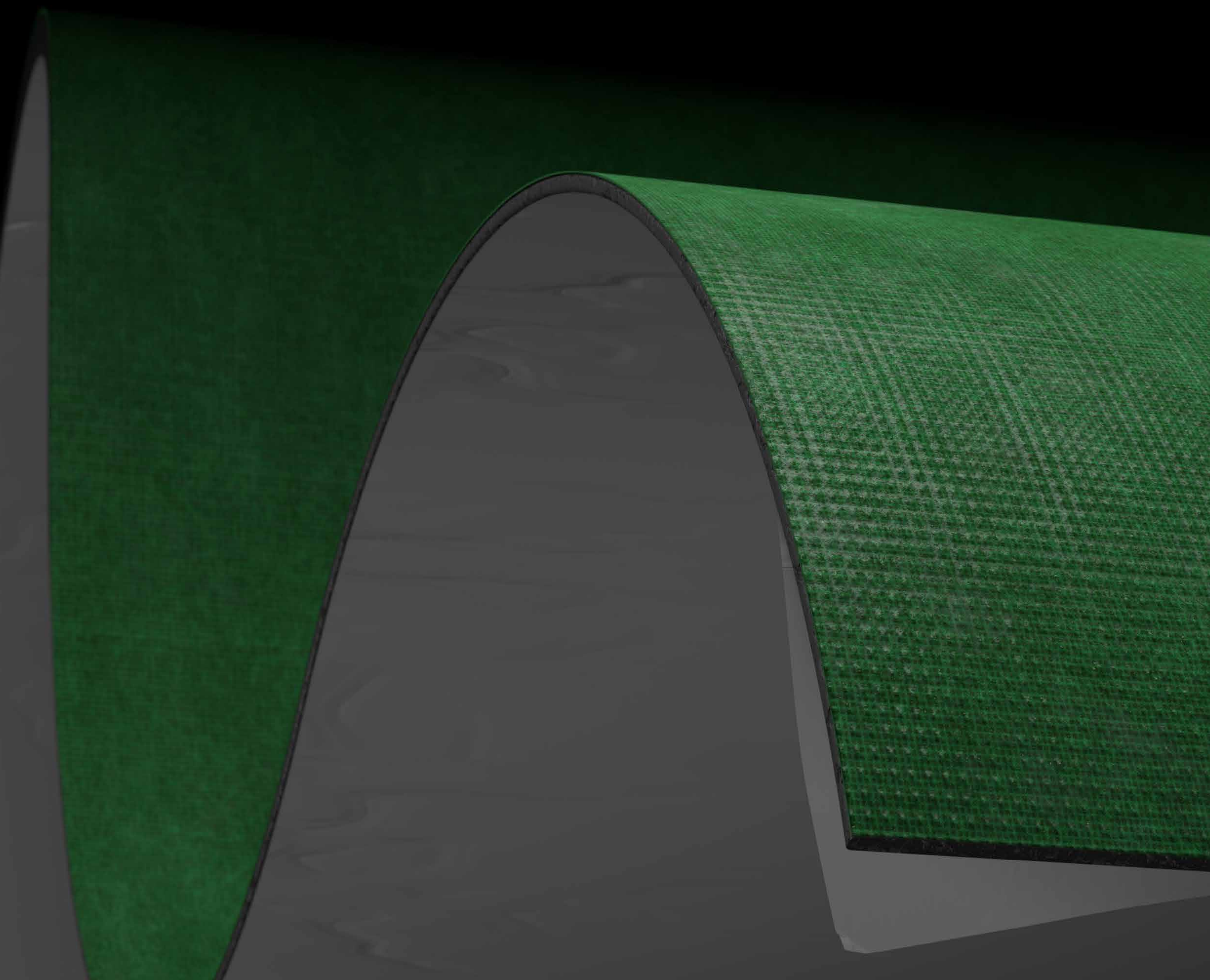
SILENT WALL BYTUM SA

TECHNICAL MANUAL



rothoblaas

Solutions for Building Technology

CONTENTS

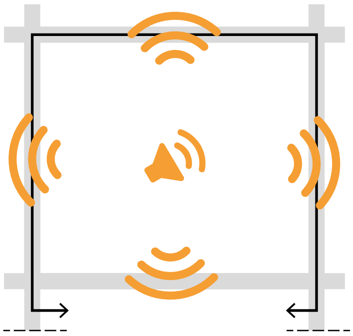
WALL ACOUSTIC PROBLEMS

WHAT IS AIRBORNE NOISE?

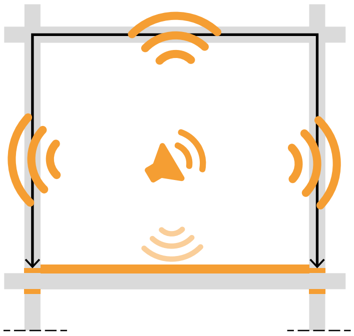
Airborne noise is a set of sound waves that originates in the air and is then transmitted into adjacent rooms either by air or by structure. This is the main problem to be solved when designing vertical partitions in buildings.

AIRBORNE NOISE TRANSMISSION AND POSSIBLE SOLUTIONS

The purpose of soundproofing measures is to minimise the transmission of sound from one room to another.



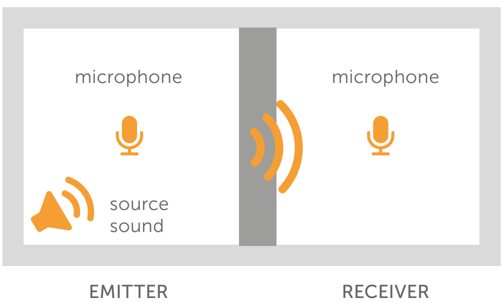
Airborne noise is transmitted to adjacent rooms either by air or by structure, following the paths represented by the arrows (lateral transmission).



The floor assembly reduces noise propagation through the ceiling. The use of resilient decoupling profiles reduces the propagation of airborne and structural noise.

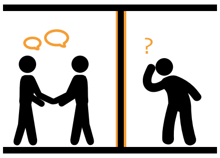
The correct design of partition walls and of any false ceilings makes it possible to attenuate all types of noise propagation by preventing the transmission of airborne noise generated in the environment.

