

Test Report

SPONSOR: **ezoBord**
Mississauga, Ontario, Canada

Sound Absorption
RAL™-A19-263

CONDUCTED: 2019-06-19

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ON: Geocloud-Hexagon 12 mm (0.5 in.) with closed back

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 17025:2005 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM C423-17: "Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method." The specimen mounting was performed according to ASTM E795-16: "Standard Practices for Mounting Test Specimens During Sound Absorption Tests." A description of the 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 Geocloud-Hexagon 12 mm (0.5 in.) with closed back. 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

Trade Name: Geocloud Hexagon
Manufacturer: ezoBord
Materials: Polyethylene terephthalate
Wall Thickness: 12 mm (0.472 in.)
Overall Thickness: 63.5 mm (2.5 in.)

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 body, 2 metal rails per panel, felt lid
Dimensions: Hexagons, 8 @ 901.7 mm (35.5 in.) short diagonal
Thickness: Overall @ 63.45 mm (2.498 in.)
Wall thickness @ 12 mm (0.472 in.)
Felt bodies @ 50.8 mm (2 in.)
Overall Weight: 23.81 kg (52.5 lbs)
Assembly: Lid piece laid over body piece, no adhesives

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Page 2 of 10**Physical Measurements (per unit)**

Dimensions: 0.9 m (35.5 in) wide by 1.04 m (40.875 in) long
Thickness: 0.06 m (2.498 in)
Weight: 2.98 kg (6.56 lbs)**Test Environment**

Room Volume: 291.98 m³
Temperature: 21.4 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity: 63.45 % ± 0.5 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure: 97.9 kPa (Requirement not defined)

From sponsor-provided calculations, the array of units had an exposed surface area of 10.08 m² (108.50 ft²). The array of units covered 7.89 m² (84.96 ft²) of the horizontal test surface (total treated area).

MOUNTING METHOD

Type J Mounting: The specimen is an array of 8 spaced sound absorbing units suspended atop an array of cables such that the closest face of the units is located approximately 1.448 m (57 in.) from the horizontal test surface. This approximates the mounting method of a typical ceiling baffle installation. The units were installed as a single cloud, alternating between rows of 1 and 2 units. Parallel edges were spaced approximately 38.1 mm (1.5 in.) apart.

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Figure 1 – Specimen mounted in test chamber



Figure 2 – Detail of individual assembled unit

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Figure 3 – Body and lid pieces, metal rails at body interior



Figure 4 – Underside of installed specimen, spacing between units

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TEST RESULTS

Note: There is currently no standardized method for calculating Absorption Coefficients from spaced object absorbers. The sound absorption performance of spaced object absorbers should not be compared directly with specimens tested as a single rectangular area (e.g. mounting types A, E, etc.).

1/3 Octave Center Frequency (Hz)	Total Absorption		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
100	2.81	30.21	0.35	3.78
** 125	2.86	30.73	0.36	3.84
160	2.95	31.79	0.37	3.97
200	3.92	42.25	0.49	5.28
** 250	4.06	43.71	0.51	5.46
315	5.09	54.78	0.64	6.85
400	5.39	58.02	0.67	7.25
** 500	6.54	70.43	0.82	8.80
630	7.13	76.79	0.89	9.60
800	8.03	86.39	1.00	10.80
** 1000	8.87	95.51	1.11	11.94
1250	9.55	102.76	1.19	12.84
1600	10.18	109.61	1.27	13.70
** 2000	10.35	111.44	1.29	13.93
2500	10.42	112.12	1.30	14.02
3150	10.48	112.77	1.31	14.10
** 4000	10.52	113.29	1.32	14.16
5000	10.89	117.27	1.36	14.66

