

## Laboratory for Acoustics



*Determination of the sound insulation of a ventilation grill type 449-225, manufacturer Renson*





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### *Determination of the sound insulation of a ventilation grill type 449-225, manufacturer Renson*

|                |                                                                                                     |
|----------------|-----------------------------------------------------------------------------------------------------|
| Principal      | Renson Ventilation nv<br>Maalbeekstraat (Industriezone 2 Vijverdam) 10<br>B-8790 WAREGEM<br>Belgium |
| Report number  | A 4328-5E-RA-001                                                                                    |
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## 1 Introduction

At the request of Renson Ventilation nv in Waregem (Belgium) sound insulation measurements have been carried out on;

**ventilation grill type 449-225**  
**manufacturer Renson**

The measurements were performed in the Laboratory for Acoustics of Peutz bv, situated at Lindenlaan 41, 6584 AC in Molenhoek (the Netherlands). See Appendix 2 for a plan of the laboratory.



## 2 Standards and guidelines

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

|                                  |                                                                                                                                            |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| EN ISO 10140-1:2021              | Acoustics - Laboratory measurements of sound insulation of building elements – Part 1: Application rules for specific products             |
| EN ISO 10140-2:2021 <sup>1</sup> | Acoustics - Laboratory measurements of sound insulation of building elements – Part 2: Measurement of airborne sound insulation            |
| EN ISO 10140-4:2021              | Acoustics - Laboratory measurements of sound insulation of building elements – Part 4: Measurement procedures and requirements             |
| EN ISO 10140-5:2021              | Acoustics - Laboratory measurements of sound insulation of building elements – Part 5: Requirements for test facilities and equipment      |
| EN ISO 12999-1:2020              | Acoustics – Determination and application of measurement uncertainties in building acoustics – Part 1: Sound insulation (ISO 12999-1:2020) |
| EN ISO 717-1:2020 <sup>1</sup>   | Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation                           |

1



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>).

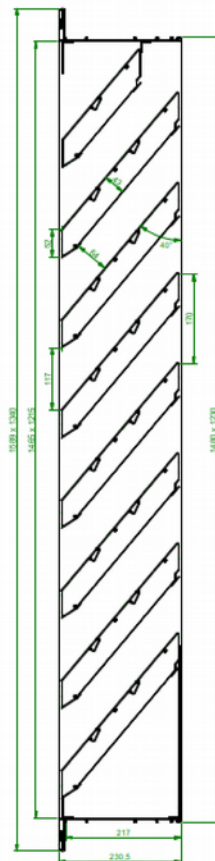
*EA: "Certificates and reports issued by bodies accredited by MLA and MRA members are considered to have the same degree of credibility, and are accepted in MLA and MRA countries."*

### 3 Tested ventilation grill

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

The following ventilation grill is tested (for drawing see appendix 4):

|                                      |                      |
|--------------------------------------|----------------------|
| type:                                | <b>449-225</b>       |
| manufacturer:                        | Renson               |
| dimensions (width x height x depth): | 1230 x 1480 x 230 mm |
| distance between slats:              | 170 mm               |
| minimum opening between slats:       | 64 mm                |
| length slats:                        | 1215,4 mm            |
| number of slats:                     | 8                    |



*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 set-up and method

The grill to be tested is built in the test opening C (dimensions W x H = 1500 x 1250 mm) between testing rooms 2 and 3.

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 appendix 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 of an object is defined as the "sound reduction index R" to be evaluated according to formula 4.1 and expressed in dB:

$$R = L_1 - L_2 + 10 \lg \left( \frac{S}{A} \right) \quad (4.1)$$

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<sup>2</sup>]

$A$  = equivalent sound absorption [m<sup>2</sup>] in the receiving room according to:

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

in which:

$V$  = volume of the receiving room [m<sup>3</sup>]

$T$  = 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

The repeatability describes 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 difference between the two test results.

