PEUTZ

Lboratory for Acoustics

Determination of the sound insulation of Homebox the isolated postbox, manufacturer Trim Trading

Report number A 3687-2E-RA-001 d.d. 28 April 2020

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Determination of the sound insulation of Homebox the isolated postbox, manufacturer Trim Trading

Principal	Trim Trading Zuidendijk 519A 3329 LD Dordrecht The Netherlands
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BTW NL004933837B01 KvK: 12028033

mook – zoetermeer – groningen – eindhoven –düsseldorf – dortmund – berlijn – leuven – parijs – lyon

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1 Introduction

At the request of Trim Trading based at Dordrecht (the Netherlands) sound insulation measurements have been carried out on

Hombox
the isolated postbox
manufactured by Trim Trading

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

Various other related standards:

ISO 10140-1:2016 Acoustics - Laboratory measurements of sound insulation of building elements – Part 1: Application rules for specific products

ISO 10140-4:2010 Acoustics - Laboratory measurements of sound insulation of building elements – Part 4: Measurement procedures and requirements

ISO 10140-5:2010/A1:2014
Acoustics - Laboratory measurements of sound insulation of building elements – Part 5: Requirements for test facilities and equipment

ISO 140-2:1991/Cor 1:2014
Acoustics - Measurement of sound insulation of building elements - Part 2: Determination, verification and application of precision data

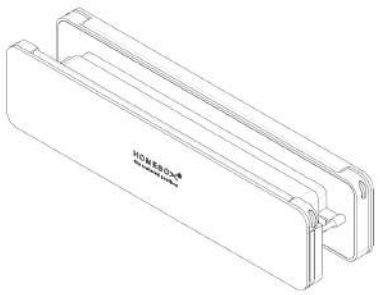
ISO 717-1:2013 Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

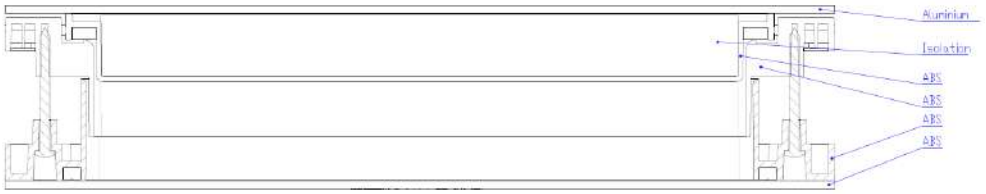
3 Tested construction

The following data have been provided by the principal, supplemented by observations in the laboratory where applicable.

Tested postbox

type:	Homebox
	the isolated postbox
manufacturer:	Trim Trading
box dimensions (W x H):	338 x 78 mm
dimensions slit (W x H):	265 x 35 mm
depth:	70 mm
thickness inner cover:	3 mm
thickness outer cover:	31 mm






outside view


inside view

Four variants were tested:

1. both covers closed
2. inside cover closed / outside cover opened
3. inside cover opened / outside cover closed
4. both covers opened

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 Measurement setup

The test specimen had been placed into test opening C, see figure 2. The remaining space has been carefully sealed with a wall, consisting of a separated style-framing with a double gypsum board (2*12.5 mm thickness) applied on both sides. The dilatation between the two measuring rooms is positioned within the cavity of this wall. The cavity between the gypsum boards has been filled entirely with mineral wool. The sound insulation of this construction defined as the "element normalized level difference, $D_{n,e}$" is given in figure 7.

4.2 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 10140-2 the airborne sound insulation for small building parts is defined as the "element normalized level difference, $D_{n,e}$" to be evaluated according to formula 4.1 and expressed in dB:

$$D_{n,e} = L_{p,z} - L_{p,o} + 10 \log\left(\frac{A_0}{A}\right) \qquad (4.1)$$

in which:

$L_{p,z}$	= sound pressure level in the sending room	[dB]
$L_{p,o}$	= sound pressure level in the receiving room	[dB]
A_0	= reference surface of 10 m^2	[-]
A	= equivalent sound absorption [m^2] in the receiving room according to:	

$$A = \frac{0{,}16\,V}{T} \qquad (4.2)$$

in which:

V = volume of the receiving room [m^3]

T = reverberation time in the receiving room [s]

4.3 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).

4.3.1 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.

4.3.2 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.

