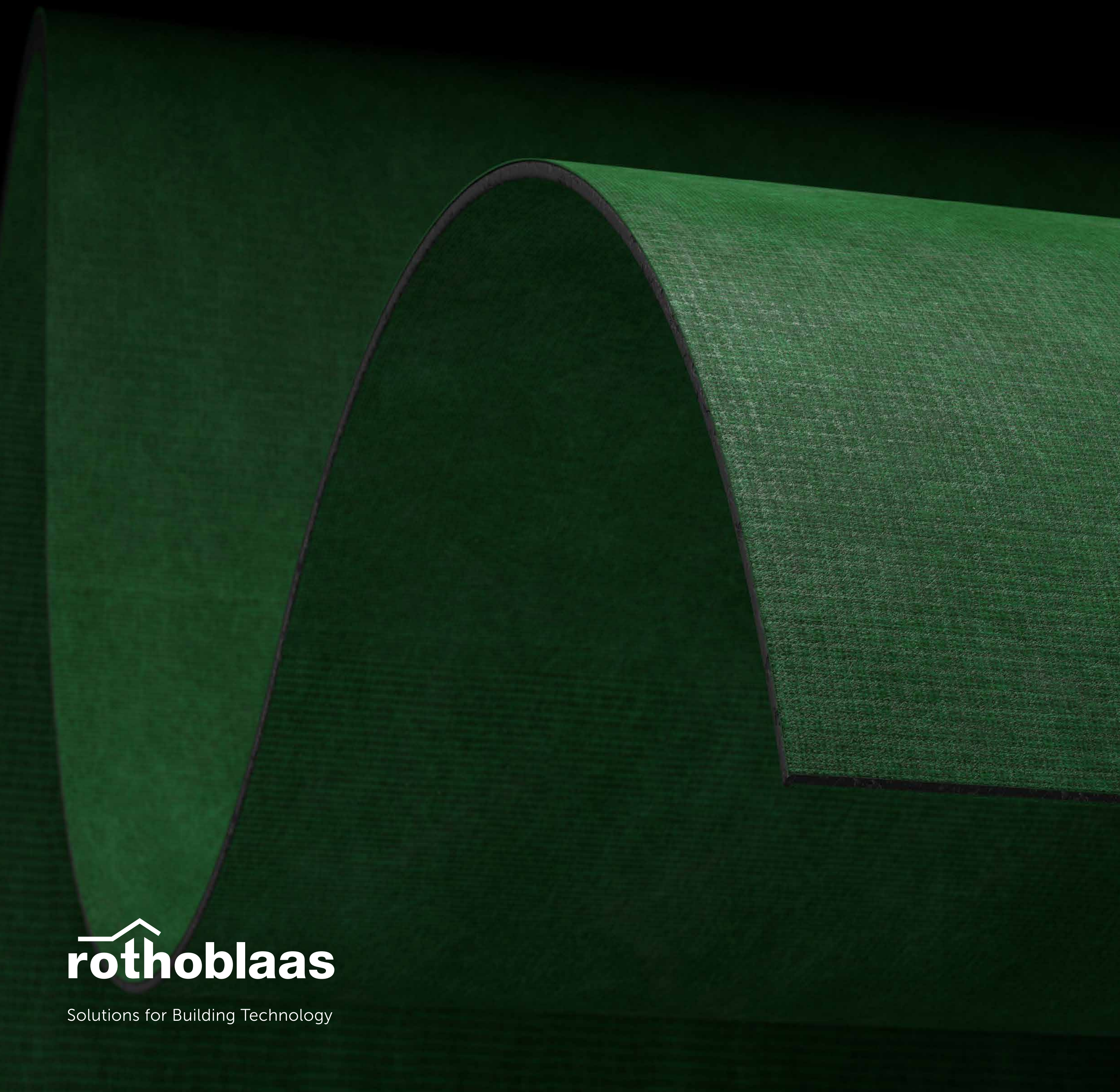
SILENT WALL BYTUM

TECHNICAL MANUAL



rothoblaas

Solutions for Building Technology

CONTENTS

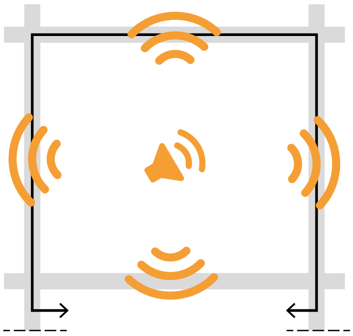
WALL ACOUSTIC PROBLEMS

WHAT IS AIRBORNE NOISE?

