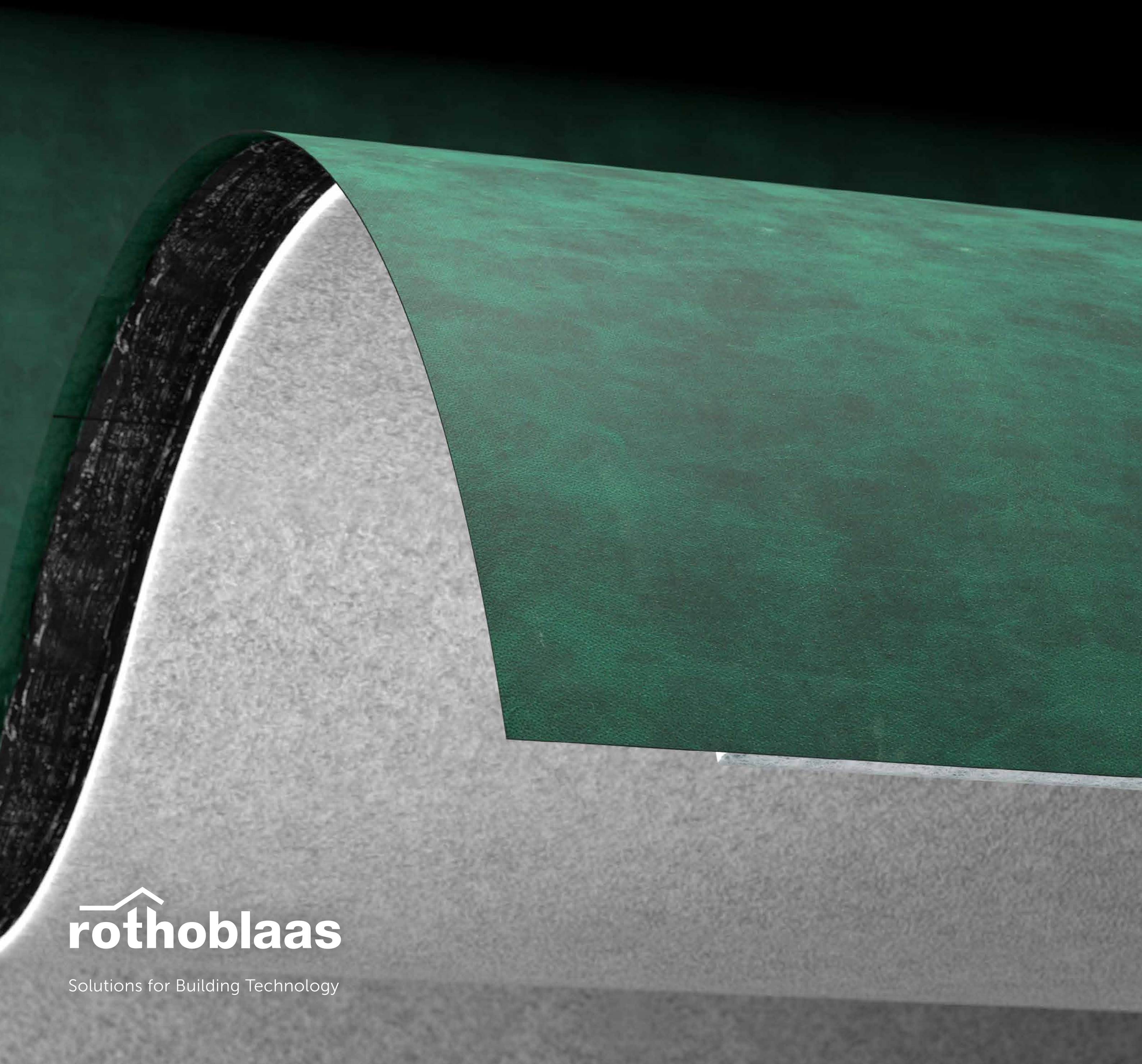
SILENT FLOOR BYTUM

TECHNICAL MANUAL



Solutions for Building Technology

CONTENTS

ACOUSTIC PROBLEMS OF FLOORS

WHAT IS IMPACT NOISE?

When it comes to floors, impact noise is the main acoustic problem because it constantly affects them. When a body impacts on the floor structure, the noise quickly spreads throughout the building either by air, affecting the nearest rooms, or by structure, propagating into the most distant rooms.

WHAT IS AIRBORNE NOISE?

Airborne noise is generated in the air and, after an initial airborne phase, is transported both by air and by structure. This is a problem that affects both walls and floors, but if we are talking about floors, the most important problem is certainly impact noise.

HERE IS THE SOLUTION

In order to be able to minimise the discomfort caused by impact noise, a stratigraphic package should be designed consisting of layers of different materials that are disconnected from each other and are able to dissipate the energy transmitted by the impact.

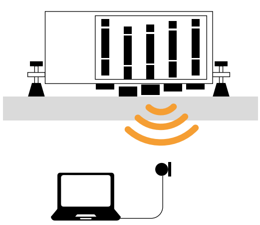
MASS-SPRING-MASS SYSTEM

A floating screed system such as the one shown in the images below can be schematised with a mass-spring-mass system, in which the structural floor represents the mass, the impact-absorbing product is equivalent to the spring, and the upper screed with the floor constitutes the second mass of the system. In this context, "resilient layer" is defined as the element with the spring function characterised by its own *dynamic stiffness s'*.

HOW IS THE IMPACT NOISE LEVEL MEASURED?

