PEUTZ

Laboratory for Acoustics

Determination of the sound insulation of a lightweight partition, provided with absorption material, type Metisse, manufacturer Le Relais

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Determination of the sound insulation of a lightweight partition, provided with absorption material, type Metisse, manufacturer Le Relais

Principal	Le Relais ZI Artois Flandres 62 138 Billy Berclau France
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1 Introduction

At the request of Le Relais based at Billy Berclau (France) sound insulation measurements have been carried out on a:

lightweight partition, provided with absorption material,
type Metisse, manufacturer Le Relais

in the Laboratory for Acoustics of Peutz bv, at Mook, the Netherlands (see figure 1).

TESTING
RvA L 334

For these type of measurements the Laboratory for Acoustics has been accredited by the Dutch Accreditation Council (RvA).

The RvA is member of the EA MLA (**EA MLA**: **E**uropean **A**ccreditation Organisation **M**ulti**L**ateral **A**greement: http://www.european-accreditation.org).

EA: "Certificates and reports issued by bodies accredited by MLA and MRA members are considered to have the same degree of credibility, and are accepted in MLA and MRA countries."

2 Standards and guidelines

The measurements have been carried out according to the Quality Manual of the Laboratory for Acoustics as well as:

ISO 10140-2:2010	Acoustics - Laboratory measurements of sound insulation of building elements – Part 2: Measurement of airborne sound insulation
N.B.	The standard ISO 10140-2 is in all countries of the EU accepted as European Standard EN ISO 10140-2:2010

Various other related norms:

ISO 10140-1:2010	Acoustics - Laboratory measurements of sound insulation of building elements – Part 1: Application rules for specific products
N.B.	The standard ISO 10140-1 is in all countries of the EU accepted as European Standard EN ISO 10140-1:2010
ISO 10140-4:2010	Acoustics - Laboratory measurements of sound insulation of building elements – Part 4: Measurement procedures and requirements
N.B.	The standard ISO 10140-4 is in all countries of the EU accepted as European Standard EN ISO 10140-4:2010
ISO 10140-5:2010	Acoustics - Laboratory measurements of sound insulation of building elements – Part 5: Requirements for test facilities and equipment
N.B.	The standard ISO 10140-5 is in all countries of the EU accepted as European Standard EN ISO 10140-5:2010
ISO 140-2:1991	Acoustics - Measurement of sound insulation of building elements - Part 2: Determination, verification and application of precision data
N.B.	The standard ISO 140-2 is accepted as European Standard EN 20140-2:1993 in all countries of the EG
ISO 717-1:2013	Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation
N.B.	The standard ISO 717-1:2013 is in all countries of the EU accepted as European Standard EN ISO 717-1:2013

3 Tested construction

The following data have been provided by the principal, supplemented by observations in the laboratory where applicable. The partition to be tested is built in to the test opening D (c. 4300 x 2800 mm) between testing rooms 1 and 2 (see figure 2).

3.1 The following materials were used

Wall panels

Type:	plasterboard AK
Manufacturer:	Knauf
Thickness:	12,5 mm
Surface mass:	approx. 9,3 kg/m^2 (weighted by the laboratory)

Cottonwool sustainable insulation

Type:	Métisse PM+50
Manufacturer:	Le Relais
thickness:	50 mm
Density::	approx. 28 kg/m^3 (weighted by the laboratory)

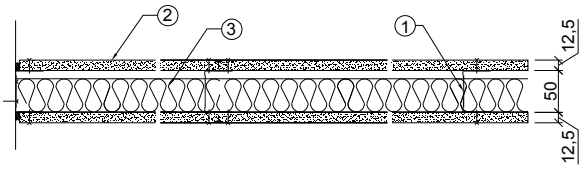
f1 Cottonwool absorption material

3.2 Installation of the partition

single framework

The framework consists of 50 mm U-profiled ceiling and floor tracks fixed at 500 mm center at the test opening. The 50 mm C-profiled studs are inserted in the tracks at 600 mm center to center distance. The 50 mm cottonwool layer is inserted into the studs, standing by the studs. One layer of 12,5 mm plasterboard is screw fixed to both sides of the framework. The joints between the wall boards and on the perimeter is treated by fast jointing compound. At the floor, the gap of 10 mm is sealed with an acrylic sealant.
The total width of the partition is about 100 mm.