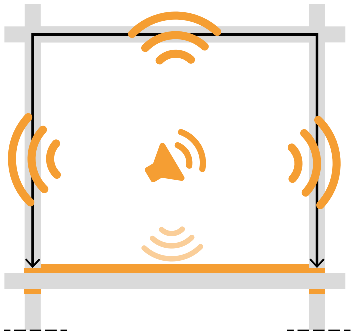
Airborne noise is a set of sound waves that originates in the air and is then transmitted into adjacent rooms either by air or by structure. This is the main problem to be solved when designing vertical partitions in buildings.

AIRBORNE NOISE TRANSMISSION AND POSSIBLE SOLUTIONS

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



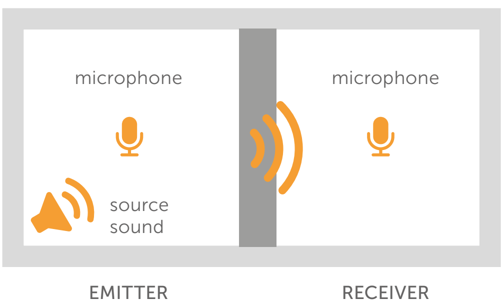
Airborne noise is transmitted to adjacent rooms either by air or by structure, following the paths represented by the arrows (lateral transmission).



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

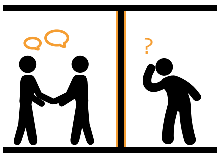
The correct design of partition walls and of any false ceilings makes it possible to attenuate all types of noise propagation by preventing the transmission of airborne noise generated in the environment.

HOW DO YOU MEASURE SOUND REDUCTION?

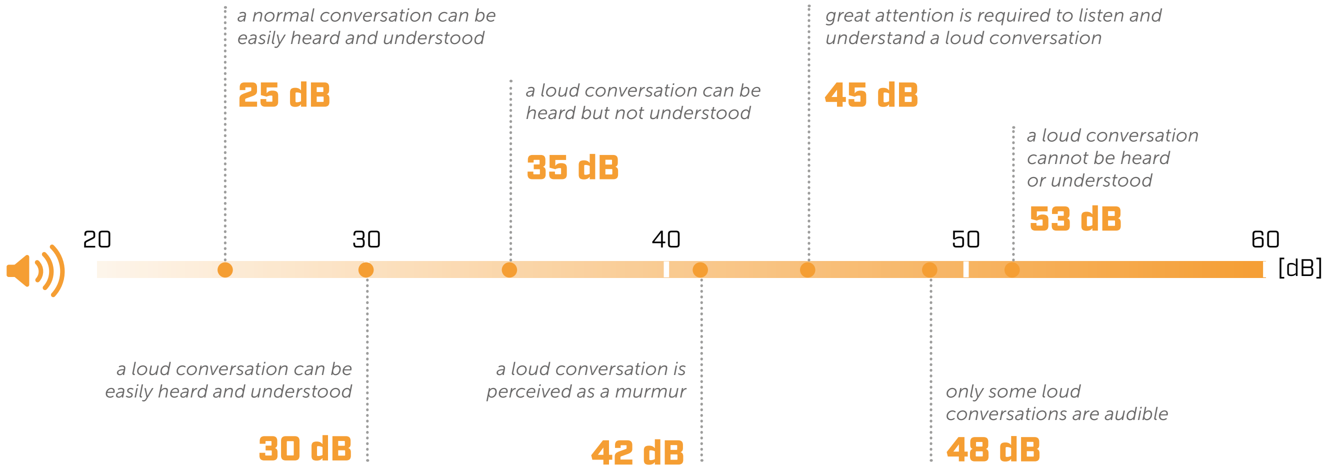


The measurement is performed by activating a specific noise source in the emitting environment and measuring the sound pressure levels in both environments (emitter and receiver). The sound reduction is given by the difference of the two measured levels. Therefore, the higher the R_w value, the better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