HOW DO YOU MEASURE SOUND REDUCTION?

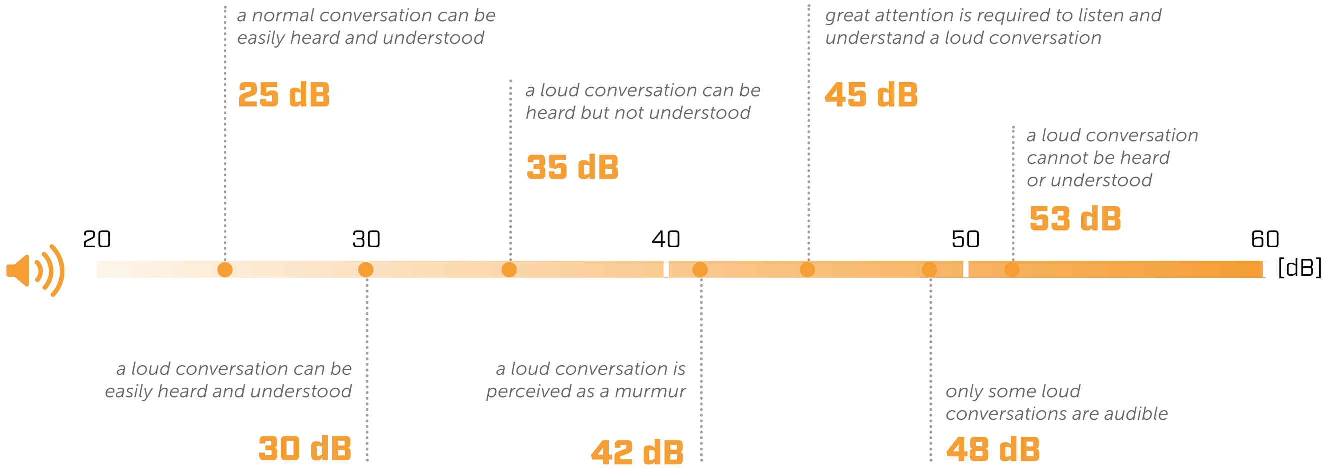


The measurement is performed by activating a specific noise source in the emitting environment and measuring the sound pressure levels in both environments (emitter and receiver). The sound reduction is given by the difference of the two measured levels. Therefore, the higher the R_w value, the better the acoustic performance of the construction assembly.

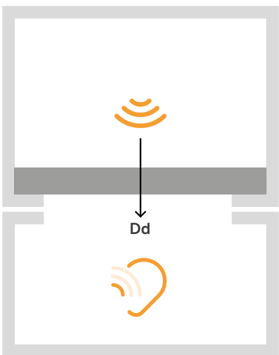
SOUNDPROOFING POWER... WHAT DOES IT MEAN "IN PRACTICE"?



Sound reduction is the ability to reduce noise transmission between one room and another. Sound insulation allows noise thresholds to be controlled and makes the building pleasant and comfortable.

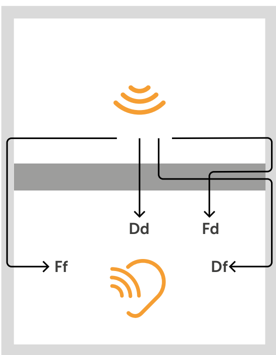


SOUND REDUCTION **R** VS APPARENT SOUND REDUCTION **R'**



R

Soundproofing power (R) is the performance of a partition **measured in a test laboratory**



R'

The apparent sound reduction (R'), on the other hand, indicates the performance **measured on site**

The acoustic laboratories are constructed in such a way that the chambers are completely decoupled from each other, so that lateral transmissions are completely eliminated. **For the same construction assembly and installation, the performance measured in the laboratory will therefore be better than the performance measured on site.**

IMPORTANCE OF DETAILS

In acoustic design, as in other fields, the design and correct implementation of details is very important. It is counter productive to design a high-performing construction assembly if discontinuities are neglected (holes, structure-to-doors/windows connection, wall intersections, etc.).

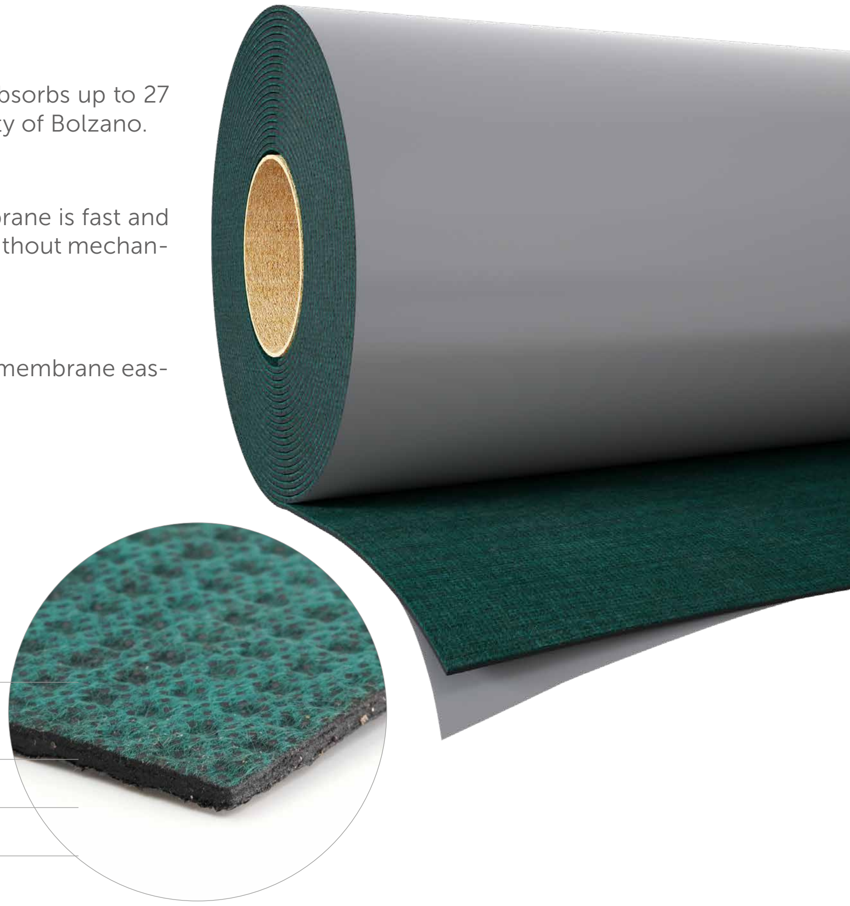
Best practice that: **to increase the sound reduction of a wall constructed of several elements, the sound reduction of the weakest element should be increased.**

R_w vs STC

STC stands for Sound Transmission Classification. It indicates the sound reduction of a construction assembly by evaluating sound sources with frequencies between 125 and 4000 Hz. The higher the number, the better the performance.