4.4 Environmental conditions during the measurements

t4.1 Environmental conditions during the measurements

Measuring room	temperature	relative humidity
	[°C]	[%]
2	22,0	56
3	23,6	51

4.5 Results

The results of the measurements are given in the tables 4.2 and 4.3 and in figure 3 up to and including 7. In the tables and graphs the values of the "element normalized level difference, $D_{n,e}$" according ISO 10140-2 are presented in 1/3 and 1/1 octave bands. From these values the weighted element normalized level difference $D_{n,e,w}$ according to ISO 717-1 including the spectrum adaptation terms C and C_{tr} have been calculated and stated.

t4.2 Measurement results Homebox the isolated postbox

	element normalized level difference $D_{n,e}$ [dB]							
variant	1		2		3		4	
cover	both closed		inside closed outside open		inside open outside closed		both open	
record nr.	#47		#54		#68		#61	
see figure	3		4		5		6	
frequency [Hz]	1/3 oct.	1/1 oct.	1/3 oct.	1/1 oct.	1/3 oct.	1/1 oct.	1/3 oct.	1/1 oct.
50	31,9		31,8		31,7		29,2	
63	28,0	30,4	27,8	30,3	27,5	30,1	25,4	28,0
80	33,2		33,2		33,2		31,7	
100	37,2		37,9		37,7		34,9	
125	41,0	39,5	41,9	40,2	40,1	39,5	32,0	33,6
160	41,6		42,2		41,5		34,4	
200	47,5		47,2		47,2		38,7	
250	50,1	49,5	49,5	48,7	49,6	48,3	37,7	36,3
315	52,1		49,9		48,5		34,0	
400	51,2		49,0		47,7		33,2	
500	53,2	53,3	49,1	47,8	47,0	46,0	32,7	32,0
630	57,4		46,0		44,2		30,6	
800	57,3		45,8		42,9		29,8	
1000	58,7	57,4	43,7	45,4	42,4	43,4	28,7	28,7
1250	56,5		47,7		45,3		27,8	
1600	56,1		47,4		49,9		27,3	
2000	57,6	57,5	50,5	49,7	51,8	50,6	27,4	27,8
2500	59,2		52,8		50,2		28,8	
3150	59,7		53,5		47,2		29,8	
4000	64,0	62,4	58,3	56,2	48,5	48,5	31,5	30,6
5000	66,1		58,9		50,3		30,7	
$D_{n,e,w}(C;C_{tr})$	56(-1;-4) dB		49(-1;-3) dB		47(-1;-2) dB		29(0;0) dB	
$C_{100\text{-}5000};C_{tr,100\text{-}5000}$	(0;-4) dB		(0;-3) dB		(0;-2) dB		(0;0) dB	
$C_{50\text{-}3150};C_{tr,50\text{-}3150}$	(-2;-9) dB		(-1;-5) dB		(-1;-4) dB		(0;0) dB	
$C_{50\text{-}5000};C_{tr,50\text{-}5000}$	(-1;-9) dB		(0;-5) dB		(0;-4) dB		(0;0) dB	

The results as presented here are based on the in chapter 3 described Homebox. 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