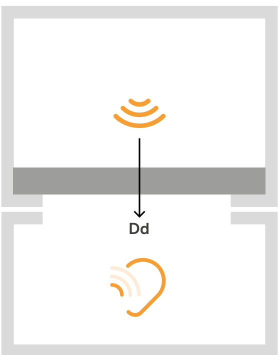
SOUNDPROOFING POWER... WHAT DOES IT MEAN "IN PRACTICE"?



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.

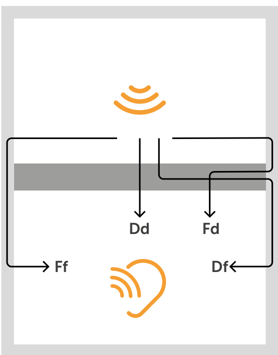


SOUND REDUCTION **R** VS APPARENT SOUND REDUCTION **R'**



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.).

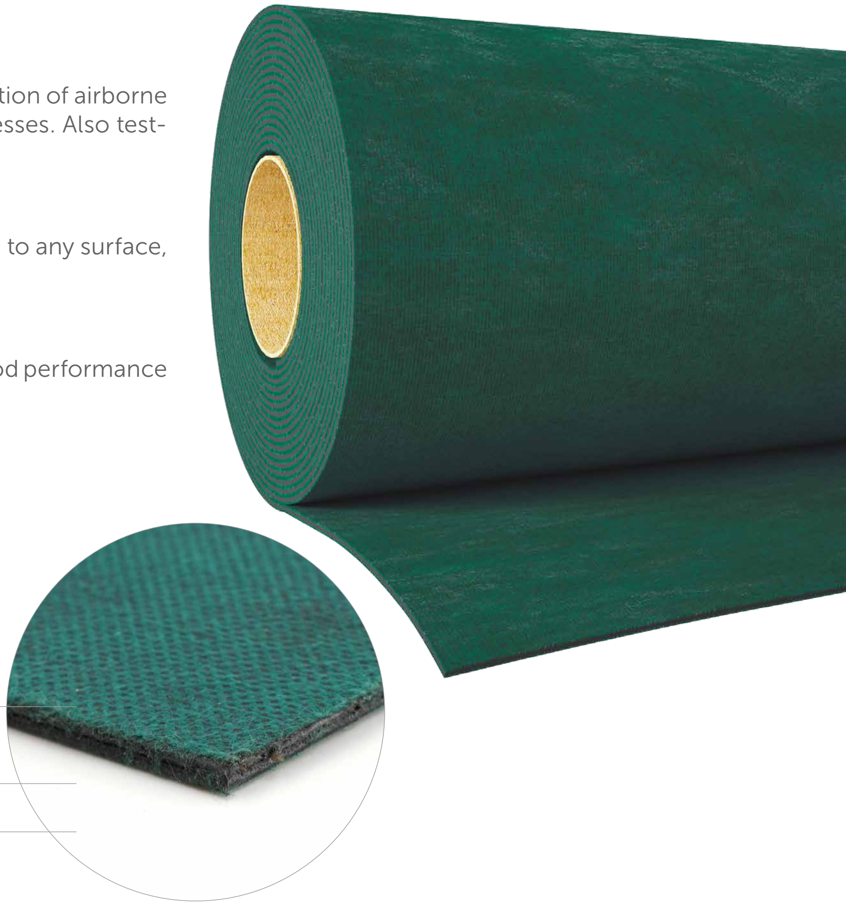
Best practice that: **to increase the sound reduction of a wall constructed of several elements, the sound reduction of the weakest element should be increased.**

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

SOUNDPROOFING AND WATERPROOFING BITUMINOUS MEMBRANE



TESTED
Thanks to its high surface mass (6 kg/m²), excellent reduction of airborne noise transmission can be achieved with minimal thicknesses. Also tested at the University of Bolzano.

