

## Laboratory for Acoustics

*Determination of the insertion loss of two different pipe insulation blankets Econtras® (DN300), made by C.J. van Waas B.V.*



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

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## 1 Introduction

At the request of Isolatiebedrijf C.J. van Waas B.V. based in Barendrecht (Netherlands) measurements (insertion loss) have been carried out on two different:

**Acoustic insulation blankets for pipes, valves and flanges  
type Econtras®  
made by C.J. van Waas**

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



The insertion loss is calculated based on Sound Power Level measurements in the reverberation room. 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: European Accreditation Organisation MultiLateral Agreement**: <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 and to:

ISO 15665:2003                      Acoustics - Acoustic insulation for pipes, valves and flanges

which standard refers to:

ISO 3741:2010                      Acoustics - Determination of sound power levels of noise sources  
using

sound pressure - Precision methods for reverberation rooms

NOTE:                                this international standard has been accepted within all EU-  
countries as European Norm EN ISO 3741:2010

### 3 Tested constructions

The dimensions and masses have been provided by the principal.  
The following prefabricated insulation blankets were used:

#### **Insulation blanket Econtras® type 1 (total thickness 100 mm)**

Inside cover	high temperature glass cloth type W1080T700 mass 1000 gr/m <sup>2</sup> thickness 1,2 mm
Filling resilient	glass wool Isover Tech Roll type PSI 713 mass 35 kg/m <sup>3</sup> thickness 50 mm
Mass filling	stone wool Rockwool type Prorox LF970 mass 155 kg/m <sup>3</sup> thickness 50 mm
Damping layer	EPDM
Outer cover	Silicone coated glass cloth type Temtex 420/SG1 mass 520 gr/m <sup>2</sup> thickness 0,45 mm

#### **Insulation blanket Econtras® type 2 (total thickness 50 mm)**

Inside cover	high temperature glass cloth type W1080T700 mass 1000 gr/m <sup>2</sup> thickness 1,2 mm
Mass filling	stone wool Rockwool type Prorox LF970 mass 155 kg/m <sup>3</sup> thickness 50 mm
Damping layer	EPDM
Outer cover	Antistatic glass cloth type Stam 3739 mass 759 gr/m <sup>2</sup> thickness 1,2 mm



*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 test was conducted in accordance with the provisions of the test method ISO 15665 in the Laboratory for Acoustics of Peutz bv in Mook. A detailed description of the test set up has been given in figure 2 of this report.

A steel pipe (323 mm outer diameter; wall thickness 6.3 mm) is installed crossing the reverberation room, both ends of the pipe penetrating through the walls of the room. The penetrations have been sealed adequately.

Noise is introduced in this pipe using a loudspeaker mounted in one end. The opposite end of the pipe is terminated by means of a closed anechoic termination.

A microphone on a rotating boom is used in the reverberation room in order to measure the noise radiated from the pipe before and after insulation is applied to the pipe.

The reverberation time of the room is also determined before and after insulation is applied to the pipe.

From each set of measurements (sound pressure level and reverberation time) the sound power level  $L_W$  radiated into the reverberation room is calculated according to ISO 3741<sup>1)</sup>.

The insertion loss  $D_W$  caused by the cladding is now calculated as

$$D_W = L_{W,b} - L_{W,c}$$

in which:

$L_{W,b}$  = the sound power level with the bare pipe

$L_{W,c}$  = the sound power level with the insulated pipe



1 For this type of measurements the Laboratory for Acoustics has been accredited by the Dutch Council for Accreditation (RvA) as a test laboratory, registration number L334.



## 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).

Based on various investigations there is indicated within ISO 3741:2010 which reproducibility may be expected, see table 4.1:

t4.1 *Estimated upper values of the standard deviations of reproducibility of sound power levels determined in accordance ISO 3741:2010*

Band width	mid-band frequencies [Hz]	upper values of standard deviation of reproducibility [dB]
1/3 octave	100 <sup>a</sup> tot 160	3,0
	200 tot 315	2,0
	400 to 5000	1,5
	6300 tot 1000	3,0
1/1 octave	125 <sup>a</sup>	2,5
	250	1,5
	500 to 4000	1,0
	8000	2,0
A-weighted per Annex E		0,5 <sup>b</sup>

<sup>a</sup> Recommendations for frequencies below 100 Hz: are given in Annex C

<sup>b</sup> Applicable to a source which emits noise with a relatively "flat" spectrum in the frequency range 100 Hz to 10000 Hz

## 4.3 Classification

In ISO 15665 a classification system is given in order to give a simple way to classify the material under test. It has to be mentioned that before comparison the octave-band insertion loss values have to be rounded to the nearest 0,5 dB.