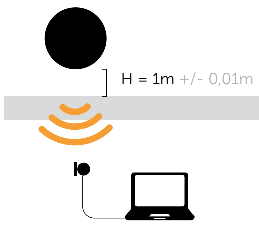
The impact noise level is a measure of the disturbance perceived in a room when an impact noise source is activated in the upper room. It can be measured both on site and in the laboratory. Clearly, ideal conditions exist in the laboratory for the effects of lateral transmission to be neglected, as the laboratory itself is constructed so that the walls are decoupled from the ceiling.

TAPPING MACHINE method



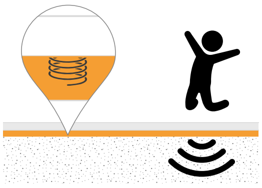
The TAPPING MACHINE is used to simulate "light" and "hard" impacts, such as walking with heeled shoes or the impact caused by falling objects.

RUBBER BALL method



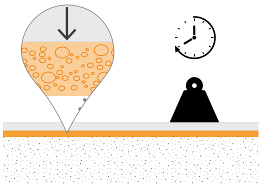
The RUBBER BALL is used to simulate "soft" and "heavy" impacts, such as a barefoot walk or a child jumping.

HOW TO CHOOSE THE BEST PRODUCT



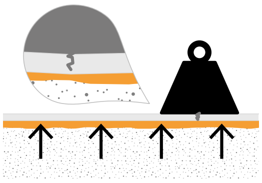
DYNAMIC STIFFNESS – **s'**

Expressed in MN/m³, it is measured according to EN 29052-1 and expresses the deformation capacity of a material that is subjected to a dynamic stress. Consequently, it indicates the ability to dampen the vibrations generated by an impact noise.
The measurement method involves, first, measuring the *apparent dynamic stiffness* s'_t of the material and then correcting it, if necessary, to obtain the *real dynamic stiffness s'*. Dynamic stiffness depends in fact on the *flow resistivity r*, which is measured in the lateral direction of the sample. If the material has specific flow resistivity values, the apparent dynamic stiffness must be corrected by adding the contribution of the gas contained within the material: air.



VISCOUS SLIDING UNDER COMPRESSION – **CREEP**

Expressed as a percentage, it is measured according to EN 1606 and represents the long-term deformation of a material under constant load to be simulated. The measurement in the laboratory must be carried out over a period of at least 90 days.

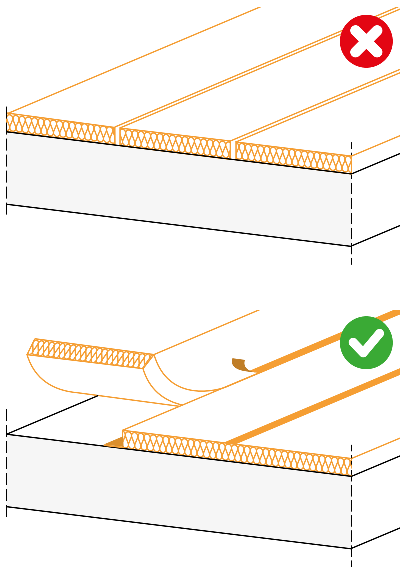


COMPRESSIBILITY - **c**

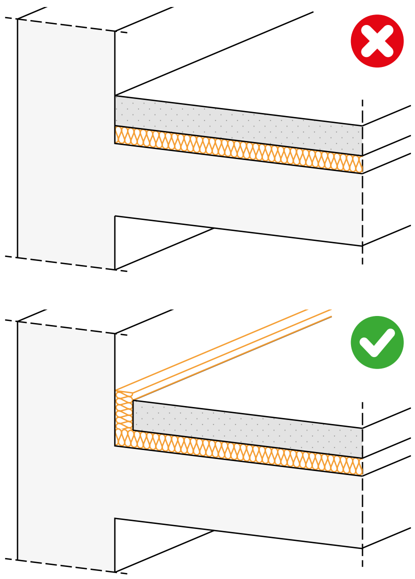
The compressibility class expresses the behaviour of a material while subjected to screed loading. During measurement, the product is subjected to different loads and its thickness is measured. The compressibility measurement is carried out to understand what loads the underscreed product can withstand, in order to avoid cracking and splitting of screeds.

CORRECT INSTALLATION

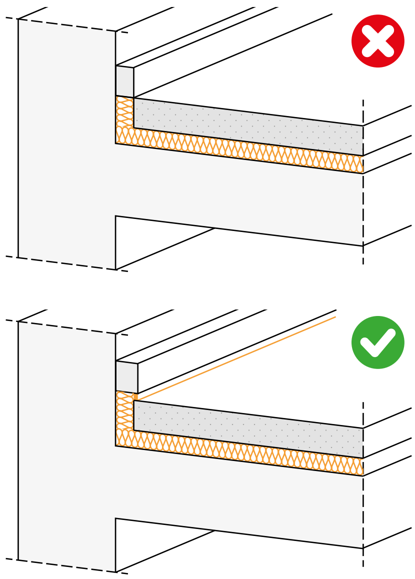
The technological solution of the floating screed is one of the most widely used and one of the most effective, but in order to achieve satisfactory results it is important that the system is designed and implemented correctly.



The resilient layer must be continuous because any gap would represent an acoustic bridge. When installing underscreed mats, care must be taken not to create discontinuities.



It is important to use the SILENT EDGE perimeter strip to ensure that the resilient layer is continuous around the entire perimeter of the room. The SILENT EDGE should only be trimmed after the floor has been installed and grouted.