PRACTICAL
Mechanical fastening allows the membrane to be applied to any surface, compensating for irregularities.

COST-PERFORMANCE
Composition of the mixture optimised to provide both good performance and low cost.

COMPOSITION

- non-woven polypropylene fabric
- waterproofing membrane made of elastoplastomeric bitumen
- non-woven polypropylene fabric

CODES AND DIMENSIONS

CODE	H	L	thickness	surface mass	A	
	[m]	[m]	[mm]	[kg/m²]	[m²]	
SILWALL	1,2	5	4,2	6	6	30

VERSATILE
For any application where an increase in mass is required.

SAFE
Made of elastoplastomeric bitumen, covered on both sides with a polypropylene non-woven fabric. Does not contain harmful substances.

TECHNICAL DATA

Properties	standard	value
Thickness	-	4,2 mm
Surface mass m	-	6 kg/m^2
Density ρ	-	1500 kg/m^3
Resistance to airflow r	ISO 9053	> 100 kPa·s·m^{-2}
Compressibility class	EN 12431	class CP2
CREEP viscous sliding under compression (1.6 kPa)	EN 1606	0,5 %
Increase of sound reduction ΔR_w[(1)]	ISO 10140-2	4 dB
Vibration damping - loss factor η (200 Hz)	ASTM E756	0,25
Thermal resistance R_t	-	0,1 m^{2}K/W
Thermal conductivity λ	-	0,7 W/m·K
Specific heat c	-	900 J/kg·K
Water vapour resistance factor μ	EN 12086	20000
Water vapour transmission Sd	-	80 m
Reaction to fire	EN 13501-1	class E

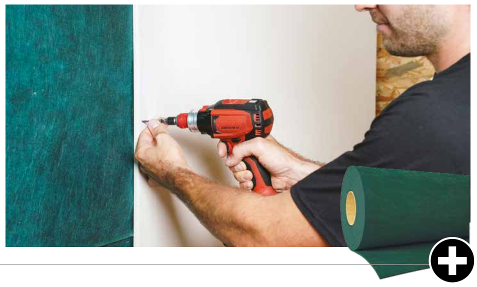
[(1)] Measured in the laboratory on a 170 mm timber-framed wall. See the manual for more information on configuration.

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.

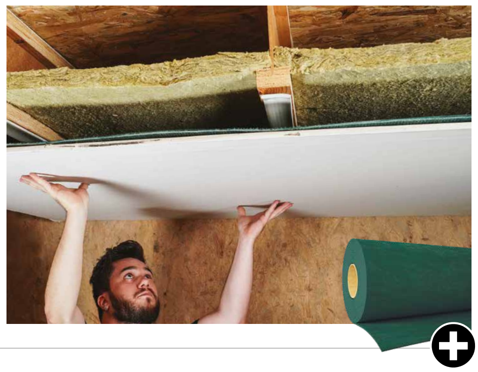
Add mass by coupling **SILENT WALL BYTUM** or **SILENT WALL BYTUM SA** to the plasterboard sheet



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.

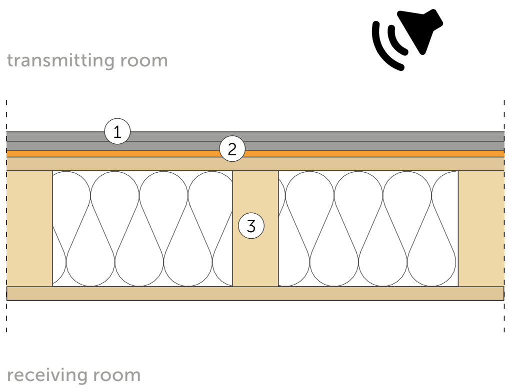
INSTALLATIONS

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 | 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 = 48,3 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: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
③ Timber frame (thickness: 170 mm)
timber struts 60 x 140 mm - spacing 600 mm
rock wool (thickness: 60 mm), (70 kg/m^3)
2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	30,0
63	25,0
80	21,0
100	26,2
125	28,6
160	28,1
200	37,8
250	41,6
315	43,7
400	44,5
500	44,7
630	49,6
800	51,9
1000	54,2
1250	56,8
1600	57,5
2000	56,6
2500	55,2
3150	54,7
4000	60,0
5000	60,6