SILENT WALL BYTUM SA

SOUNDPROOFING AND WATERPROOFING SELF-ADHESIVE BITUMINOUS MEMBRANE



NOISE REDUCTION
Due to its high surface mass (5 kg/m^2), the membrane absorbs up to 27 dB. Also tested in different configurations at the University of Bolzano.

SELF-ADHESIVE
Thanks to its self-adhesive side, installation of the membrane is fast and precise in both horizontal and vertical applications and without mechanical fastening.

PRACTICAL
The pre-cut removable film makes the sound-insulating membrane easier to install.

COMPOSITION

non-woven polypropylene fabric

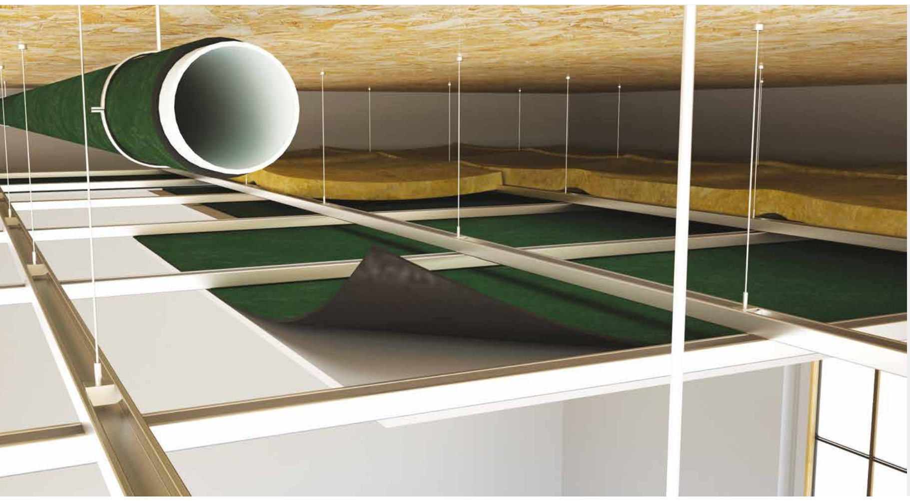
waterproofing membrane
made of elastoplastomeric bitumen

adhesive

removable silicone film

CODES AND DIMENSIONS

CODE	H	L	thickness	surface mass	A	
	[m]	[m]	[mm]	[kg/m^2]	[m^2]	
SILWALLSA	1	8,5	4	5	8,5	24



HERMETIC
Watertight and airtight, sealing of penetrations for mechanical fasteners is not required.

WITHOUT LEAD
Made of self-adhesive elastoplastomeric bitumen, it does not contain lead or harmful substances.

TECHNICAL DATA

Properties	standard	value
Thickness	-	4 mm
Surface mass m	-	5 kg/m²
Density ρ	-	1250 kg/m³
Resistance to airflow r	ISO 9053	> 100 kPa·s·m⁻²
Critical frequency	-	> 85000 Hz
Increase of sound reduction ΔR_w[1]	ISO 10140-2	4 dB
Vibration damping - loss factor η (200 Hz)	ASTM E756	0,26
Thermal resistance R_t	-	0,023 m²K/W
Thermal conductivity λ	-	0,17 W/m·K
Specific heat c	-	1200 J/kg·K
Water vapour resistance factor μ	EN 12086	100000
Water vapour transmission Sd	-	approx. 400 m
Reaction to fire	EN 13501-1	class E

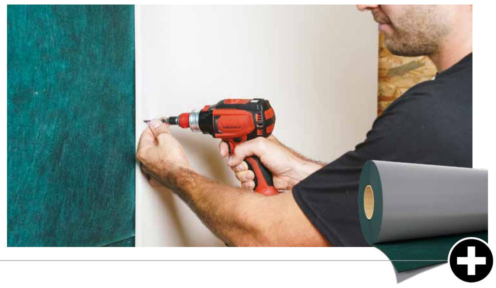
[1]Measured in the laboratory on a 170 mm timber-framed wall. See the manual for more information on configuration.

WALL ASSEMBLIES

THIN ACOUSTIC UPGRADES

Bonded coating is a commonly used method for acoustic upgrades because it allows, in just a few centimetres of thickness, a significant improvement in the sound rating of the partition.

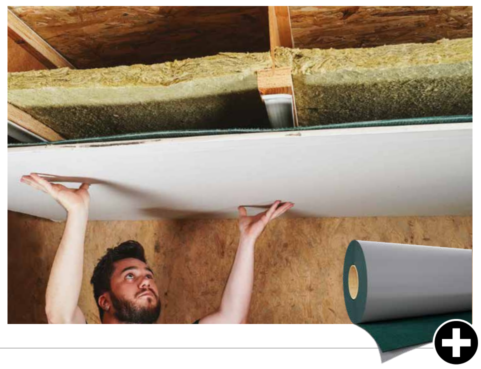
Add mass by coupling **SILENT WALL BYTUM** or **SILENT WALL BYTUM SA** to the plasterboard sheet



FLOORS ASSEMBLIES

ACOUSTIC UPGRADES FROM ABOVE

Cover the underside of the floor by applying a resilient layer **PIANO A**, **SILENT UNDERFLOOR**, **GEMINI**, **GIPS BAND**, **CONSTRUCTION SEALING** to the joists and by adding mass to the plasterboard sheet with **SILENT WALL BYTUM** or **SILENT WALL BYTUM SA**



Values obtained through calculations from experimental data.