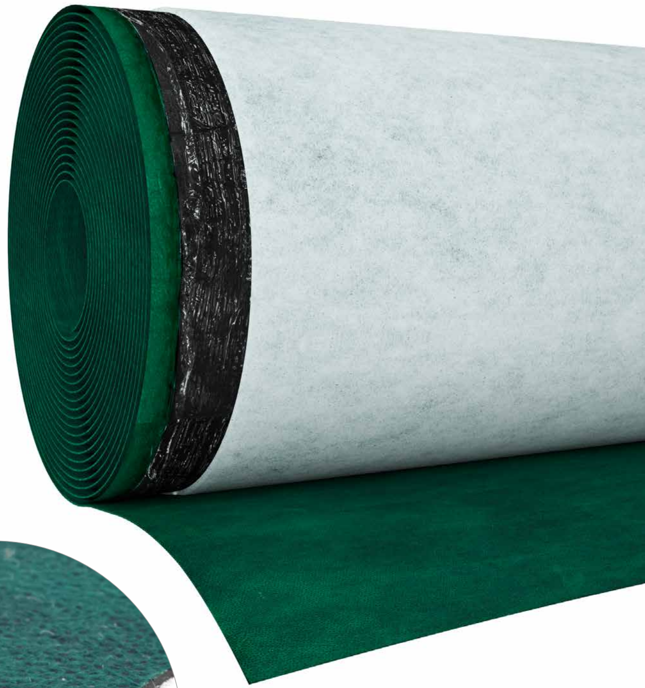
The skirting board must be installed after the SILENT EDGE has been cut, ensuring that it is always suitably raised from the floor.

IIC vs L_W

IIC stands for **Impact Insulation Class** and is the value obtained by subtracting the noise level measured in the receiving room from the noise level measured in the source room. Impact Insulation Class, sometimes referred to as Impact Isolation Class, measures the resistance of the floor construction assembly against the propagation of impact-generated noise.

SILENT FLOOR BYTUM

RESILIENT UNDERSCREED MEMBRANE MADE OF BITUMEN AND POLYESTER FELT



TESTED EFFECTIVENESS
The special structure absorbs vibrations from impact noise up to 20 dB.

STRUCTURAL RESTORATION
The material and special structure of the product make it extremely safe even in applications in historic or valuable buildings, as it prevents the screed from percolating in applications with timber and concrete connectors.

HERMETIC
Thanks to the bituminous mixture the membrane tends to close around the fastening system, ensuring watertightness.

COMPOSITION

elastoplastomeric bitumen waterproofing membrane

polyester fibre felt made from post-consumer waste

CODES AND DIMENSIONS

CODE	H[1]	L	thickness	A_f[2]	
	[m]	[m]	[mm]	[m²]	
SILFLOORBYT5	1,05	10	5	10	20

[1] 1 m bituminous membrane with felt + 0.05 m bitumen membrane for overlap.
[2] Without considering the overlap area.

DURABLE
Stable over time, thanks to the bituminous mixture. Also highly compatible with fresh concrete.

TIMBER-TO-CONCRETE
Ideal in combination with CTC connectors. Stiffness values also calculated in the presence of vapour barrier sheet or soundproofing layer.

TECHNICAL DATA

Properties	standard	value
Thickness	-	approx. 5 mm
Surface mass m	-	1.2 kg/m^2
Density ρ	-	240 kg/m^3
Resistance to airflow r	ISO 9053	> 100.0 kPa·s·m^{-2}
Apparent dynamic stiffness s'_t	EN 29052-1	7 MN/m^3
Double layer apparent dynamic stiffness(1) s'_t	EN 29052-1	4 MN/m^3
Dynamic stiffness s'	EN 29052-1	27 MN/m^3
Double layer dynamic stiffness(1) s'	EN 29052-1	14,5 MN/m^3
Compressibility class	EN 12431	CP2 (≤ 2 mm)
Double layer compressibility class(1)	EN 12431	CP3 (≤ 3 mm)
CREEP Viscous sliding under compression X_{ct} (2 kPa)	EN 1606	≤ 1 mm
CREEP Viscous sliding under compression double layer(1) X_{ct} (2 kPa)	EN 1606	≤ 1 mm
Theoretical estimate of the impact sound pressure level attenuation ΔL_w(2)	ISO 12354-2	27,7 dB
System resonance frequency f_0(3)	ISO 12354-2	74,4 Hz
Impact sound pressure level attenuation ΔL_w(4)	ISO 10140-3	20 dB
Theoretical estimate of the impact sound pressure level attenuation ΔLw(2) double layer	ISO 12354-2	31.6 dB
System resonance frequency f_0(3) double layer	ISO 12354-2	54.5 Hz
Thermal resistance R_t	ISO 6946	0,13 m^{2}K/W
Thermal conductivity λ (bituminous membrane - white felt)	-	0.045 - 0.17 W/(m·K)
Specific heat c	-	1,3 kJ/kg·K
Water vapour resistance factor μ	EN 12086	100000
Water vapour transmission Sd	-	> 70 m

(1)With opposing white felts. | (2)ΔL_w= (13 lg(m'))-(14.2 lg(s'))+20.8 [dB] with m'= 125 kg/m^2. | (3)f_0= 160 √(s'/m') with m'= 125 kg/m^2. | (4)Measured in the laboratory on 200 mm CLT floor. See the manual for more information on configuration.

