

TFI Report 462257-01

Sound Absorption Impact Sound Insulation

Customer

Desso B.V.
Taxandriaweg 15
5142 PA Waalwijk
NETHERLANDS

Product

textile floor covering
AirMaster EcoBase

This report includes 2 pages and 2 annex(es)

Responsible at TFI

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Aachen, 04.01.2017

Dr. Alexander Siebel

- Head of the testing laboratory -

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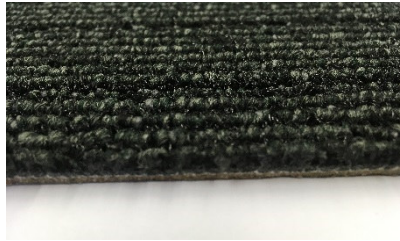
1 Transaction

Test order	sound absorption according to EN ISO 354 sound insulation according to EN ISO 10140
Order date	08.12.2016
Your reference	X. van Kampen
Product designation	AirMaster EcoBase
TFI sample number	16-12-0207

2 Product Specification

Type of manufacture	tufted
Type of surface	loop pile
Backing	heavy backing
Pattern	tonal effect without pattern
Colour	grey, black

View



Thickness [mm]	6.0*
Area density [g/m ²]	4150*
Type of delivery	tiles
	*customer information

3 Results

Sound absorption	$\alpha_w = 0,15$ (H)
Impact sound insulation	$\Delta L_w = 25$ dB

4 Annexes

Sound absorption	SA 462257-01 ^a
Impact sound insulation	TS 462257-01 ^a

The annexes marked ^a are based on tests accredited in accordance with EN ISO/IEC 17025.

Annex SA - Sound Absorption Coefficient

1 Transaction

Product designation	AirMaster EcoBase
TFI sample number	16-12-0207
Testing period	21.12.2016

2 Test Method / Requirements

EN ISO 354:2003	Measurement of sound absorption in a reverberation room
EN ISO 11654:1997	Sound absorbers for use in buildings – Rating of sound absorption
Deviation from the standard	None

3 Remarks

None

4 Measuring Operation

Test noise:	broadband pink noise
Receive filter:	third octave band filter
Measurement:	2 loudspeaker positions 6 microphone positions

5 Laboratories

Test rooms:	laboratory of the TFI Aachen GmbH, Hauptstr. 133, 52477 Alsdorf, Germany
Test method:	reverberation room method
Volume:	211 m ³
Total surface:	213 m ²
Floor plan:	trapezoidal
Reflectors:	6 aluminium plates 1.0 m x 2.0 m 7 plywood boards 1.5 m x 1.3 m 1 aluminium plate 1.8 m x 0.9 m

6 Measuring Devices

Real time analyser:	CESVA INSTRUMENTS, TYPE: SC310, SN: T234359
Microphone:	CESVA INSTRUMENTS, TYPE: C130, SN: 11861
Microphone amplifier:	CESVA INSTRUMENTS, TYPE: PA13, SN: 49649
Calibrator:	CESVA INSTRUMENTS, TYPE: CB006, SN 49649
Loudspeaker:	2 dodecahedrons

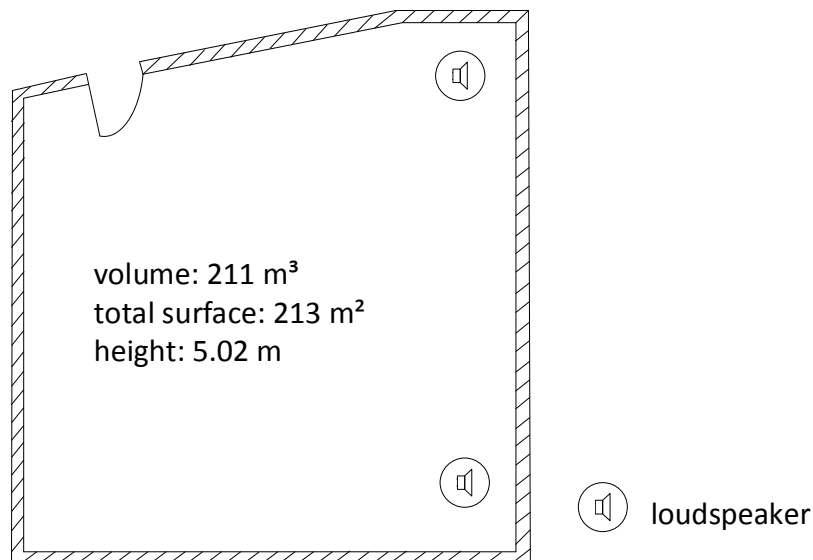
7 Evaluation

The decay curves are determined using the interrupted noise method. Several decay curves measured at one microphone and/or loudspeaker position are averaged in order to reach a sufficient reproducibility. The reverberation time of the room is expressed by the arithmetic mean derived from the total number of all reverberation time measurements in each frequency band.

