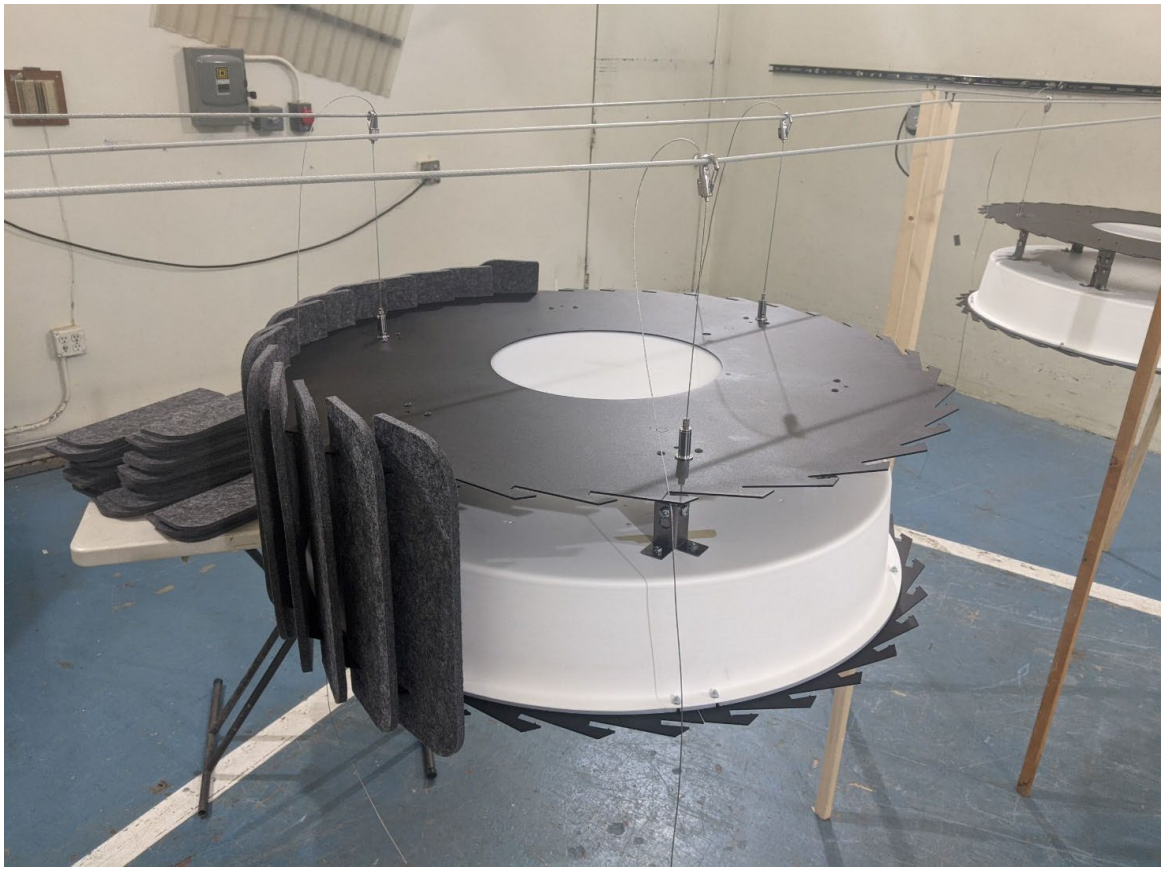


Figure 5 – Specimen fins partially installed to hubs

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	0.36	3.89	0.18	1.94
** 125	0.79	8.53	0.40	4.27
160	0.71	7.66	0.36	3.83
200	0.63	6.82	0.32	3.41
** 250	1.13	12.16	0.56	6.08
315	1.52	16.37	0.76	8.19
400	1.57	16.88	0.78	8.44
** 500	1.90	20.40	0.95	10.20
630	2.27	24.48	1.14	12.24
800	2.30	24.78	1.15	12.39
** 1000	2.64	28.42	1.32	14.21
1250	2.75	29.61	1.38	14.81
1600	2.82	30.36	1.41	15.18
** 2000	2.78	29.93	1.39	14.96
2500	2.90	31.17	1.45	15.58
3150	2.89	31.14	1.45	15.57
** 4000	3.01	32.42	1.51	16.21
5000	2.91	31.34	1.46	15.67

Tested by: Marc Sciaky, *Senior Experimentalist*

Report by: Keith Kimberling, *Test Engineer*

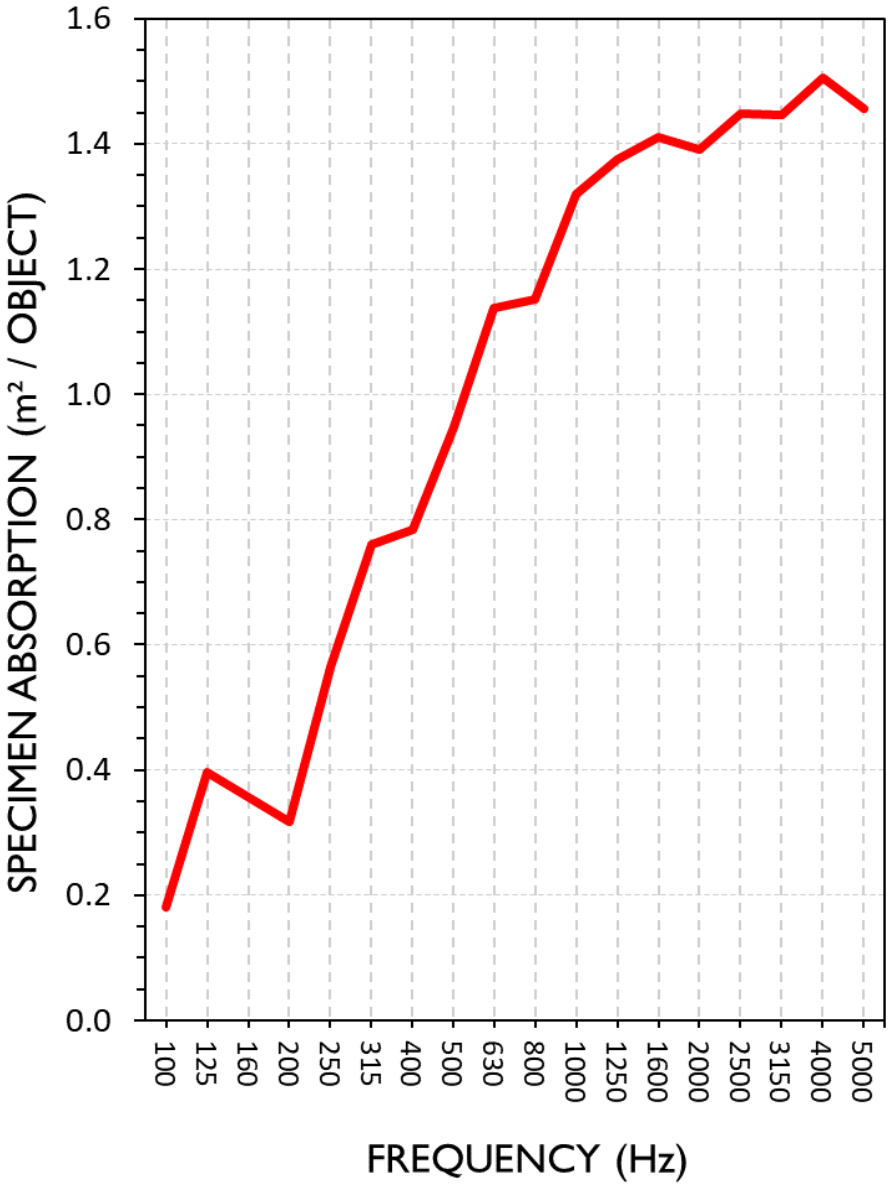
Approved by: Eric P. Wolfram, *Laboratory Manager*