Table 1 of ISO 15665 is reproduced here partly (table 4.2), it is simplified for the nominal diameter of the used pipe (DN300; 310 mm inner diameter, 323 mm outer diameter).

t4.2 *Minimum insertion loss required for each class for a pipe diameter  $300 \leq D \leq 650$  mm*

Class	octave band centre frequency [Hz]						
	125	250	500	1000	2000	4000	8000
	minimum insertion loss [dB]						
A2	-4	-4	2	9	16	22	29
B2	-9	-3	6	15	24	33	42
C2	-7	4	14	24	34	38	42

#### 4.4 Environmental conditions during the test

##### 4.3 Environmental conditions during the tests

Barometric pressure [kPa]	Temperature [°C]	Humidity [%]
102,1 - 103,2	18 - 19	52 - 56

#### 4.5 Results

The results of the measurements are given in table 4.4 and in the figures 3 and 4.

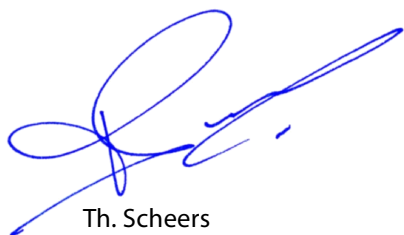
Measurements and calculations are made in 1/3 octave bands from 50 to 10 000 Hz. From the final results the octave-band insertion loss has been calculated from 125 to 8000 Hz. From the rounded octave-band values the Class has been determined and stated.

## t4.4 Measurements results

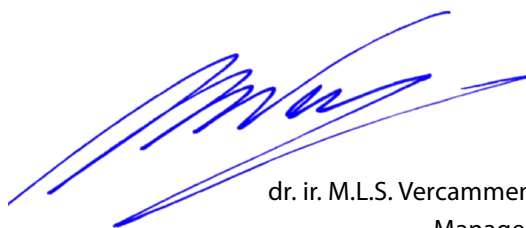
INSERTION LOSS [dB]				
blanket type built up (inside → outside)  record nr. figure nr.	1		2	
	glass cloth		glass cloth	
	50 mm glass wool 50 mm stone wool damping layer EPDM silicone coated glass cloth		50 mm stone wool damping layer EPDM antistatic glass cloth	
	#58 3		#75 4	
frequency [Hz]	1/3 oct.	1/1 oct.	1/3 oct.	1/1 oct.
50	>-3,6		>-4,4	
63	-6,8	>-4,6	-2,7	>-4,4
80	-2,0		-5,6	
100	4,1		-4,1	
125	2,6	4,0	-9,2	-6,3
160	5,7		-2,6	
200	4,9		-3,6	
250	3,0	4,5	1,2	-0,8
315	6,1		2,7	
400	16,3		7,9	
500	>23,1	>20,1	12,6	11,1
630	29,0		17,4	
800	31,1		21,3	
1000	39,3	34,9	30,0	25,2
1250	41,8		32,6	
1600	46,8		40,2	
2000	44,9	45,6	38,9	40,2
2500	45,2		42,2	
3150	44,8		45,1	
4000	46,6	46,1	46,0	46,0
5000	47,1		47,1	
Class (ISO 15665)	A2, B2 and C2		B2	

The results were obtained using the described measurement set-up under laboratory conditions. In situations where the sound field excitation, the dimensions and/or method of mounting differ from the ones tested, different results may be found.

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 is valid as long as the tested constructions and/or materials are unchanged.



