

## Test Report

SPONSOR: **Turf Design**  
Elgin, IL

**Sound Absorption**  
**RAL™-A19-049**

CONDUCTED: 2019-02-12

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ON: Assorted Switchblade tiles over fissured ceiling tiles - deep weighting

### 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 Assorted Switchblade tiles over fissured ceiling tiles - deep weighting. 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: Switchblade  
Material ID: AF, BF, XF1, XF2, C1, C2  
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 (in order of installation)

##### **Layer 1**

Materials: Fissured ceiling tile, wet-formed mineral fiber substrate  
Dimensions: 8 @ 1212.85 mm (47.75 in.) x 603.25 mm (23.75 in.)  
2 @ 1212.85 mm (47.75 in.) x 330.2 mm (13 in.)  
Thickness: 14.27 mm (0.562 in.)  
Overall Weight: 20.18 kg (44.5 lbs)

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### Test Specimen (continued)

#### **Layer 2**

Material: Polyethylene terephthalate felt  
Dimensions: 28 @ 598 mm (23.543 in.) long x 27 mm (1.063 in.) thick  
3 @ 295.27 mm (11.625 in.) long x 27 mm (1.063 in.) thick  
Key Geometry: Center felt piece @ 9 mm (0.354 in.) thick @ 50 mm (1.969 in.) deep  
9 mm (0.354 in.) thick felt pieces adhered to both sides of center piece

#### **Type AF**

Quantity: 17  
Depth Profile: Sinusoidal, maximum and minimum at opposite endpoints  
Maximum depth @ 238.12 mm (9.375 in.)  
Minimum depth @ 63.5 mm (2.5 in.)

#### **Type BF**

Quantity: 6 full length, 1 cut to accommodate mounting dimensions  
Depth Profile: Sinusoidal, maximum and minimum at opposite endpoints  
Maximum depth @ 152.4 mm (6 in.)  
Minimum depth @ 63.5 mm (2.5 in.)

#### **Type XF1**

Quantity: 1 full length, 1 cut to accommodate mounting dimensions  
Depth Profile: Sinusoidal, maxima at endpoints, minimum at midpoint  
Maximum depth @ 152.4 mm (6 in.)  
Minimum depth @ 69.85 mm (2.75 in.)

#### **Type XF2**

Quantity: 2 full length, 1 cut to accommodate mounting dimensions  
Depth Profile: Sinusoidal, minima at endpoints, maximum at midpoint  
Maximum depth @ 146.05 mm (5.75 in.)  
Minimum depth @ 63.5 mm (2.5 in.)

#### **Type C1**

Quantity: 1  
Depth Profile: Flat  
Depth @ 238.12 mm (9.375 in.)

#### **Type C2**

Quantity: 1  
Depth Profile: Flat  
Depth @ 152.4 mm (6 in.)

Installation: Mounted vertically in square grid pattern over Layer 1  
Tiles oriented such that depth is equal at all mating edges  
See specimen configuration diagram on following page  
Overall Weight: 10.89 kg (24 lbs)

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Specimen Layer 2 Configuration

TEST CHAMBER SOUTH WALL			
	AF	AF	AF
XF2	AF	AF	AF
	AF	AF	AF
C1	AF	AF	AF
	AF	BF	AF
AF	BF	BF	AF
	BF	XF1	XF2
BF	C2	BF	AF
	BF (short)	XF1 (short)	XF2 (short)

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### Overall Specimen Properties

Size: 2.74 m (108.0 in) wide by 2.43 m (95.5 in) long  
Thickness: 0.25 m (9.84 in)  
Weight: 31.07 kg (68.5 lbs)  
Mass per Unit Area: 4.67 kg/m<sup>2</sup> (0.96 lbs/ft<sup>2</sup>)  
Calculation Area: 6.658 m<sup>2</sup> (71.63 ft<sup>2</sup>)

### Test Environment

Room Volume: 291.98 m<sup>3</sup>  
Temperature: 21.3 °C ± 0.0 °C (Requirement: ≥ 10 °C and ≤ 5 °C change)  
Relative Humidity: 65.45 % ± 0.5 % (Requirement: ≥ 40 % and ≤ 5 % change)  
Barometric Pressure: 97.3 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 Layer 1 for reference. Perimeter edges of Layer 1 were sealed with metal framing.

