



eco-scan bvba  
 Industrieweg 114H  
 B-9032 Wondelgem  
 Belgium  
 BTW nr.: BE 0887 763 992



N° 0451-TEST  
 NBN EN ISO 17025:2005

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**NOISE LAB**  
**REPORT Number A-2018\_ES\_214-I157-43474\_E**

**Customer :** Aporta  
 Prins Albertlaan 65  
 8870 Izegem  
 Belgium

**Contacts :** Client : Mike Scheepens  
 Noise lab : Volker Spessart

**Tests :** Laboratory measurement of airborne sound insulation of building elements  
**Product name :** Folding Door with sound insulation

**Reference norm :**  
 NBN EN ISO 10140-2:2010 Acoustics - Laboratory measurement of sound insulation of building elements  
 - Part 2: Measurement of airborne sound insulation

*Various other related norms:*

NBN EN ISO 10140-1:2010 Acoustics - Laboratory measurement of sound insulation of building elements  
 - Part 1: Application rules for specific products  
 NBN EN ISO 10140-4:2010 Acoustics - Laboratory measurement of sound insulation of building elements  
 - Part 4: Measurement procedures and requirements  
 NBN EN ISO 10140-5:2010 Acoustics - Laboratory measurement of sound insulation of building elements  
 - Part 5: Requirements for test facilities and equipment  
 NBN EN 20140-2:1995 Acoustics - Measurement of sound insulation in buildings and of building elements  
 - Part 2: Determination, verification and application of precision data (ISO 140-2:1991)  
 NBN EN ISO 717-1: 1996 Acoustics - Rating of sound insulation in buildings and of building elements  
 - Part 1: Airborne sound insulation

**To perform the above measurements, the laboratory of eco-scan is accredited by BELAC "The Belgian Accreditation Body"**  
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 In this way, reports and certificates issued by BELAC accredited bodies are internationally accredited.

<b>Date and reference of the request:</b>	4/12/2018	2018_ES_214
<b>Date of receipt of the specimen (s):</b>	9/01/2019	SONI157
<b>Date of tests:</b>	9/01/2019	
<b>Date of preparation of the report:</b>	15/01/2019	

This test report together with its annexes contains : 9 pages and must be multiplied only in its entirety

Technical Manager,

Volker Spessart

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**MEASURING EQUIPMENT**

**Sound Sources**

Brüel & Kjaer - 4292 : Omni Power Sound Source (+ Brüel & Kjaer - 2716: Power amplifier)

**Microphone and data acquisition system:**

Brüel & Kjaer - 4189 : 1/2" free field microphone, 6Hz to 20kHz, prepolarized  
 Brüel & Kjaer - ZC-0032 : 1/2" microphone preamplifier  
 Brüel & Kjaer - JP 1041 : dual 10-pole adaptor JP-1041  
 Brüel & Kjaer - 3923 : rotating microphone boom  
 Brüel & Kjaer - 4231 : Sound calibrator 94&114dB SPL-1000Hz, Fulfills IEC 60942(2003)Class1  
 Brüel & Kjaer - 2270 : Sound level meter - dual channel instrument (measuring both channels simultaneously)  
 Conforms with IEC 61672-1 (2002-05) Class 1

*Two rotating microphone systems, one in the receiving room, one in the source room*

*Number of source positions:* 3

*Minimum 3m between the different source positions*

*Number of microphone positions for each source position:* 3

*Microphone position with a rotating microphone*

*Number of rotations:* 3

*Rotation speed:* 16 s/tr

*Minimum rotation time:* 30 s

*Just not a rotation angle <10 ° to the chamber surfaces*

**Data processing**

Brüel & Kjaer - BZ-5503 : utility software for hand-held analyzers  
 Brüel & Kjaer - BZ-7229 : dual-channel building acoustics software  
 Brüel & Kjaer - 7830 :Qualifier Software for reporting of results  
 A computer with proprietary software

*Averaging Time per measurement:* 48 s

*Number of reverberation time measurements (with graphic control):* 27 measurements

**Test chambers**

Volume source room: 65.65 m<sup>3</sup>

Volume receiving room: 51.4 m<sup>3</sup>

Total partition wall area: 1.9 m<sup>2</sup>

Surface test opening: 1.8 m<sup>2</sup>

There is absorption material applied in the test rooms

**Partition wall**

n/a

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**STANDARD METHOD**

**Airborne sound insulation measurement**

The tests were conducted in accordance with the provisions of the test method ISO 10140-2. A detailed description of the test set up has been given in the figures of annex 1 of this report.