The equivalent sound absorption area of the test specimen A_T is calculated as the difference between the equivalent sound absorption area of the reverberation room with test specimen A_2 and the equivalent sound absorption area of the empty reverberation room A_1 without test specimen.

The equivalent sound absorption coefficient α_s describes the ratio of the equivalent sound absorption area A_T of a test specimen divided by the area of the test specimen.

The evaluated sound absorption coefficient α_w is a single-number frequency-independent value which equals the value of the reference curve at 500 Hz after shifting it.



Drawing reverberation room

Sound absorption according EN ISO 354

Measurement of sound absorption in a reverberation room

Product name AirMaster EcoBase

TFI sample number 16-12-0207

Construction -
(from top to bottom)

Installation term TYP A

Test area 12.0 m² / 4.00 m x 3.00 m

Installation loose laid on the floor of the reverberation room

Testing period 21.12.2016

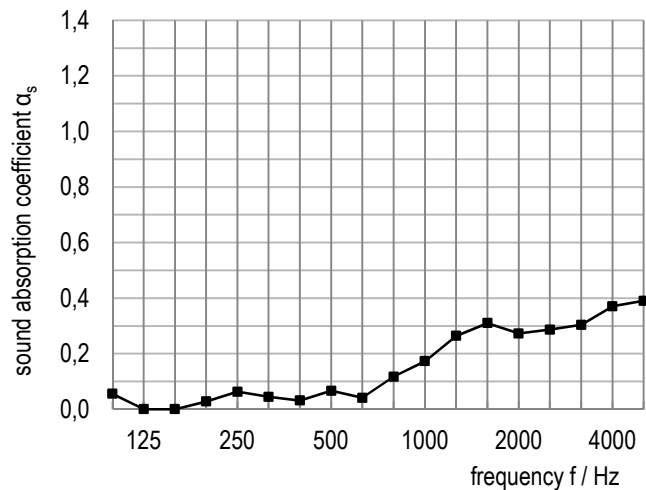
Room Reverberation room

Volume 211 m³

	Θ [°C]	r. h. [%]	B [kPa]
without sample	19,8	33,5	100,8
with sample	19,8	33,5	100,8

Note ---

Frequency [Hz]	T1 [s]	T2 [s]	α_s [-]
100	10,06	8,40	0,06
125	7,62	7,61	0,00
160	6,94	6,93	0,00
200	7,58	7,05	0,03
250	7,29	6,27	0,06
315	6,37	5,79	0,04
400	6,39	5,97	0,03
500	6,30	5,49	0,07
630	6,07	5,58	0,04
800	6,14	4,90	0,12
1000	5,62	4,19	0,17
1250	5,48	3,63	0,26
1600	5,16	3,30	0,31
2000	4,77	3,27	0,27
2500	3,97	2,84	0,29
3150	3,17	2,37	0,30
4000	2,47	1,87	0,37
5000	1,81	1,45	0,39



T1 reverberation time (average) / without sample

T2 reverberation time (average) / with sample

α_s sound absorption according EN ISO 354

Sound absorption for the application in buildings according EN ISO 11654

Valuation of sound absorption

Product name AirMaster EcoBase

TFI sample number 16-12-0207

Construction -
(from top to bottom)

Installation term TYP A

Test area 12.0 m² / 4.00 m x 3.00 m

Installation loose laid on the floor of the reverberation room

Testing period 21.12.2016

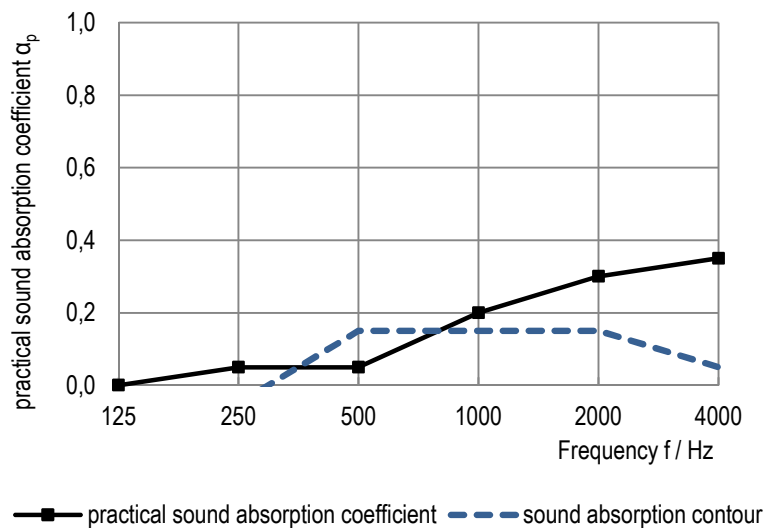
Room Reverberation room

Volume 211 m³

	Θ [°C]	r. h. [%]	B [kPa]
without sample	19,8	33,5	100,8
with sample	19,8	33,5	100,8