Digitally signed by Eric P Wolfram
Date: 2022.07.05 12:54:44 -05'00'

NVLAP TESTING
NVLAP LAB CODE 100227-0

SOUND ABSORPTION REPORT

MILL-XL 4278U-14



APPENDIX A: Extended Frequency Range Data

Specimen: MILL-XL 4278U-14 (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	0.00	-0.05	0.00	-0.02
40	0.56	6.05	0.28	3.03
50	-0.20	-2.19	-0.10	-1.10
63	-0.33	-3.55	-0.17	-1.78
80	0.52	5.63	0.26	2.82
100	0.36	3.89	0.18	1.94
125	0.79	8.53	0.40	4.27
160	0.71	7.66	0.36	3.83
200	0.63	6.82	0.32	3.41
250	1.13	12.16	0.56	6.08
315	1.52	16.37	0.76	8.19
400	1.57	16.88	0.78	8.44
500	1.90	20.40	0.95	10.20
630	2.27	24.48	1.14	12.24
800	2.30	24.78	1.15	12.39
1000	2.64	28.42	1.32	14.21
1250	2.75	29.61	1.38	14.81
1600	2.82	30.36	1.41	15.18
2000	2.78	29.93	1.39	14.96
2500	2.90	31.17	1.45	15.58
3150	2.89	31.14	1.45	15.57
4000	3.01	32.42	1.51	16.21
5000	2.91	31.34	1.46	15.67
6300	2.97	32.00	1.49	16.00
8000	2.99	32.23	1.50	16.12
10000	2.96	31.82	1.48	15.91
12500	2.65	28.48	1.32	14.24

APPENDIX B: Instruments of Traceability

Specimen: MILL-XL 4278U-14 (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2021-07-01	2022-07-01
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2021-07-13	2022-07-13
Bruel & Kjaer Pistonphone	Type 4228	2781248	2021-08-13	2022-08-13
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: MILL-XL 4278U-14 (See Full Report)

Date	Revision
2022-07-05	Original report issued

END

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Report Referenced: **RAL™-A22-264**

CONDUCTED: 2022-06-21

ON: MILL-XL 4278U-14 (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. This method is not applicable in this case. 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 (2.23 m^2 (24.1 ft^2) per object x 2 objects = 4.47 m^2 (48.1 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 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).

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

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. This method is not applicable in this case. 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. This method is not applicable in this case. 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.

ANNEXES

Mill 4278U-35

RIVERBANK ACOUSTICAL LABORATORIES

1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Sound Absorption
RAL™-A22-265

CONDUCTED: 2022-06-21

ON: MILL-XL 4278U-35

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." 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 MILL-XL 4278U-35. 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:	MILL-XL
Product Code:	4278U-35
Nominal Dimensions:	Diameter @ 889 mm (35 in.)
	Thickness @ 889 mm (35 in.)
Total Surfaces:	11.50 m^2 (123.74 ft^2)
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Top Hub

Diameter:	864 mm (34 in.)
Thickness:	1.94 mm (0.0765 in.)
Overall Weight:	7.82 kg (17.25 lbs)

Bottom Hub

Diameter:	864 mm (34 in.)
Depth:	140 mm (5.5 in.)
Overall Weight:	7.03 kg (15.5 lbs)

Structural Columns

Dimensions:	6 columns @ 25 mm (1 in.) wide by 25 mm (1 in.) long
Depth:	597 mm (23.5 in.)
Overall Weight:	1.59 kg (3.5 lbs)

Felt Panels

Dimensions:	36 fins @ 117.48 mm (4.625 in.) wide by 889 mm (35 in.) deep
Thickness:	9.27 mm (0.365 in.)
Overall Weight:	6.69 kg (14.75 lbs)

Physical Measurements (per object)

Dimensions:	0.89 m (35.0 in) wide by 0.89 m (35.0 in) long
Thickness:	0.89 m (35.0 in)
Weight:	23.13 kg (51.0 lbs)

Test Environment

Room Volume:	291.98 m^3
Temperature:	21.6 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	55.4 % ± 0.2 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.7 kPa (Requirement not defined)

The single sound absorbing object had an exposed surface area of 3.72 m^2 (40.1 ft^2). The total exposed surface area of all sound-absorbing objects was 3.72 m^2 (40.1 ft^2).

MOUNTING METHOD

Type J Mounting: The specimen is a single sound absorbing object suspended from cables such that the closest face is located approximately 610 mm (24 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling installation.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Specimen mounted in test chamber

