

Raumakustik • Bauphysik
Medientechnik • Schallschutz
VMPA Schallschutzprüfstelle nach DIN 4109
Messstelle nach § 29b
Bundes-Immissionsschutzgesetz

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Ru A6517-I
170310 prüf-IV-1-engl

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Gräf (Cert. Eng.), extension: -18
10 March 2017

TEST CERTIFICATE

• Determination of sound insulation R'_w in accordance with DIN EN ISO 140-3 / 717-1 •

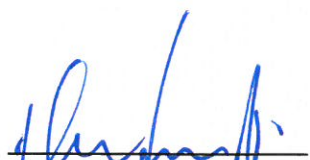
Test object: Influence of switch and socket boxes (cavity wall boxes)
Type 9464-02 integrated in lightweight walls on
sound insulation

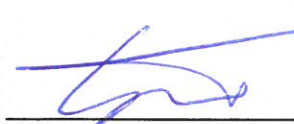
Applicant: Kaiser GmbH & Co. KG
Ramsloh 4
58579 Schalksmühle

Test certificate no.: A6517-IV

Drawn up on: 10 March 2017




(GRANER+PARTNER)


(head of testing centre)


(measurement engineer)



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Appendices

Evaluation diagrams for constructional sound reduction indices

1. General provisions

The sound reduction index of the test material is determined in accordance with
DIN EN ISO 140 / 717.

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The test certificate will remain valid for as long as the manufacturer guarantees continued use of the materials tested with the same properties and structures.

Revocation of test certificate

The test certificate may be revoked by G + P if the conditions for its issue are no longer fulfilled. This applies in particular if materials or structural designs have been altered, so that the product no longer corresponds to the version tested.

2. System description of test material / test set-up

The aim of the examinations conducted here was to ascertain the extent to which cavity wall boxes designed to accommodate light switches, sockets and other similar devices installed in lightweight partition walls compromise the sound insulation of those walls.

To this end, a lightweight wall with a metal frame was installed in the test stand for constructional acoustics.

Structure of lightweight wall

- fireproof gypsum plasterboard panelling, 2 x 12.5 mm on CW 50 metal frame
- mineral fibre insulating material packed into frame, thickness 40 mm
- ventilation space
- frame and panelling as above
- overall structure approx. 500 mm

In the first stage, the sound insulation of the construction was measured.

Following that, the switch and socket boxes were installed in pairs in the partition wall, each box in a pair being placed directly opposite the other. The insulating material in the wall cavity between the switch and socket boxes was completely removed. Empty conduit with cables was introduced into each box. The conduit was closed off by means of a plug. The boxes were equipped with devices or fitted with a cover plate.

3. **Sound insulation test**

The size of the test surface, i.e. the area of the partition wall element, was 11.7 m². In the evaluation of the constructional sound reduction indices, the sound insulation was determined with reference to this test surface.

The following individual measurements were carried out:

- measurement of the sound insulation of the lightweight wall element without any installations
- measurement of the sound insulation after the integration of 9 installations as follows:
 - 3 x fivefold combination with device
 - 3 x single box with device
 - 3 x single box with cover

each member of a pair being directly opposite the other.

Between the boxes the insulating material was completely removed, and the boxes were connected up with one another using empty conduit with cables inserted.

The following switch and socket boxes were used:

- Type 9464-02, T = 61 mm

4. Measurement technique

Cortex Instruments	Spectrum Analyser, Type NC10 Free-field microphone 221 Pre-amplifier MV203
Norsonic	Amplifier, Type 235
Behr & Obermeyer	Loudspeakers

5. Measurement and analysis specifications

DIN EN ISO 10140:

Measurement of sound insulation of building elements on a test stand

DIN EN ISO 717-1:

Rating of sound insulation in buildings and of building elements –
Part 1: Airborne sound insulation

The test sound used was noise, filtered by means of third-octave filters on the transmission and receiving sides in accordance with DIN 45652.

The measurements were carried out with 2 loudspeakers and 2 positions each on the microphone swivel unit (4 measurement sequences each on both the transmission and the receiving side).

The sound reduction index is calculated from the measurement values as follows:

$$R' = L_1 - L_2 + 10 \log S/A, \quad A = 0.16 * V/T$$

Key to symbols used in formula:

R'	=	sound reduction index as per DIN EN ISO 140
L_1	=	sound pressure level in transmission room
L_2	=	sound pressure level in receiving room
S	=	surface area of test wall
A	=	equivalent sound absorption surface area of transmission room, determined from measurements of reverberation time
V	=	volume of receiving room
T	=	reverberation time in receiving room

6. Measurement results

The measurements thus carried out resulted in the following single sound insulation values (see also Appendices 1 - 2):

Appendix 1	Sound insulation of partition wall element without fittings	$R_w = 69 \text{ dB}$
Appendix 2	Sound reduction index with fittings Switch and socket boxes Type 9464-02 ➤ 3 x fivefold combination with device ➤ 3 x single box with device ➤ 3 x single box with cover Each member of a pair being directly opposite the other	$R_w = 68 \text{ dB}$

These single values show that the installation of the combined wall and joint boxes causes marginal changes of the wall construction in terms of its constructional acoustics. It can, moreover, be seen from the comparative diagram in Appendix 3 that no relevant weakening occurs in individual frequency ranges either.



