

## Test Report

SPONSOR: **Turf Design**  
Elgin, IL

CONDUCTED: 2019-02-14

ON: Swell - Open

Sound Absorption  
**RAL™-A19-050**

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### 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 Swell - Open. 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: Swell – Open  
Manufacturer: Turf Design

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

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

#### Test Specimen

Material: Polyethylene terephthalate felt  
Dimensions: 16 tiles @ 609.6 mm (24 in.) x 609.6 mm (24 in.)  
Key Geometry: Sixteen (16) felt fins per tile, each 9 mm (0.354 in.) thick  
Fins spaced approximately 30 mm (1.181 in.) on center  
Spacing held by two (2) felt rails connected perpendicular to fins  
Depth Profile: Sinusoidal, minimum and maximum at endpoints of outermost fins  
Range of depth varies sinusoidally from fin to fin  
Maximum depth @ 164 mm (6.457 in.)  
Minimum depth @ 71 mm (2.795 in.)  
Overall Weight: 33.57 kg (74 lbs)  
Installation: Tiles oriented such that corners of maximum and minimum depth align

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### Overall Specimen Properties

Size: 2.44 m (96.0 in) wide by 2.44 m (96.0 in) long  
Thickness: 0.17 m (6.75 in)  
Weight: 33.57 kg (74.0 lbs)  
Mass per Unit Area: 5.65 kg/m<sup>2</sup> (1.16 lbs/ft<sup>2</sup>)  
Calculation Area: 5.946 m<sup>2</sup> (64 ft<sup>2</sup>)

### Test Environment

Room Volume: 291.98 m<sup>3</sup>  
Temperature: 21.4 °C ± 0.1 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)  
Relative Humidity: 66.0 % ± 0.4 % (Requirement: ≥ 40 % and ≤ 5 % change)  
Barometric Pressure: 97.6 kPa (Requirement not defined)

### MOUNTING METHOD

Type E-400 Mounting: The test specimen was mounted with an airspace behind it. The numeral suffix in the designation is the distance in millimeters from the exposed face of the test specimen to the test surface, rounded to the nearest integer multiple of 5. For the purposes of this report, the mounting designation uses the top face of the felt rails for reference. Perimeter edges up to this reference point were sealed with metal framing.

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Figure 1 – Specimen mounted in test chamber

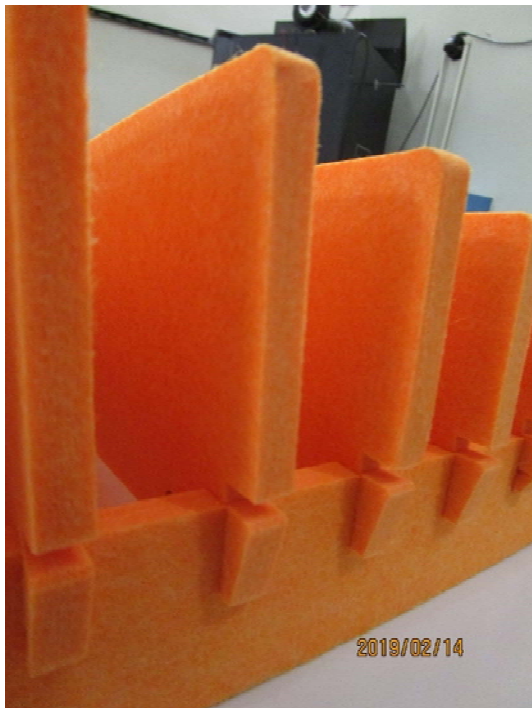


Figure 2 – Detail of specimen material, attachment of fins to rails

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Figure 3 – Individual tile, fin to fin endpoint depth profile



Figure 4 – Individual tile, individual fin depth profile



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### TEST RESULTS

Specimen total absorption and absorption coefficient are tabulated at the eighteen standard frequencies. A graphic presentation of the data and additional information appear on the following pages.

1/3 Octave Center

Frequency (Hz)	Total Absorption (m <sup>2</sup> )	Total Absorption (Sabins)	Absorption Coefficient
100	2.22	23.85	0.37
** 125	2.36	25.39	0.40
160	1.56	16.78	0.26
200	1.48	15.89	0.25
** 250	1.67	17.96	0.28
315	1.91	20.59	0.32
400	2.32	24.97	0.39
** 500	3.34	35.96	0.56
630	3.99	42.91	0.67
800	4.22	45.44	0.71
** 1000	4.95	53.24	0.83
1250	5.36	57.65	0.90
1600	6.00	64.57	1.01
** 2000	6.36	68.51	1.07
2500	6.97	75.05	1.17
3150	7.20	77.51	1.21
** 4000	7.42	79.90	1.25
5000	7.77	83.67	1.31

**SAA = 0.68**

**NRC = 0.70**

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### TEST RESULTS (continued)