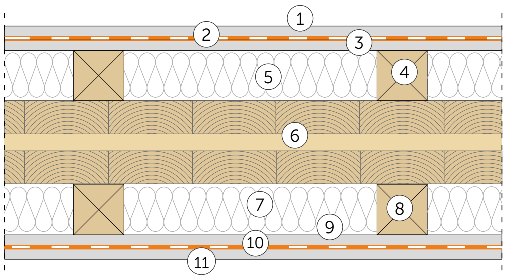
INSTALLATIONS

Solutions vary depending on the type of construction and acoustic requirements.

Create a mechanical, electrical, plumbing (MEP) enclosure and use **SILENT WALL BYTUM** or **SILENT WALL BYTUM SA** to improve its sound reduction

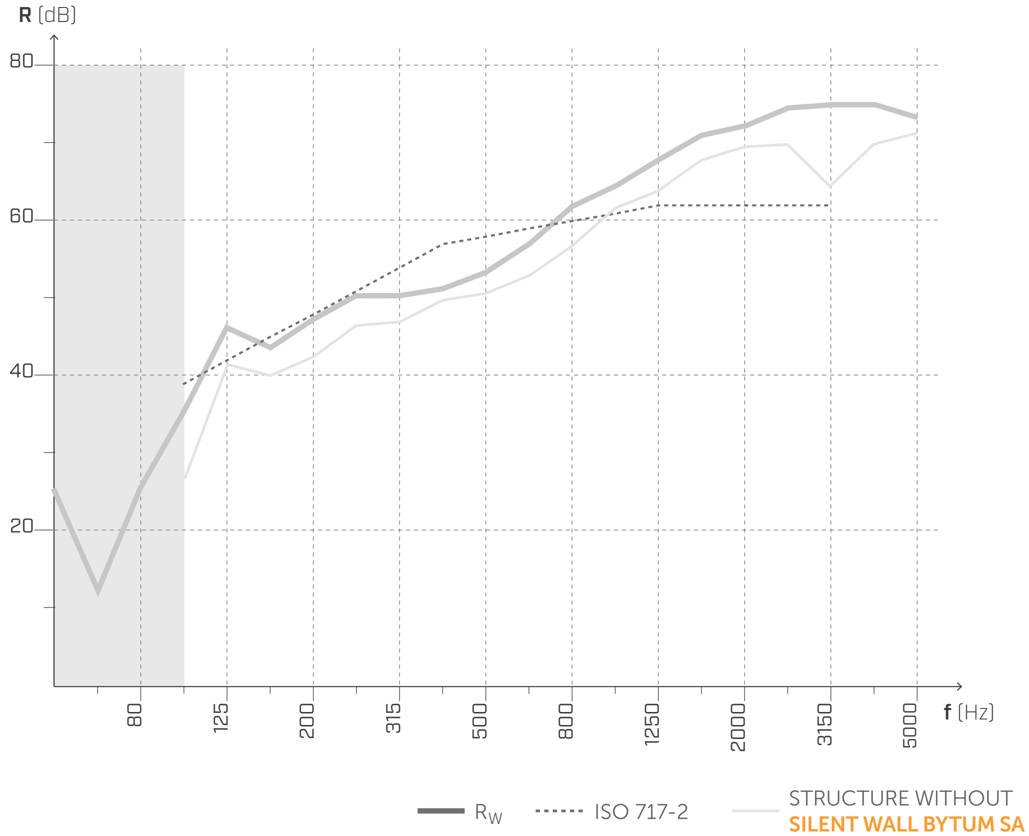
LABORATORY MEASUREMENT | CLT WALL 1

AIRBORNE SOUND INSULATION ACCORDING TO ISO 10140-2



1. plasterboard panel (thickness: 12,5 mm)
2. SILENT WALL BYTUM SA (thickness: 4 mm)
3. plasterboard panel (thickness: 12,5 mm)
4. solid wood batten (thickness: 60 mm)
5. low density mineral wool insulation (thickness: 60 mm)
6. CLT panel (thickness: 100 mm)
7. low density mineral wool insulation (thickness: 60 mm)
8. solid wood batten (thickness: 60 mm)
9. plasterboard panel (thickness: 12,5 mm)
10. SILENT WALL BYTUM SA (thickness: 4 mm)
11. plasterboard panel (thickness: 12,5 mm)

AIRBORNE SOUND INSULATION



f [Hz]	R_W [dB]
50	21,5
63	13,1
80	25,6
100	34,9
125	46,1
160	44,5
200	46,0
250	50,2
315	50,2
400	51,3
500	53,4
630	57,1
800	61,8
1000	64,5
1250	67,8
1600	71,0
2000	72,3
2500	74,6
3150	75,0
4000	74,9
5000	73,3
	59

R_W (C;C_{tr}) = **59 (-2;-7) dB**

STC_{ASTAM} = **59**

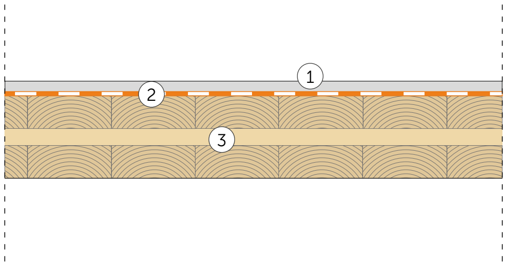
ΔR_W = +5 dB[(1)]

Testing laboratory: University of Padua
Test protocol: test 2017.