As stated in the ISO 12999-1 standard, the repeatability with regard to the single number value  $R_w$  is  $\pm 0,8$  dB. See appendix 1 of this report for a further explanation.

### 4.2.2 Reproducibility

The reproducibility describes when: - two tests are performed on identical test material - in different laboratories - by different person(s) - under different environmental conditions - the difference between the two test results.

As stated in the ISO 12999-1 standard, the reproducibility with regard to the single number value  $R_w$  is  $\pm 2,4$  dB. See appendix 1 of this report for a further explanation.



## 4.3 Environmental conditions during the measurements

t4.1 *Environmental conditions during the measurements at February 6<sup>th</sup>, 2023*

| Measuring room | temperature<br>[°C] | relative humidity<br>[%] | barometric pressure<br>[kPa] |
|----------------|---------------------|--------------------------|------------------------------|
| 2              | 17,3                | 52                       | 103,8                        |
| 3              | 18,0                | 45                       | 103,8                        |

## 4.4 Results

The results of the measurements are given in table 4.2 and in the figure of appendix 3. In the table and graphs the values of the insulation found are presented in 1/3 octave bands. From those values the following single-number quantities have been calculated and stated:

- the "weighted sound reduction index  $R_w$ " and the spectrum adaptation terms  $C$  and  $C_{tr}$  according to ISO 717-1;

## t4.2 Measurement results **Ventilation grill type 449-225**

|                                                 | airborne sound insulation R [dB] |          |
|-------------------------------------------------|----------------------------------|----------|
| record nr.                                      | #221                             |          |
| appendix nr.                                    | 3.1                              |          |
| frequency [Hz]                                  | 1/3 oct.                         | 1/1 oct. |
| 50                                              | 6,7                              |          |
| 63                                              | 7,7                              | 7,8      |
| 80                                              | 9,5                              |          |
| 100                                             | 4,3                              |          |
| 125                                             | 5,5                              | 4,7      |
| 160                                             | 4,3                              |          |
| 200                                             | 3,9                              |          |
| 250                                             | 4,3                              | 4,6      |
| 315                                             | 5,7                              |          |
| 400                                             | 6,3                              |          |
| 500                                             | 7,6                              | 7,7      |
| 630                                             | 10,2                             |          |
| 800                                             | 12,9                             |          |
| 1000                                            | 15,5                             | 15,0     |
| 1250                                            | 18,1                             |          |
| 1600                                            | 19,2                             |          |
| 2000                                            | 18,7                             | 18,1     |
| 2500                                            | 16,7                             |          |
| 3150                                            | 15,4                             |          |
| 4000                                            | 14,2                             | 14,3     |
| 5000                                            | 13,5                             |          |
| <b>R<sub>w</sub>(C;C<sub>tr</sub>)</b>          | <b>13(0;-3) dB</b>               |          |
| R <sub>w</sub>                                  | 13,8 ± 2,4 dB                    |          |
| C <sub>100-5000</sub> ;C <sub>tr,100-5000</sub> | (0;-3) dB                        |          |
| C <sub>50-3150</sub> ;C <sub>tr,50-3150</sub>   | (-1;-3) dB                       |          |
| C <sub>50-5000</sub> ;C <sub>tr,50-5000</sub>   | (0;-3) dB                        |          |

The results as presented here are based on a testing area of 1,88 m<sup>2</sup>. In situations where different dimensions and/or method of mounting differ from the ones tested, different results may be found.