f2 *tested partition*

Single framework 1: Metal stud CW 50 2: 1x 12,5 mm plasterboard AK 3: 50 mm cottenwool PM+50	

The results as presented here relate only to the tested items and laboratory conditions as described in this report. The laboratory can make no judgement about the representativity of the tested samples. The test report ahead is valid as long as the tested constructions and/or materials are unchanged.

4 Measurements

4.1 Method

The tests were conducted in accordance with the provisions of the test method ISO 10140-2 in the Laboratory for Acoustics of Peutz bv in Mook. A detailed description of the test set up has been given in figures 1 and 2 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) loudspeakers generate broadband noise.

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 instruments and the method used meet the requirements of ISO 10140-5.

As allowed by the test method the test procedure is repeated reversing the sending and receiving rooms. The reported value of each sound insulation is the arithmetic average of the two results.

In ISO 140-3 the airborne sound insulation of an object is defined as the "sound reduction index R" to be evaluated according to formula 1 and expressed in dB:

$$R = L_1 - L_2 + 10 \log\left(\frac{S}{A}\right) \quad (1)$$

in which:

L_1 = sound pressure level in the sending room [dB]
L_2 = sound pressure level in the receiving room [dB]
S = area of the object to be tested [m^2]
A = equivalent sound absorption [m^2] in the receiving room according to:

$$A = \frac{0{,}16\,V}{T} \quad (2)$$

in which:

V = volume of the receiving room [m^3]
T = reverberation time in the receiving room [s]

4.2 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).

4.2.1 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.

In order to evaluate the repeatability r for the sound insulation measurements performed in the laboratories of Peutz bv in Mook eight series of measurements have been carried out according to ISO 140-2. From the results of those measurements the repeatability r has been calculated. It was found that for the frequency range from 100 to 250 Hz the repeatability r is 2,0 dB as a maximum. For the frequency range 315 to 3150 Hz the repeatability r is 1,3 dB as a maximum.

The repeatability r regarding the single-figure rating R_w is 0,7 dB as a maximum. As ISO 717-1 prescribes rounding of the R_w-values to the nearest dB repeatability r of 1 dB is applicable for the R_w-value.

From these results it may be concluded that the repeatability r as found satisfies the demands of ISO 140-2.

4.2.2 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 140-2 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.

4.3 Results

The results of the measurements are given in table 4.1 and in figure 3. In the table and graph the values of the insulation found are presented in 1/3 octave bands. From these values the weighted sound reduction index R_w according to ISO 717-1 including the spectrum adaptation terms C and C_{tr} have been calculated and stated.

t4.1 measurement results

	airborne sound insulation R [dB]	
measurement nr.	**1**	
record nr.	**#69**	
see figure	**3**	
frequency [Hz]	**1/3 oct.**	**1/1 oct.**
50	18,9	
63	17,3	18,4
80	19,2	
100	18,1	
125	16,5	18,3
160	22,2	
200	28,3	
250	34,5	32,0
315	41,2	
400	46,3	
500	47,7	47,9
630	51,1	
800	54,6	
1000	57,0	56,6
1250	59,4	
1600	60,6	
2000	59,9	53,5
2500	49,4	
3150	42,2	
4000	45,7	45,0
5000	50,9	
$R_w(C;C_{tr})$	42(-3;-9) dB	
$C_{100\text{-}5000};C_{tr,100\text{-}5000}$	(-2;-9) dB	
$C_{50\text{-}3150};C_{tr,50\text{-}3150}$	(-4;-11) dB	
$C_{50\text{-}5000};C_{tr,50\text{-}5000}$	(-3;-11) dB	

The results as presented here are based on a testing area of 12 m^2. In situations where different dimensions and/or method of mounting differ from the ones tested, different results may be found.

