

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

FOR: **Turf Design**
Elgin, IL

Sound Absorption
RAL™-A18-442

CONDUCTED: 2018-12-10

Page 1 of 7

ON: 18 millimeter felt tiles, carved pattern

TEST METHOD

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.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as 18 millimeter felt tiles, carved pattern. A full external visual inspection performed on the test specimen by Riverbank personnel verified the manufacturer's description.

Test Specimen

Materials: Polyethylene terephthalate felt, paper backer
Dimensions: 16 @ 596.9 mm (23.5 in.) x 596.9 mm (23.5 in.)
4 @ 596.9 mm (23.5 in.) x 301.62 mm (11.875 in.)
Key Geometry: Thickness profile varies in carved triangular ridges
Peaks spaced 36.5 mm (1.437 in.) apart
Thickness: Overall maximum @ 18 mm (0.709 in.)
Overall minimum @ 5.5 mm (0.217 in.)
Paper backer @ 0.18 mm (0.007 in.)
Overall Weight: 16.22 kg (35.75 lbs)
Installation: Carved pattern exposed to sound field
Pattern oriented parallel between tiles

Physical Measures

Size: 2.39 m (94.0 in) wide by 2.69 m (105.75 in) long
Thickness: 0.02 m (0.717 in)
Weight: 16.22 kg (35.75 lbs)
Mass per Unit Area: 2.53 kg/m² (0.52 lbs/ft²)
Calculation Area: 6.413 m² (69.03 ft²)

Test Environment

Room Volume: 291.98 m³
Temperature: 20.1 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)
Relative Humidity: 61.75 % ± 0.3 % (Requirement: ≥ 40 % and ≤ 5 % change)
Barometric Pressure: 99.7 kPa (Requirement not defined)



NVLAP LAB CODE 100227-0

® 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.

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

Turf Design
2018-12-10

RAL™-A18-442

Page 2 of 7



Figure 1 – Specimen mounted in test chamber

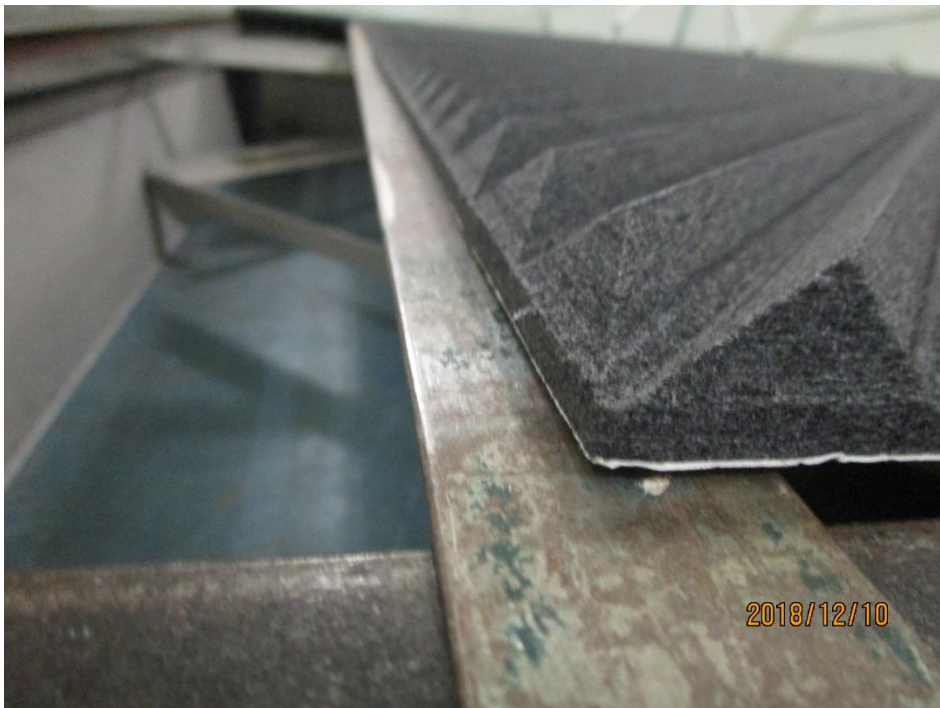


Figure 2 – Detail of varying thickness profile

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

Turf Design
2018-12-10

RAL™-A18-442

Page 3 of 7

MOUNTING METHOD

Type E-400 Mounting: The test specimen was mounted with an airspace behind it. The numerical suffix in the mounting designation is the distance in millimeters between the exposed surface of the test specimen and the horizontal test surface, rounded to the nearest integer multiple of 5. For the purposes of this report, the designation uses the point of maximum specimen thickness for reference. Perimeter edges were sealed with metal framing.

TEST RESULTS

1/3 Octave Center

Frequency (Hz)	Total Absorption (m ²)	Total Absorption (Sabins)	Absorption Coefficient
100	4.14	44.61	0.65
** 125	2.58	27.78	0.40
160	2.06	22.16	0.32
200	1.98	21.29	0.31
** 250	1.83	19.68	0.29
315	1.52	16.41	0.24
400	1.38	14.82	0.21
** 500	2.03	21.85	0.32
630	2.43	26.21	0.38
800	3.45	37.10	0.54
** 1000	4.19	45.09	0.65
1250	4.85	52.25	0.76
1600	5.58	60.06	0.87
** 2000	6.33	68.10	0.99
2500	6.91	74.39	1.08
3150	7.08	76.25	1.10
** 4000	7.25	78.05	1.13
5000	7.07	76.10	1.10

SAA = 0.55

NRC = 0.55

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

Turf Design
2018-12-10

RAL™-A18-442
Page 4 of 7

TEST RESULTS (Continued)


The sound absorption average (SAA) is defined in ASTM C423-17 Section 3.1.1 as the average, rounded to the nearest integer multiple of 0.01, of the sound absorption coefficients of a material for the twelve one-third octave bands from 200 Hz through 2500 Hz, inclusive.