R.T. Allan  
Laboratory Supervisor

Mook,

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

This report contains 11 pages and 4 appendices.

|            |                       |           |
|------------|-----------------------|-----------|
| appendix 1 | Standard uncertainty  | (1 page)  |
| appendix 2 | Plans and Sections    | (2 pages) |
| appendix 3 | Measurement results   | (1 page)  |
| appendix 4 | Construction drawings | (1 page)  |

## Appendix 1 Standard uncertainty

In table I.1 the general standard uncertainties for the single number quantities are given as mentioned in the standard ISO 12999-1:2020, Chapter 7. These values are derived from inter-laboratory tests on different type of test specimens, including walls, glazing and windows.

tl.1 Standard Uncertainties (partly taken from table 3 of the EN ISO 12999-1)

| Single Number           | repeatability<br>Standard Uncertainty $\sigma_r$ [dB] | reproducibility<br>Standard Uncertainty $\sigma_R$ [dB] |
|-------------------------|-------------------------------------------------------|---------------------------------------------------------|
| $R_W$                   | 0,4                                                   | 1,2                                                     |
| $R_W + C_{100-3150}$    | 0,5                                                   | 1,3                                                     |
| $R_W + C_{100-5000}$    | 0,5                                                   | 1,3                                                     |
| $R_W + C_{50-3150}$     | 0,7                                                   | 1,3                                                     |
| $R_W + C_{50-5000}$     | 0,7                                                   | 1,3                                                     |
| $R_W + C_{tr,100-3150}$ | 0,7                                                   | 1,5                                                     |
| $R_W + C_{tr,100-5000}$ | 0,7                                                   | 1,5                                                     |
| $R_W + C_{tr,50-3150}$  | 1,0                                                   | 1,5                                                     |
| $R_W + C_{tr,50-5000}$  | 1,0                                                   | 1,5                                                     |

For measurements obtained in accordance with the ISO 10140 series, the expanded uncertainty  $U$  shall be calculated by:

$$U = k u \quad (1.1)$$

in which:

$u$  = the standard uncertainty see table I.1

$k$  = the coverage factor

A measurement result shall be read as follows:

$$Y = y \pm U \quad (1.2)$$

in which:

$Y$  = the measurand,  $y$  the best estimate found by the measurement; and

$U$  = the expanded uncertainty calculated for a given confidence level. For a normal distribution of measured values, there is a 95% confidence that the true value lies within the range  $(y-U)$  to  $(y+U)$ . This corresponds to a coverage factor of  $k=2$