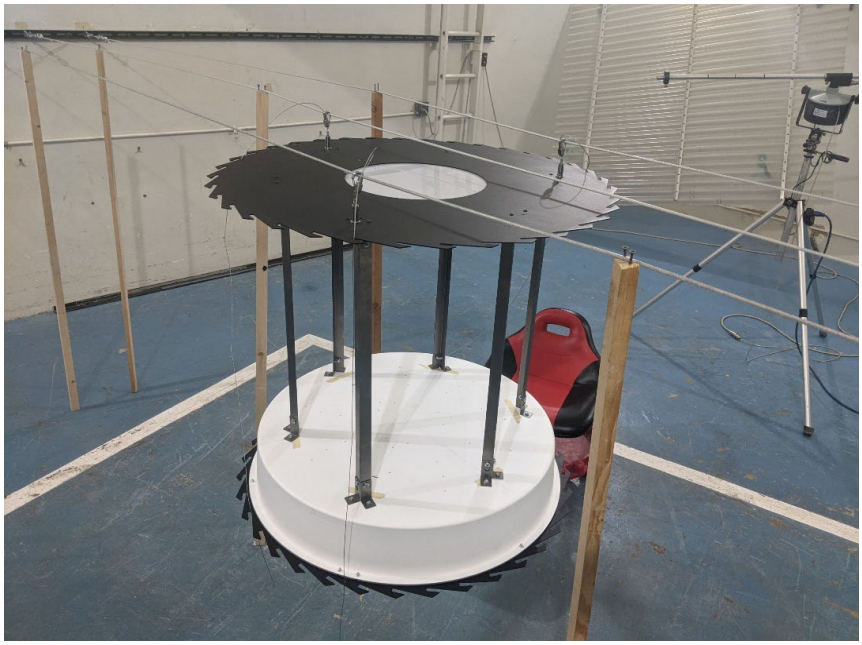


Figure 3 – Specimen top and bottom hubs connected by "V" columns

Figure 4 – Individual specimen fin prior to installation to hub

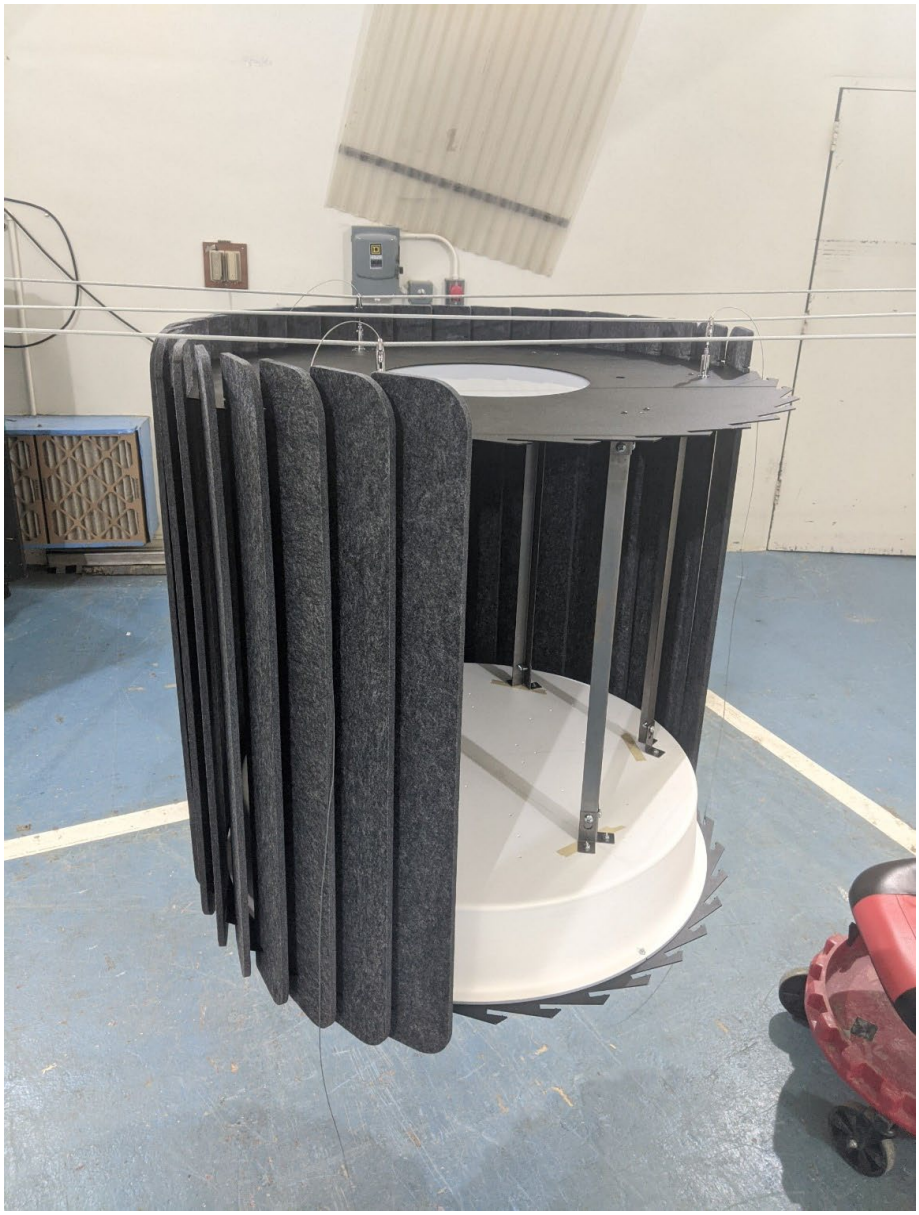


Figure 5 – Specimen fins partially installed to hubs

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	0.44	4.78	0.44	4.78
** 125	0.93	10.01	0.93	10.01
160	1.21	13.04	1.21	13.04
200	0.83	8.94	0.83	8.94
** 250	0.92	9.90	0.92	9.90
315	1.42	15.32	1.42	15.32
400	1.55	16.63	1.55	16.63
** 500	1.88	20.21	1.88	20.21
630	2.45	26.37	2.45	26.37
800	2.52	27.15	2.52	27.15
** 1000	2.81	30.21	2.81	30.21
1250	3.05	32.81	3.05	32.81
1600	3.13	33.73	3.13	33.73
** 2000	3.15	33.94	3.15	33.94
2500	3.24	34.83	3.24	34.83
3150	3.06	32.98	3.06	32.98
** 4000	3.18	34.23	3.18	34.23
5000	3.11	33.48	3.11	33.48

Tested by: Marc Sciaky, *Senior Experimentalist*

Report by: Keith Kimberling, *Test Engineer*

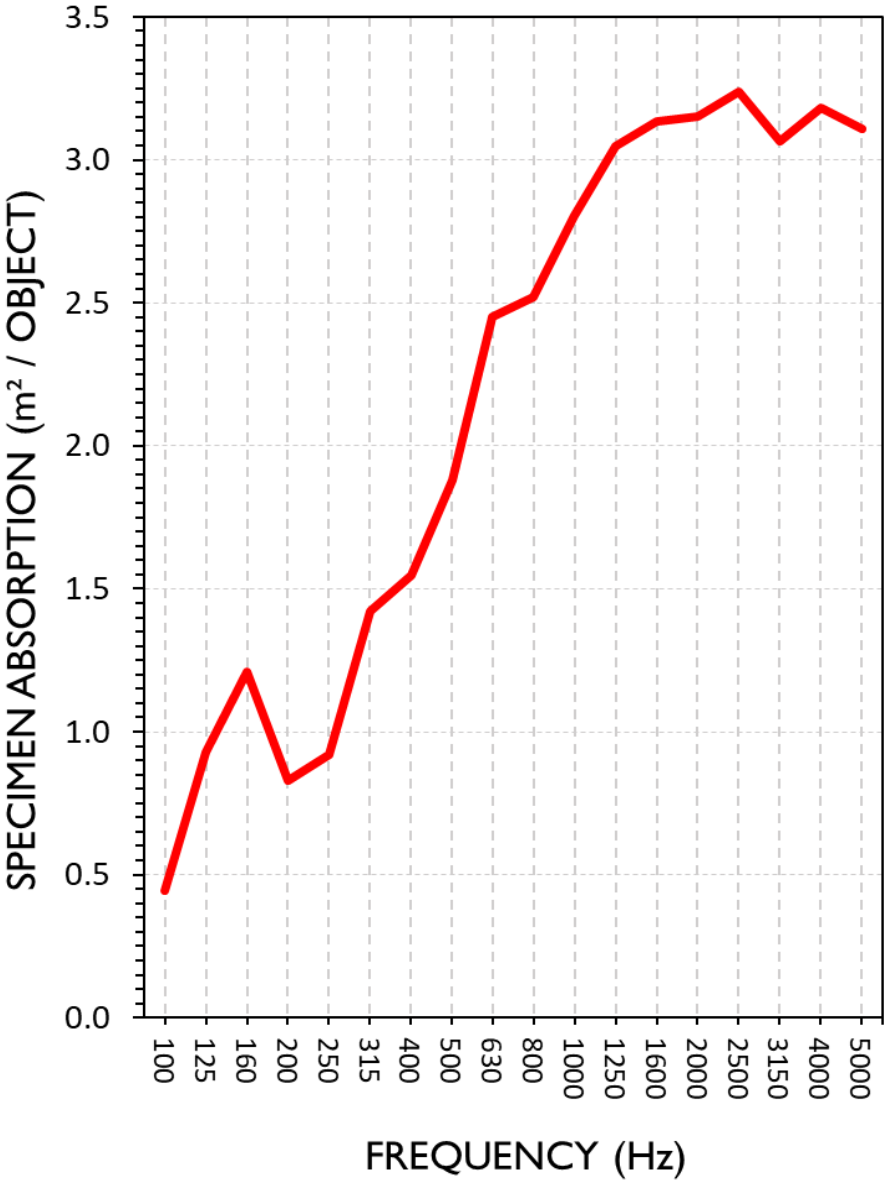
Approved by: Eric P. Wolfram, *Laboratory Manager*