Th. Scheers  
Laboratory Supervisor

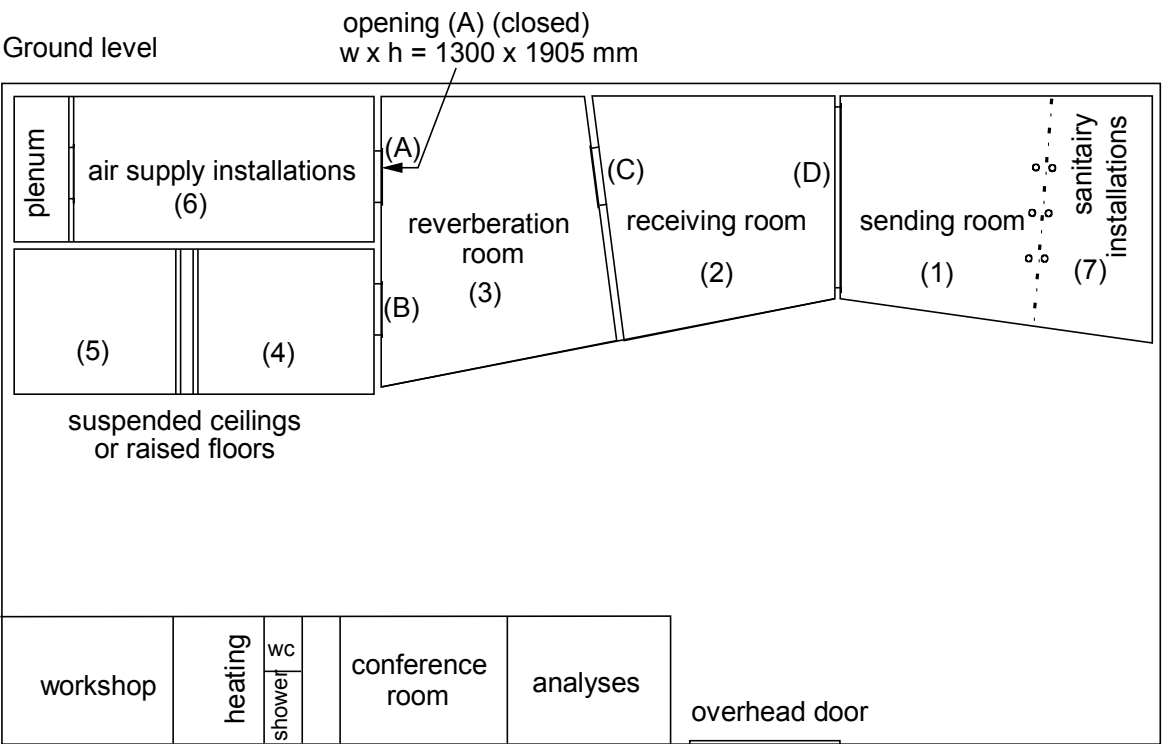
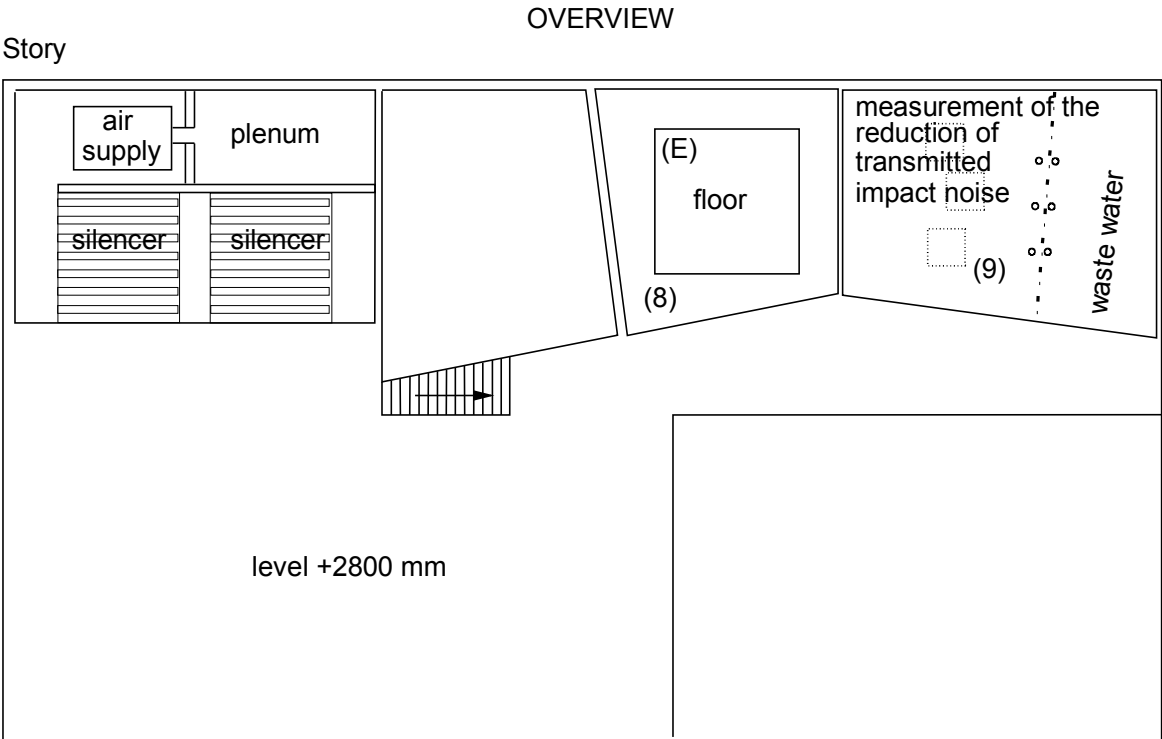


dr. ir. M.L.S. Vercammen  
Manager

Mook,

This report contains 12 pages and 4 figures.