NOTES :
[(1)] Increase due to the addition of SILENT WALL BYTUM SA (layers 2 and 10)

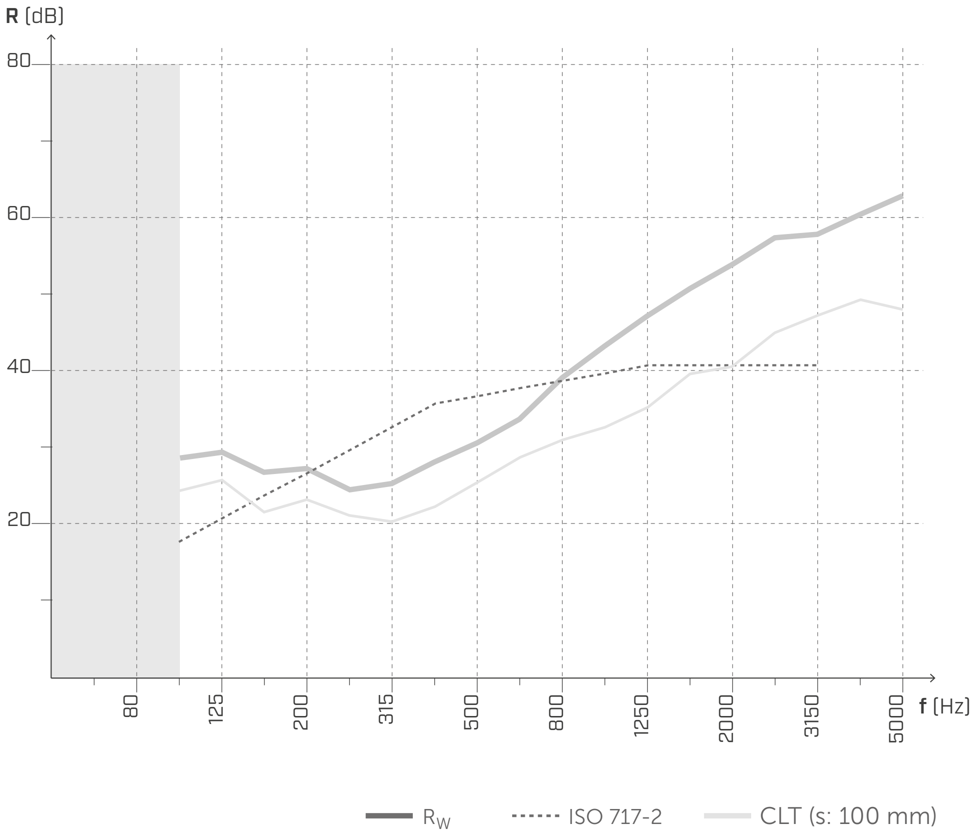
LABORATORY MEASUREMENT | CLT WALL 2

AIRBORNE SOUND INSULATION ACCORDING TO ISO 10140-2



1. plasterboard panel (thickness: 12,5 mm)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm)
3. CLT (thickness: 100 mm)

AIRBORNE SOUND INSULATION



f [Hz]	R_W [dB]
50	-
63	-
80	-
100	28,5
125	29,4
160	26,3
200	26,8
250	25,1
315	25,7
400	27,5
500	30,8
630	34,5
800	39,1
1000	43,3
1250	47,7
1600	51,3
2000	56,0
2500	58,2
3150	58,3
4000	60,2
5000	62,4
	37

R_W $(C;C_{tr})$ = **37 (-1;-4) dB**

$\Delta R_W = +6$ dB[(1)]

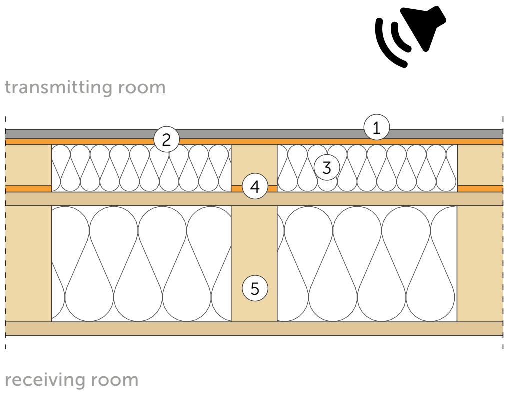
STC_{ASTAM} = **36**

Testing laboratory: University of Padua
Test protocol: test 2017.

NOTES :
(1) Increase due to the addition of layers no. 1 and no. 2.

LABORATORY MEASUREMENT | FRAME WALL 1A

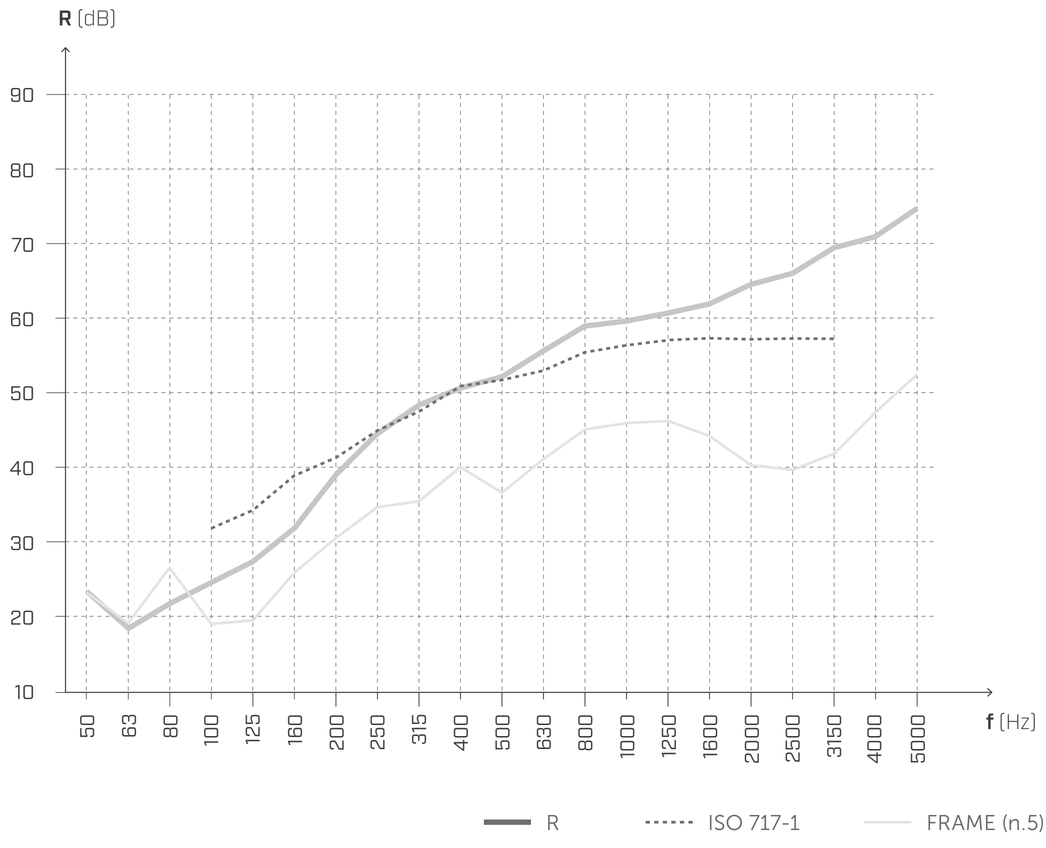
MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1