Digitally signed by Eric P Wolfram
Date: 2022.07.05 12:50:23 -05'00'

NVLAP TESTING
NVLAP LAB CODE 100227-0

SOUND ABSORPTION REPORT

MILL-XL 4278U-35



APPENDIX A: Extended Frequency Range Data

Specimen: MILL-XL 4278U-35 (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	0.25	2.70	0.25	2.70
40	0.25	2.73	0.25	2.73
50	0.19	2.09	0.19	2.09
63	0.20	2.17	0.20	2.17
80	1.40	15.07	1.40	15.07
100	0.44	4.78	0.44	4.78
125	0.93	10.01	0.93	10.01
160	1.21	13.04	1.21	13.04
200	0.83	8.94	0.83	8.94
250	0.92	9.90	0.92	9.90
315	1.42	15.32	1.42	15.32
400	1.55	16.63	1.55	16.63
500	1.88	20.21	1.88	20.21
630	2.45	26.37	2.45	26.37
800	2.52	27.15	2.52	27.15
1000	2.81	30.21	2.81	30.21
1250	3.05	32.81	3.05	32.81
1600	3.13	33.73	3.13	33.73
2000	3.15	33.94	3.15	33.94
2500	3.24	34.83	3.24	34.83
3150	3.06	32.98	3.06	32.98
4000	3.18	34.23	3.18	34.23
5000	3.11	33.48	3.11	33.48
6300	3.10	33.40	3.10	33.40
8000	3.18	34.23	3.18	34.23
10000	3.03	32.65	3.03	32.65
12500	2.90	31.26	2.90	31.26

APPENDIX B: Instruments of Traceability

Specimen: MILL-XL 4278U-35 (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2021-07-01	2022-07-01
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2021-07-13	2022-07-13
Bruel & Kjaer Pistonphone	Type 4228	2781248	2021-08-13	2022-08-13
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: MILL-XL 4278U-35 (See Full Report)

Date	Revision
2022-07-05	Original report issued

END

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Report Referenced: **RAL™-A22-265**

CONDUCTED: 2022-06-21

ON: MILL-XL 4278U-35 (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. This method is not applicable in this case. 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 (3.72 m^2 (40.1 ft^2) per object x 1 objects = 3.72 m^2 (40.1 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 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).

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

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 This method is not applicable in this case. 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. This method is not applicable in this case. 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.

ANNEXES

Mill 4279U-14

RIVERBANK ACOUSTICAL LABORATORIES

1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Sound Absorption
RAL™-A22-266

CONDUCTED: 2022-06-21

ON: MILL-XL 4279U-14

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." 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 MILL-XL 4279U-14. 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:	MILL-XL
Product Code:	4279U-14
Nominal Dimensions:	Diameter @ 1143 mm (45 in.)
	Thickness @ 356 mm (14 in.)
Total Surfaces:	11.59 m^2 (124.71 ft^2)
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Top Hub

Diameter:	1165 mm (45.875 in.)
Thickness:	2.03 mm (0.0799 in.)
Overall Weight:	14.97 kg (33 lbs)

Bottom Hub

Diameter:	1165 mm (45.875 in.)
Depth:	140 mm (5.5 in.)
Overall Weight:	12.13 kg (26.75 lbs)

Structural Columns

Dimensions:	6 columns @ 25 mm (1 in.) wide by 25 mm (1 in.) long
Depth:	76 mm (3 in.)
Overall Weight:	0.23 kg (0.5 lbs)

Felt Panels

Dimensions:	48 fins @ 117.48 mm (4.625 in.) wide by 356 mm (14 in.) deep
Thickness:	9.27 mm (0.365 in.)
Overall Weight:	3.18 kg (7 lbs)

Physical Measurements (per object)

Dimensions:	1.17 m (46.0 in) wide by 1.17 m (46.0 in) long
Thickness:	0.36 m (14.0 in)
Weight:	30.5 kg (67.25 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.6 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	54.9 % ± 1.2 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.7 kPa (Requirement not defined)

The single sound absorbing object had an exposed surface area of 3.45 m^2 (37.1 ft^2). The total exposed surface area of all sound-absorbing objects was 3.45 m^2 (37.1 ft^2).

MOUNTING METHOD

Non-Standard Mounting: The specimen is a single sound absorbing object suspended from cables such that the closest face is located approximately 965 mm (38 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling installation.