Mook,

Th. Scheers
Laboratory Supervisor

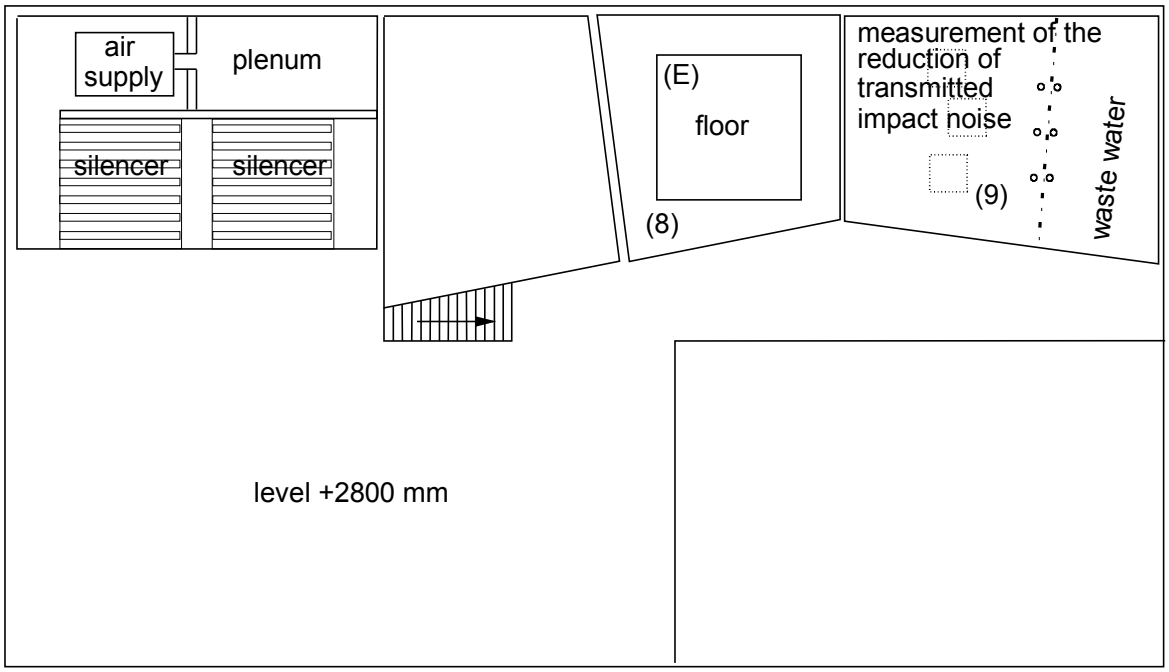
ir. C.I. Esmeijer
Manager

This report contains 11 pages and 3 figures.

