CSIRO ACOUSTIC MEASUREMENT REPORT

Commonwealth Scientific and Industrial Research Organisation, Infrastructure Technologies
Acoustics Testing Laboratory, Gate 5, 2 Normanby Road, Clayton, Vic 3168 Australia

Report No:
AC204-01-3

Client: Ontera – 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 (ISO 11654:1997) *"Acoustics–Rating of sound absorption–Materials and systems"*

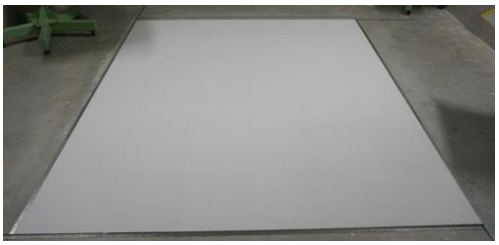
Test Specimen

[Specimen area: 3.5 x 3.0 m (10.5 m^2)]

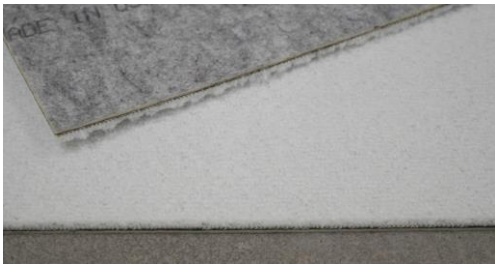
Designation: Milliken 'WellBAC Comfort' carpet tiles

Description:
- Carpet tiles, 500 mm square by approx 8 mm thick.
- Loop pile face (420 g/m^2 face weight) on PU foam with a nonwoven fabric backing layer.
- Overall weight approx. 2.9 kg/m^2.

Installation:
- The floor of the laboratory was swept and vacuumed to remove dust.
- 42 tiles were arranged in a rectangle 3.5 x 3.0 m on the concrete floor of the reverberation room, and pushed together to avoid gaps between adjacent tiles.
- The perimeter edge of the rectangular array of specimen tiles was covered with a skirt of 1 mm thick steel angles.
- Specimen installation was carried out by laboratory staff.



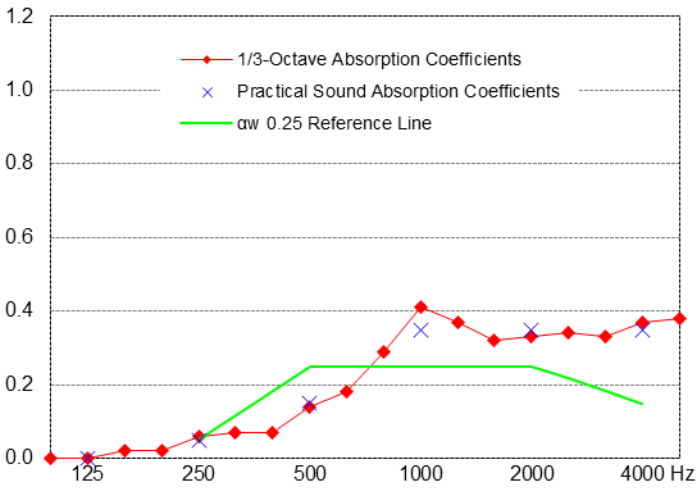
Test specimen as tested



View showing face and backing of carpet tile

Measurement Details & Results

Freq	Absorption coefficient		Reverberation times, T_{60} (sec)	
Hz	α_s	α_p	Empty room	with Specimen
100	0.00		6.50	6.51
125	0.00	0.00	6.84	6.85
160	0.02		7.52	7.20
200	0.02		7.22	6.83
250	0.06	0.05	6.71	5.99
315	0.07		6.71	5.85
400	0.07		6.70	5.80
500	0.14	0.15	6.34	4.98
630	0.18		6.13	4.53
800	0.29		5.76	3.75
1000	0.41	0.35	5.48	3.19
1250	0.37		5.02	3.16
1600	0.32		4.52	3.10
2000	0.33	0.35	4.02	2.84
2500	0.34		3.48	2.54
3150	0.33		2.99	2.28
4000	0.37	0.35	2.47	1.92
5000	0.38		1.90	1.55



Performance Indices[2,3]
α_w = 0.25
SAA = 0.22
NRC = 0.25

Measurement Conditions

	Empty room	with Test Specimen
Date of measurement:	5 Oct 2016	5 Oct 2016
Temperature & humidity:	12 °C, 63 % R.H.	12 °C, 64 % R.H.
Atmospheric pressure:	1001 mBar	1001 mBar

Notes, Deviations etc

1. 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.
2. Shape indicators (L, M, and H), if any, accompanying the α_w index, signify absorption coefficients (α_p) exceeding the α_w reference value by 0.25 or more in the Low, Medium or High frequency ranges respectively.
3. SAA and NRC are defined in ASTM C423; laboratory requirements for which differ from AS ISO 354.
4. Physical characteristics of materials may be as per client or supplier's advice; not necessarily verified by CSIRO.
5. The laboratory elected to install the test specimen parallel with the walls of the room.
6. Laboratory temperature being below 15 °C is a deviation from AS ISO 354.
7. This report describes the same test as the earlier report AC204-01-1, the product now being identified by the trade designation given above.

Issuing Authority

Signed: .....
David Truett

Date: 25 November 2019

Instrumentation

Real time analyser: • Brüel & Kjær PULSE LAN-XI type 3160-A-4/2
Microphones/preamps: • 2 x GRAS 40AP & 2 x Brüel & Kjær 4134 microphones, all on Brüel & Kjær 2669 preamps, positioned in the room as per AS ISO 354
Noise source: • Rola 12UX on flat 1m^2 baffle (up to 1.8 KHz)
• Brüel & Kjær type HP 1000 dodecahedron (from 1.8 KHz)
Calibration: • Brüel & Kjær type 4228 Pistonphone: Feb 2016 (NATA cal)
• Analyser: Feb 2016 (NATA cal)

Laboratory Construction

Reverb room: • 300 mm thick concrete (closed off from the adjoining room by a plasterboard faced composite wall) • parallelepiped with dimensional proportions 1:1.3:1.6 for distribution of room modes • approx 203 m^3 total room volume • approx 215 m^2 surface area excluding diffusers
Diffusers: • 20 stationary diffusers, approx. 40 m^2 total surface area
Absorption area: • in accordance with AS ISO 354 unless noted otherwise

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