Note ---

Frequency [Hz]	α_s [-]	α_p [-]
100	0,06	
125	0,00	0,00
160	0,00	
200	0,03	
250	0,06	0,05
315	0,04	
400	0,03	
500	0,07	0,05
630	0,04	
800	0,12	
1000	0,17	0,20
1250	0,26	
1600	0,31	
2000	0,27	0,30
2500	0,29	
3150	0,30	
4000	0,37	0,35
5000	0,39	



α_s sound absorption according EN ISO 354

α_p practical sound absorption coefficient according EN ISO 11654

Evaluation according EN ISO 11654:

Evaluated sound absorption grade $\alpha_w =$ **0,15** (H)

Sound absorption class: **E**



Annex TS - Impact Sound Insulation

1 Transaction

Product designation	AirMaster EcoBase
TFI sample number	16-12-0207
Testing period	20.12.2016

2 Test Method / Requirements

EN ISO 10140-1:2014	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for certain products
EN ISO 10140-2:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation
EN ISO 10140-3:2015	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound reduction
EN ISO 10140-4:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
EN ISO 10140-5:2014	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
EN ISO 717-1:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation
EN ISO 717-2:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound reduction

3 Remarks

None

4 Measuring Operation

Measurement of the impact sound pressure level:	Using with 3 tapping machine position. (The single results of the one-third-octave-bands were averaged on an energy basis)
Test surface:	~0.5 m ²
Category:	I
Connection with the floor:	loose laid
Damage to the sample:	None

5 Laboratories

Test rooms:	Laboratories of the TFI Aachen GmbH, Hauptstrasse133, 52477 Alsdorf, Germany
Sending room (1.04):	$V = 52.4 \text{ m}^3$ (with diffusers)
Receiving room (0.01):	$4.05 \text{ m} \times 3.95 \text{ m} \times 3.33 \text{ m} + 2.00 \text{ m} \times 0.98 \text{ m} \times 0.18 \text{ m}$; $V = 53.6 \text{ m}^3$ (cuboid room, with diffusers)
Reference floor:	$4.27 \text{ m} \times 4.46 \text{ m}$; $S = 19.04 \text{ m}^2$ 14 cm concrete slab floor with an area-related mass of $m' \sim 322 \text{ kg/m}^2$
Flanking walls:	Lime sand brick walls with light wall facings (facing shell $d = 12 \text{ cm}$) with an average area-related mass of $m' \sim 330 \text{ kg/m}^2$
Weighted normalized impact sound pressure level	$L_{n,0,w} = 74 \text{ dB}$
Weighted normalized impact sound pressure level	$L_{n,w} = 49 \text{ dB}$
Weighted normalized impact sound pressure level	$L_{n,r,w} = 53 \text{ dB}$

6 Measuring Devices

Real time analyser:	CESVA INSTRUMENTS, TYP: SC310, SN: T237102
Microphone:	CESVA INSTRUMENTS, TYP: C130, SN: 13523
Microphone amplifier:	CESVA INSTRUMENTS, TYP: PA13, SN: 4162
Calibrator:	CESVA INSTRUMENTS, TYP: CB006, SN 49649
Tapping machine:	NORSONIC, Type 211, SN: 502 (standard tapping machine with 3 feet and 5 hammers according to ISO 10140)

7 Evaluation

The impact sound pressure level generated by the standard tapping machine is measured in the receiving room under a bare heavy floor with and without a floor covering. The impact sound reduction is determined on the basis of the measured values as follows:

$$\Delta L = L_{n,0} - L_n \text{ (dB)}$$

$L_{n,0}$ Impact sound pressure level without a floor covering (dB)

L_n Impact sound pressure level with a floor covering (dB)

For the evaluation of the weighted reduction in impact sound pressure level ΔL_w , the relevant reference curve is shifted in increments of 1 dB towards the measured curve until the sum of unfavourable deviations is as large as possible, but not more than 32 dB.

The linear impact sound level ΔL_{lin} is determined according to the following equation:

$$\Delta L_{lin} = L_{n,r,0,w} + C_{l,r,0} - (L_{n,r,w} + C_{l,r}) = \Delta L_w + C_{l,\Delta}$$

$L_{n,r,w}$	is the calculated weighted normalized impact sound pressure level of the reference floor with the floor covering under test
$L_{n,r,0,w}$	78 dB, calculated from $L_{n,r,0}$ according to Section 4.3.1 of DIN EN ISO 717-2: 2013
$C_{l,r}$	Spectrum adaptation term for the reference floor with the floor covering to be tested
$C_{l,r,0}$	-11 dB, spectrum adaptation term for the reference floor with $L_{n,r,0}$ determined according to Annex A, Section A.2.1 of DIN EN ISO 717-2:2013

8 Note

The results are based on measurements performed under laboratory conditions with artificial excitation (standard procedure). The test results are applicable in due consideration of the national provisions and the local circumstances and/or constructions.