Figure 1 – Specimen mounted in test chamber

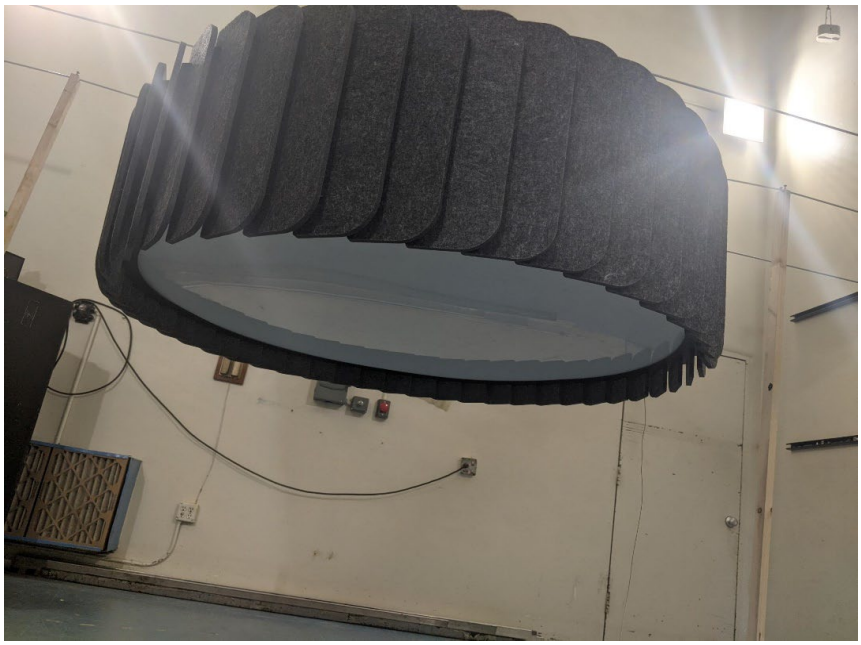


Figure 2 – Specimen mounted in test chamber

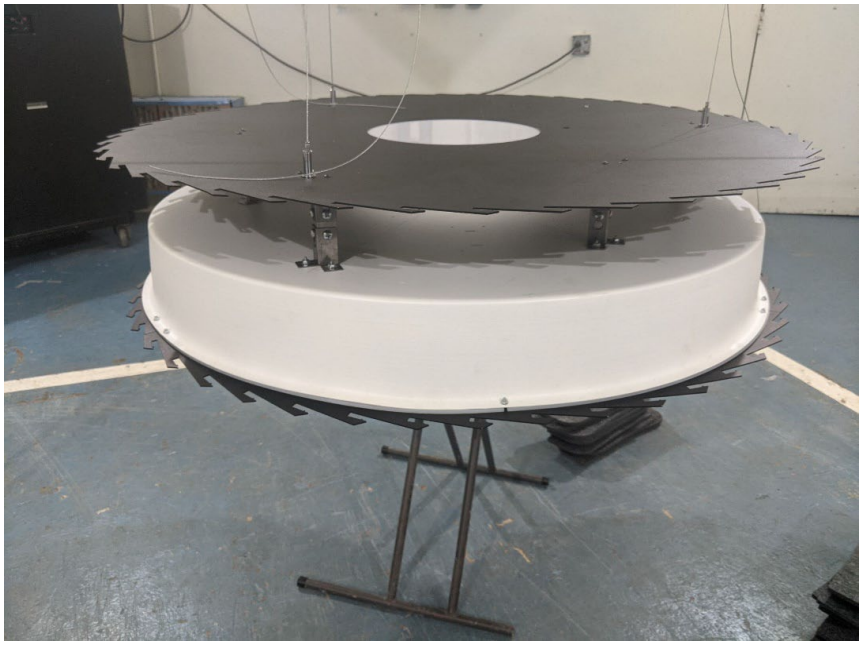


Figure 3 – Specimen top and bottom hubs connected by "V" columns

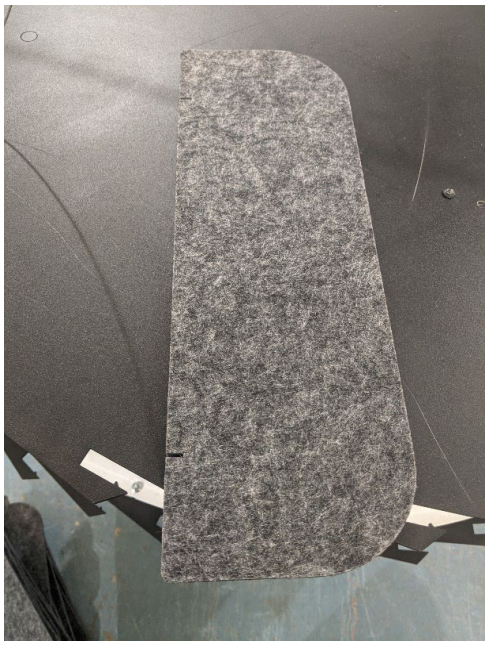


Figure 4 – Individual specimen fin prior to installation to hub

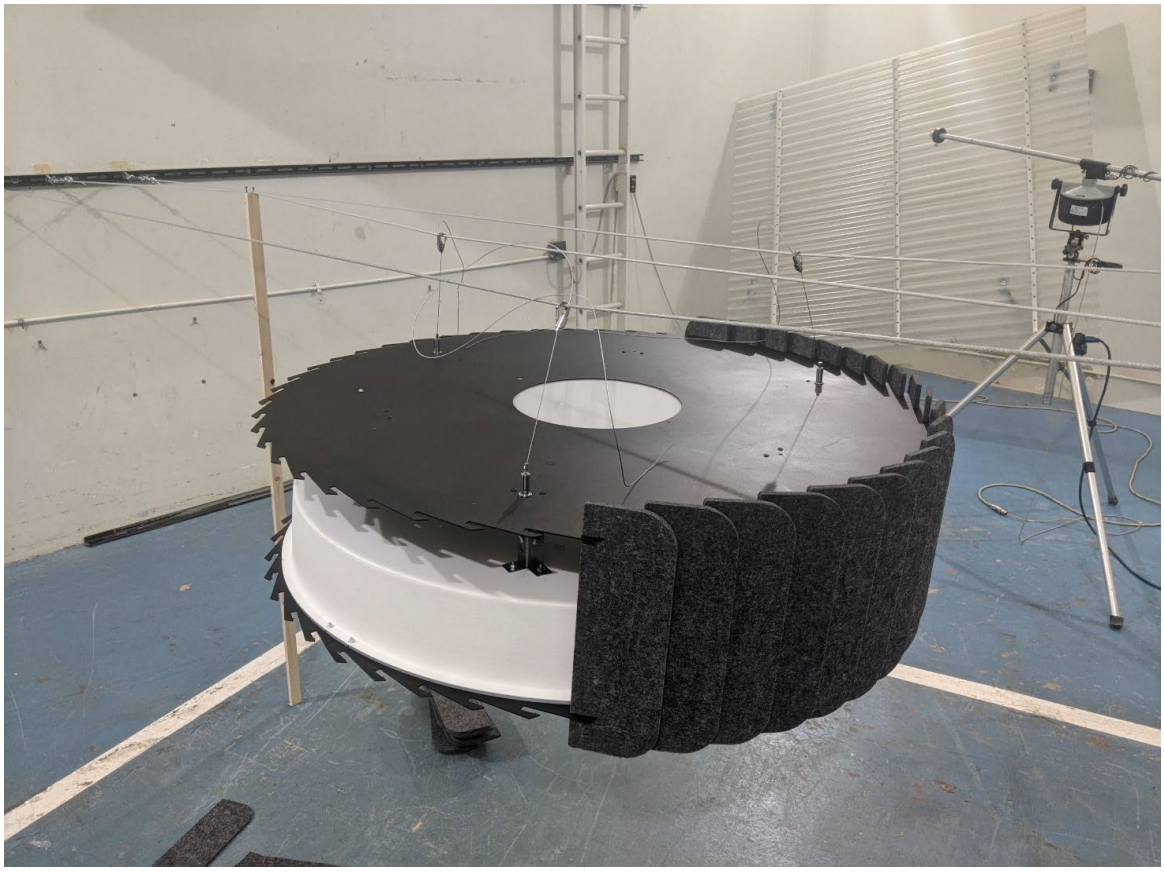


Figure 5 – Specimen fins partially installed to hubs

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	0.09	1.00	0.09	1.00
** 125	0.75	8.03	0.75	8.03
160	0.22	2.36	0.22	2.36
200	0.54	5.77	0.54	5.77
** 250	0.65	7.04	0.65	7.04
315	1.09	11.76	1.09	11.76
400	1.09	11.71	1.09	11.71
** 500	1.39	14.95	1.39	14.95
630	1.56	16.78	1.56	16.78
800	1.54	16.60	1.54	16.60
** 1000	1.77	19.05	1.77	19.05
1250	1.87	20.10	1.87	20.10
1600	1.89	20.36	1.89	20.36
** 2000	1.96	21.11	1.96	21.11
2500	2.06	22.21	2.06	22.21
3150	2.00	21.53	2.00	21.53
** 4000	1.97	21.18	1.97	21.18
5000	2.01	21.63	2.01	21.63