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

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


Tested by

  
Marc Sciaky  
Senior Experimentalist

Report by

  
Malcolm Kelly  
Test Engineer, Acoustician

Approved by

  
Eric P. Wolfram  
Laboratory Manager

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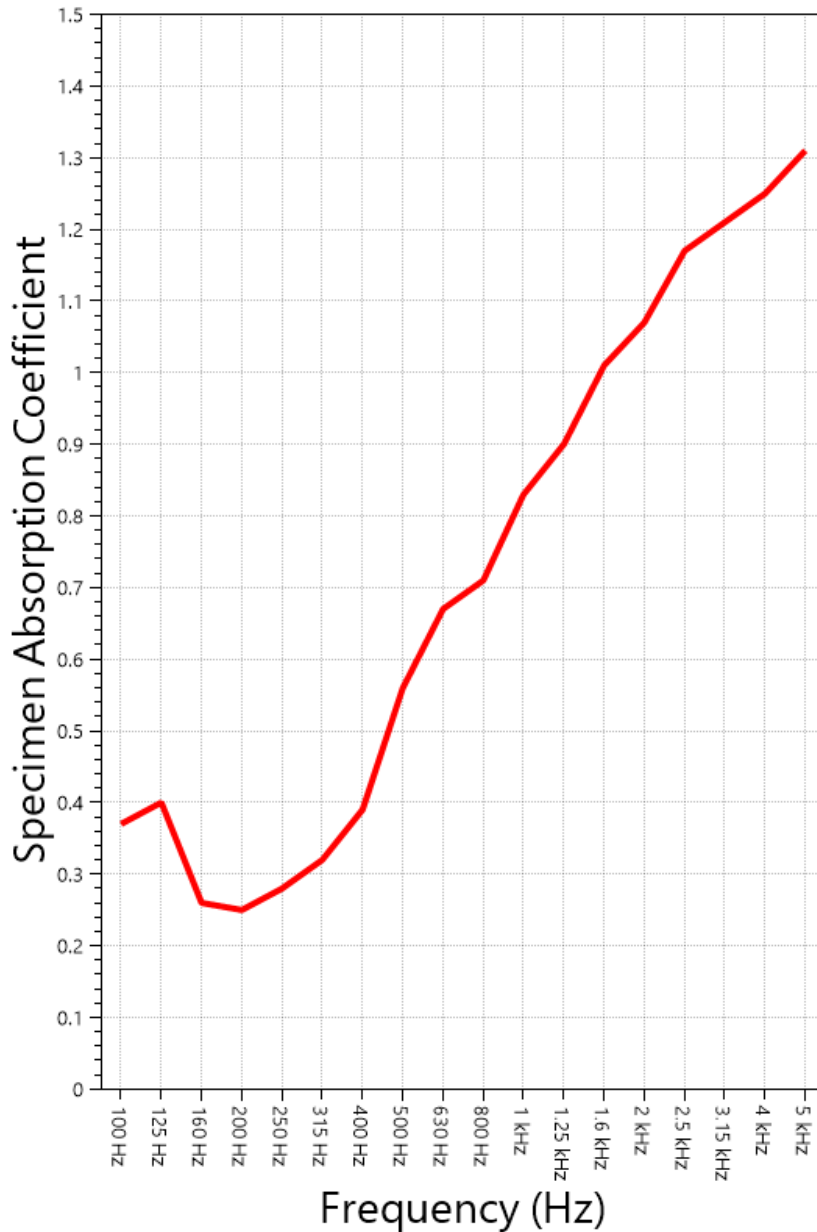
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### SOUND ABSORPTION REPORT

Swell - Open



**SAA = 0.68**

**NRC = 0.70**

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### **APPENDIX A: Extended Frequency Range Data**

Specimen: Swell - Open (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	32.53	0.51
40	-4.01	-0.06
50	15.57	0.24
63	9.29	0.15
80	7.64	0.12
100	23.85	0.37
125	25.39	0.40
160	16.78	0.26
200	15.89	0.25
250	17.96	0.28
315	20.59	0.32
400	24.97	0.39
500	35.96	0.56
630	42.91	0.67
800	45.44	0.71
1000	53.24	0.83
1250	57.65	0.90
1600	64.57	1.01
2000	68.51	1.07
2500	75.05	1.17
3150	77.51	1.21
4000	79.90	1.25
5000	83.67	1.31
6300	84.00	1.31
8000	87.33	1.36
10000	88.53	1.38
12500	92.56	1.45



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### **APPENDIX B: Instruments of Traceability**

Specimen: Swell - Open (See Full Report)

<b><u>Description</u></b>	<b><u>Model</u></b>	<b><u>Serial Number</u></b>	<b><u>Date of Certification</u></b>	<b><u>Calibration Due</u></b>
System 1	Type 3160-A-042	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
EXTECH Hygro 662	SD700	A083662	2018-11-29	2019-11-29

### **APPENDIX C: Revisions to Original Test Report**

Specimen: Swell - Open (See Full Report)

<b><u>Date</u></b>	<b><u>Revision</u></b>
2019-02-18	Original report issued

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END