EN ISO 12354-2 ANNEX C | ESTIMATE ΔL_W (FORMULA C.4) E ΔL (FORMULA C.1)

The following tables show how the attenuation in dB (ΔL_W e ΔL) of SILFLOORBYT5 varies as the load m' (i.e., the surface mass of the layers with which SILFLOORBYT5 is loaded) changes.

SILFLOORBYT5

	s't or s'	27	27	27	27	27	27	27	27	27	27	27	[MN/m^3]
	load m'	50	75	100	125	150	175	200	225	250	275	300	[kg/m^2]
	ΔL_w	22,6	24,9	26,5	27,7	28,8	29,6	30,4	31,1	31,6	32,2	32,7	[dB]
	f_0	117.6	96,0	83,1	74,4	67.9	62,8	58,8	55,4	52,6	50,1	48,0	[Hz]
							ΔL in frequency						
[Hz]	**100**	-2.1	0,5	2,4	3,9	5,0	6,1	6,9	7,7	8,4	9,0	9,6	[dB]
[Hz]	**125**	0,8	3,4	5,3	6,8	8,0	9,0	9,8	10,6	11,3	11,9	12,5	[dB]
[Hz]	**160**	4,0	6,7	8,5	10,0	11,2	12,2	13,0	13,8	14,5	15,1	15,7	[dB]
[Hz]	**200**	6,9	9,6	11,4	12,9	14,1	15,1	16,0	16,7	17,4	18,0	18,6	[dB]
[Hz]	**250**	9,8	12,5	14,3	15,8	17,0	18,0	18,9	19,6	20,3	20,9	21,5	[dB]
[Hz]	**315**	12,8	15,5	17,4	18,8	20,0	21,0	21,9	22,6	23,3	23,9	24,5	[dB]
[Hz]	**400**	16,0	18,6	20,5	21,9	23,1	24,1	25,0	25,8	26,4	27,1	27,6	[dB]
[Hz]	**500**	18,9	21,5	23,4	24,8	26,0	27,0	27,9	28,7	29,3	30,0	30,5	[dB]
[Hz]	**630**	21,9	24,5	26,4	27,8	29,0	30,0	30,9	31,7	32,4	33,0	33,5	[dB]
[Hz]	**800**	25,0	27,6	29,5	31,0	32,1	33,1	34,0	34,8	35,5	36,1	36,7	[dB]
[Hz]	**1000**	27,9	30,5	32,4	33,9	35,0	36,1	36,9	37,7	38,4	39,0	39,6	[dB]
[Hz]	**1250**	30,8	33,4	35,3	36,8	38,0	39,0	39,8	40,6	41,3	41,9	42,5	[dB]
[Hz]	**1600**	34,0	36,7	38,5	40,0	41,2	42,2	43,0	43,8	44,5	45,1	45,7	[dB]
[Hz]	**2000**	36,9	39,6	41,4	42,9	44,1	45,1	46,0	46,7	47,4	48,0	48,6	[dB]
[Hz]	**2500**	39,8	42,5	44,3	45,8	47,0	48,0	48,9	49.6	50,3	50,9	51,5	[dB]
[Hz]	**3150**	42,8	45,5	47,4	48,8	50,0	51,0	51,9	52,6	53,3	53,9	54,5	[dB]

EN ISO 12354-2 ANNEX C | ESTIMATE ΔL_W (FORMULA C.4) E ΔL (FORMULA C.1)

SILFLOORBYT5 - double layer

	s't or s'	14,5	14,5	14,5	14,5	14,5	14,5	14,5	14,5	14,5	14,5	14,5	[MN/m^3]
	load m'	50	75	100	125	150	175	200	225	250	275	300	[kg/m^2]
	ΔL_w	26,4	28,7	30,3	31,6	32,6	33,5	34,2	34,9	35,5	36,0	36,5	[dB]
	f_0	86,2	70,4	60,9	54,5	49,7	46,1	43,1	40,6	38,5	36,7	35,2	[Hz]
		ΔL in frequency											
[Hz]	**100**	1,9	4,6	6,5	7,9	9,1	10,1	11,0	11,7	12,4	13,0	13,6	[dB]
[Hz]	**125**	4,8	7,5	9,4	10,8	12,0	13,0	13,9	14,6	15,3	16,0	16,5	[dB]
[Hz]	**160**	8,1	10,7	12,6	14,0	15,2	16,2	17,1	17,9	18,5	19,2	19,7	[dB]
[Hz]	**200**	11,0	13,6	15,5	16,9	18,1	19,1	20,0	20,8	21,5	22,1	22,6	[dB]
[Hz]	**250**	13,9	16,5	18,4	19,8	21,0	22,0	22,9	23,7	24,4	25,0	25,6	[dB]
[Hz]	**315**	16,9	19,5	21,4	22,9	24,0	25,1	25,9	26,7	27,4	28,0	28,6	[dB]
[Hz]	**400**	20,0	22,6	24,5	26,0	27,2	28,2	29,0	29,8	30,5	31,1	31,7	[dB]
[Hz]	**500**	22,9	25,6	27,4	28,9	30,1	31,1	31,9	32,7	33,4	34,0	34,6	[dB]
[Hz]	**630**	25,9	28,6	30,4	31,9	33,1	34,1	35,0	35,7	36,4	37,0	37,6	[dB]
[Hz]	**800**	29,0	31,7	33,5	35,0	36,2	37,2	38,1	38,8	39,5	40,1	40,7	[dB]
[Hz]	**1000**	31,9	34,6	36,5	37,9	39,1	40,1	41,0	41,7	42,4	43,0	43,6	[dB]
[Hz]	**1250**	34,8	37,5	39,4	40,8	42,0	43,0	43,9	44,6	45,3	46,0	46,5	[dB]
[Hz]	**1600**	38,1	40,7	42,6	44,0	45,2	46,2	47,1	47,9	48,5	49,2	49,7	[dB]
[Hz]	**2000**	41,0	43,6	45,5	46,9	48,1	49,1	50,0	50,8	51,5	52,1	52,6	[dB]
[Hz]	**2500**	43,9	46,5	48,4	49,8	51,0	52,0	52,9	53,7	54,4	55,0	55,6	[dB]
[Hz]	**3150**	46,9	49,5	51,4	52,9	54,0	55,1	55,9	56,7	57,4	58,0	58,6	[dB]