WALL
Surface = 10,16 m^2
Surface mass = 42,0 kg/m^2
Receiving environment volume = 60,6 m^3

(1) Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
(2) **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
(3) Counter wall (thickness: 40 mm)
timber battens 40 x 60 mm - spacing 600 mm
rock wool (thickness: 40mm), (38 kg/m^3)
(4) **GIPS BAND** (thickness: 3 mm); (25 kg/m^3) (0,075 kg/m^2)
(5) Timber frame (thickness: 170 mm)
timber struts 60 x 140 mm - spacing 600 mm
rock wool (thickness: 60mm), (70 kg/m^3)
2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	24,1
63	18,5
80	22,1
100	24,1
125	27,3
160	33,5
200	39,3
250	44,6
315	48,7
400	51,6
500	52,6
630	57,9
800	59,6
1000	59,9
1250	61,2
1600	63,6
2000	65,3
2500	66,9
3150	66,9
4000	71,0
5000	76,4

$R_w(C;C_{tr})$ = **52 (-4;-11) dB**

ΔR_w = +11 dB[(1)]

STC = **51**

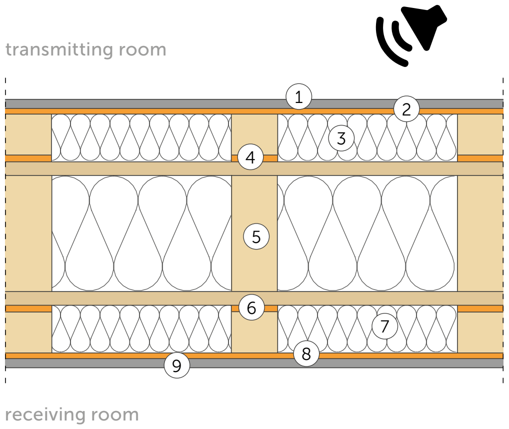
ΔSTC = +10[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R10a

NOTES :
(1) Increase due to the addition of layers no. 1,2,3 and no. 4.

LABORATORY MEASUREMENT | FRAME WALL 1B

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1



WALL

Surface = 10,16 m^2
Surface mass = 59,7 kg/m^2
Receiving environment volume = 60,6 m^3

1. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
3. Counter wall (thickness: 40 mm)
   timber battens 40 x 60 mm - spacing 600 mm
   rock wool (thickness: 40 mm), (38 kg/m^3)
4. **GIPS BAND** (thickness: 3 mm); (25 kg/m^3) (0,075 kg/m^2)
5. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
6. **GIPS BAND** (thickness: 3 mm); (25 kg/m^3) (0,075 kg/m^2)
7. Counter wall (thickness: 40 mm)
   timber battens 40 x 60 mm - spacing 600 mm
   rock wool (thickness: 40 mm), (38 kg/m^3)
8. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
9. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	20,9
63	11,1
80	26,3
100	27,4
125	31,4
160	38,2
200	44,7
250	53,4
315	60,4
400	62,0
500	66,7
630	68,8
800	70,7
1000	73,7
1250	74,7
1600	76,8
2000	80,3
2500	83,7
3150	82,9
4000	84,2
5000	83,5

$R_w(C;C_{tr})$ = **57 (-4;-12) dB**   STC = **55**

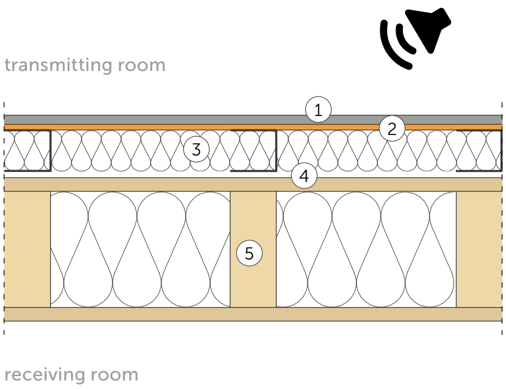
ΔR_w = +16 dB(1)   *ΔSTC = +14(1)*

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R10b

NOTES :
(1) Increase due to the addition of layers no. 1,2,3,4,6,7,8 and no. 9.

LABORATORY MEASUREMENT | FRAME WALL 2A

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1



WALL

Surface = 10,16 m^2
Surface mass = 41,7 kg/m^2
Receiving environment volume = 60,6 m^3

(1) Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
(2) **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m3), 5 kg/m2)
(3) Counter wall (thickness: 50 mm)
C-shaped profiles (thickness: 50 mm) - spacing 600 mm
rock wool (thickness: 40 mm), (38 kg/m^3)
(4) Air (thickness: 10 mm)
(5) Timber frame (thickness: 170 mm)
timber struts 60 x 140 mm - spacing 600 mm
rock wool (thickness: 60mm), (70 kg/m^3)
2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	19,2
63	14,7
80	28,4
100	29,5
125	30,5
160	40,6
200	46,8
250	55,4
315	60,0
400	64,4
500	66,5
630	70,6
800	72,8
1000	75,5
1250	74,8
1600	73,4
2000	73,3
2500	77,5
3150	79,5
4000	81,9
5000	82,4

$R_w(C;C_{tr})$ = **59 (-5;-13) dB** STC = **54**

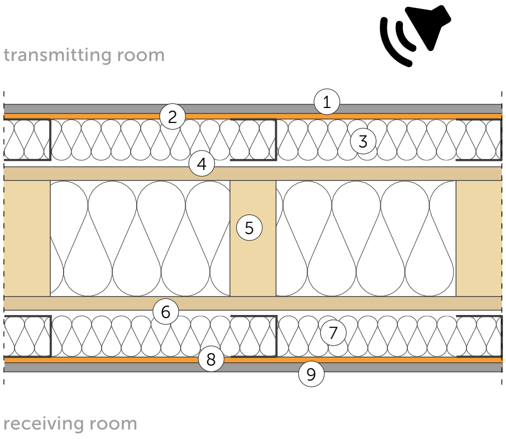
ΔR_w = +18 dB(1) *ΔSTC = +13*(1)

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R14a

NOTES :
(1) Increase due to the addition of layers no. 1,2,3 and no. 4.