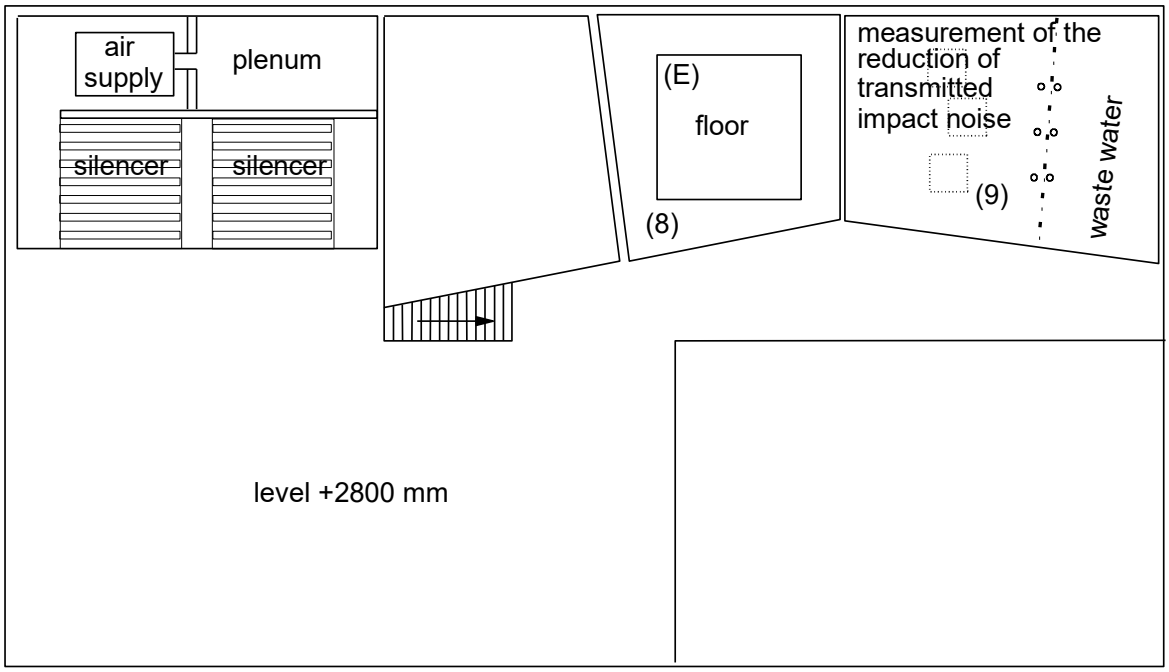
dr. ir. M.L.S. Vercammen
Manager

This report contains 11 pages and 7 figures

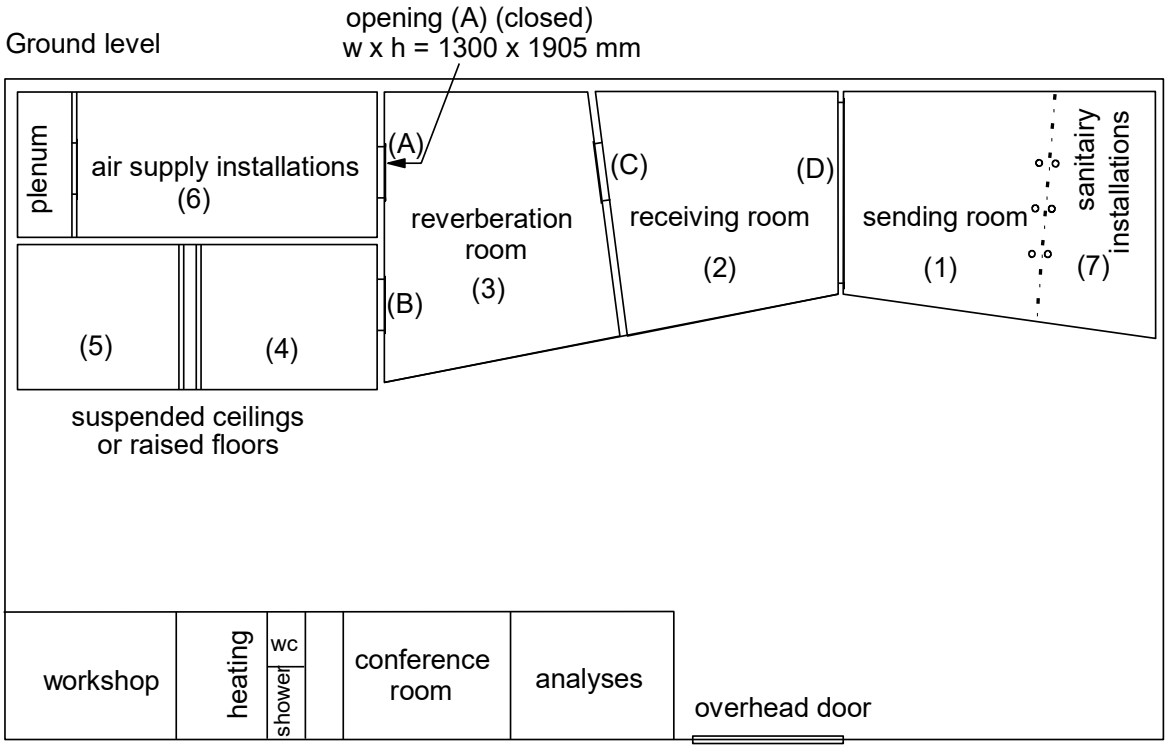
PEUTZ bv
Lindenlaan 41, NL-6584 AC MOLENHOEK (LB), THE NETHERLANDS