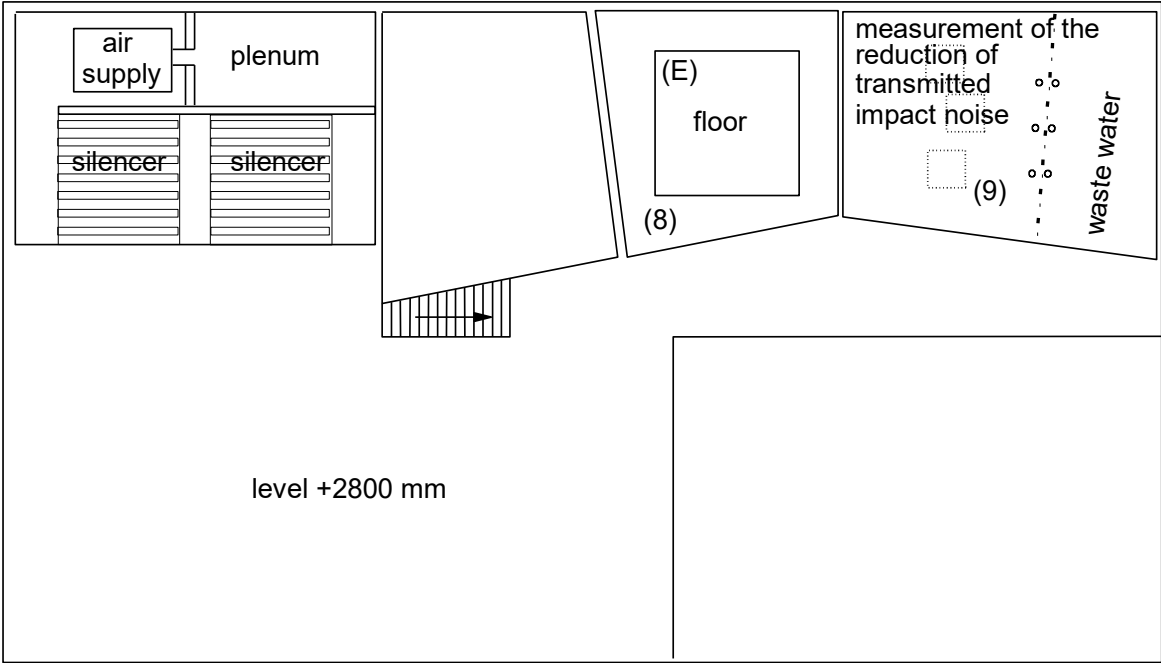
### EXAMPLE

The airborne sound insulation will be designated as:  $R_W = 28,3 \pm 2,4$  dB ( $k = 2$ , two sided).

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

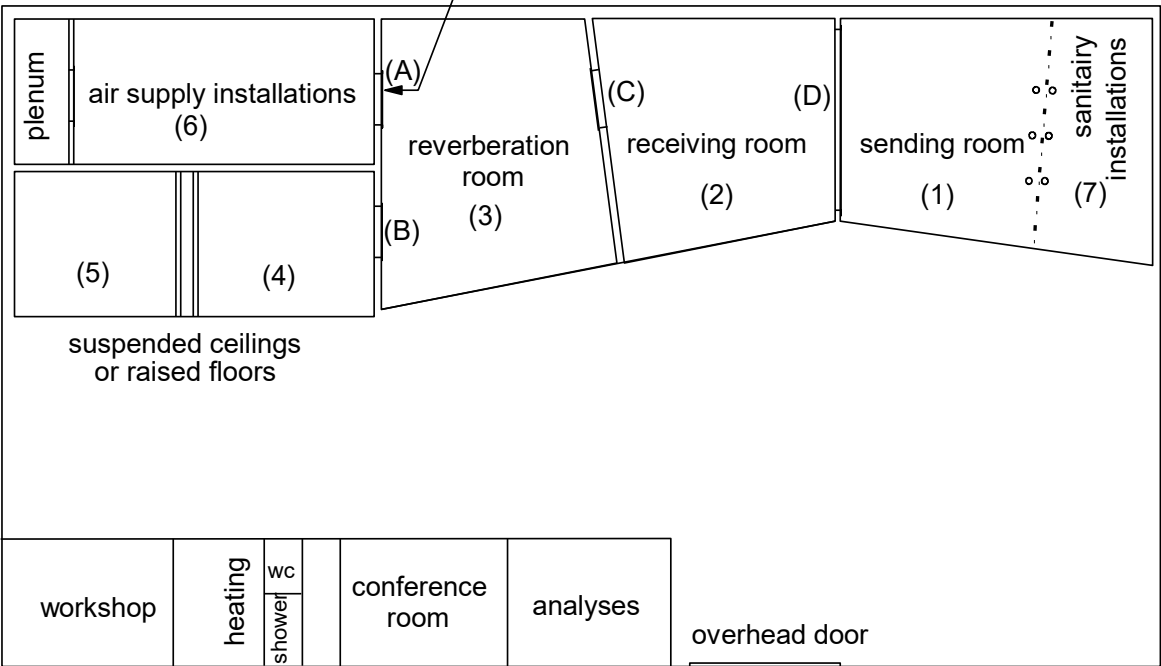
OVERVIEW

Story



Ground level

opening (A) (closed)  
w x h = 1300 x 1905 mm



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 the receiving room: 115 m<sup>3</sup>