LABORATORY MEASUREMENT | FRAME WALL 2B

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1



WALL

Surface = 10,16 m^2
Surface mass = 59,1 kg/m^2
Receiving environment volume = 60,6 m^3

1. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m3), 5 kg/m2)
3. Counter wall (thickness: 50 mm)
   C-shaped profiles (thickness: 50 mm) - spacing 600 mm
   rock wool (thickness: 40 mm), (38 kg/m^3)
4. Air (thickness: 10 mm)
5. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
6. Air (thickness: 10 mm)
7. Counter wall (thickness: 40 mm)
   C-shaped profiles (thickness: 50 mm) - spacing 600 mm
   rock wool (thickness: 40 mm), (38 kg/m^3)
8. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m3), 5 kg/m2)
9. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	19,0
63	13,8
80	32,1
100	37,1
125	40,6
160	53,3
200	62,3
250	69,0
315	71,3
400	70,0
500	73,8
630	74,4
800	75,4
1000	78,9
1250	78,9
1600	80,5
2000	83,0
2500	85,8
3150	84,6
4000	84,5
5000	83,6

$R_w(C;C_{tr})$ = **70 (-7;-15) dB**   STC = **65**

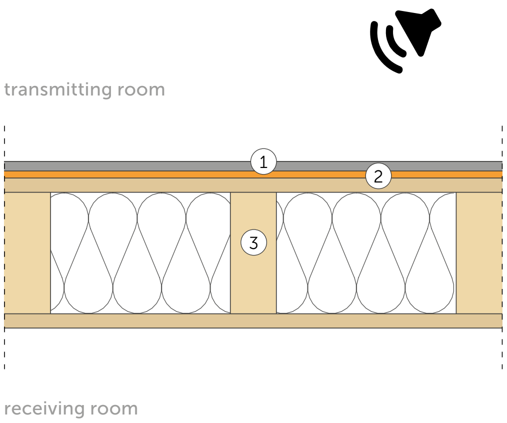
ΔR_W = +29 dB[1]   *ΔSTC = +24*[1]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R14b

NOTES :
[1] Increase due to the addition of layers no. 1,2,4,6,7,8 and no. 9.

LABORATORY MEASUREMENT | FRAME WALL 3

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1

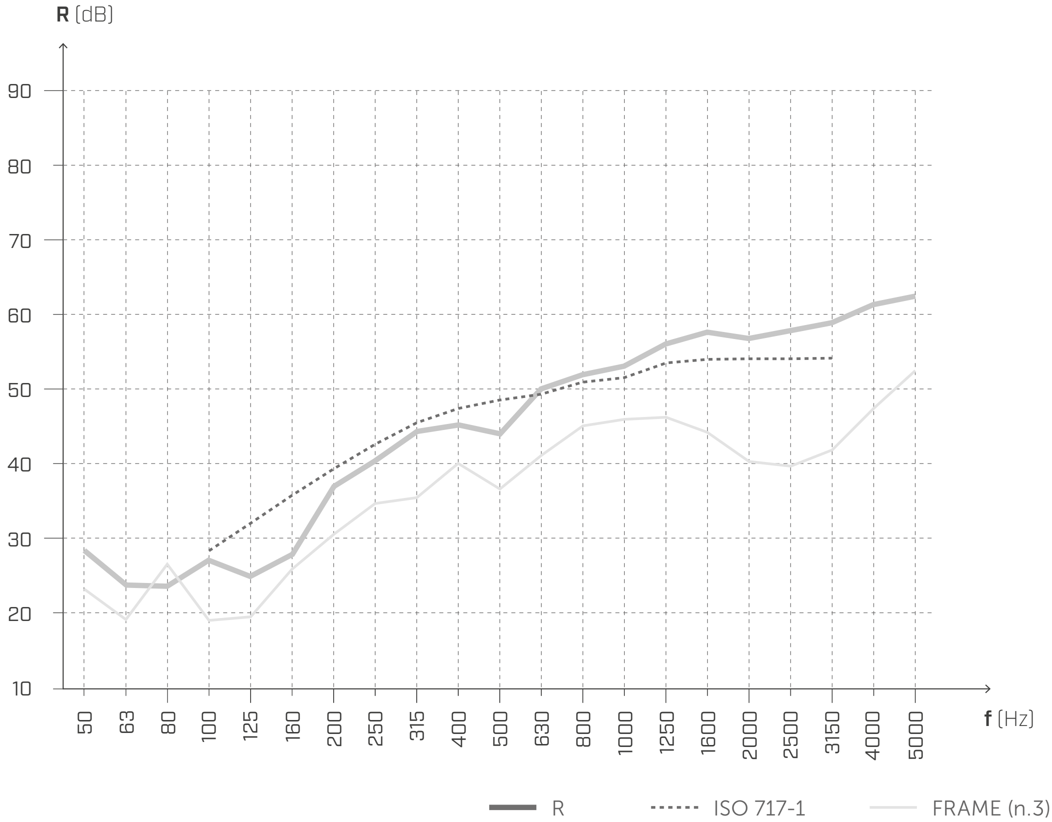


WALL

Surface = 10,16 m^2
Surface mass = 38,3 kg/m^2
Receiving environment volume = 60,6 m^3

1. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
3. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	27,8
63	22,6
80	23,4
100	26,4
125	24,7
160	28,1
200	37,1
250	40,2
315	42,6
400	43,8
500	43,6
630	49,7
800	52,3
1000	55,3
1250	55,3
1600	56,0
2000	55,1
2500	56,0
3150	56,6
4000	60,5
5000	61,3

$R_w(C;C_{tr})$ = **48 (-3;-8) dB**

ΔR_w = +7 dB[(1)]

STC = **49**

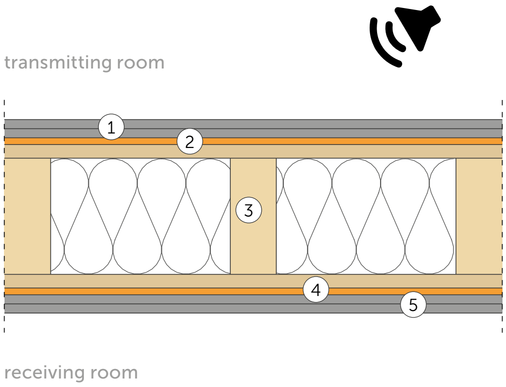
ΔSTC = +8[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R1a

NOTES :
(1) Increase due to the addition of layers no. 1 and no. 2.