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

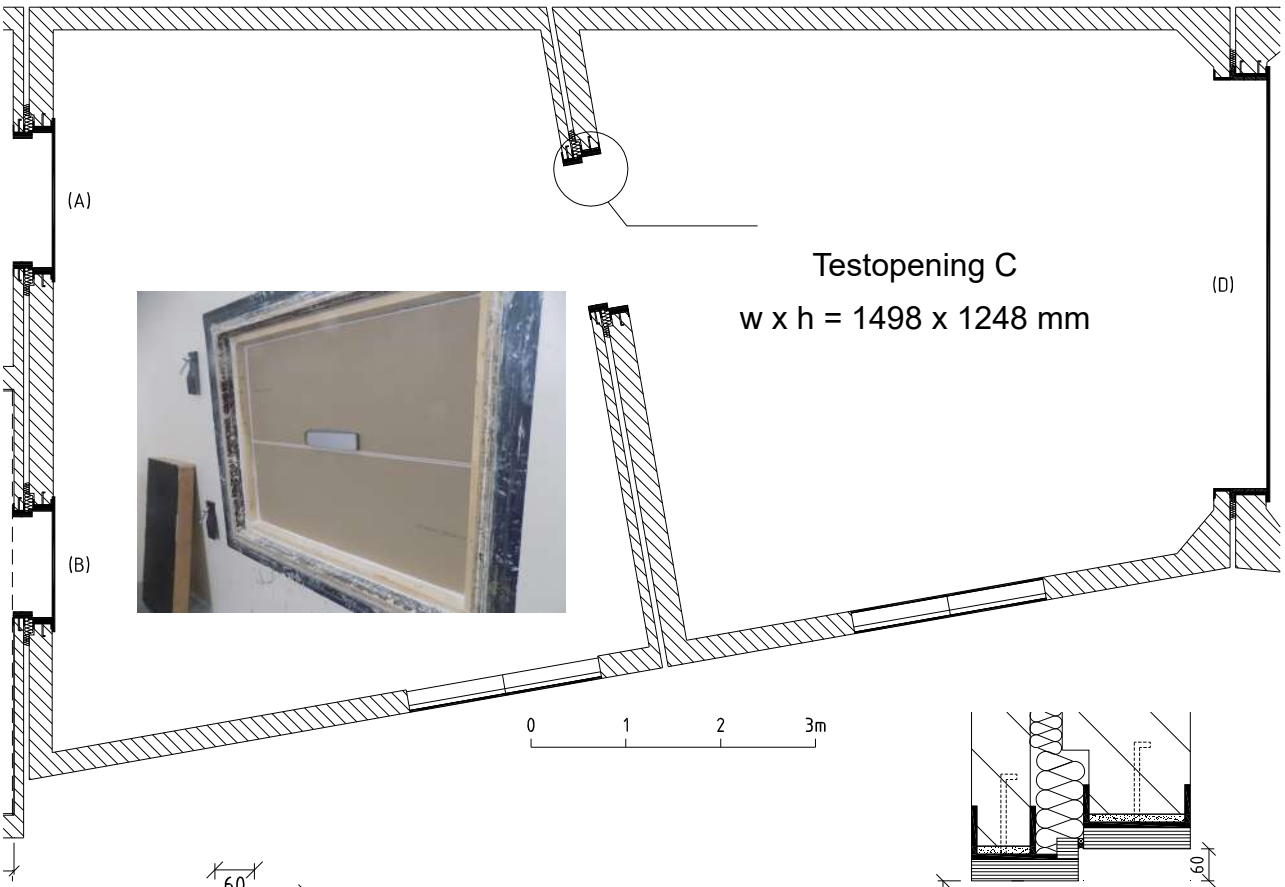
PEUTZ bv
Lindenlaan 41, 6584 AC MOLENHOEK (LB), HOLLAND

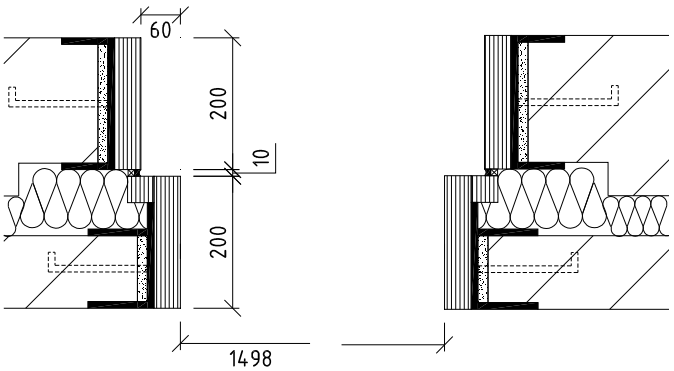
SOUND INSULATION TEST FACILITIES

The testrooms meet the requirements of ISO 10140-5
Additional data:
volume of measuring room (2): 115 m^3
volume of measuring room (3): 214 m^3
area of the test specimen: 1.88 m^2

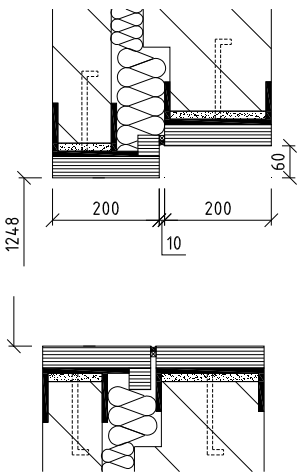
Both rooms are isolated for vibrations by using a so called room-in-room construction. Flanking transmission is thus minimised.

closed other testopenings (nominal width x height in mm)
(A): 1300 x 1800
(B): 1000 x 2200
(D): 4300 x 2800





Horizontal section



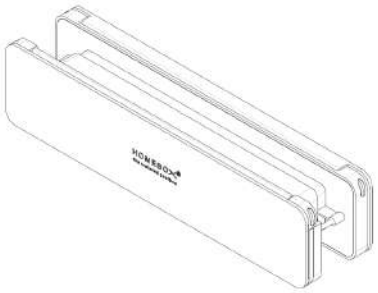
Vertical section

MEASUREMENT OF THE AIRBORNE SOUND INSULATION OF SMALL BUILDING ELEMENTS ACCORDING TO ISO 10140-2:2010

TESTEN RvA L 334

principal: Trim Trading

construction tested:



Homebox the isolated postbox
outside dimensions (W x H): 338 x 78 mm
dimensions opening (W x H): 265 x 35 mm
depths: 70 mm

variant 1; both (inside / outside) covers closed

volume measuring room: 214 m³

volume measuring room: 115 m³

reference area: 10 m²

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

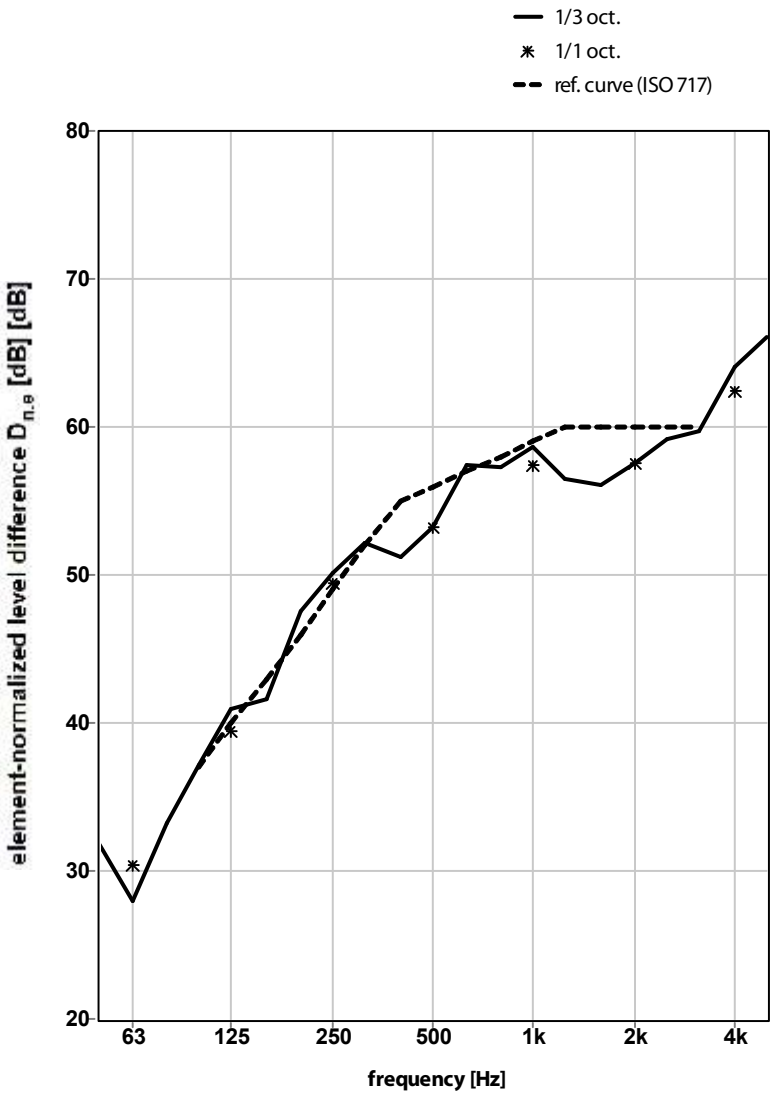
ISO 717-1:2013

$D_{n,e,w}(C;C_{tr}) = 56(-1;-4)$ dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000} = (0;-4)$ dB

$C_{50\text{-}3150};C_{tr,50\text{-}3150} = (-2;-9)$ dB

$C_{50\text{-}5000};C_{tr,50\text{-}5000} = (-1;-9)$ dB



	31,9	37,2	47,5	51,2	57,3	56,1	59,7	
1/3 oct.	28,0	41,0	50,1	53,2	58,7	57,6	64,0	dB
	33,2	41,6	52,1	57,4	56,5	59,2	66,1	
1/1 oct.	**30,4**	**39,5**	**49,5**	**53,3**	**57,4**	**57,5**	**62,4**	**dB**

