

Test Report

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

Sound Absorption
RAL™-A19-264

CONDUCTED: 2019-06-19

Page 1 of 10

ON: Geocloud Hexagon 12 mm (0.5 in.) with open 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 open 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: 50.8 mm (2 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
Dimensions: Hexagons, 8 @ 901.7 mm (35.5 in.) short diagonal
Thickness: Overall @ 50.8 mm (2 in.)
Wall thickness @ 12 mm (0.472 in.)
Overall Weight: 14.17 kg (31.25 lbs)

Test Report

ezoBord
2019-06-19

RAL™-A19-264
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: 0.05 m (2.0 in)
Weight: 1.77 kg (3.91 lbs)

Test Environment

Room Volume: 291.98 m³
Temperature: 21.5 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity: 64.1 % ± 2.4 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure: 97.8 kPa (Requirement not defined)

From sponsor-provided calculations, the array of units had an exposed surface area of 10.61 m² (114.21 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.

Test Report

ezoBord
2019-06-19

RAL™-A19-264
Page 3 of 10



Figure 1 – Specimen mounted in test chamber

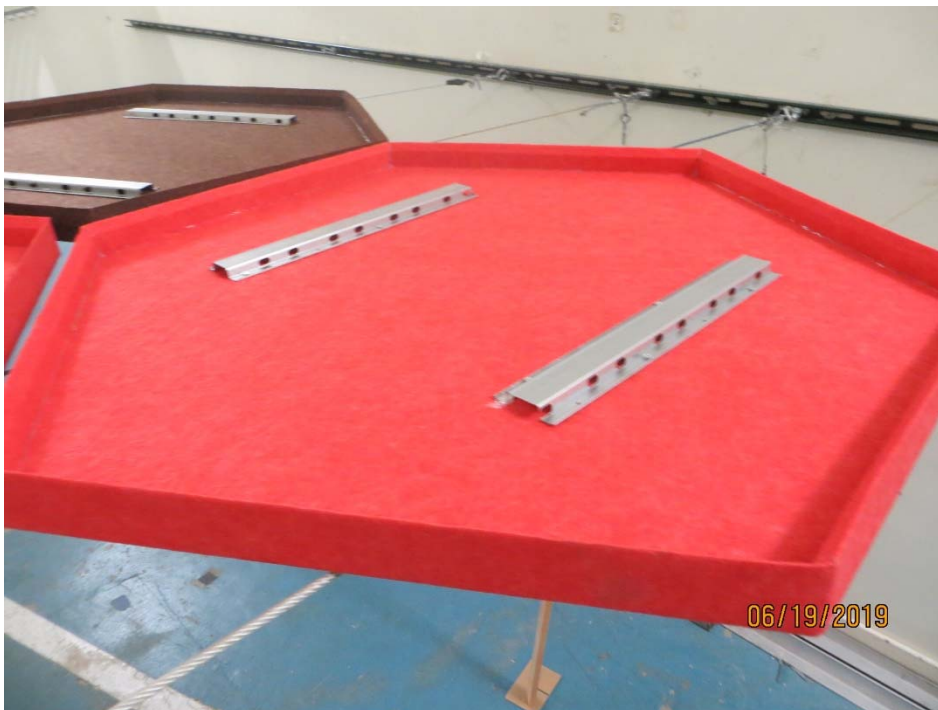


Figure 2 – Detail of individual unit

Test Report

ezoBord
2019-06-19

RAL™-A19-264
Page 4 of 10



Figure 3 – Underside of installed specimen

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

ezoBord
 2019-06-19

RAL™-A19-264
 Page 5 of 10

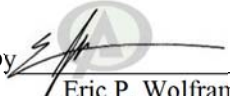
TEST RESULTS

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	2.18	23.42	0.27	2.93
** 125	1.90	20.43	0.24	2.55
160	1.95	21.01	0.24	2.63
200	2.88	30.99	0.36	3.87
** 250	2.78	29.87	0.35	3.73
315	3.56	38.37	0.45	4.80
400	3.71	39.94	0.46	4.99
** 500	4.21	45.32	0.53	5.67
630	4.59	49.38	0.57	6.17
800	5.19	55.90	0.65	6.99
** 1000	5.68	61.13	0.71	7.64
1250	6.28	67.57	0.78	8.45
1600	6.78	72.97	0.85	9.12
** 2000	7.22	77.71	0.90	9.71
2500	7.62	82.02	0.95	10.25
3150	7.80	83.93	0.97	10.49
** 4000	8.30	89.35	1.04	11.17
5000	8.25	88.76	1.03	11.10