The construction to be tested is placed into a test opening between two measuring rooms. In one of the rooms ( the so-called sending room) broad band noise is generated by loud-speakers. The test rooms meet the requirements of ISO 10140-5. Both rooms are isolated for vibrations by using a so-called room-in-room construction.

In this sending room as well as in the adjacent room (the "receiving room") the resulting sound pressure level is measured by means of a continuous rotating boom, so the (time- and space-) averaged sound pressure level is determined.

The reverberation time of the receiving room is also measured. The measurement of the reverberation time in the receiving room allows to determined the sound absorption per octave band using the formula Sabine as in the norm ISO 10140-4 and in accordance with ISO 354

The equivalent sound absorption ( $m^2$ ) in the receiving room according to :  $A = 0,16 V/T$  in which :

V = volume of the receiving room in cubic meter  
 T = reverberation time in the receiving room in sec

In ISO 10140-2 the airborne sound insulation of an object is defined as the "sound reduction index R" to be evaluated according to the formula

$$R = L_1 - L_2 + 10 \log (S/A) \quad [dB]$$

with  $L_1$  = sound pressure level in the sending room, in dB (ref 20 $\mu$ Pa)  
 $L_2$  = sound pressure level in the receiving room, in dB (ref 20 $\mu$ Pa)  
 S = area of the object to be tested, in square metre  
 A = equivalent sound absorption in the receiving room, in square metre

The above parameters are determined at least in the 1/3 octave bands 100 Hz to 5000 Hz  
 The environmental conditions in the test rooms (temperature, relative humidity) are measured during the tests

**Single-rating number :  $R_w$  (C:C<sub>tr</sub>)**

The values of the measured airborne sound reduction index of the tested element are drawn-up in the diagram of the annexed data sheet as a function of the frequency (in 1/3 octave bands) and are given in a table.

According to EN ISO 717-1 the weighted sound reduction index  $R_w$  and the spectrum adaptation terms C and C<sub>tr</sub> for the frequency range from 100 Hz to 3150 Hz can be calculated.

$R_w$  = weighted sound reduction index  
 $R_w + C$  = characterize in one number the insulation of the test element against NON-dominant low-frequency noise  
 $R_w + C_{tr}$  = characterize in one number the insulation of the test element against dominant low-frequency noise

Optionally, these two terms are supplemented by additional adjustment terms (if necessary and measured data are available) on a wider frequency range between 50 Hz and 5000 Hz

Optionally and according other international standards, other single-figure ratings have been calculated and stated.



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### SPECIAL MEASUREMENT CONDITIONS

n/a

### ACCURACY

The accuracy of the airborne sound insulation as calculated can be expressed in terms of repeatability (tests within one laboratory) and reproducibility (between various laboratories)

#### Repeatability [r]

When: - two tests are performed on identical test material - within a short period of time - by the same person or team - using the same instrumentation - under unchanged environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to r

#### Reproducibility [R]

When: - two tests are performed on identical test material - in different laboratories - by different person(s) - under different environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to R

In ISO 20140-2 there is a statement on the reproducibility R to be expected, based on the results of various inter-laboratory tests. The reproducibility of the single figure rating  $R_w$  is about 3 dB.