Mook, measured at 26-07-2019

MEASUREMENT OF THE AIRBORNE SOUND INSULATION OF SMALL BUILDING ELEMENTS ACCORDING TO ISO 10140-2:2010

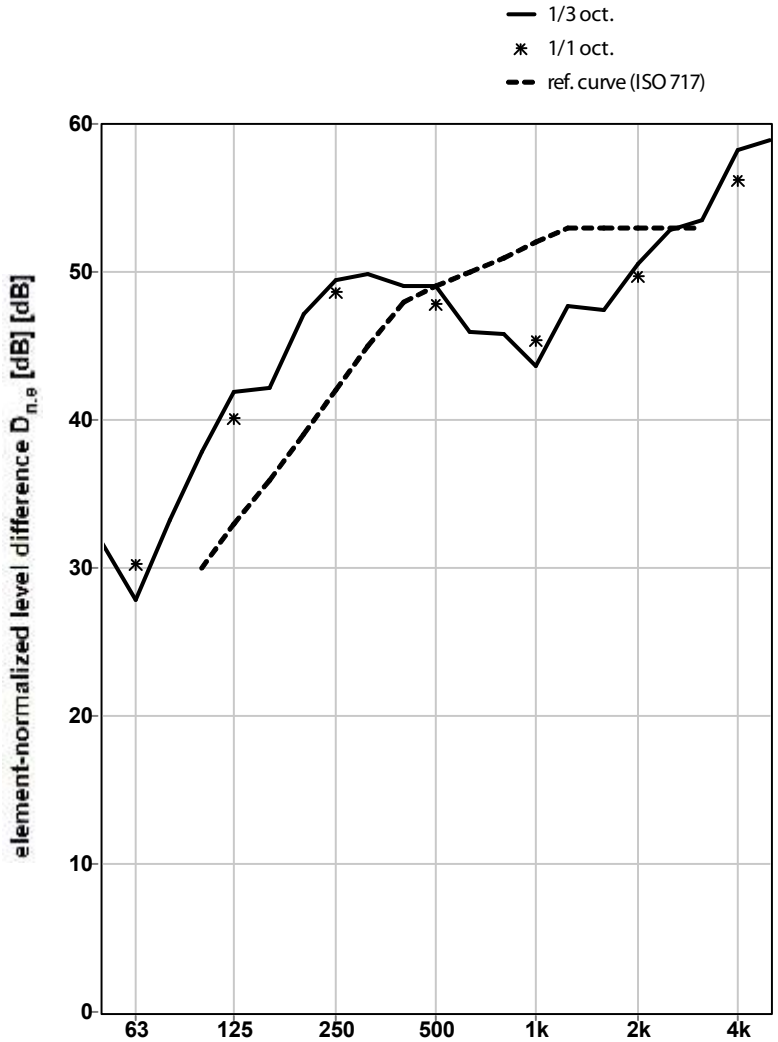
principal: Trim Trading

TESTEN RvA L 334

construction tested:

Homebox the isolated postbox
outside dimensions (W x H): 338 x 78 mm
dimensions opening (W x H): 265 x 35 mm
depths: 70 mm

variant 2; inside cover closed / outside cover open



volume measuring room: 214 m³

volume measuring room: 115 m³

reference area: 10 m²

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

ISO 717-1:2013

$D_{n,e,w}(C;C_{tr}) = 49(-1;-3)$ dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000} = (0;-3)$ dB

$C_{50\text{-}3150};C_{tr,50\text{-}3150} = (-1;-5)$ dB

$C_{50\text{-}5000};C_{tr,50\text{-}5000} = (0;-5)$ dB

	31,8	37,9	47,2	49,0	45,8	47,4	53,5	
1/3 oct.	27,8	41,9	49,5	49,1	43,7	50,5	58,3	dB
	33,2	42,2	49,9	46,0	47,7	52,8	58,9	
1/1 oct.	**30,3**	**40,2**	**48,7**	**47,8**	**45,4**	**49,7**	**56,2**	**dB**