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



TEST OPENINGS (w x h in mm)

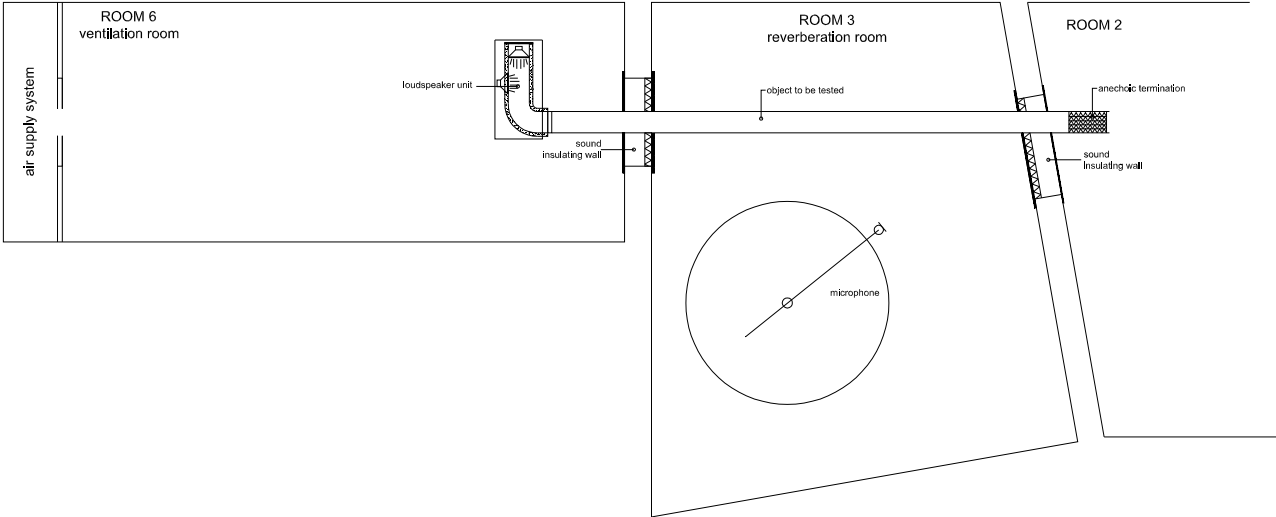
(B) 1000 x 2200

(C) 1500 x 1250

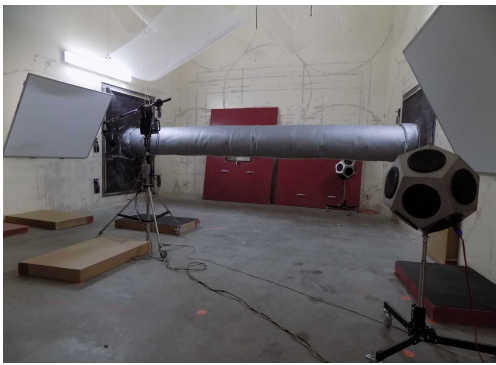
(D) 4300 x 2800

(E) 4000 x 4000

0 1 2 3 4 5 m  
scale



ROOM 6



ROOM 3



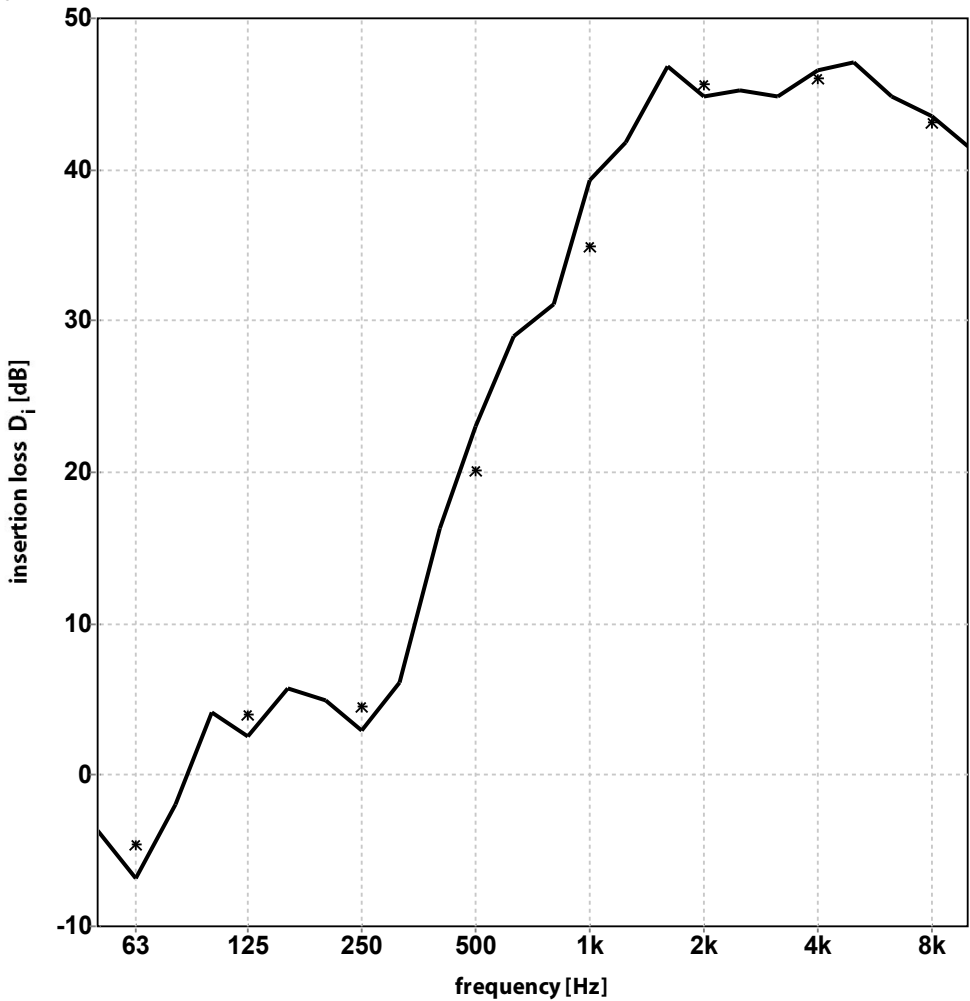
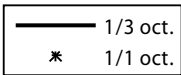
ROOM 2

INSERTION LOSS ACCORDING TO ISO 7235:2003

principal: Installatiebedrijf C.J. van Waal B.V.

Insulation blanket Econtras® type 1 (total thickness 100 mm)

- Inside cover high temperature glass cloth  
type W1080T700  
mass 1000 gr/m<sup>2</sup>  
thickness 1,2 mm
- Filling resilient glass wool Isover Tech Roll  
type PSI 713  
mass 35 kg/m<sup>3</sup>  
thickness 50 mm
- Mass filling stone wool Rockwool  
type Prorox LF970  
mass 155 kg/m<sup>3</sup>  
thickness 50 mm
- Damping layer EPDM
- Outer cover Silicone coated glass cloth  
type Temtex 420/SG1  
mass 520 gr/m<sup>2</sup>  
thickness 0,45 mm



Class (ISO 15665): A2, B2 and C2

	>-3,6	4,1	4,9	16,3	31,1	46,8	44,8	44,9
1/3 oct.	-6,8	2,6	3,0	>23,1	39,3	44,9	46,6	43,5 dB
	-2,0	5,7	6,1	29,0	41,8	45,2	47,1	41,5
1/1 oct.	>-4,6	4,0	4,5	>20,1	34,9	45,6	46,1	43,1 dB