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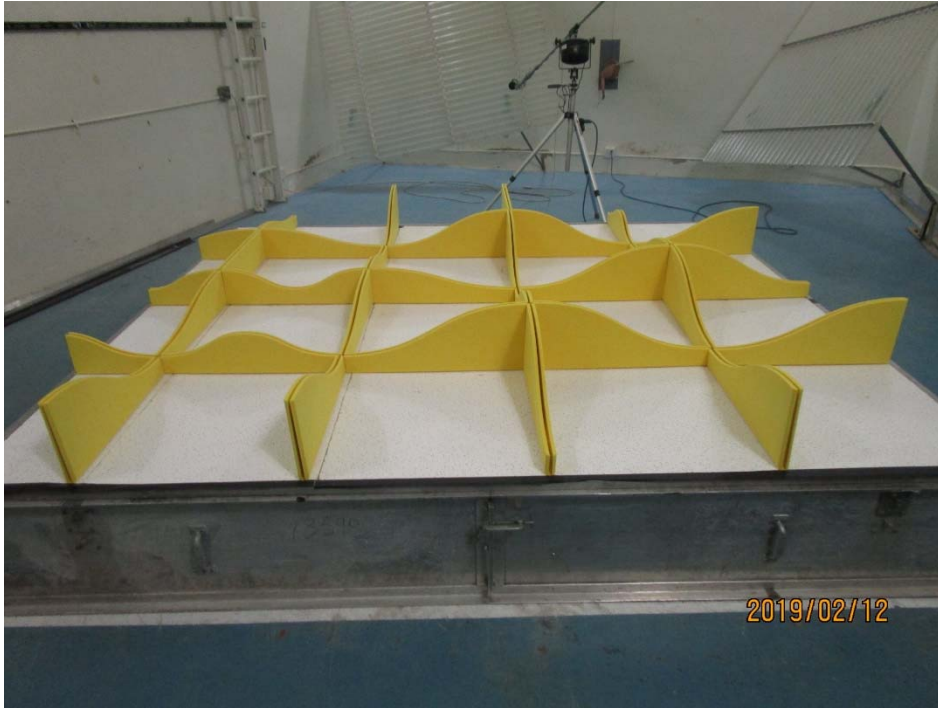