$R_w(C;C_{tr})$ = **49 (-3;-8) dB**

ΔR_w = +8 dB[(1)]

STC = **49**

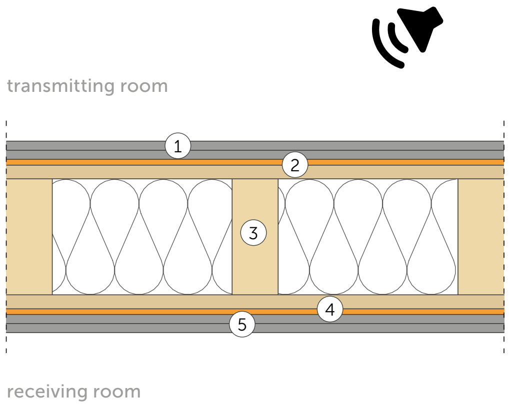
ΔSTC = +8[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R3a

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

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 = 72,3 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** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
3. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60 mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
4. **SILENT WALL BYTUM** (thickness: 4,2 mm), (1500 kg/m^3), (6 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	29,4
63	25,2
80	20,7
100	32,9
125	30,1
160	35,3
200	44,3
250	48,1
315	51,6
400	51,8
500	51,7
630	53,9
800	56,9
1000	60,2
1250	64,8
1600	67,1
2000	67,0
2500	66,1
3150	63,6
4000	64,9
5000	62,0

$R_w(C;C_{tr})$ = **55 (-3;-9) dB**

ΔR_w = +14 dB[(1)]

STC = **54**

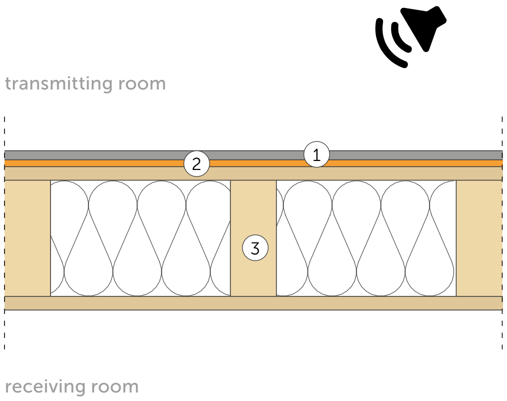
ΔSTC = +13[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R3b

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

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 = 39,3 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** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
(3) Timber frame (thickness: 170 mm)
timber struts 60 x 140 mm - spacing 600 mm
rock wool (thickness: 60 mm), (70 kg/m^3)
2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	29,2
63	24,8
80	18,1
100	24,3
125	27,0
160	27,0
200	36,8
250	41,2
315	42,8
400	43,1
500	43,8
630	49,7
800	51,5
1000	53,9
1250	55,5
1600	55,5
2000	54,7
2500	54,5
3150	55,2
4000	59,7
5000	60,6

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

ΔR_w = +7 dB[(1)]

STC = **48**

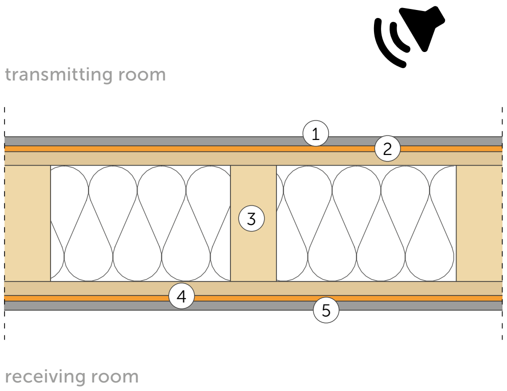
ΔSTC = +7[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R4a