Impact sound insulation according ISO 10140-1

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight reference floor

Product name AirMaster EcoBase

Testing period 20.12.2016

TFI sample number 16-12-0207

Construction
(from top to bottom) -

Installed by TFI

Receiving room

Volume 53,6 m³

Air temperature 19,2 °C

Relative air humidity 55,5 %

Static pressure 98,7 kPa

Source room

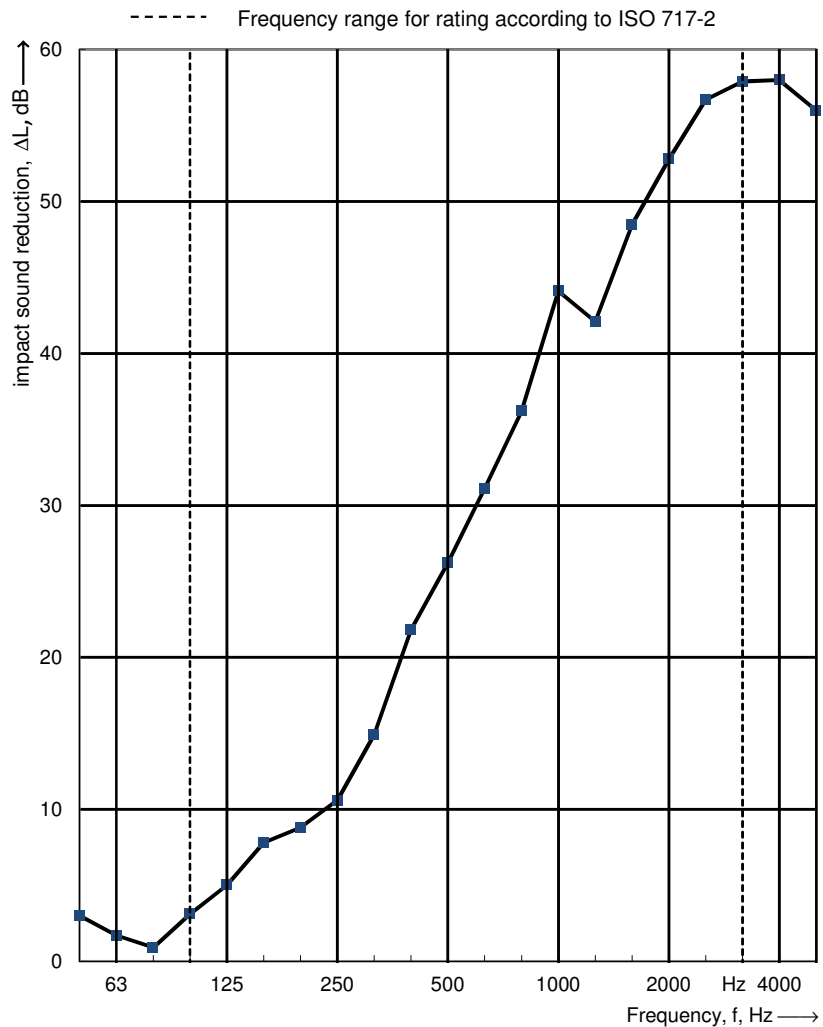
Volume 52,4 m³

Air temperature 20,6 °C

Relative air humidity 53,7 %

Type of reference floor: Massiv

Frequency f [Hz]	$L_{n,0}$ 1/3 oct. [dB]	ΔL 1/3 oct. [dB]
50	61,9	3,0
63	62,7	1,7
80	60,5	0,9
100	60,8	3,1
125	65,6	5,0
160	62,3	7,8
200	62,6	8,8
250	68,2	10,6
315	65,4	14,9
400	67,2	21,8
500	65,7	26,2
630	66,1	31,1
800	67,0	36,2
1000	67,5	44,1
1250	67,3	42,1
1600	67,9	48,5
2000	68,6	52,8
2500	68,5	56,7
3150	68,9	57,9 ¹
4000	67,5	58,0 ¹
5000	64,2	56,0 ¹

¹ correction basic noise

Rating according to ISO 717-2

 $\Delta L_w = 25$ dB $C_{l,\Delta} = -12$ dB $C_{l,r} = 1$ dB

The results are based on a test performed with an artificial source under laboratory conditions (engineering method) with the specified reference floor.