Figure 1 – Test specimen as viewed from West wall of test chamber

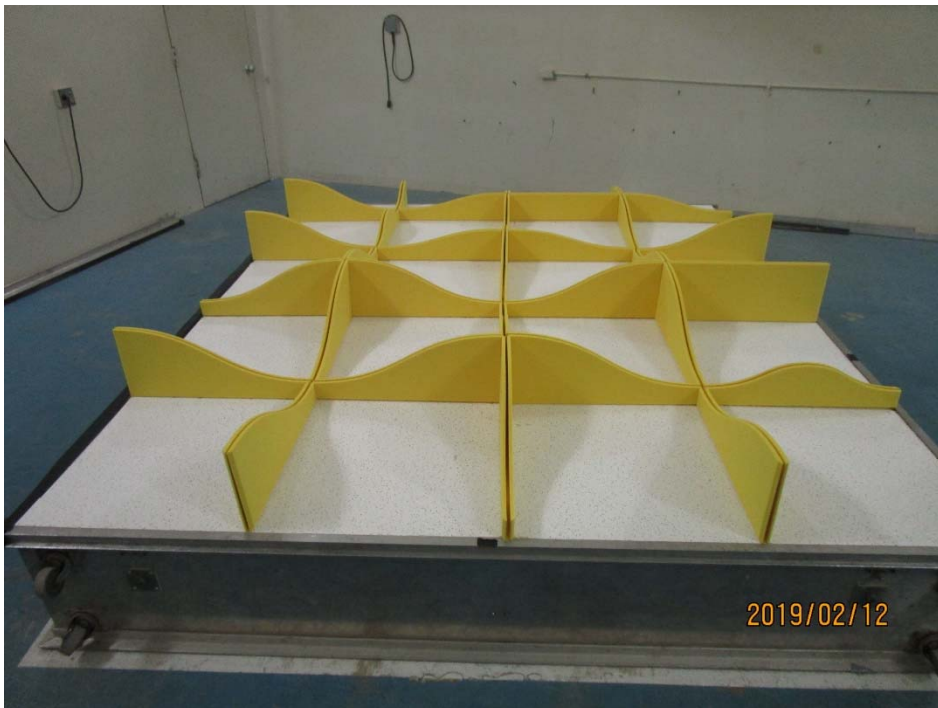


Figure 2 – Test specimen as viewed from South wall of test chamber



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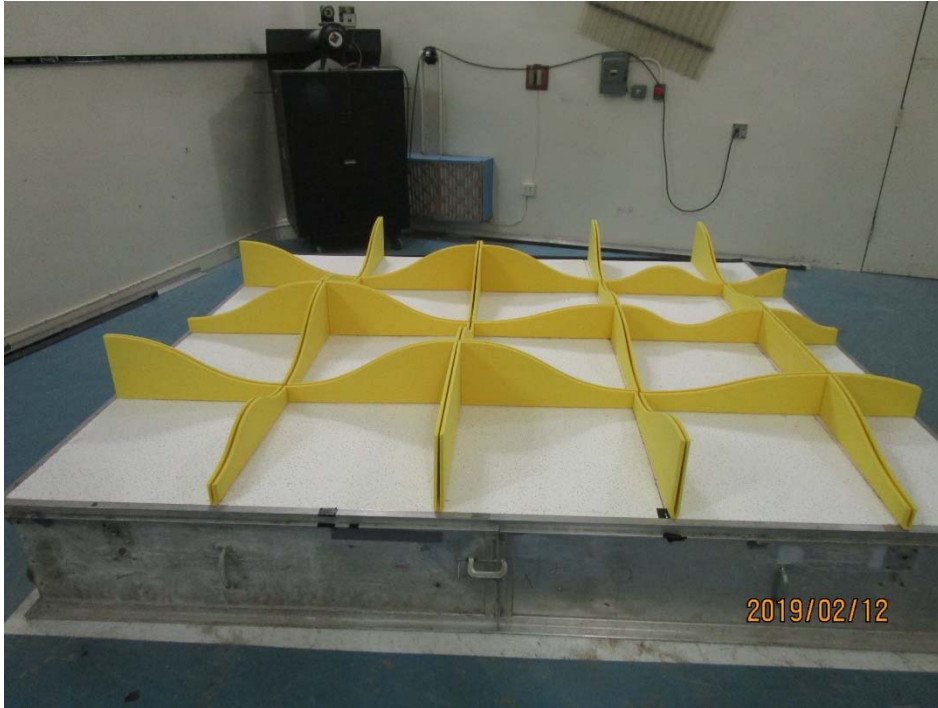


Figure 3 – Test specimen as viewed from East wall of test chamber

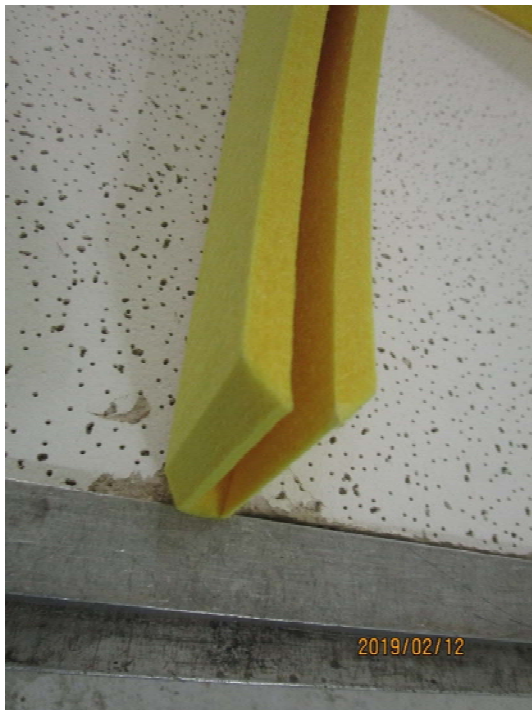


Figure 4 – Detail of specimen materials

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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	4.48	48.20	0.67
** 125	3.70	39.86	0.56
160	3.64	39.17	0.55
200	3.55	38.26	0.53
** 250	4.04	43.52	0.61
315	4.38	47.10	0.66
400	4.75	51.12	0.71
** 500	5.36	57.69	0.80
630	5.56	59.84	0.83
800	6.00	64.58	0.90
** 1000	6.41	68.98	0.96
1250	6.56	70.61	0.99
1600	6.71	72.22	1.01
** 2000	6.69	72.00	1.00
2500	6.70	72.11	1.01
3150	6.65	71.61	1.00
** 4000	6.44	69.37	0.97
5000	6.48	69.75	0.97