EN ISO 12354-2 Annex C - formula C.4

$$\Delta L_W = \left(13 \lg\left(m'\right)\right) - \left(14{,}2 \lg\left(s'\right)\right) + 20{,}8 \text{ dB}$$

EN ISO 12354-2 Annex C - formula C.1

$$\Delta L = \left(30 \lg \frac{f}{f_0}\right) \text{dB}$$

EN ISO 12354-2 Annex C - formula C.2

$$f_0 = 160 \sqrt{\frac{s'}{m'}}$$

SILENT EDGE

SELF-ADHESIVE STRIP FOR PERIMETER SEPARATION

- Together with SILENT FLOOR range, it creates a highly soundproof floating screed.
- The special adhesive compound with hotmelt technology is particularly resistant even in high humidity or stagnant water.

VERSION WITH POLYETHYLENE STRAP

CODE	pcs
SILEDGEH150	1

UNIVERSAL VERSION

CODE	pcs
SILEDGE150	1
SILEDGE240	1

For more information, see the "**SOUNDPROOFING SOLUTIONS**" catalogue, available in the "Catalogues" section of the website www.rothoblaas.com.

IMPACT NOISE INSULATION ACCORDING TO SCREED THICKNESS

A predictive study of the sound insulation of airborne and impact noise in buildings cannot be determined by calculations alone, but must be supported by experimental data and measurements in the laboratory and on site.

The acoustics laboratory at the University of NorthernBritish Columbia is designed optimized for testing the sound insulation performance of floors in timber buildings. In fact, the receiving room is built of frame walls made of mullions and interposed mineral wool insulation and OSB sheathing and two layers of gypsum board.

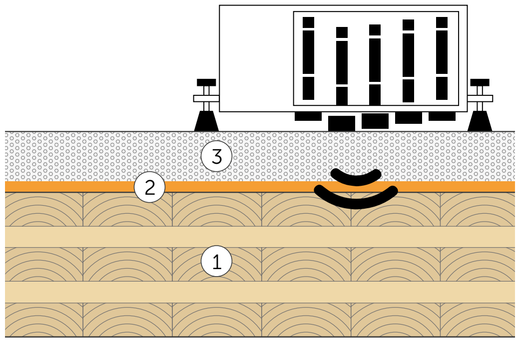
Impact noise assessment is measured according to ASTM E1007-15 using the impact sound machine and a sound pressure meter according to ISO. The tests involve evaluating the acoustic behaviour of the floor slab according to the thickness of the screed (38 mm, 50 mm, 100 mm).

MATERIALS

1. **X-LAM FLOOR SLABS:** The tested floor slab consists of three of 139 mm thick CLT 139V panels. Each CLT panel is 4.0 m long and 1.8 m wide. All joints are sealed with acoustic sealant and tapes. The edges between floors and walls are also sealed with acoustic sealant. The AIIC of the bare CLT floor slab is 21 (L'n,w = 89dB)

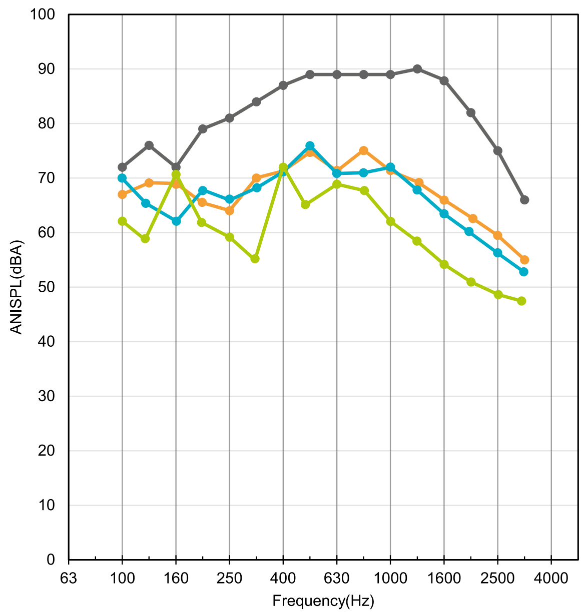
2. **SILENT FLOOR BYTUM:** Resilient underscreed foil made of bitumen and polyester felt.