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Sound reduction Index, R, as per ISO 10140-2

Appendix: 1

Order no.: A6517-IV

Test date: 06.03.2017

Client: Kaiser GmbH & Co. KG, Ramsloh 4, 58579 Schalkmühle

Object:

Device connection box HWD 68 item no.: 9464-02
in lightweight partition wall

Structure

Base wall: Lightweight partition wall, separate framework 2 x CW50

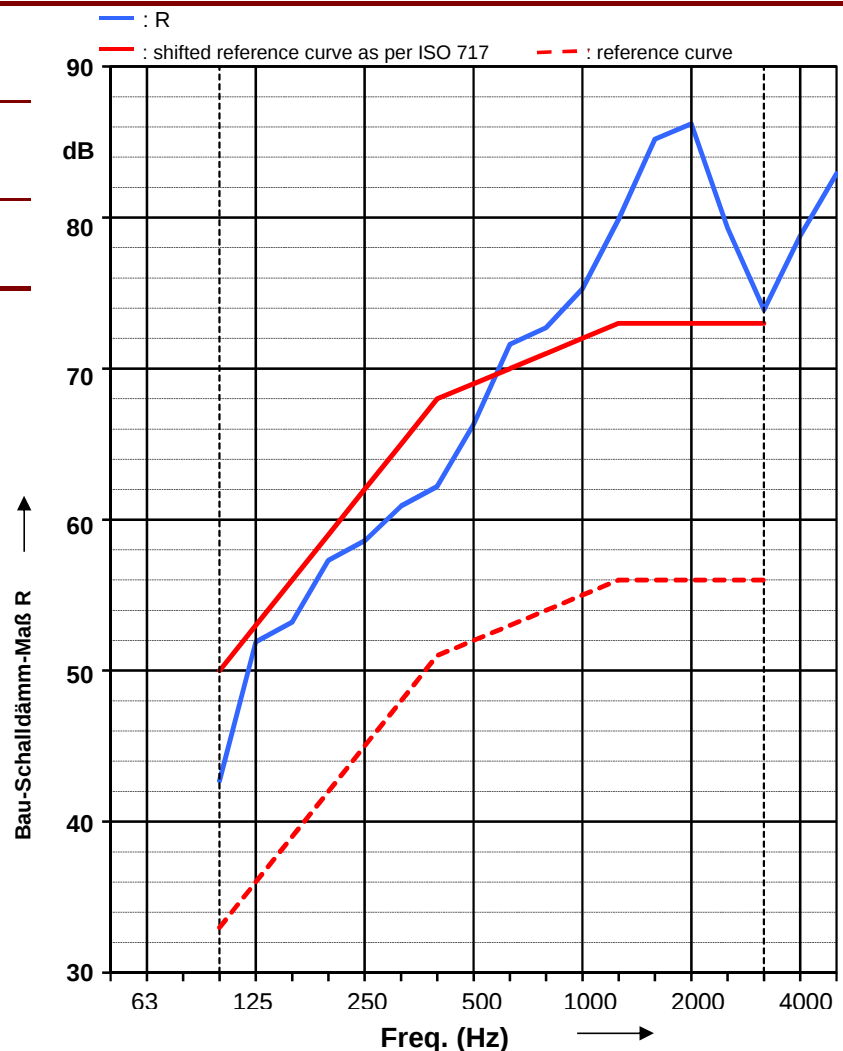
Planking on both sides made of fire protection plasterboard

Each structure: 2 x 12.5 mm fire protection plasterboard, 2 x 40 mm mineral fibre insulation

Total wall thickness d = 500 mm

transmit	Condition
	Type: Laboratory I
receive	Location: Ground floor
	Condition
	Type: Laboratory II
	Location: Ground floor
	Surface area of separating comp: 11,7 m ²
	Volume of transmitting room: 53.6 m ³
	Volume of receiving room: 61.7 m ³

Freq.: [Hz]	R [dB]	shifted reference curve
50		
63		
80		
100	42,7	50
125	51,9	53
160	53,2	56
200	57,3	59
250	58,6	62
315	60,9	65
400	62,2	68
500	66,3	69
630	71,6	70
800	72,7	71
1000	75,3	72
1250	79,9	73
1600	85,2	73
2000	≥ 86,2	73
2500	79,3	73
3150	73,9	73
4000	78,8	
5000	82,9	