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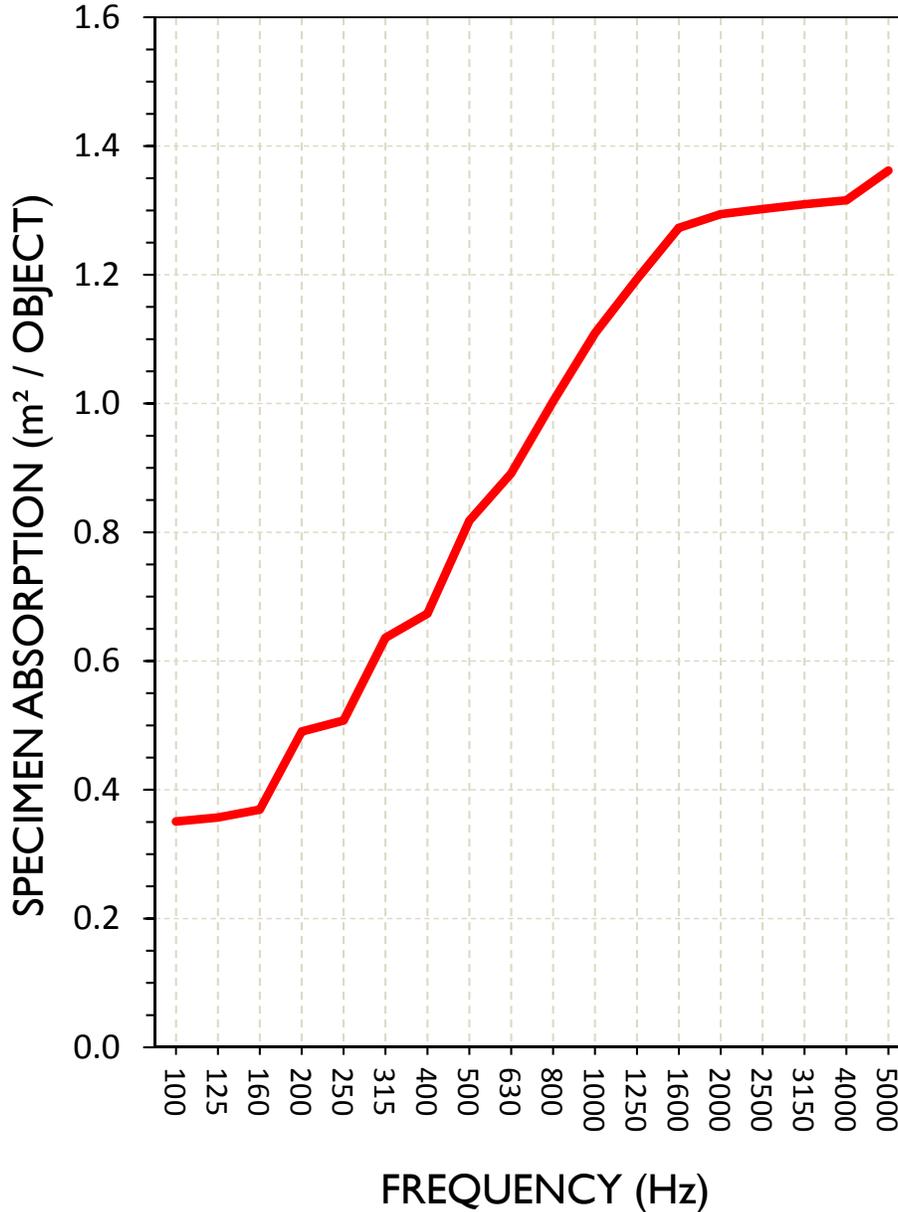
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SOUND ABSORPTION REPORT

Geocloud-Hexagon 12 mm (0.5 in.) with closed back



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APPENDIX A: Extended Frequency Range Data

Specimen: Geocloud-Hexagon 12 mm (0.5 in.) with closed back (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		Absorption per Unit	
	(m ²)	(Sabins)	(m ² / Unit)	(Sabins / Unit)
31.5	0.00	0.01	0.00	0.00
40	0.79	8.54	0.10	1.07
50	1.57	16.87	0.20	2.11
63	1.52	16.34	0.19	2.04
80	2.15	23.17	0.27	2.90
100	2.81	30.21	0.35	3.78
125	2.86	30.73	0.36	3.84
160	2.95	31.79	0.37	3.97
200	3.92	42.25	0.49	5.28
250	4.06	43.71	0.51	5.46
315	5.09	54.78	0.64	6.85
400	5.39	58.02	0.67	7.25
500	6.54	70.43	0.82	8.80
630	7.13	76.79	0.89	9.60
800	8.03	86.39	1.00	10.80
1000	8.87	95.51	1.11	11.94
1250	9.55	102.76	1.19	12.84
1600	10.18	109.61	1.27	13.70
2000	10.35	111.44	1.29	13.93
2500	10.42	112.12	1.30	14.02
3150	10.48	112.77	1.31	14.10
4000	10.52	113.29	1.32	14.16
5000	10.89	117.27	1.36	14.66
6300	11.24	121.00	1.41	15.12
8000	11.16	120.15	1.40	15.02
10000	10.91	117.42	1.36	14.68
12500	11.06	119.10	1.38	14.89