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

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 = 54,3 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** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
3. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60 mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
4. **SILENT WALL BYTUM** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
5. Plasterboard (thickness: 12,5 mm); (720 kg/m^3); (9 kg/m^2)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	27,3
63	24,1
80	21,7
100	28,4
125	26,1
160	34,6
200	42,4
250	46,1
315	49,1
400	50,9
500	51,3
630	54,4
800	56,6
1000	59,1
1250	63,2
1600	65,5
2000	66,9
2500	66,9
3150	65,7
4000	69,0
5000	66,2

$R_w(C;C_{tr})$ = **53 (-4;-10) dB**   STC = **50**

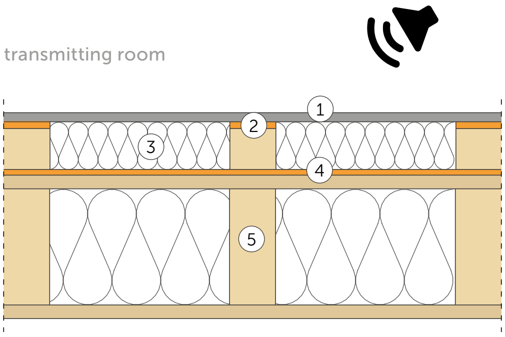
ΔR_w = +12 dB[(1)]   *ΔSTC = +9*[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R4b

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

LABORATORY MEASUREMENT | FRAME WALL 3A

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



WALL

Surface = 10,16 m^2
Surface mass = 43,0 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. **GIPS BAND** (thickness: 3 mm); (25 kg/m^3)
3. Counter wall (thickness: 40 mm)
   timber battens 40 x 60 mm - spacing 600 mm
   rock wool (thickness: 40mm), (38 kg/m^3)
4. **SILENT WALL BYTUM** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
5. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60 mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	23,5
63	18,3
80	20,6
100	22,4
125	23,3
160	30,0
200	38,7
250	45,8
315	47,6
400	51,6
500	53,2
630	57,8
800	60,5
1000	62,5
1250	62,9
1600	63,3
2000	63,2
2500	63,5
3150	61,7
4000	68,5
5000	74,0

$R_w(C;C_{tr})$ = **51 (-5;-12) dB**

ΔR_w = +10 dB[(1)]

STC = **47**

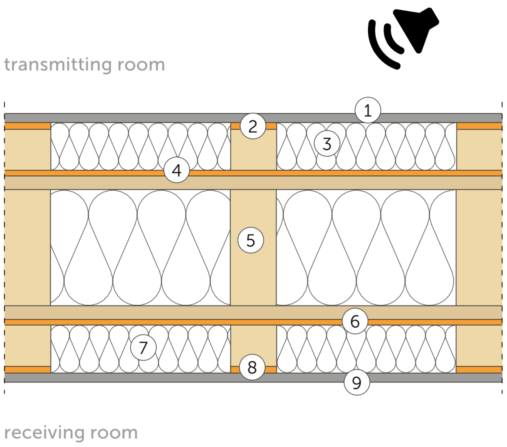
ΔSTC = +6[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R11a