: noise rate to high

Evaluation as per ISO 717-1

R (C,C_{tr}) = 69 (-2;-8) dBC₅₀₋₃₁₅₀ = - dBC_{tr50-3150} = - dBC₅₀₋₅₀₀₀ = - dBC_{tr50-5000} = - dBC₁₀₀₋₅₀₀₀ = -1 dBC_{tr100-5000} = -8 dB

VMIPA - recognized sound insulation testing authority as per DIN 4109

Test centre as per §§ 26, 28 BImSchG
(German Federal Immission Control)

Date: 06.03.2017 Compiled by: Dipl. Ing. U. Gräf

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Sound reduction Index, R, as per ISO 10140-2

Appendix: 2

Order no.: A6517-IV

Test date: 06.03.2017

Client: Kaiser GmbH & Co. KG, Ramsloh 4, 58579 Schalkmühle

Object:

Device connection box HWD 68 item no.: 9464-02
in lightweight partition wall

Structure

Base wall: Lightweight partition wall, separate framework 2 x CW50

Planking on both sides made of fire protection plasterboard

Each structure: 2 x 12.5 mm fire protection plasterboard, 2 x 40 mm mineral fibre insulation

Total wall thickness d = 500 mm

Installation of device connection boxes, type 9464-02, T = 61 mm

3 x quintuple combination with devices

3 x single box with device

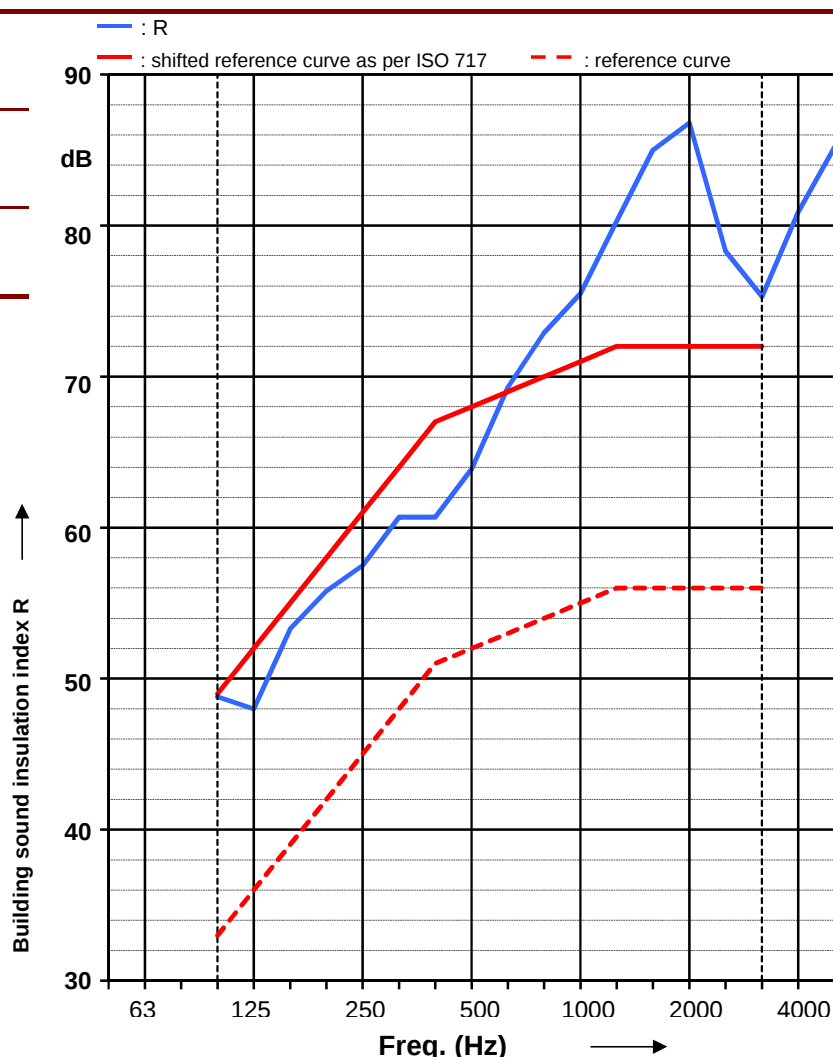
3 x single box with lid

each opposite on both sides

Insulating material removed in the area of the boxes

transmit	Condition
	Type: Laboratory I
receive	Location: Ground floor
	Condition
	Type: Laboratory II
	Location: Ground floor
	Surface area of separating comp: 11,7 m ²
	Volume of transmitting room: 53.6 m ³
	Volume of receiving room: 61.7 m ³