The specific value of uncertainty is available on request

### ENVIRONMENTAL CONDITIONS during the tests

	<i>Source room</i>	<i>Receiving room</i>
Temperature :	T = 18.2 °C	18.6 °C
Atmospheric pressure :	p = 1020 hPa	1020 hPa
Relative humidity :	$h_r$ = 56 %	53 %

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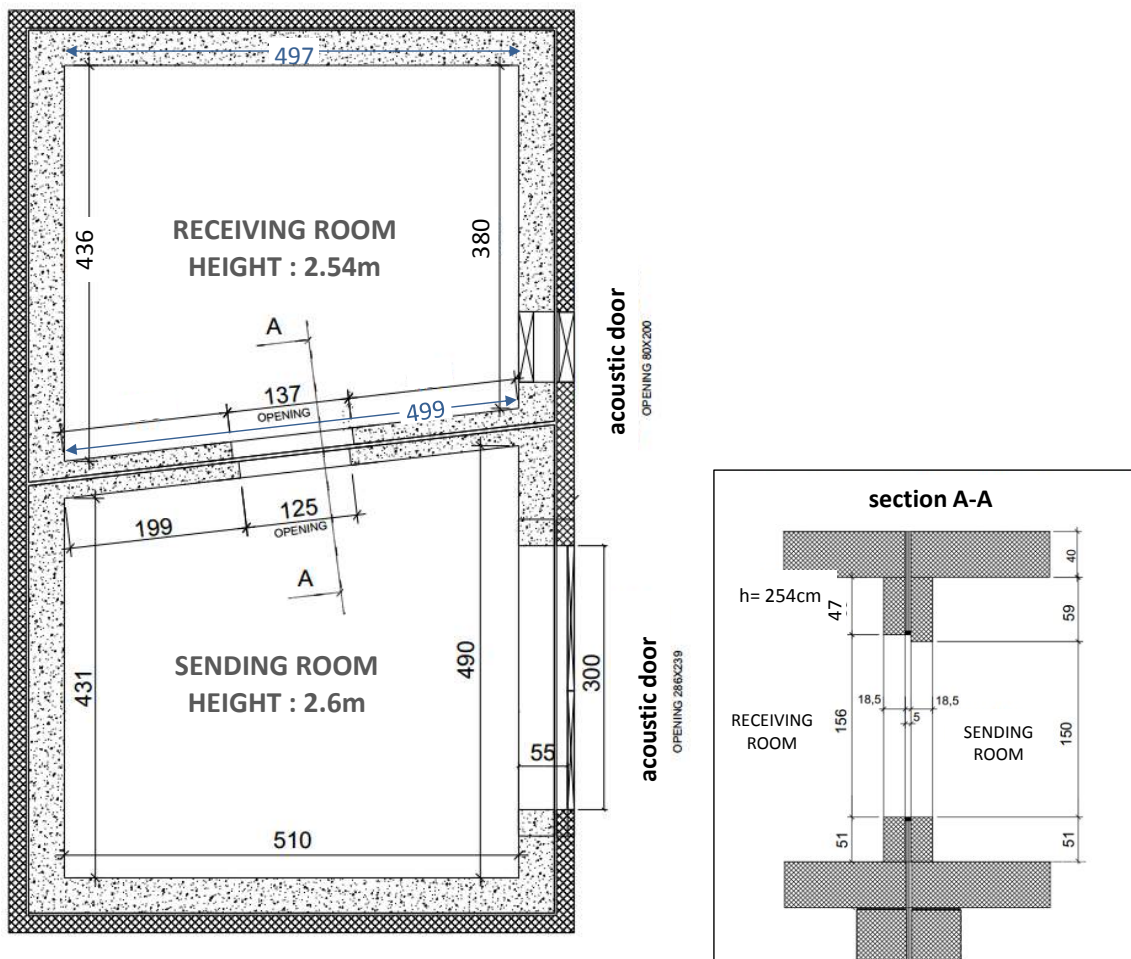
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**ANNEX 1 : Sound insulation test facilities**

The test rooms meet the requirements of ISO 10140-5  
 Both rooms are isolated for vibrations by using a so called room-in-room construction.





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**ANNEX 2: Description test items by manufacturer**

*The test sample description given by manufacturer is checked visually as good as possible by the laboratory.*

*The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer*

Description of the test element as a layered structure

	Thickness (mm)	$\rho$ (kg/m <sup>3</sup> )	$m''$ (kg/m <sup>2</sup> )	Description of the layer
1				Folding Door with sound insulation
2				
3				
4				
5				
6				
7				
8				
9				
10				

On both sides the tested product is made of one layer of artificial leather (visual side) plus one layer of Akomass Saund 2kg/m<sup>2</sup> (inside).  
 The bottom side has an integrated door seal made of 1 layer of artificial leather on both sides.