Tested by 
 Marc Sciaky
 Senior Experimentalist

Report by 
 Malcolm Kelly
 Test Engineer, Acoustician

Approved by 
 Eric P. Wolfram
 Laboratory Manager



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2005 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT. THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

Test Report

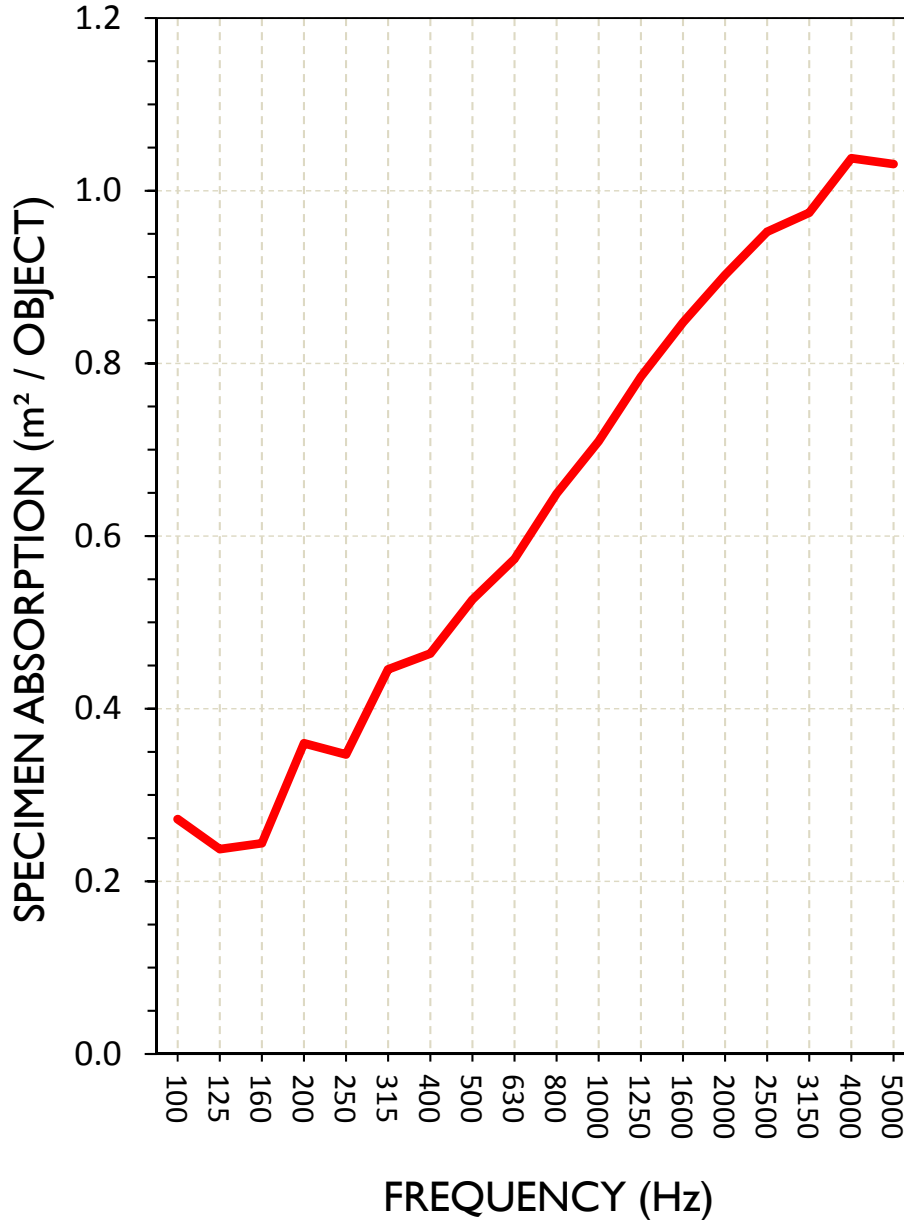
ezoBord
2019-06-19

RAL™-A19-264

Page 6 of 10

SOUND ABSORPTION REPORT

Geocloud Hexagon 12 mm (0.5 in.) with open back



Test Report

ezoBord
2019-06-19

RAL™-A19-264
Page 7 of 10

APPENDIX A: Extended Frequency Range Data

Specimen: Geocloud Hexagon 12 mm (0.5 in.) with open 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	0.22	2.41	0.03	0.30
40	0.16	1.70	0.02	0.21
50	0.74	8.00	0.09	1.00
63	1.32	14.17	0.16	1.77
80	2.34	25.15	0.29	3.14
100	2.18	23.42	0.27	2.93
125	1.90	20.43	0.24	2.55
160	1.95	21.01	0.24	2.63
200	2.88	30.99	0.36	3.87
250	2.78	29.87	0.35	3.73
315	3.56	38.37	0.45	4.80
400	3.71	39.94	0.46	4.99
500	4.21	45.32	0.53	5.67
630	4.59	49.38	0.57	6.17
800	5.19	55.90	0.65	6.99
1000	5.68	61.13	0.71	7.64
1250	6.28	67.57	0.78	8.45
1600	6.78	72.97	0.85	9.12
2000	7.22	77.71	0.90	9.71
2500	7.62	82.02	0.95	10.25
3150	7.80	83.93	0.97	10.49
4000	8.30	89.35	1.04	11.17
5000	8.25	88.76	1.03	11.10
6300	8.77	94.42	1.10	11.80
8000	9.20	99.00	1.15	12.37
10000	9.41	101.27	1.18	12.66
12500	9.77	105.16	1.22	13.14

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

ezoBord
2019-06-19

RAL™-A19-264
Page 8 of 10

APPENDIX B: Instruments of Traceability

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

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