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APPENDIX B: Instruments of Traceability

Specimen: Geocloud-Hexagon 12 mm (0.5 in.) with closed back (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	System 2	2018-08-09	2019-08-09
Bruel & Kjaer Mic And Preamp A	Type 4943-B-001	2311428	2018-09-28	2019-09-28
Bruel & Kjaer Pistonphone	Type 4228	2781248	2018-08-06	2019-08-06
EXTECH Hygro 662	SD700	A083662	2018-11-29	2019-11-29

APPENDIX C: Revisions to Original Test Report

Specimen: Geocloud-Hexagon 12 mm (0.5 in.) with closed back (See Full Report)

<u>Date</u>	<u>Revision</u>
2019-06-26	Original report issued

END

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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. Multiple alternate non-standard calculation methods are provided. Riverbank Acoustical Laboratories prefers method 1.

Method 1) Apparent Sound Absorption Coefficient calculated from treated test surface per unit

The absorption per unit yielded by the specimen is divided by the surface treated by a single unit, including intermediate spaces. Each unit in the array and its respective portion of the intermediate spaces treated 0.76 m² (8.23 ft²) of horizontal test surface area. Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This may be the most accurate method for comparing unit 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 unit array performance. Such approximations rely on the assumptions that unit spacing is similar to that of the tested array and that the installation occurs over a perfectly reflective ceiling surface.

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 calculated from test sponsor CAD models ((10.08 m² (108.50 ft²) total surface area). Apparent Noise Reduction Coefficient (NRC) rating and Sound Absorption Average (SAA) figures are calculated from this data based on the methods described in ASTM C423-17. This method shows the actual absorption occurring at the exposed surfaces, but does not provide a fair comparison with materials mounted as a uniform patch (in A-mount or E-mount).

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Appendix D: Data Note: See full test report for details of mounting position, spacing, and configuration, as these parameters greatly affect sound absorption performance.

Specimen Absorption			Method 1	Method 2	
Freq. (Hz)	Sabins	Sabins / Unit	Apparent Abs. Coefficient From Coverage Area Per Unit	Apparent Abs. Coefficient From Total Exposed Surface Area	
31.5	0.01	0.00	0.00	0.00	
40	8.54	1.07	0.13	0.08	
50	16.87	2.11	0.26	0.16	
63	16.34	2.04	0.25	0.15	
80	23.17	2.90	0.35	0.21	
100	30.21	3.78	0.46	0.28	
125	30.73	3.84	0.47	0.28	
160	31.79	3.97	0.48	0.29	
200	42.25	5.28	0.64	0.39	
250	43.71	5.46	0.66	0.40	
315	54.78	6.85	0.83	0.50	
400	58.02	7.25	0.88	0.53	
500	70.43	8.80	1.07	0.65	
630	76.79	9.60	1.17	0.71	
800	86.39	10.80	1.31	0.80	
1,000	95.51	11.94	1.45	0.88	
1,250	102.76	12.84	1.56	0.95	
1,600	109.61	13.70	1.66	1.01	
2,000	111.44	13.93	1.69	1.03	
2,500	112.12	14.02	1.70	1.03	
3,150	112.77	14.10	1.71	1.04	
4,000	113.29	14.16	1.72	1.04	
5,000	117.27	14.66	1.78	1.08	
6,300	121.00	15.12	1.84	1.12	
8,000	120.15	15.02	1.82	1.11	
10,000	117.42	14.68	1.78	1.08	
12,500	119.10	14.89	1.81	1.10	
			Apparent NRC:	1.20	0.75
			Apparent SAA:	1.22	0.74

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