The noise reduction coefficient (NRC) is defined from previous versions of ASTM C423 as the average of the sound absorption coefficients at 250 Hz, 500 Hz, 1000 Hz, and 2000 Hz, expressed to the nearest integer multiple of 0.05.

Tested by


Dean Victor
Senior Experimentalist

Report by


Malcolm Kelly
Acoustician

Approved by


Eric P. Wolfram
Laboratory Manager

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

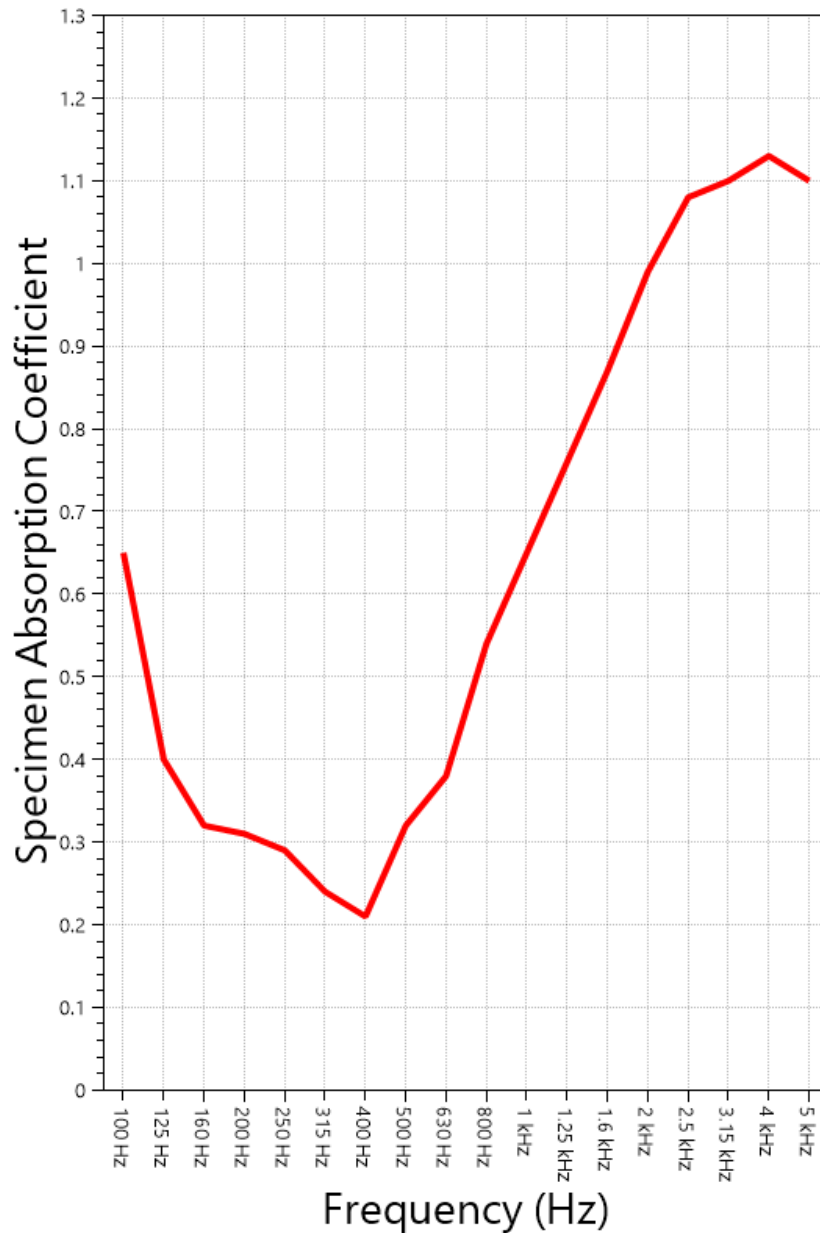
Turf Design
2018-12-10

RAL™-A18-442

Page 5 of 7

SOUND ABSORPTION REPORT

18 millimeter felt tiles, carved pattern



SAA = 0.55

NRC = 0.55

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

An  ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

Test Report

FOUNDED 1918 BY
WALLACE CLEMENT SABINE

Turf Design
2018-12-10

RAL™-A18-442

Page 6 of 7

APPENDIX A: Extended Frequency Range Data

Specimen: 18 millimeter felt tiles, carved pattern (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 (Sabins)	Absorption Coefficient
31.5	15.73	0.23
40	5.08	0.07
50	11.91	0.17
63	34.23	0.50
80	31.49	0.46
100	44.61	0.65
125	27.78	0.40
160	22.16	0.32
200	21.29	0.31
250	19.68	0.29
315	16.41	0.24
400	14.82	0.21
500	21.85	0.32
630	26.21	0.38
800	37.10	0.54
1000	45.09	0.65
1250	52.25	0.76
1600	60.06	0.87
2000	68.10	0.99
2500	74.39	1.08
3150	76.25	1.10
4000	78.05	1.13
5000	76.10	1.10
6300	76.49	1.11
8000	77.80	1.13
10000	77.96	1.13
12500	75.97	1.10



NVLAP LAB CODE 100227-0

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.

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

Turf Design
2018-12-10

RAL™-A18-442

Page 7 of 7

APPENDIX B: Instruments of Traceability

Specimen: 18 millimeter felt tiles, carved pattern (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 1	Type 3160-A-4/2	3160- 106968	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
Omega Digital Temp., Humid. And Pressure Recorder	OM-CP- PRHTemp2000	P97844	2018-02-03	2019-02-03

END