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

LABORATORY MEASUREMENT | FRAME WALL 3B

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

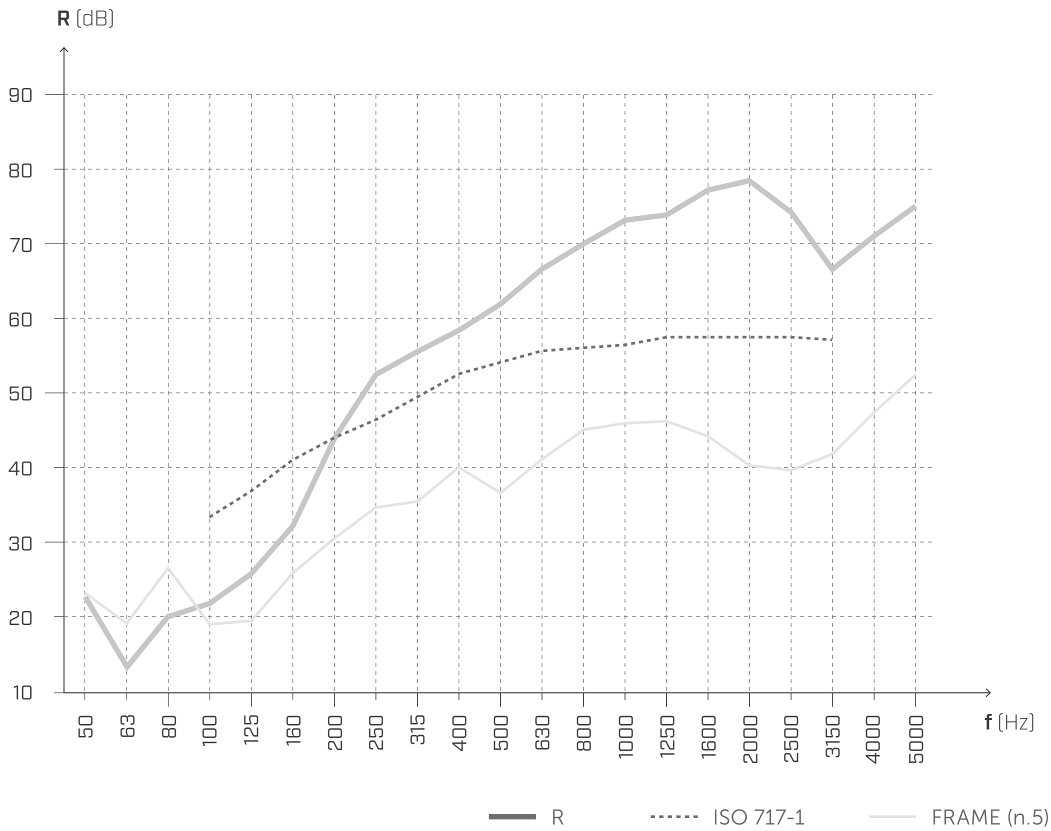


WALL

Surface = 10,16 m^2
Surface mass = 61,7 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. **GIPS BAND** (thickness: 3 mm); (25 kg/m^3)
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. **SILENT WALL BYTUM** (thickness: 4,2 mm), (1500 kg/m^3), (6 kg/m^2)
5. Timber frame (thickness: 170 mm)
   timber struts 60 x 140 mm - spacing 600 mm
   rock wool (thickness: 60 mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)
6. **SILENT WALL BYTUM** (thickness: 4,2 mm), (1500 kg/m^3), (6 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. **GIPS BAND** (thickness: 3 mm); (25 kg/m^3)
9. Plasterboard (thickness: 12,5 mm); (720 kg/m^3) (9 kg/m^2)

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	23,2
63	13,1
80	20,0
100	23,7
125	26,1
160	33,1
200	44,2
250	52,7
315	55,8
400	57,6
500	62,6
630	66,9
800	70,1
1000	74,1
1250	74,4
1600	77,0
2000	78,4
2500	74,7
3150	66,9
4000	71,1
5000	75,3

$R_w(C;C_{tr})$ = **54 (-6;-13) dB**

ΔR_w = +16 dB[(1)]

STC = **50**

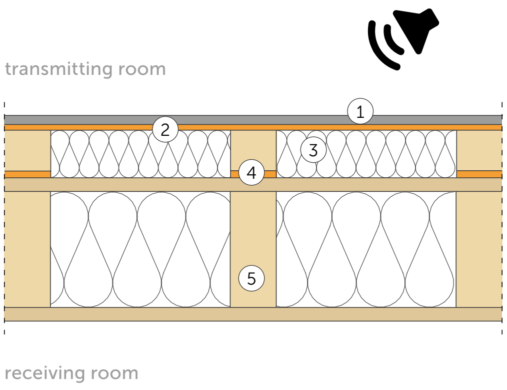
ΔSTC = +9[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R11b