3. **Screed**: ordinary concrete
   - thickness 38 mm, 91 kg/m²
   - thickness 50 mm, 120 kg/m²
   - thickness 100 mm, 240 kg/m²



RESULTS

- CLT
- CLT + SILENT FLOOR BYTUM + 38 mm concrete
- CLT + SILENT FLOOR BYTUM + 50 mm concrete
- CLT + SILENT FLOOR BYTUM + 100 mm concrete

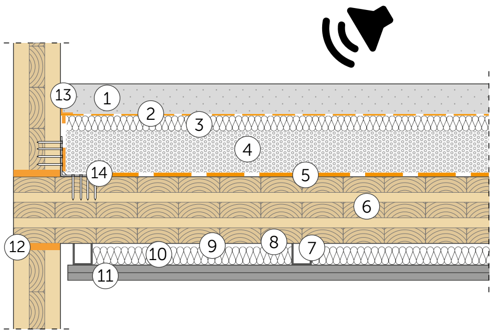


	AIIC (dBA)	$L'_{n,w}$ (dB)	Acoustic improvement (dB)
CLT	21	89	
CLT + SILENT FLOOR BYTUM + 38 mm concrete	39	71	**18**
CLT + SILENT FLOOR BYTUM + 50 mm concrete	40	70	**19**
CLT + SILENT FLOOR BYTUM + 100 mm concrete	46	64	**25**

Testing laboratory: University of Northern British Columbia
Test protocol: 20200720

LABORATORY MEASUREMENT | CLT FLOOR 1

AIRBORNE SOUND INSULATION
REFERENCE STANDARD: ISO 10140-2 AND EN ISO 717-1.

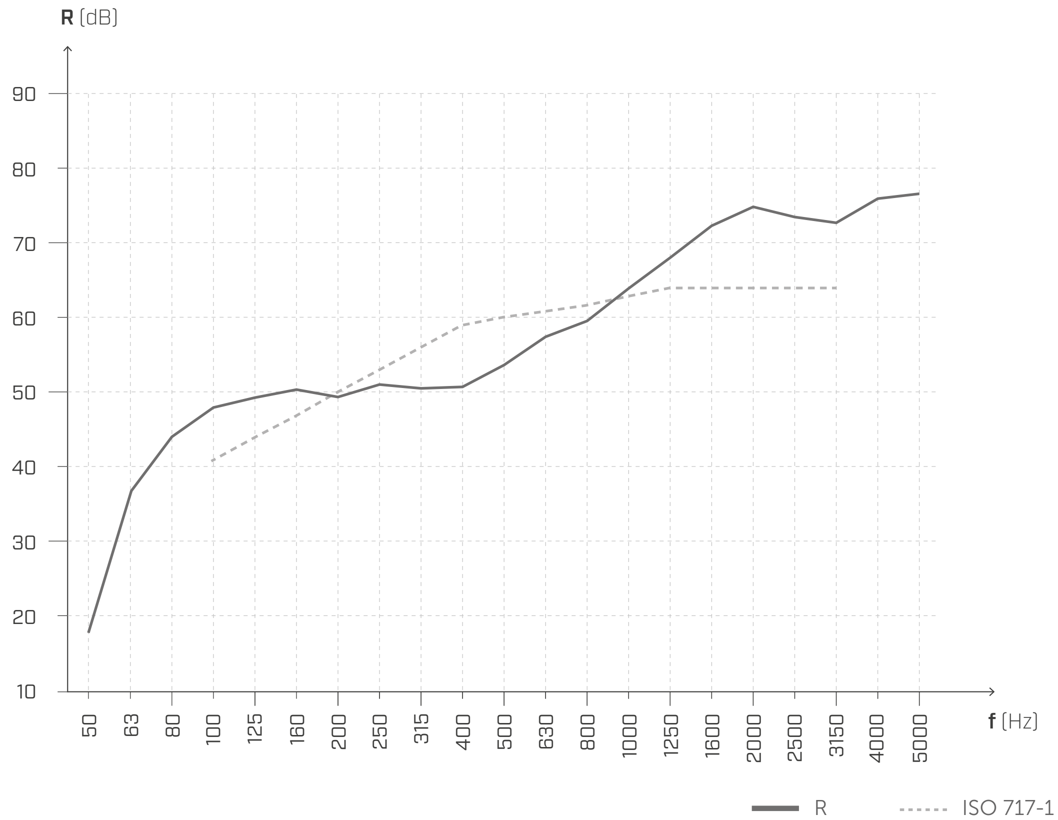


FLOOR SLAB

Surface = 31,17 m^2
Mass = 457.3 kg/m^2
Receiving room volume = 78,4 m^3

1. Concrete screed (2400 $kg/m^{3)}$ (t: 60 mm)
2. BARRIER SD150
3. Mineral wool insulation s' ≤ 10 MN/m^3 (110 kg/m^3) (t: 30 mm)
4. Compact gravel fill with cement (1800 kg/m^3) (t: 80 mm)
5. **SILENT FLOOR BYTUM** (t: 5 mm)
6. CLT (t: 160 mm)
7. Resilient plasterboard connectors (t: 60 mm)
8. Metal structure for plasterboard
9. Air chamber (t: 10 mm)
10. Low density mineral wool insulation (1.25 kg/m^2) (t: 50 mm)
11. 2 plasterboard panels (t: 25 mm)
12. Resilient profile: **XYLOFON**
13. Perimeter band: **SILENT EDGE**
14. Fastening system:
    HBS 8 x 240 mm, 300 mm spacing
    TITAN SILENT 800 mm spacing

AIRBORNE SOUND INSULATION



f [Hz]	R [dB]
50	18,6
63	38,2
80	44,8
100	48,0
125	49,5
160	50,1
200	49,0
250	51,6
315	50,6
400	50,7
500	54,2
630	58,4
800	59,9
1000	64,6
1250	68,7
1600	73,6
2000	75,0
2500	74,1
3150	73,8
4000	76,2
5000	76,9