Mook, measured at 26-07-2019

MEASUREMENT OF THE AIRBORNE SOUND INSULATION OF SMALL BUILDING ELEMENTS ACCORDING TO ISO 10140-2:2010

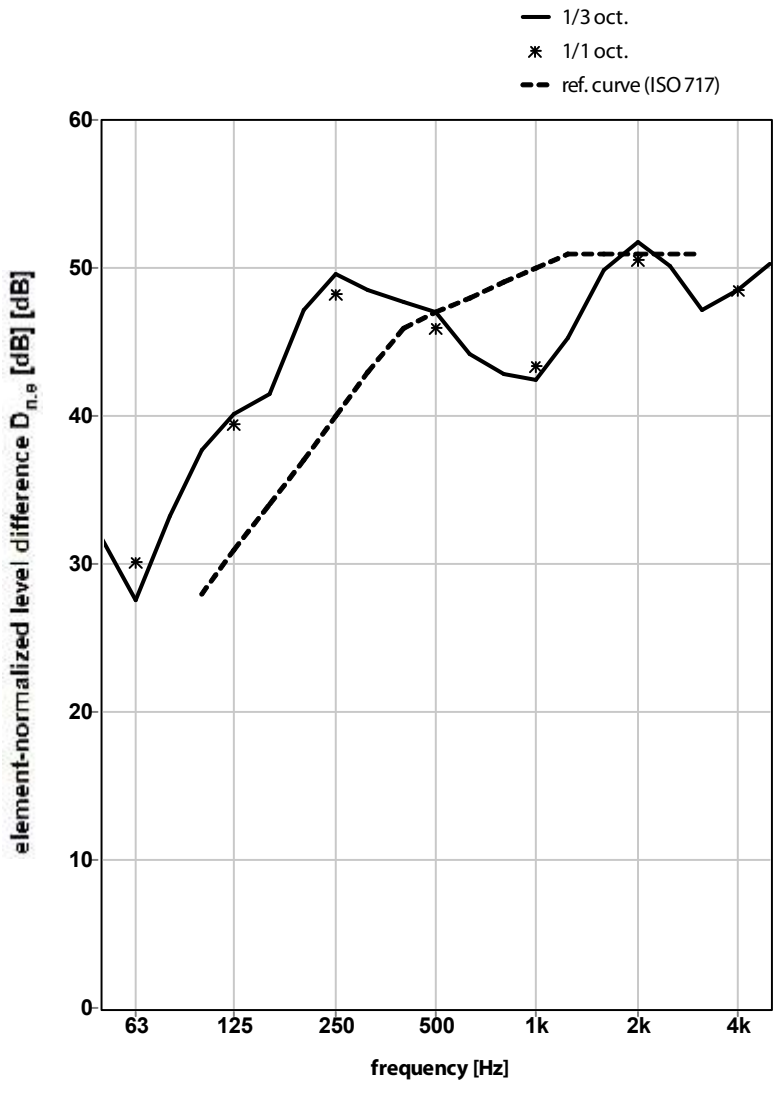
TESTEN RvA L 334

principal: Trim Trading

construction tested:

Homebox the isolated postbox
outside dimensions (W x H): 338 x 78 mm
dimensions opening (W x H): 265 x 35 mm
depths: 70 mm

variant 2; inside cover open / outside cover closed



volume measuring room: 214 m³

volume measuring room: 115 m³

reference area: 10 m²

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

		31,7	37,7	47,2	47,7	42,9	49,9	47,2	
	1/3 oct.	27,5	40,1	49,6	47,0	42,4	51,8	48,5	dB
		33,2	41,5	48,5	44,2	45,3	50,2	50,3	
	1/1 oct.	**30,1**	**39,5**	**48,3**	**46,0**	**43,4**	**50,6**	**48,5**	**dB**

ISO 717-1:2013

$D_{n,e,w}(C;C_{tr}) = 47(-1;-2)$ dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000} = (0;-2)$ dB

$C_{50\text{-}3150};C_{tr,50\text{-}3150} = (-1;-4)$ dB

$C_{50\text{-}5000};C_{tr,50\text{-}5000} = (0;-4)$ dB

Mook, measured at 26-07-2019

MEASUREMENT OF THE AIRBORNE SOUND INSULATION OF SMALL BUILDING ELEMENTS ACCORDING TO ISO 10140-2:2010

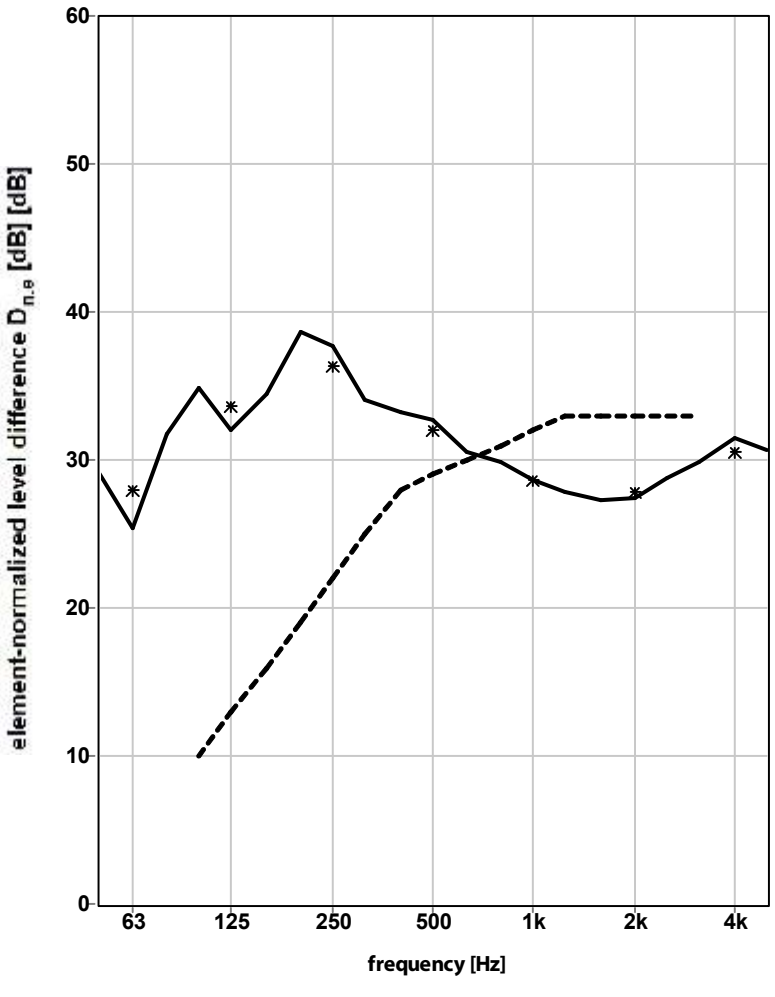
TESTEN RvA L 334

principal: Trim Trading

construction tested: #5; brievenbus beide zijden open

Homebox the isolated postbox
outside dimensions (W x H): 338 x 78 mm
dimensions opening (W x H): 265 x 35 mm
depths: 70 mm

variant 2; both (inside / outside) covers open



volume measuring room: 214 m³

volume measuring room: 115 m³

reference area: 10 m²

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

	29,2	34,9	38,7	33,2	29,8	27,3	29,8	
1/3 oct.	25,4	32,0	37,7	32,7	28,7	27,4	31,5	dB
	31,7	34,4	34,0	30,6	27,8	28,8	30,7	
1/1 oct.	**28,0**	**33,6**	**36,3**	**32,0**	**28,7**	**27,8**	**30,6**	**dB**