END

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

Report Referenced: **RAL™-A19-264**
Page 1 of 2

CONDUCTED: 2019-06-19

ON: Geocloud-Hexagon 12 mm (0.5 in.) with open back (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. Multiple alternate non-standard calculation methods are provided. Riverbank Acoustical Laboratories prefers method 1.

Method 1) Apparent Sound Absorption Coefficient calculated from total test surface area covered

The 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 (10.61 m² (114.21 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).

SPONSOR: **ezoBord**
CONDUCTED: 2019-06-19

Report Referenced: **RAL™-A19-264**

Page 2 of 2

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 Total Coverage Area	Apparent Abs. Coefficient From Total Exposed Surface Area
31.5	2.41	0.30	0.04	0.02
40	1.70	0.21	0.03	0.01
50	8.00	1.00	0.12	0.07
63	14.17	1.77	0.22	0.12
80	25.15	3.14	0.38	0.22
100	23.42	2.93	0.36	0.21
125	20.43	2.55	0.31	0.18
160	21.01	2.63	0.32	0.18
200	30.99	3.87	0.47	0.27
250	29.87	3.73	0.45	0.26
315	38.37	4.80	0.58	0.34
400	39.94	4.99	0.61	0.35
500	45.32	5.67	0.69	0.40
630	49.38	6.17	0.75	0.43
800	55.90	6.99	0.85	0.49
1,000	61.13	7.64	0.93	0.54
1,250	67.57	8.45	1.03	0.59
1,600	72.97	9.12	1.11	0.64
2,000	77.71	9.71	1.18	0.68
2,500	82.02	10.25	1.25	0.72
3,150	83.93	10.49	1.27	0.73
4,000	89.35	11.17	1.36	0.78
5,000	88.76	11.10	1.35	0.78
6,300	94.42	11.80	1.43	0.83
8,000	99.00	12.37	1.50	0.87
10,000	101.27	12.66	1.54	0.89
12,500	105.16	13.14	1.60	0.92
Apparent NRC:			0.80	0.45
Apparent SAA:			0.82	0.48

Prepared by 
Malcolm Kelly
Test Engineer, Acoustician