volume of the reverberation room: 214 m<sup>3</sup>

area of the test specimen: 1.88 m<sup>2</sup>

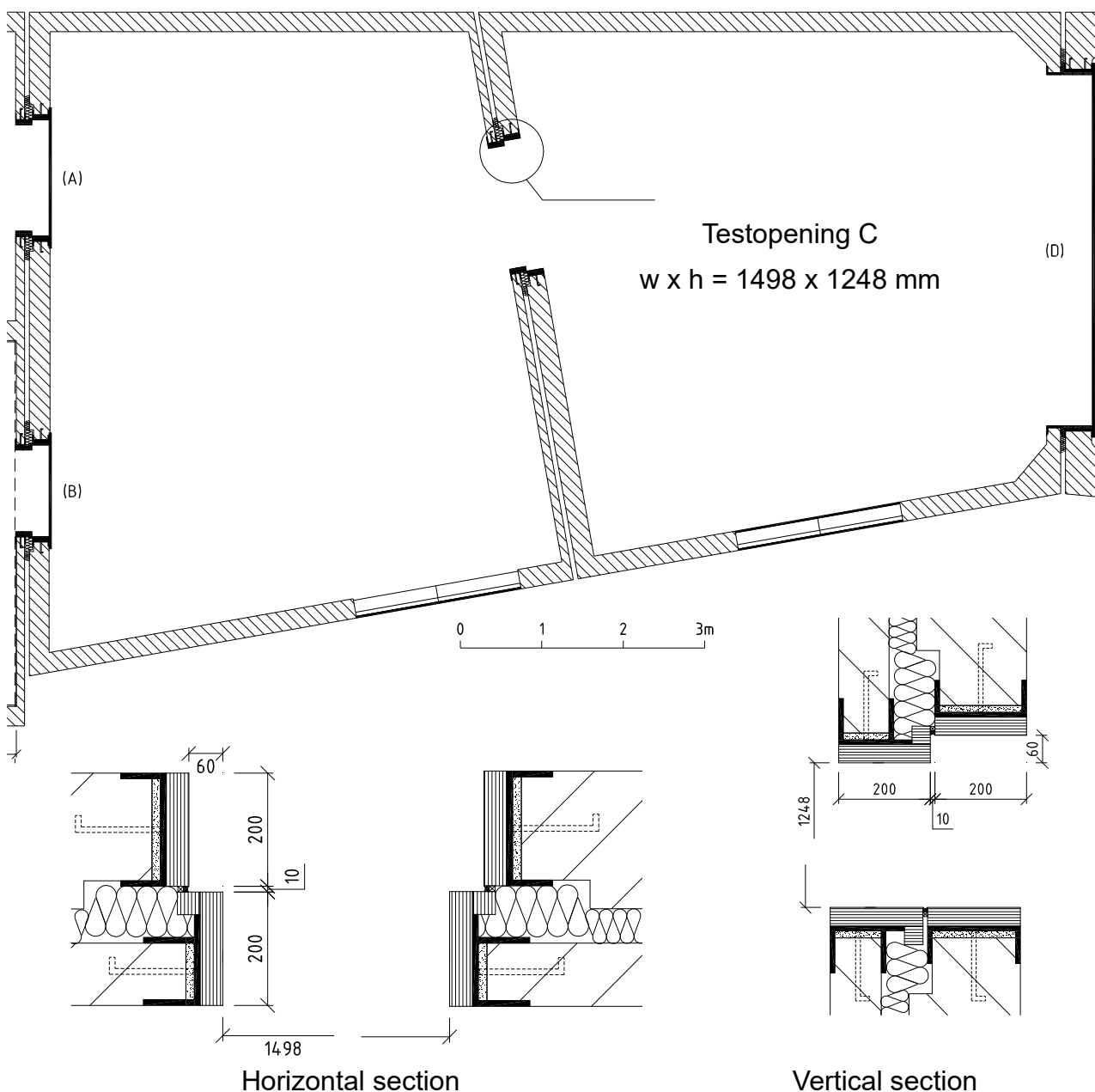
Both rooms are isolated for vibrations by using a so called room-in-room construction. Flanking transmission is thus minimised.

closed other testopenings (nominal width x height in mm)