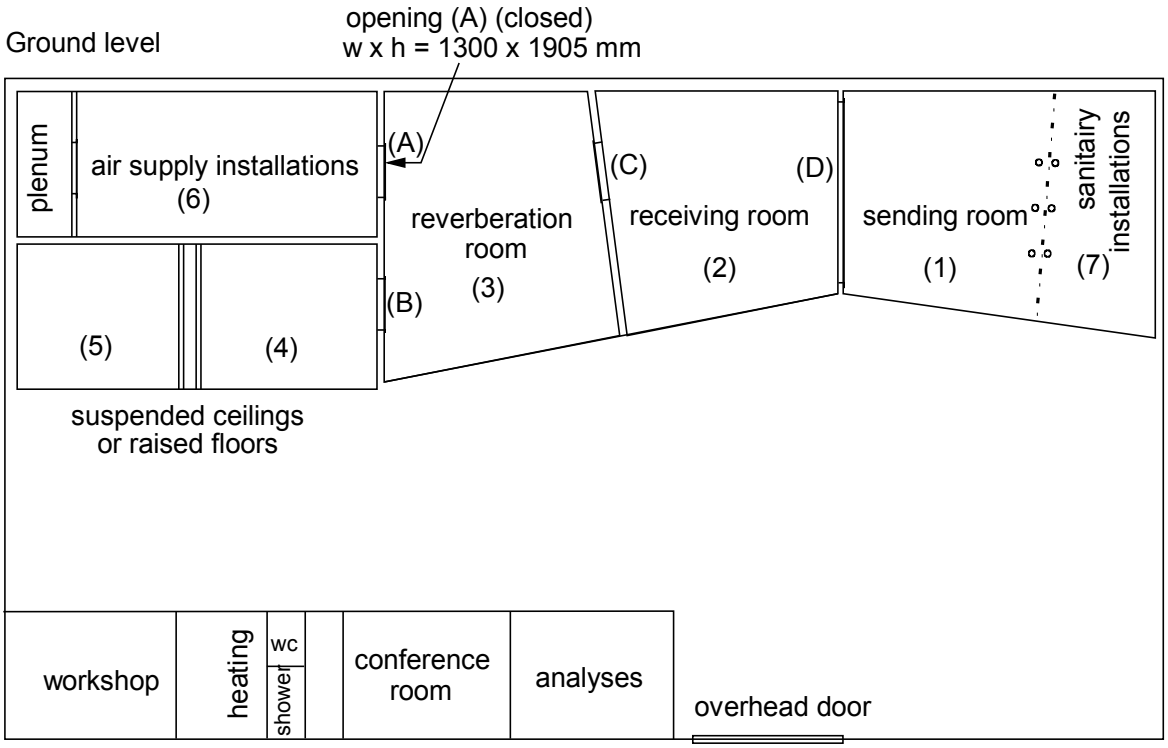
PEUTZ bv
Lindenlaan 41, NL-6584 AC MOLENHOEK (LB), THE NETHERLANDS

OVERVIEW

Story



Ground level



TEST OPENINGS (w x h in mm)
(B) 1000 x 2200
(C) 1500 x 1250
(D) 4300 x 2800
(E) 4000 x 4000

0 1 2 3 4 5 m
scale

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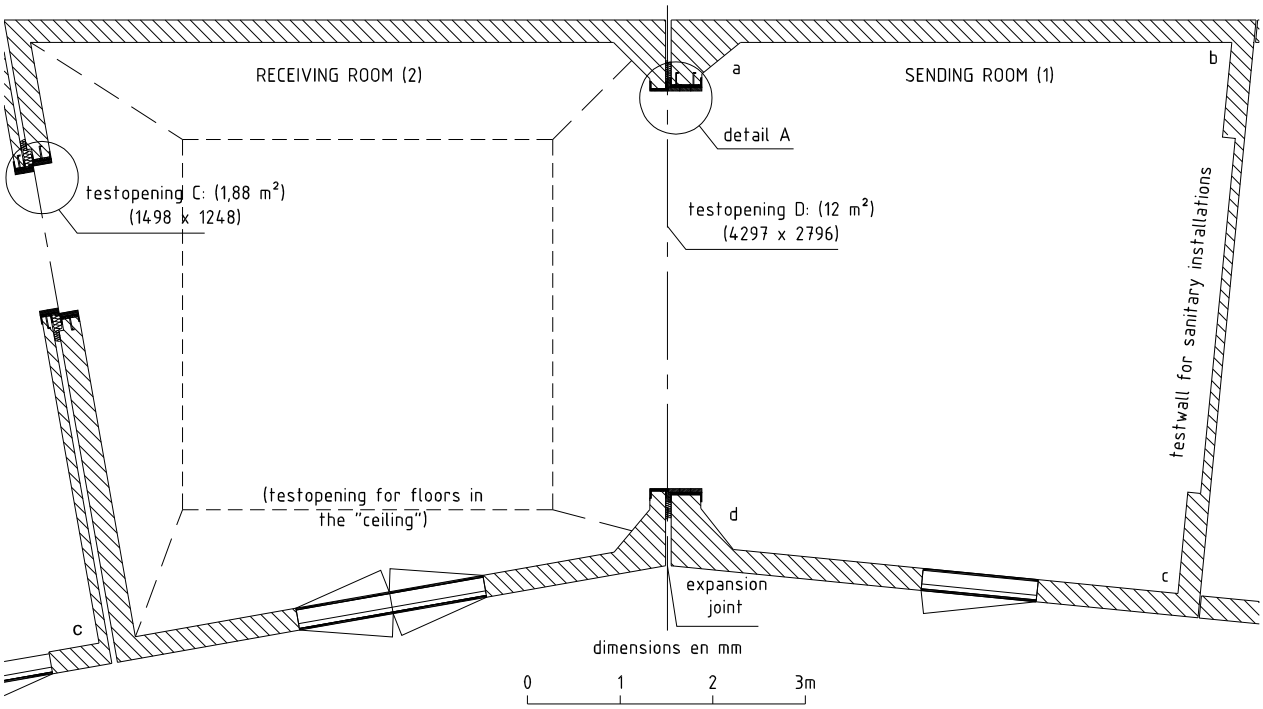
SOUND INSULATION TEST FACILITIES