LABORATORY MEASUREMENT | FRAME WALL 4

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1



WALL

Surface = 10,16 m^2
Surface mass = 70,3 kg/m^2
Receiving environment volume = 60,6 m^3

1. 2X Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
3. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
4. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
5. 2X Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	28,5
63	22,9
80	23,8
100	30,9
125	31,2
160	39,6
200	45,1
250	49,5
315	51,1
400	52,0
500	50,0
630	52,5
800	56,8
1000	60,0
1250	64,9
1600	67,1
2000	67,8
2500	68,5
3150	65,5
4000	64,9
5000	61,8

$R_w(C;C_{tr})$ = **55 (-2;-8) dB**

ΔR_w = +14 dB(1)

STC = **55**

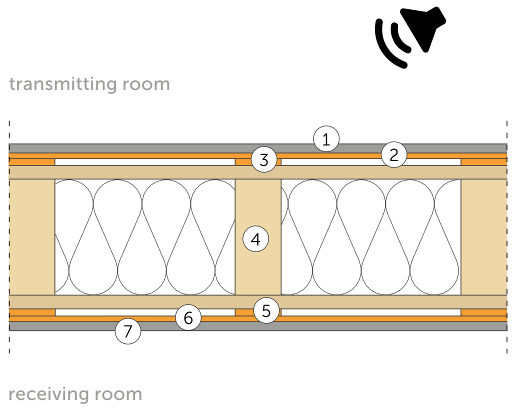
ΔSTC = +14(1)

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R2b

NOTES :
(1) Increase due to the addition of layers no. 1,2,4 and no. 5.

LABORATORY MEASUREMENT | FRAME WALL 5

MEASUREMENT OF AIRBORNE SOUND INSULATION EVALUATION INDEX
REFERENCE STANDARD: ISO 10140-2, EN ISO 717-1

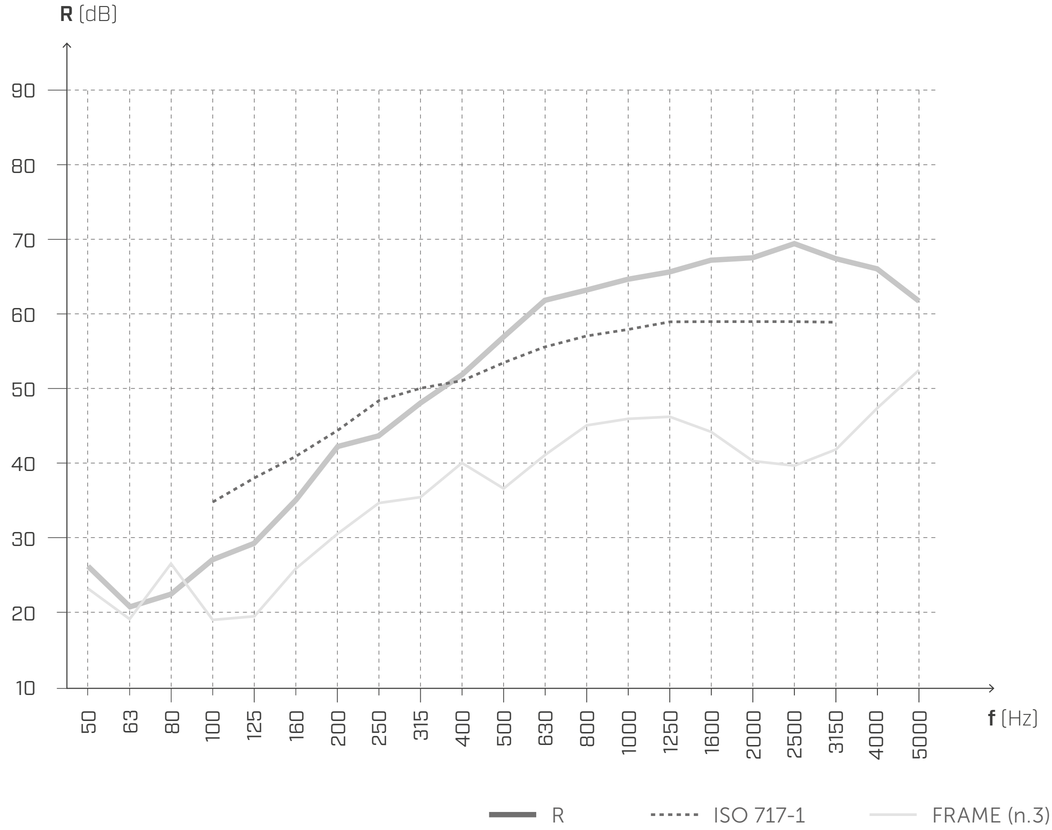


WALL

Surface = 10,16 m^2
Surface mass = 52,9 kg/m^2
Receiving environment volume = 60,6 m^3

1. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)
2. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
3. **SILENT FLOOR PUR - SILFLOORPUR10 strips** (thickness: 10 mm)
4. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
5. **SILENT FLOOR PUR - SILFLOORPUR10 strips** (thickness: 10 mm)
6. **SILENT WALL BYTUM SA** (thickness: 4 mm), (1250 kg/m^3), 5 kg/m^2)
7. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	26,1
63	20,6
80	21,9
100	27,9
125	29,8
160	35,8
200	43,2
250	43,8
315	47,0
400	53,2
500	57,0
630	62,3
800	63,7
1000	65,1
1250	66,8
1600	67,6
2000	67,7
2500	69,6
3150	67,0
4000	66,0
5000	62,8

$R_w(C;C_{tr})$ = **54 (-3;-9) dB**

ΔR_w = +13 dB[(1)]

STC = **54**

ΔSTC = +13[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R5b

NOTES :
(1) Increase due to the addition of layers no. 1,2,3,4,5,6 and no. 7.

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