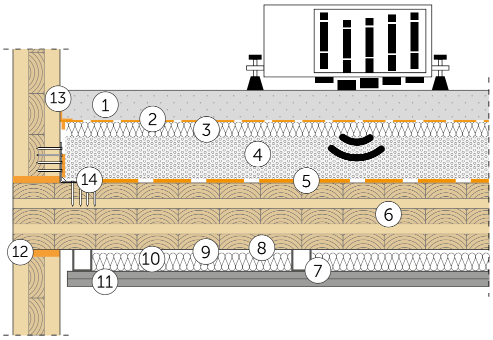
$R_w(C;C_{tr})$ = **60 (-1;-4) dB**   STC = **59**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M01

LABORATORY MEASUREMENT | CLT FLOOR 1

IMPACT SOUND INSULATION

REFERENCE STANDARD ISO 10140-3 AND EN ISO 717-2.



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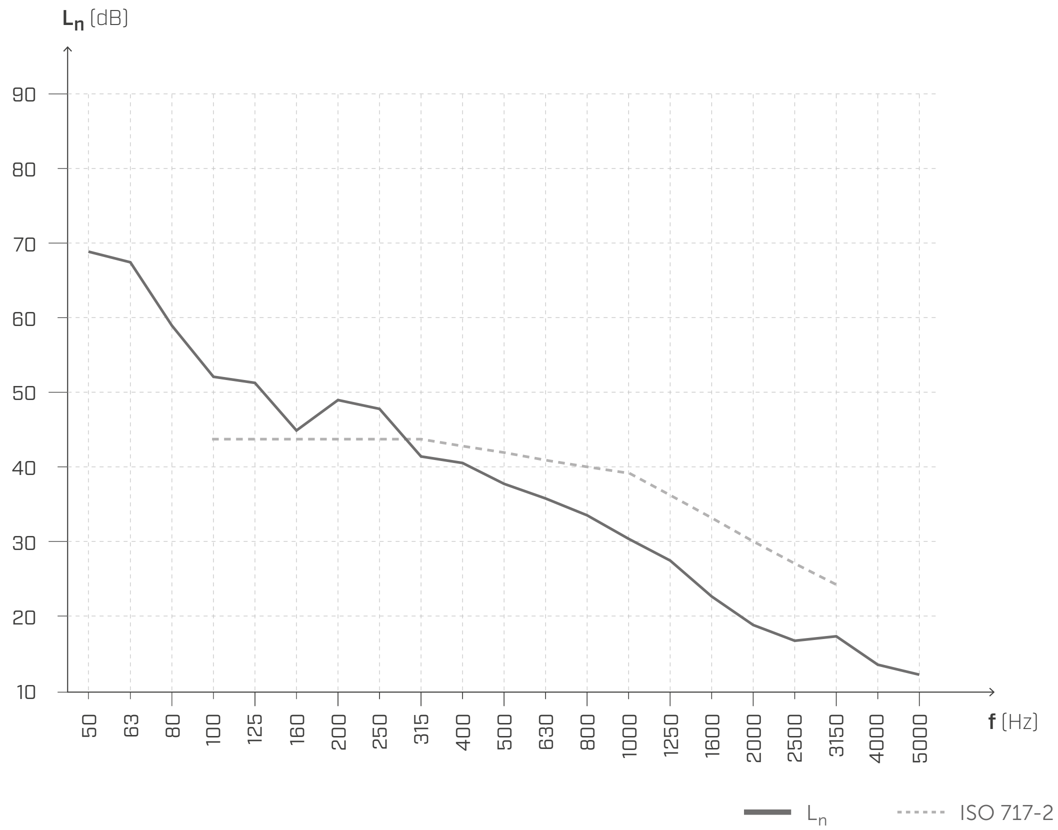
IMPACT SOUND NOISE INSULATION



f [Hz]	L_n [dB]
50	69,1
63	67,3
80	59,7
100	52,9
125	51,1
160	46,6
200	49,4
250	47,5
315	41,8
400	40,5
500	38,8
630	36,7
800	34,5
1000	30,1
1250	27,5
1600	22,5
2000	18,2
2500	17,1
3150	17,3
4000	13,8
5000	12,5

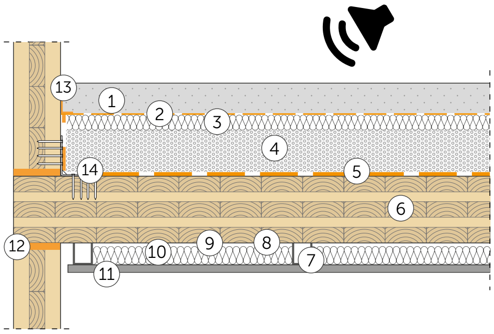
$L_{n,w}(C_I)$ = **42 (0) dB**

IIC = **67**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M01

LABORATORY MEASUREMENT | CLT FLOOR 2

AIRBORNE SOUND INSULATION
REFERENCE STANDARD: ISO 10140-2 AND EN ISO 717-1.