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**ANNEX 3: Technical sheet**

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*The test sample description given by manufacturer is checked visually as good as possible by the laboratory.*

*The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer*

Please request at supplier

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**ANNEX 4: photographs of the test element or the test arrangement**

*Description of the assembly and/or drawing and/or image*

The product was build into the small-sized test opening using standard mounting profiles on a wooden frame.

view in Sending Room side



view in Receiving Room side





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**R**

**SOUND REDUCTION INDEX according to ISO 10140-2**  
**Laboratory measurement of airborne sound insulation between rooms**

**Client:** Aporta

**Date of test:** 9/01/2019

*Description of the test setup:*

**Folding Door with sound insulation**

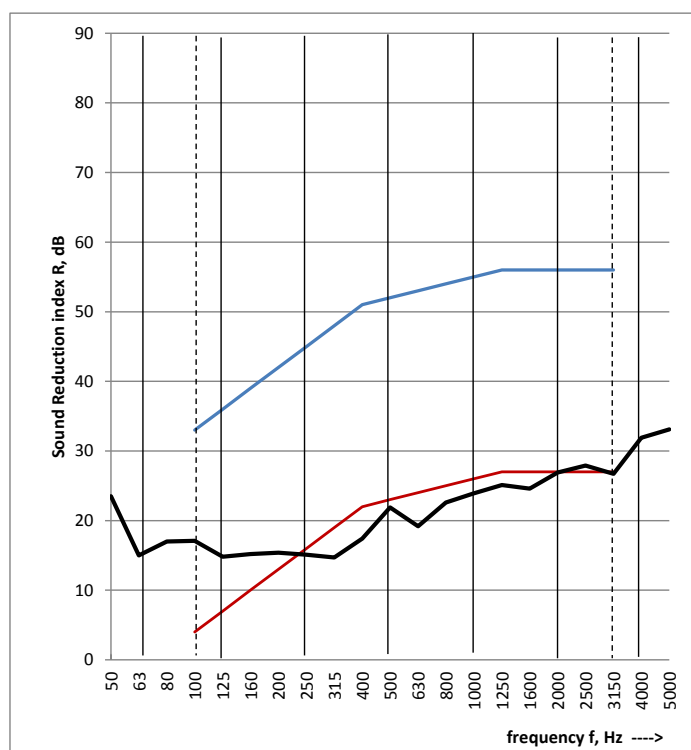
**Area S of separating element:** 1.8 m<sup>2</sup>

**Receiving room volume:** 51.4 m<sup>3</sup>

**Source room volume:** 65.65 m<sup>3</sup>

— measured values of Sound Reduction Index R  
 — reference values (according ISO 717-1)  
 — shifted reference values (according ISO 717-1)

frequency Hz	R one third octave dB	(*)	(**)
50	23.5		
63	15.0		
80	17.0		
100	17.1		
125	14.8		
160	15.2		
200	15.4		
250	15.1		
315	14.7		
400	17.4		
500	21.9		
630	19.2		
800	22.6		
1000	23.9		
1250	25.1		
1600	24.6		
2000	26.9		
2500	27.9		
3150	26.7		
4000	31.9		
5000	33.1		



B or M : R >= value shown

(\*) b : background noise correction used

B : Maximum background noise correction used

(\*\*) m : flanking transmission correction used

M : Maximum flanking transmission correction used

**Rating in accordance with ISO 717-1:**

**R<sub>w</sub> (C;C<sub>tr</sub>) = 23 ( 0 ; -2 ) dB**      C<sub>50-3150</sub>= -1 dB;    C<sub>50-5000</sub>= 0 dB;    C<sub>100-5000</sub>= 0 dB

*Evaluation based on laboratory measurement-  
 results obtained by an engineering method:*

C<sub>tr,50-3150</sub>= -3 dB;    C<sub>tr,50-5000</sub>= -3 dB;    C<sub>tr,100-5000</sub>= -2 dB

**Measurement no.:** SONI157  
**Date of test report:** 15/01/2019

**Test institute:** eco-scan bvba  
**Lab-engineer:** Volker Spessart