

**Client:** Milliken (Australia) Pty Ltd  
171 Briens Road, Northmead, NSW 2152

**Measurement Type: Sound Absorption**

AS ISO 354 (2006): *Acoustics—Measurement of sound absorption in a reverberation room*  
AS ISO 11654 (2002): *Acoustics—Rating of sound absorption—Materials and systems*

**Test Specimen** [Specimen area: 3.5 x 3.0 m (10.5 m<sup>2</sup>), Test configuration: Type A]

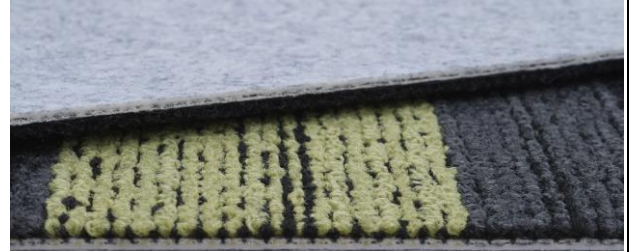
Description: Milliken 'WellBAC Function' carpet tiles

**Carpet Tile Details<sup>3</sup>**

- Product designation: WellBAC Function
- Construction: nylon loop pile carpet on a primary backing, precoated and bonded to a fibreglass layer with hotmelt, on top of a polyester felt backing layer.
- Tile size: 500 x 500 mm, x 5.84 mm thick (average thickness, nominal)
- Overall weight: 3.4 kg/m<sup>2</sup> (nom).

**Installation**

- The reverberation chamber was swept and vacuumed to remove debris and dust.
- The carpet tiles (as described above) were laid directly on the concrete floor of the chamber; no adhesives or underlay materials.
- Carpet tiles (7 tiles x 6) were arranged in a rectangular area, 8 degrees off parallel with the walls of the chamber. Tile were carefully arranged and pushed tight against each other.
- A skirt of folded steel angle (1 mm thick, 15 mm high) was arranged around the perimeter of the installed carpet to mask the edges.
- Specimen installation was carried out by laboratory staff.



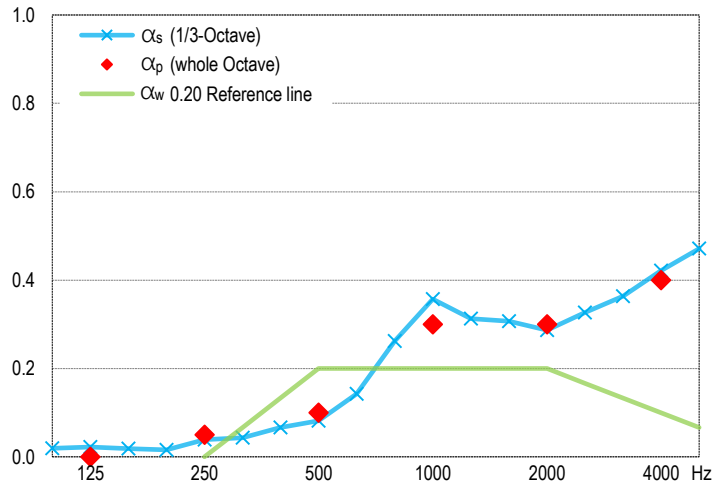
Close up of carpet tiles, showing face, edge and backing.



Test specimen installed in laboratory for test.

**Measurement Details & Results**

Freq Hz	Absorption coefficients			Reverberation times, T <sub>60</sub> (sec)	
	α <sub>s</sub>	α <sub>p</sub>	95% Conf (δ)	Empty room	with Specimen
100	0.02		0.07	6.13	5.91
125	0.02	0.00	0.04	6.66	6.36
160	0.02		0.02	6.72	6.46
200	0.02		0.03	6.24	6.05
250	0.04	0.05	0.03	5.98	5.57
315	0.04		0.02	6.63	6.08
400	0.07		0.02	6.80	5.95
500	0.08	0.10	0.02	6.49	5.56
630	0.14		0.02	6.01	4.73
800	0.26		0.02	5.57	3.80
1000	0.36	0.30	0.03	5.41	3.35
1250	0.31		0.02	4.80	3.25
1600	0.31		0.02	4.19	2.97
2000	0.29	0.30	0.03	3.67	2.75
2500	0.33		0.02	3.28	2.45
3150	0.36		0.03	2.83	2.13
4000	0.42	0.40	0.03	2.32	1.77
5000	0.47		0.06	1.86	1.46



**Performance Indices<sup>1,2</sup>**

α<sub>w</sub> = 0.20 (H)  
SAA = 0.19  
NRC = 0.20

The required 12 spatially independent decay curves came from ensemble averaging 10 successive decays with each of 3 different source loudspeaker positions, all sampled by 4 fixed microphones, using linear averaging.

**Measurement Conditions**

	Empty room	with Test Specimen
Date of measurement:	18 Aug 2019	18 Aug 2019
Temperature & humidity:	14 °C, 60 % R.H.	14 °C, 60 % R.H.
Atmospheric pressure:	993 mBar	993 mBar

**Notes, Deviations etc**

1. Shape indicators (L, M, and H), if any, following the α<sub>w</sub> index, indicate α<sub>p</sub> values above the reference contour by ≥ 0.25 in the Low, Medium or High frequency ranges respectively; it is strongly recommended to use this single number rating in combination with the complete sound absorption coefficient curve.
2. SAA and NRC are defined in ASTM C423; laboratory requirements for which differ from AS ISO 354.

3. Physical characteristics of materials may be as per client or supplier's advice; not necessarily verified by CSIRO.

**Issuing Authority**

Signed:

David Truett

Date:

22 November 2019

**Instrumentation**

- Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
- Microphones/preamps: • 2 x GRAS type 40AP and 2 x B&K type 4134 microphones, all on B&K type 2669 preamps, in 4 fixed positions as per AS ISO 354
- Noise source: • Room populated with three decahedron loudspeakers; 2 Norsonic NOR276 & 1 x B&K 4296), driven in turn by a Norsonic NOR280 power amplifier.
- Calibration: • Analyser: July 2018 (NATA cal)

**Laboratory Construction**

- Reverb room: • 300 mm thick concrete (closed off from the adjoining room by an MDF Wall) • parallelepiped with dimensional proportions 1:1.3:1.6 for distribution of room modes • approx 202 m<sup>3</sup> total room volume • approx 215 m<sup>2</sup> surface area excluding diffusers
- Diffusers: • 20 stationary diffusers, approx 40 m<sup>2</sup> total surface area
- Absorption area: • in accordance with AS ISO 354, unless noted otherwise