Tested by: Marc Sciaky, *Senior Experimentalist*

Report by: Keith Kimberling, *Test Engineer*

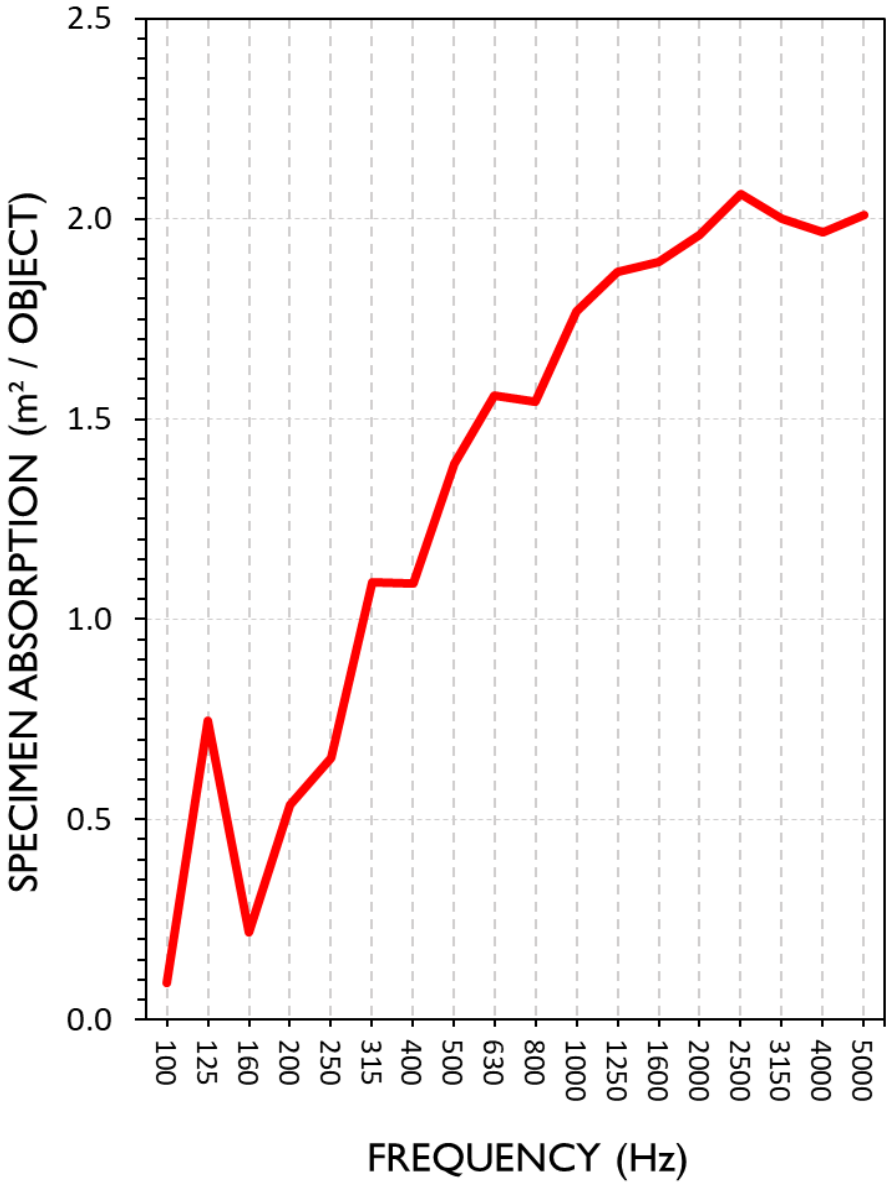
Approved by: Eric P. Wolfram, *Laboratory Manager*

Digitally signed by Eric P Wolfram
Date: 2022.07.05 12:49:45 -05'00'

NVLAP TESTING
NVLAP LAB CODE 100227-0

SOUND ABSORPTION REPORT

MILL-XL 4279U-14



APPENDIX A: Extended Frequency Range Data

Specimen: MILL-XL 4279U-14 (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	-0.28	-2.97	-0.28	-2.97
40	0.72	7.79	0.72	7.79
50	-0.72	-7.77	-0.72	-7.77
63	-0.53	-5.70	-0.53	-5.70
80	0.86	9.26	0.86	9.26
100	0.09	1.00	0.09	1.00
125	0.75	8.03	0.75	8.03
160	0.22	2.36	0.22	2.36
200	0.54	5.77	0.54	5.77
250	0.65	7.04	0.65	7.04
315	1.09	11.76	1.09	11.76
400	1.09	11.71	1.09	11.71
500	1.39	14.95	1.39	14.95
630	1.56	16.78	1.56	16.78
800	1.54	16.60	1.54	16.60
1000	1.77	19.05	1.77	19.05
1250	1.87	20.10	1.87	20.10
1600	1.89	20.36	1.89	20.36
2000	1.96	21.11	1.96	21.11
2500	2.06	22.21	2.06	22.21
3150	2.00	21.53	2.00	21.53
4000	1.97	21.18	1.97	21.18
5000	2.01	21.63	2.01	21.63
6300	1.97	21.19	1.97	21.19
8000	1.93	20.82	1.93	20.82
10000	1.79	19.23	1.79	19.23
12500	1.45	15.64	1.45	15.64

APPENDIX B: Instruments of Traceability

Specimen: MILL-XL 4279U-14 (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2021-07-01	2022-07-01
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2021-07-13	2022-07-13
Bruel & Kjaer Pistonphone	Type 4228	2781248	2021-08-13	2022-08-13
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: MILL-XL 4279U-14 (See Full Report)

Date	Revision
2022-07-05	Original report issued

END

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Report Referenced: **RAL™-A22-266**

CONDUCTED: 2022-06-21

ON: MILL-XL 4279U-14 (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. This method is not applicable in this case. 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 (3.45 m^2 (37.1 ft^2) per object x 1 objects = 3.45 m^2 (37.1 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 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).

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

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. This method is not applicable in this case. 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. This method is not applicable in this case. 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.