(A): 1300 x 1800

(B): 1000 x 2200

(D): 4300 x 2800



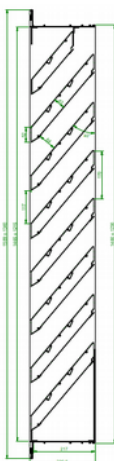
## MEASUREMENT OF THE SOUND INSULATION ACCORDING TO ISO 10140-2:2021

principal: Renson Ventilation nv



construction tested:

type: **449-225**  
 manufacturer: Renson  
 dimensions (width x height x depth): 1230 x 1480 x 230 mm  
 distance between slats: 170 mm  
 minimum opening between slats: 64 mm  
 length slats: 1215,4 mm  
 number of slats: 8



volume measuring room: 214 m<sup>3</sup>

volume measuring room: 115 m<sup>3</sup>

surface area tested partition: 1,88 m<sup>2</sup>

measured at:  
 Peutz Laboratory for Acoustics

signal: broad-band noise

bandwidth: 1/3 octave

ISO 717-1:2020

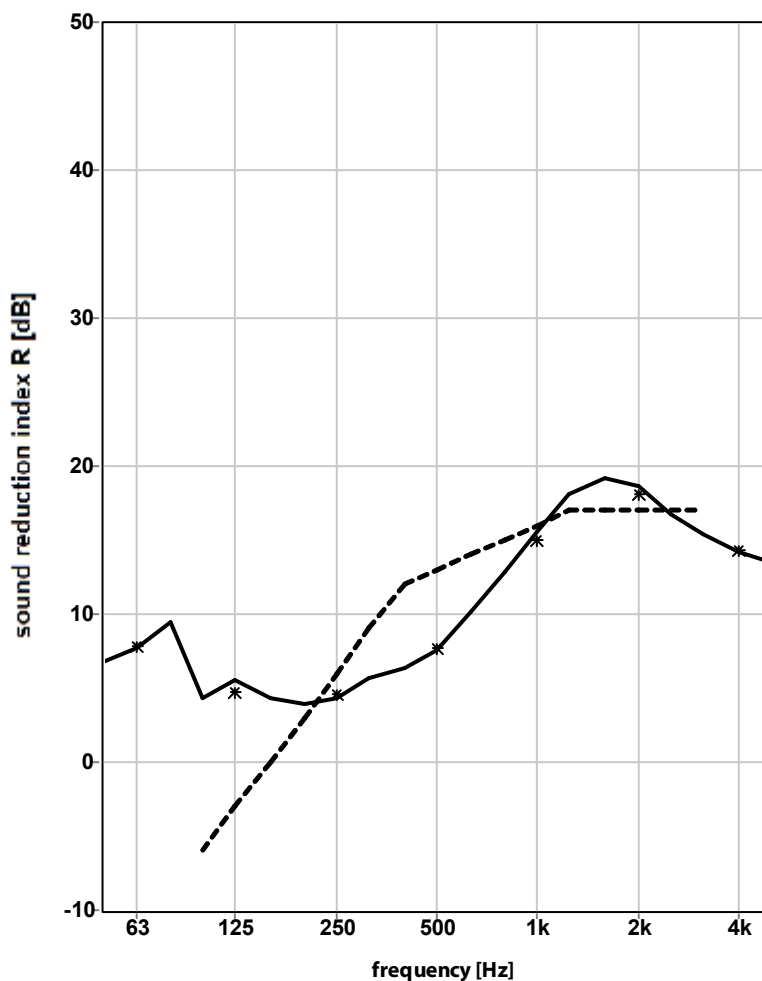
$$R_w(C;C_{tr}) = 13(0;-3) \text{ dB}$$

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

$$C_{50-3150}; C_{tr,50-3150} = (-1;-3) \text{ dB}$$

$$C_{50-5000}; C_{tr,50-5000} = (0;-3) \text{ dB}$$

— 1/3 oct.  
 \* 1/1 oct.  
 - - - ref. curve (ISO 717)