ISO 717-1:2013

$D_{n,e,w}(C;C_{tr}) = 29(0;0)$ dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000} = (0;0)$ dB

$C_{50\text{-}3150};C_{tr,50\text{-}3150} = (0;0)$ dB

$C_{50\text{-}5000};C_{tr,50\text{-}5000} = (0;0)$ dB

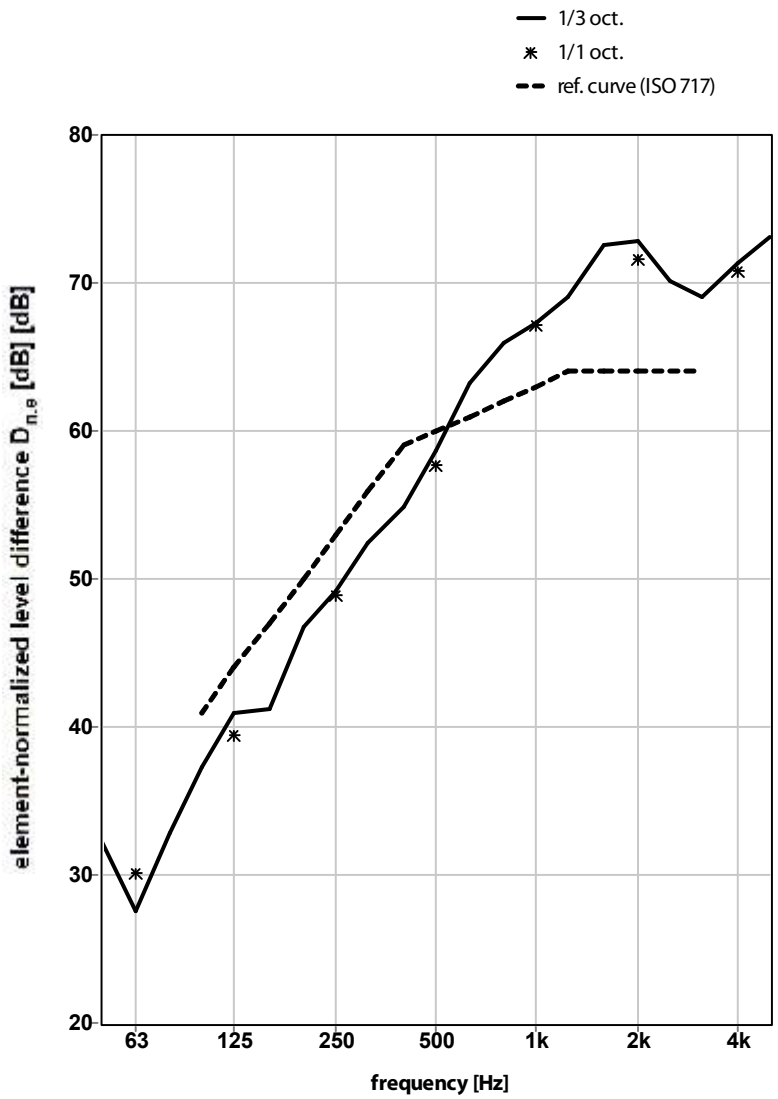
Mook, measured at 26-07-2019

MEASUREMENT OF THE AIRBORNE SOUND INSULATION OF SMALL BUILDING ELEMENTS ACCORDING TO ISO 10140-2:2010

TESTEN RvA L 334

principal: Trim Trading

construction tested: built-in construction defined as the "element normalized level difference, $D_{n,e}$"



volume measuring room: 214 m^3

volume measuring room: 115 m^3

reference area: 10 m^2

measured at:
Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

ISO 717-1:2013

$D_{n,e,w}(C;C_{tr}) = 60(-2;-7)$ dB

$C_{100\text{-}5000};C_{tr,100\text{-}5000} = (-1;-7)$ dB

$C_{50\text{-}3150};C_{tr,50\text{-}3150} = (-4;-13)$ dB

$C_{50\text{-}5000};C_{tr,50\text{-}5000} = (-3;-13)$ dB

	32,3	37,3	46,8	54,9	65,9	72,5	69,0	
1/3 oct.	27,5	41,0	49,2	58,7	67,3	72,9	71,4	dB
	32,9	41,2	52,4	63,3	69,1	70,1	73,1	
1/1 oct.	**30,2**	**39,4**	**48,9**	**57,7**	**67,2**	**71,6**	**70,8**	**dB**

Mook, measured at 26-07-2019