**SAA = 0.83**

**NRC = 0.85**

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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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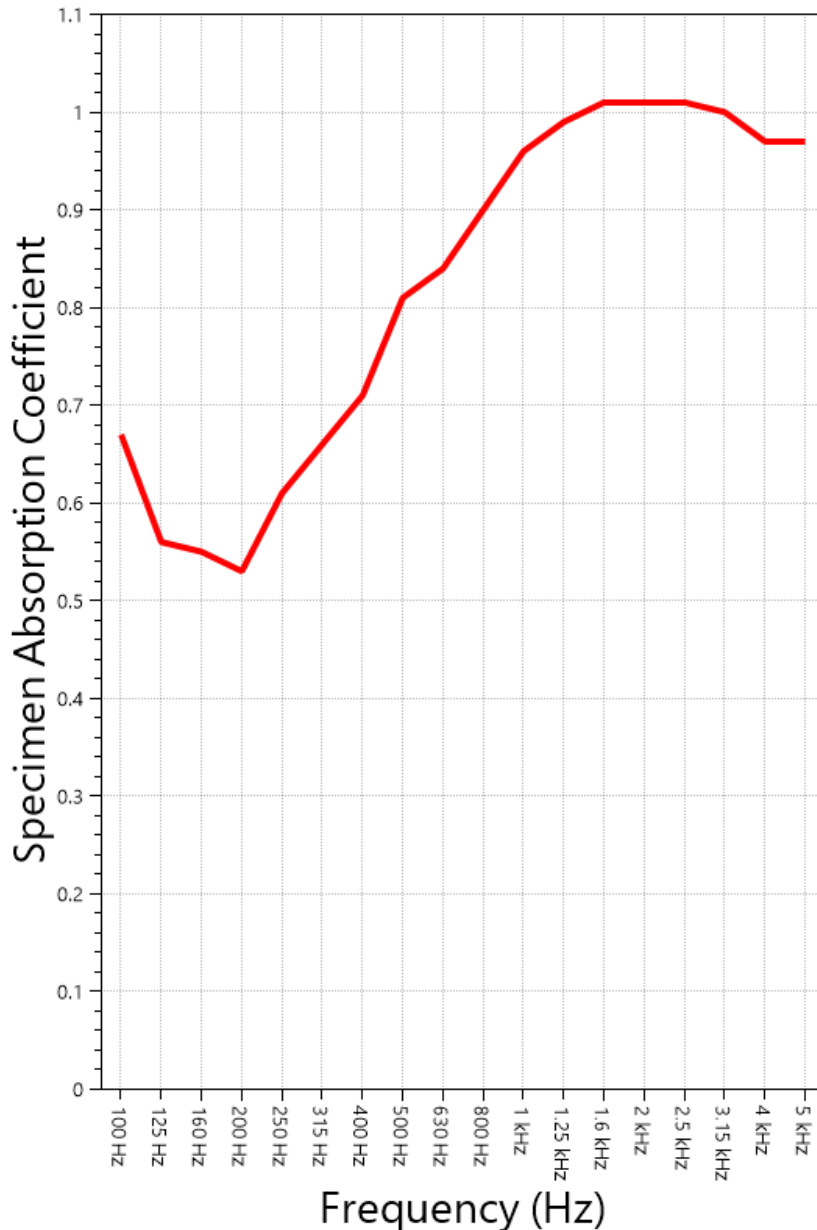
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### SOUND ABSORPTION REPORT

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**SAA = 0.83**

**NRC = 0.85**

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

Specimen: Assorted Switchblade tiles over fissured ceiling tiles - deep weighting (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	61.23	0.85
40	33.89	0.47
50	39.07	0.55
63	25.80	0.36
80	52.12	0.73
100	48.20	0.67
125	39.86	0.56
160	39.17	0.55
200	38.26	0.53
250	43.52	0.61
315	47.10	0.66
400	51.12	0.71
500	57.69	0.80
630	59.84	0.83
800	64.58	0.90
1000	68.98	0.96
1250	70.61	0.99
1600	72.22	1.01
2000	72.00	1.00
2500	72.11	1.01
3150	71.61	1.00
4000	69.37	0.97
5000	69.75	0.97
6300	68.86	0.96
8000	64.53	0.90
10000	59.33	0.83
12500	63.75	0.89

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

Specimen: Assorted Switchblade tiles over fissured ceiling tiles - deep weighting (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: Assorted Switchblade tiles over fissured ceiling tiles - deep weighting (See Full Report)

<b><u>Date</u></b>	<b><u>Revision</u></b>
2019-02-13	Original report issued

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END