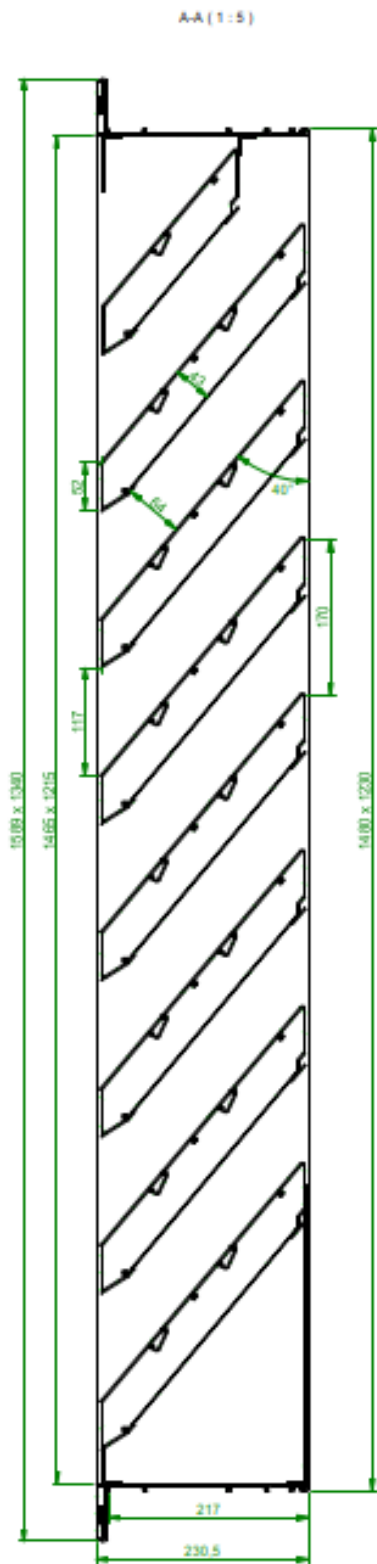


|          |     |     |     |      |      |      |      |
|----------|-----|-----|-----|------|------|------|------|
|          | 6,7 | 4,3 | 3,9 | 6,3  | 12,9 | 19,2 | 15,4 |
| 1/3 oct. | 7,7 | 5,5 | 4,3 | 7,6  | 15,5 | 18,7 | 14,2 |
|          | 9,5 | 4,3 | 5,7 | 10,2 | 18,1 | 16,7 | 13,5 |
| 1/1 oct. | 7,8 | 4,7 | 4,6 | 7,7  | 15,0 | 18,1 | 14,3 |
|          | dB  |     |     |      |      |      |      |

RA

publication is permitted for the entire page only

Mook, measured at 07-02-2023



|                                                                                                                                                                                                                                                                                                            |          |                                             |                          |                         |             |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------|--------------------------|-------------------------|-------------|---------------------------------------------------------------------------------------|
| Mat. :                                                                                                                                                                                                                                                                                                     | Finish : | Weight : 13,272 kg                          | Area :                   | Volume : 19135,655 cm   | Base part : | Tot. :                                                                                |
|  <b>RENSON®</b><br>Creating healthy spaces<br><small>www.renson.eu - 8790 Waregem (Belgium)</small><br><small>This drawing is owned by RENSON and its content is strictly confidential unless otherwise stated.</small> |          | Description : 449 / 225                     |                          |                         |             | Sheet : 1 / 1                                                                         |
|                                                                                                                                                                                                                                                                                                            |          | Use : Acoustische Raster                    |                          |                         |             | Scale : 1 : 5                                                                         |
| Part. nr. : r0248358                                                                                                                                                                                                                                                                                       |          | Revision :                                  | State : Work in Progress | Date Saved : 23/12/2023 | Size : A3   | Drawn : ealia                                                                         |
|                                                                                                                                                                                                                                                                                                            |          | Doc. nr. : r0248358 - ASSY REGISTER 449_225 |                          |                         |             |  |