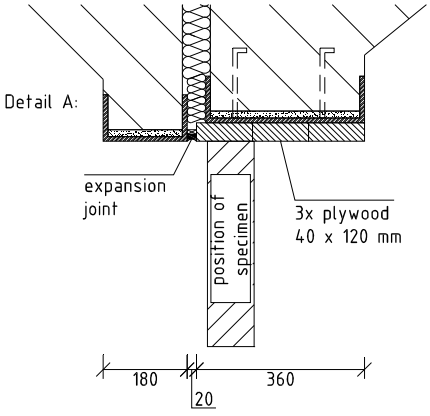
The testrooms meet the requirements of ISO 10140-5.
Additional data:
- volume of the receiving room: 111 m^3
- volume of the source room: 94 m^3
- area of the test specimen: 12,0 m^2

Both rooms are isolated for vibrations by using a so called room-in-room construction. Flanking transmission is thus minimized.

height: along the walls 2840 mm increasing to 2920 mm at the perimeter of the testopening for floors

height at a: 3055 mm
height at b: 3058 mm
height at c: 3052 mm
height at d: 3062 mm





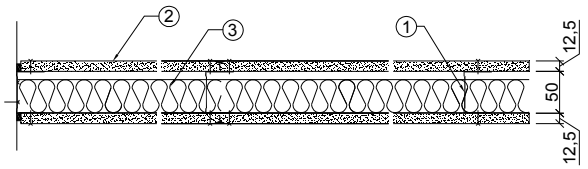
MEASUREMENT OF THE SOUND INSULATION ACCORDING TO ISO 10140-2:2010

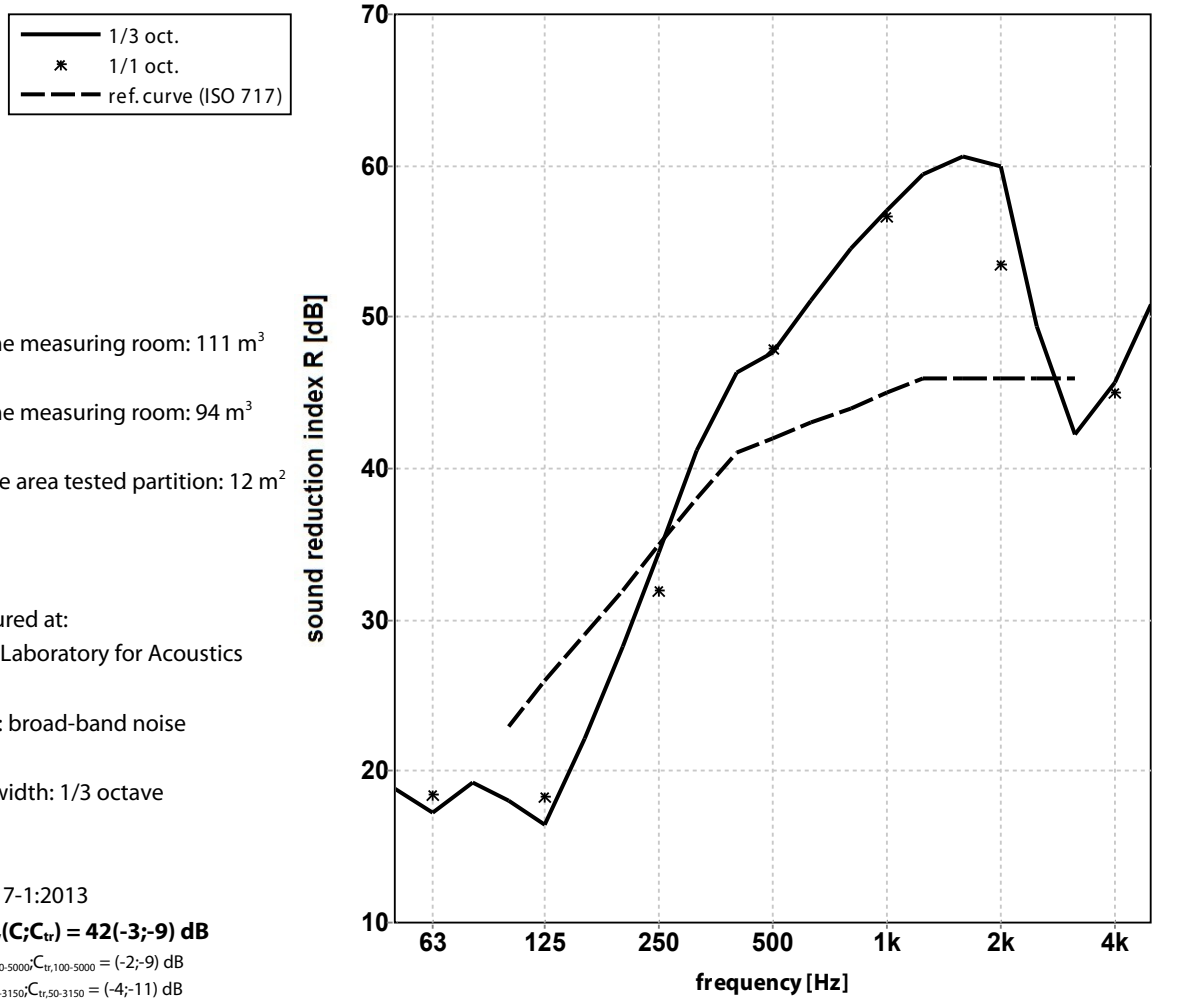
principal: Le Relais

TESTING RvA L 334

Tested partition

Single framework
1: Metal stud CW 50
2: 1x 12,5 mm plasterboard AK
3: 50 mm cottenwool PM+50





volume measuring room: 111 m³

volume measuring room: 94 m³

surface area tested partition: 12 m²

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

ISO 717-1:2013

$R_w(C;C_{tr})$ = 42(-3;-9) dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000}$ = (-2;-9) dB
$C_{50\text{-}3150};C_{tr,50\text{-}3150}$ = (-4;-11) dB
$C_{50\text{-}5000};C_{tr,50\text{-}5000}$ = (-3;-11) dB

	18,9	18,1	28,3	46,3	54,6	60,6	42,2	
1/3 oct.	17,3	16,5	34,5	47,7	57,0	59,9	45,7	dB
	19,2	22,2	41,2	51,1	59,4	49,4	50,9	
1/1 oct.	**18,4**	**18,3**	**32,0**	**47,9**	**56,6**	**53,5**	**45,0**	**dB**

publication is permitted for the entire page only

Mook, 31-03-2014

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