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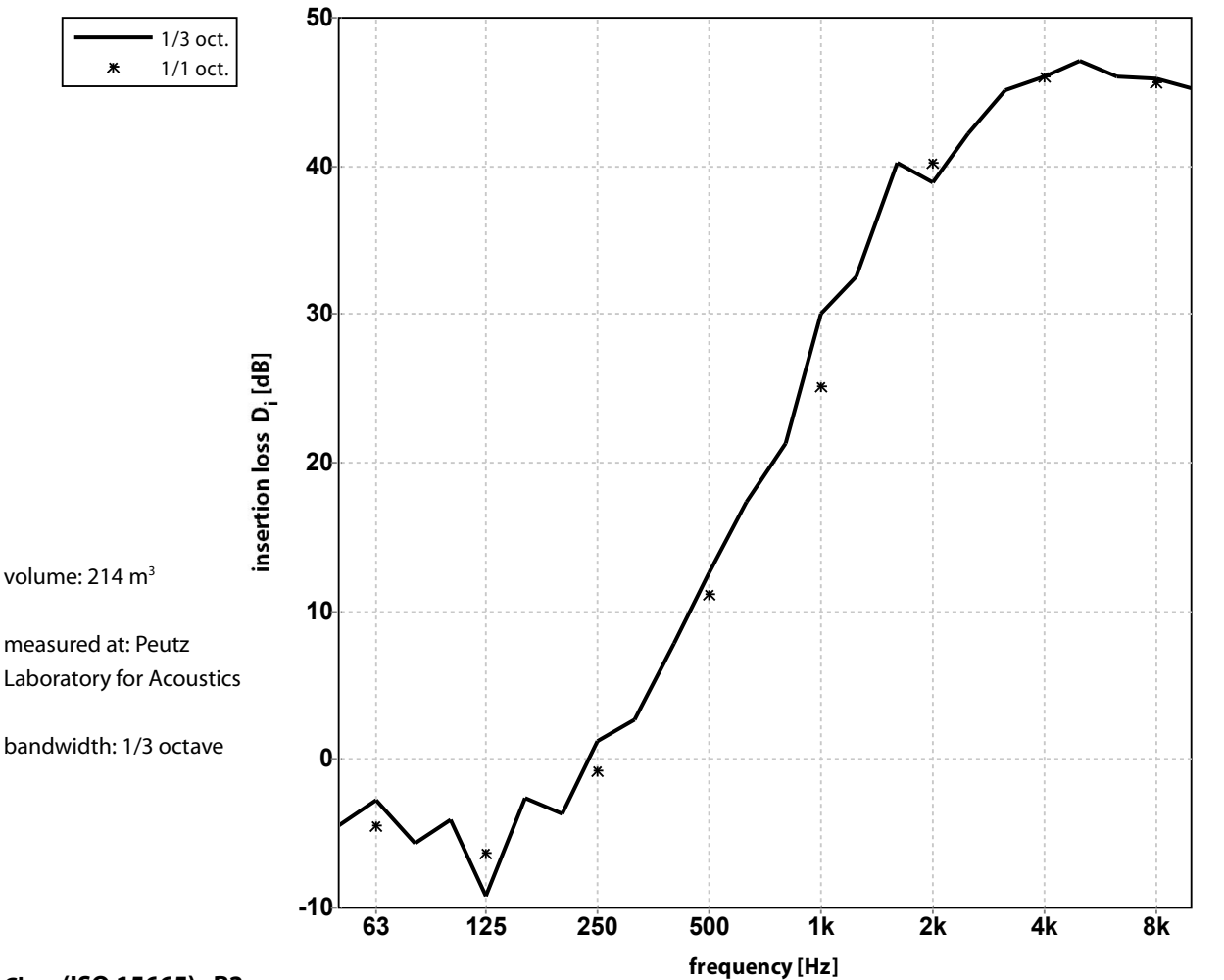
Mook, 04-02-2016

INSERTION LOSS ACCORDING TO ISO 7235:2003

principal: Installatiebedrijf C.J. van Waal B.V.

Insulation blanket Econtras® type 2 (total thickness 50 mm)

- Inside cover    high temperature glass cloth  
                  type W1080T700  
                  mass 1000 gr/m<sup>2</sup>  
                  thickness 1,2 mm
- Mass filling    stone wool Rockwool  
                  type Prorox LF970  
                  mass 155 kg/m<sup>3</sup>  
                  thickness 50 mm
- Damping layer   EPDM
- Outer cover    Antistatic glass cloth  
                  type Stam 3739  
                  mass 759 gr/m<sup>2</sup>  
                  thickness 1,2 mm



Class (ISO 15665): B2

	>-4,4	-4,1	-3,6	7,9	21,3	40,2	45,1	46,0	
1/3 oct.	-2,7	-9,2	1,2	12,6	30,0	38,9	46,0	45,9	dB
	-5,6	-2,6	2,7	17,4	32,6	42,2	47,1	45,3	
1/1 oct.	>-4,4	-6,3	-0,8	11,1	25,2	40,2	46,0	45,7	dB

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Mook, 04-02-2016