ANNEXES

Mill 4279U-35

RIVERBANK ACOUSTICAL LABORATORIES

1512 S BATAVIA AVENUE
GENEVA, IL 60134

630-232-0104

Test Report

www.riverbankacoustics.com

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Sound Absorption
RAL™-A22-262

CONDUCTED: 2022-06-17

ON: MILL-XL 4279U-35

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." 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 MILL-XL 4279U-35. 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:	MILL-XL
Product Code:	4279U-35
Nominal Dimensions:	Diameter @ 1143 mm (45 in.)
	Thickness @ 889 mm (35 in.)
Total Surfaces:	17.64 m^2 (189.81 ft^2)
Manufacturer:	Eureka

SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

Top Hub

Diameter:	1165 mm (45.875 in.)
Thickness:	2.03 mm (0.0799 in.)
Overall Weight:	14.97 kg (33 lbs)

Bottom Hub

Diameter:	1165 mm (45.875 in.)
Depth:	140 mm (5.5 in.)
Overall Weight:	12.13 kg (26.75 lbs)

Structural Columns

Dimensions:	6 columns @ 25 mm (1 in.) wide by 25 mm (1 in.) long
Depth:	597 mm (23.5 in.)
Overall Weight:	1.59 kg (3.5 lbs)

Felt Panels

Dimensions:	48 fins @ 117.48 mm (4.625 in.) wide by 889 mm (35 in.) deep
Thickness:	9.27 mm (0.365 in.)
Overall Weight:	8.96 kg (19.75 lbs)

Physical Measurements (per object)

Dimensions:	1.17 m (46.0 in) wide by 1.17 m (46.0 in) long
Thickness:	0.89 m (35.0 in)
Weight:	37.65 kg (83.0 lbs)

Test Environment

Room Volume:	291.98 m³
Temperature:	21.6 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity:	56.15 % ± 0.1 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure:	98.9 kPa (Requirement not defined)

The single sound absorbing object had an exposed surface area of 5.41 m^2 (58.2 ft^2). The total exposed surface area of all sound-absorbing objects was 5.41 m^2 (58.2 ft^2).

MOUNTING METHOD

Non-Standard Mounting: The specimen is a single sound absorbing object suspended from cables such that the closest face is located approximately 610 mm (24 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling installation.

Figure 1 – Specimen mounted in test chamber

Figure 2 – Specimen mounted in test chamber

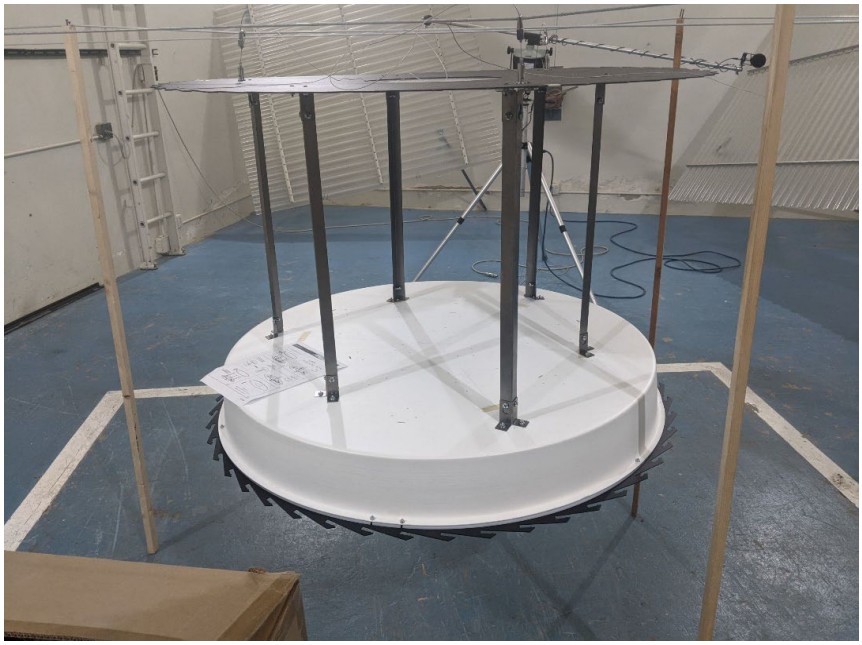


Figure 3 – Specimen top and bottom hubs connected by "V" columns

Figure 4 – Individual specimen fin prior to installation to hub

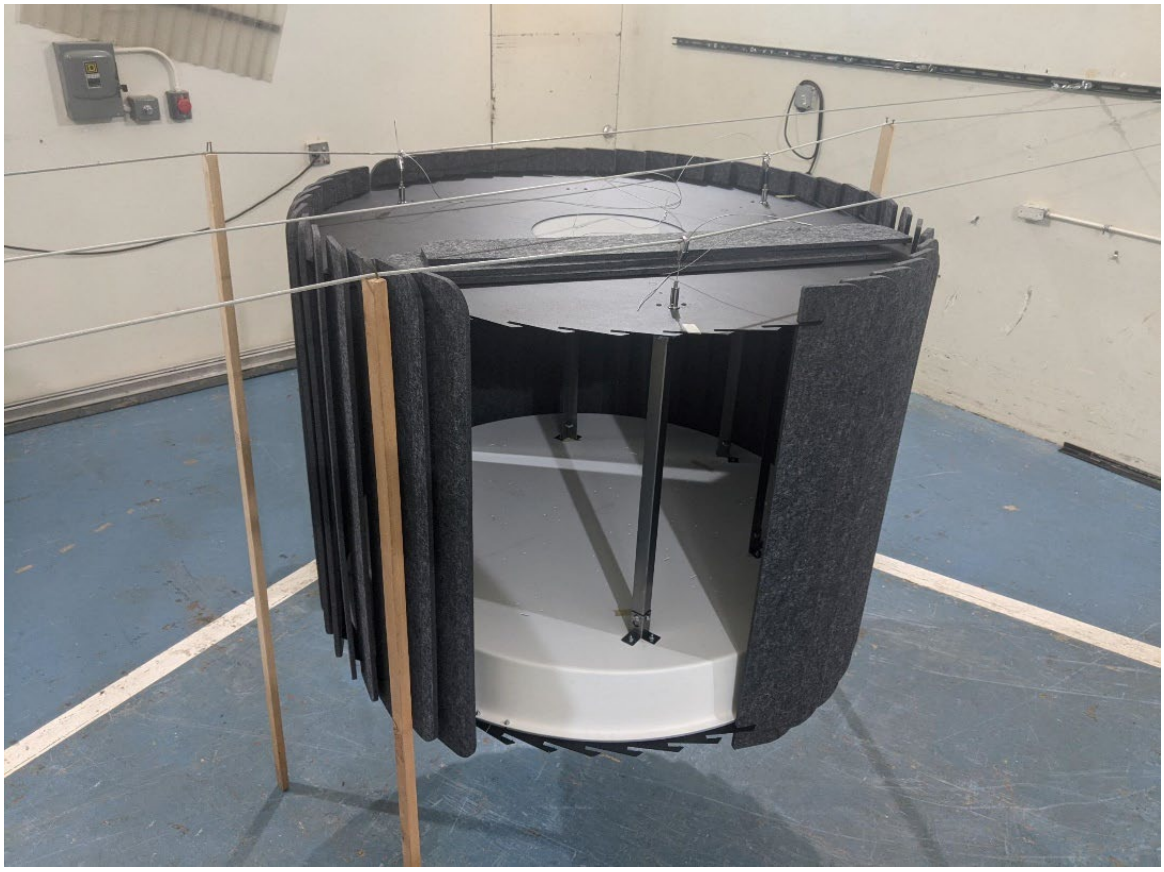


Figure 5 – Specimen fins partially installed to hub

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	Total Absorption		Absorption per Object	
(Hz)	(m^2)	(Sabins)	(m^2 / Object)	(Sabins / Object)
100	1.18	12.66	1.18	12.66
** 125	1.45	15.61	1.45	15.61
160	1.44	15.53	1.44	15.53
200	1.16	12.54	1.16	12.54
** 250	1.81	19.44	1.81	19.44
315	1.90	20.48	1.90	20.48
400	2.28	24.51	2.28	24.51
** 500	2.54	27.35	2.54	27.35
630	2.98	32.05	2.98	32.05
800	3.18	34.26	3.18	34.26
** 1000	3.49	37.57	3.49	37.57
1250	3.82	41.07	3.82	41.07
1600	4.00	43.09	4.00	43.09
** 2000	4.10	44.15	4.10	44.15
2500	4.11	44.24	4.11	44.24
3150	4.10	44.14	4.10	44.14
** 4000	4.08	43.90	4.08	43.90
5000	4.02	43.29	4.02	43.29