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

LABORATORY MEASUREMENT | FRAME WALL 4A

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

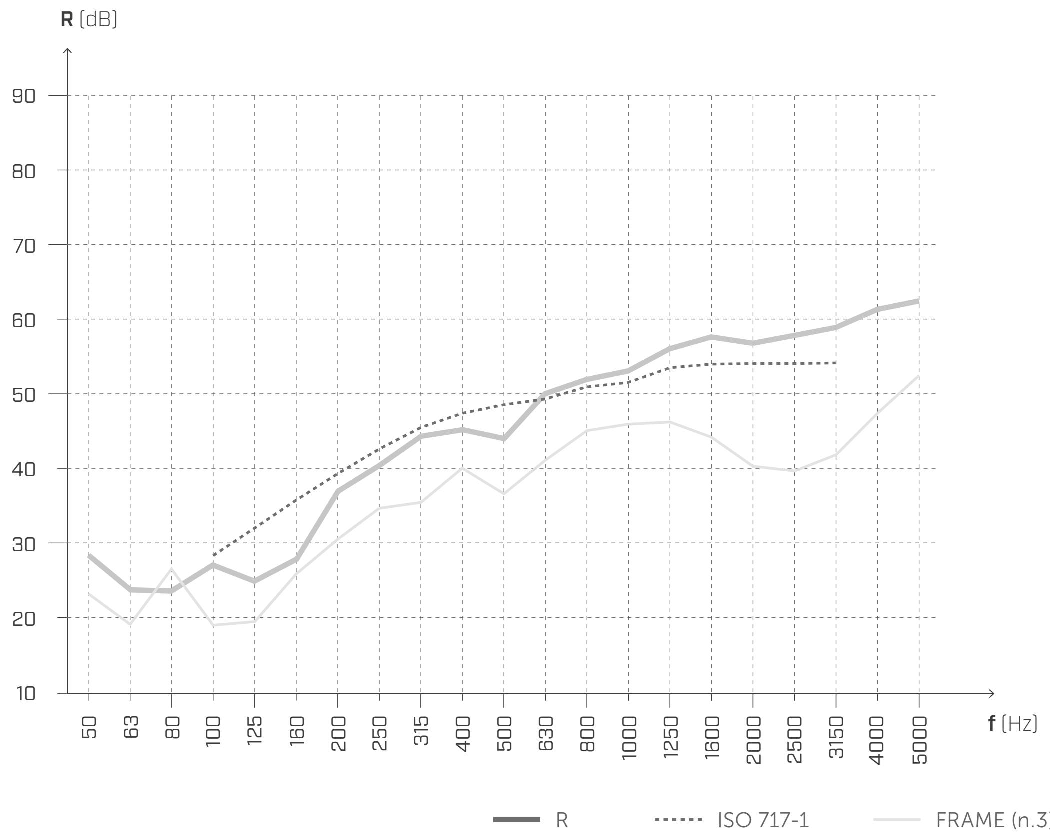


WALL

Surface = 10,16 m^2
Surface mass = 43 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** (thickness: 4,2 mm), (1500 kg/m^3), (6 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: 60 mm), (70 kg/m^3)
   2x OSB (thickness: 15 mm), (550 kg/m^3)

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	24,9
63	19,2
80	22,8
100	25,1
125	29,0
160	34,4
200	41,3
250	45,8
315	49,3
400	49,7
500	51,7
630	56,6
800	57,7
1000	58,5
1250	59,1
1600	59,6
2000	60,0
2500	60,4
3150	61,7
4000	67,5
5000	73,4

$R_w(C;C_{tr})$ = **53 (-4;-10) dB** STC = **53**

ΔR_w = +12 dB[(1)] *ΔSTC = +12*[(1)]

Testing laboratory: Building Physics Lab | Libera Università di Bolzano.
Test protocol: Pr.2022-rothoLATE-R9a

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

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