Freq.: [Hz]	R [dB]	shifted reference curve
50		
63		
80		
100	48,8	49
125	48,0	52
160	53,3	55
200	55,8	58
250	57,5	61
315	60,7	64
400	60,7	67
500	63,9	68
630	69,3	69
800	72,9	70
1000	75,5	71
1250	80,3	72
1600	85,0	72
2000	86,8	72
2500	78,3	72
3150	75,3	72
4000	80,9	
5000	85,2	



Evaluation as per ISO 717-1

R (C,C_{tr}) = 68 (-1;-6) dBC₅₀₋₃₁₅₀ = - dBC_{tr50-3150} = - dBC₅₀₋₅₀₀₀ = - dBC_{tr50-5000} = - dBC₁₀₀₋₅₀₀₀ = 0 dBC_{tr100-5000} = -7 dB

VMPIA - recognized sound insulation testing authority as per DIN 4109

Test centre as per §§ 26, 28 BImSchG
(German Federal Immission Control)

Date: 06.03.2017 Compiled by: Dipl. Ing. U. Gräf



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Comparison of sound reduction index

Appendix 3

Order no.: A6517-IV

Test date 06.03.2017

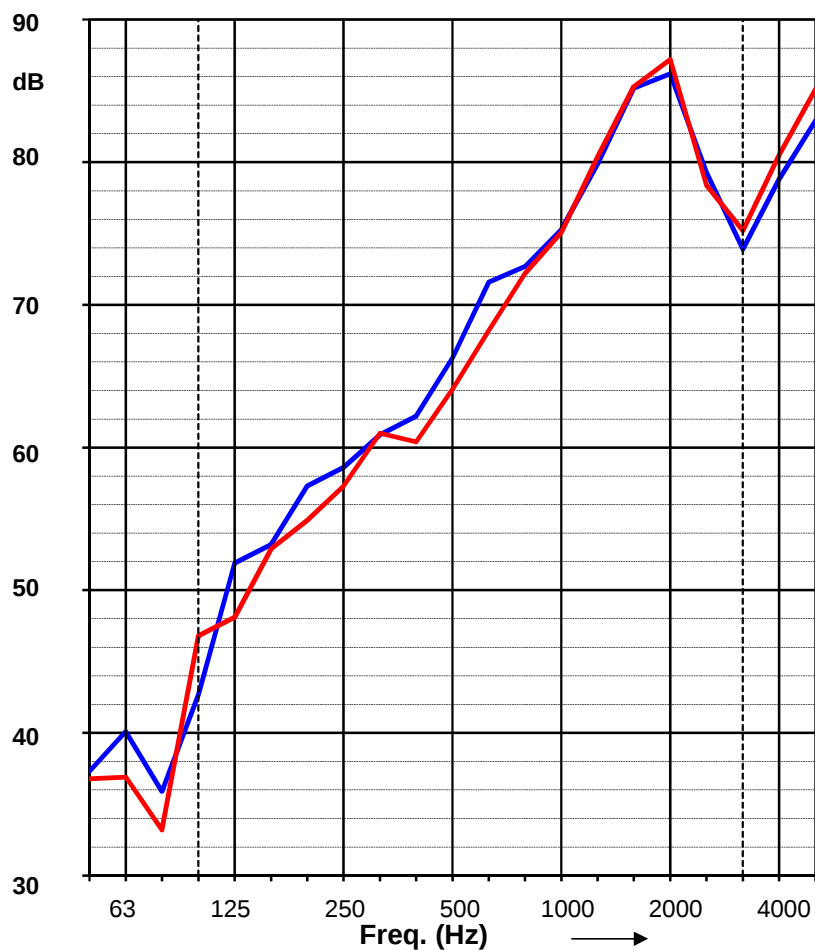
client: Kaiser GmbH & Co. KG, Ramsloh 4, 58579 Schalkmühle

object:

Device box and device connection boxes
in lightweight partition wallComparison
Base wall and wall with components
Device connection boxes HWD 68 type: 9464-02

each with devices

Freq.: [Hz]	Range 1	Range 2
50	37,3	36,8
63	40,1	36,9
80	35,9	33,2
100	42,7	46,8
125	51,9	48,1
160	53,2	52,9
200	57,3	54,9
250	58,6	57,3
315	60,9	61,0
400	62,2	60,4
500	66,3	64,1
630	71,6	68,2
800	72,7	72,2
1000	75,3	75,1
1250	79,9	80,4
1600	85,2	85,3
2000	86,2	87,2
2500	79,3	78,4
3150	73,9	75,2
4000	78,8	80,5
5000	82,9	85,1



Range 1

base wall, 69 dB

Range 2 with device connection boxes 9464-02 with device, 68 dB

VMPA - recognized sound insulation testing authority as per DIN 4109

Test centre as per § 29b BImSchG
(German Federal Immission Control)

Date: 06.03.2017 Compiled by: Dipl. Ing. U. Gräf

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51465 Bergisch Gladbach