Tested by Marc Sciaky
Marc Sciaky
Senior Experimentalist

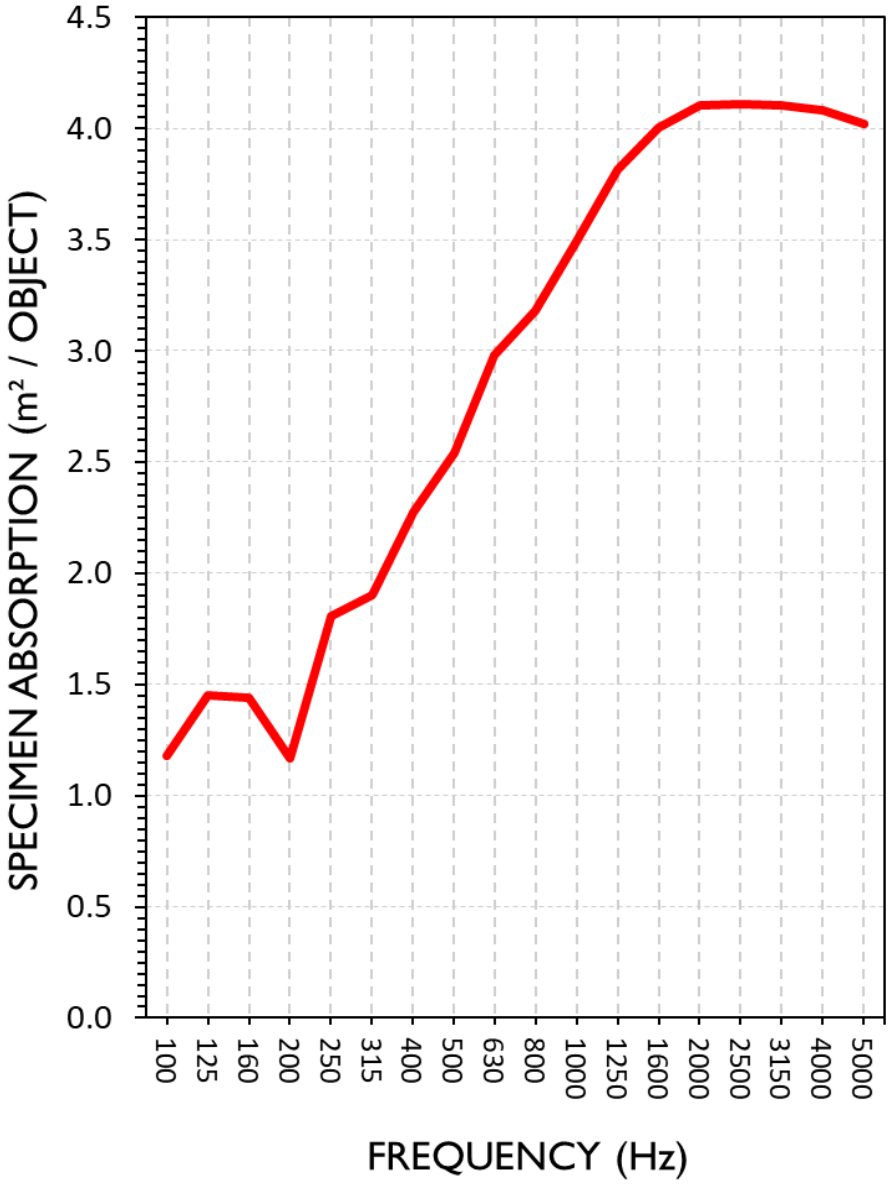
Report by Keith Kimberling
Keith Kimberling
Test Engineer

Approved by
Eric P. Wolfram
Laboratory Manager

Digitally signed by
Eric P Wolfram
Date: 2022.07.05
12:56:17 -05'00'

SOUND ABSORPTION REPORT

MILL-XL 4279U-35



APPENDIX A: Extended Frequency Range Data

Specimen: MILL-XL 4279U-35 (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	0.63	6.76	0.63	6.76
40	-0.20	-2.10	-0.20	-2.10
50	0.67	7.17	0.67	7.17
63	0.15	1.57	0.15	1.57
80	-0.02	-0.23	-0.02	-0.23
100	1.18	12.66	1.18	12.66
125	1.45	15.61	1.45	15.61
160	1.44	15.53	1.44	15.53
200	1.16	12.54	1.16	12.54
250	1.81	19.44	1.81	19.44
315	1.90	20.48	1.90	20.48
400	2.28	24.51	2.28	24.51
500	2.54	27.35	2.54	27.35
630	2.98	32.05	2.98	32.05
800	3.18	34.26	3.18	34.26
1000	3.49	37.57	3.49	37.57
1250	3.82	41.07	3.82	41.07
1600	4.00	43.09	4.00	43.09
2000	4.10	44.15	4.10	44.15
2500	4.11	44.24	4.11	44.24
3150	4.10	44.14	4.10	44.14
4000	4.08	43.90	4.08	43.90
5000	4.02	43.29	4.02	43.29
6300	4.11	44.27	4.11	44.27
8000	4.06	43.74	4.06	43.74
10000	3.99	42.97	3.99	42.97
12500	3.34	35.91	3.34	35.91

APPENDIX B: Instruments of Traceability

Specimen: MILL-XL 4279U-35 (See Full Report)

Description	Model	Serial Number	Date of Certification	Calibration Due
System 1	Type 3160-A-042	3160-106968	2021-07-01	2022-07-01
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2021-07-13	2022-07-13
Bruel & Kjaer Pistonphone	Type 4228	2781248	2021-08-13	2022-08-13
EXTECH Hygro 959	SD700	A099959	2022-03-22	2023-03-22

APPENDIX C: Revisions to Original Test Report

Specimen: MILL-XL 4279U-35 (See Full Report)

Date	Revision
2022-07-05	Original report issued

END

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

SPONSOR: **EUREKA**
Montréal, Quebec, Canada

Report Referenced: **RAL™-A22-262**

CONDUCTED: 2022-06-17

ON: MILL-XL 4279U-35 (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. This method is not applicable in this case. 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, treating the object as a cylinder (5.41 m^2 (58.2 ft^2) per object x 1 objects = 5.41 m^2 (58.2 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 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).

Riverbank Acoustical Laboratories
1512 S. Batavia Ave.
Geneva, IL 60134-3302

Tel: 630-232-0104
Fax: 630-232-0138
Email: RAL@riverbankacoustics.com

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. This method is not applicable in this case. 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. This method is not applicable in this case. 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.