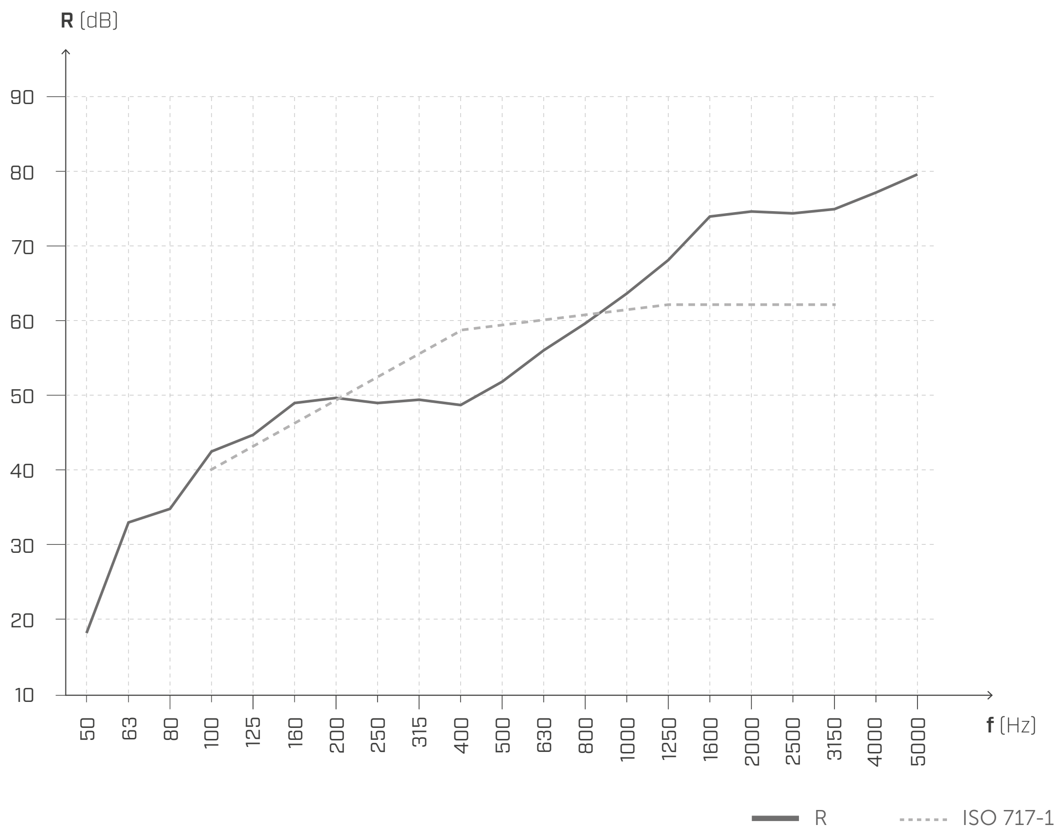


FLOOR SLAB

Surface = 31,17 m^2
Mass = 448.8 kg/m^2
Receiving room volume = 78,4 m^3

1. Concrete screed (2400 kg/m^3) (t: 60 mm)
2. BARRIER SD150
3. Mineral wool insulation s' ≤ 10 MN/m^3 (110 kg/m^3) (t: 30 mm)
4. Compact gravel fill with cement (1800 kg/m^3) (t: 80 mm)
5. **SILENT FLOOR BYTUM** (t: 5 mm)
6. CLT (t: 160 mm)
7. Resilient plasterboard connectors (t: 60 mm)
8. Metal structure for plasterboard
9. Air chamber (t: 10 mm)
10. Low density mineral wool insulation (1.25 kg/m^2) (t: 50 mm)
11. Plasterboard panel (t: 12.5 mm)
12. Resilient profile: **XYLOFON**
13. Perimeter band: **SILENT EDGE**
14. Fastening system:
    HBS 8 x 240 mm, 300 mm spacing
    TITAN SILENT 800 mm spacing

AIRBORNE SOUND INSULATION



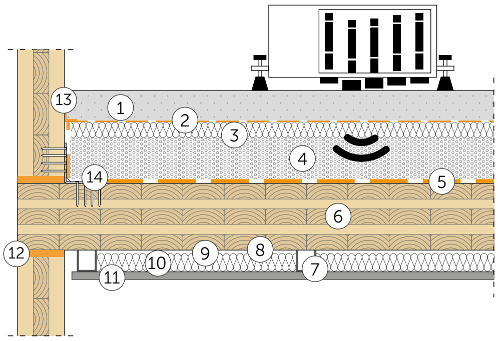
f [Hz]	R [dB]
50	18,7
63	34,9
80	36,9
100	43,8
125	45,6
160	49,1
200	49,9
250	49,1
315	49,4
400	48,7
500	53,0
630	57,4
800	59,9
1000	64,6
1250	68,9
1600	74,2
2000	74,9
2500	74,6
3150	75,1
4000	78,4
5000	79,9

$R_w(C;C_{tr})$ = **59 (-1;-4) dB**   STC = **57**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M02

LABORATORY MEASUREMENT | CLT FLOOR 2

IMPACT SOUND INSULATION
REFERENCE STANDARD ISO 10140-3 AND EN ISO 717-2.



FLOOR SLAB

Surface = 31,17 m^2
Mass = 448.8 kg/m^2
Receiving room volume = 78,4 m^3

1. Concrete screed (2400 kg/$m^{3)}$ (t: 60 mm)
2. BARRIER SD150
3. Mineral wool insulation s' $\leq$ 10 MN/m^3 (110 kg/m^3) (t: 30 mm)
4. Compact gravel fill with cement (1800 kg/m^3) (t: 80 mm)
5. **SILENT FLOOR BYTUM** (t: 5 mm)
6. CLT (t: 160 mm)
7. Resilient plasterboard connectors (t: 60 mm)
8. Metal structure for plasterboard
9. Air chamber (t: 10 mm)
10. Low density mineral wool insulation (1.25 kg/m^3) (t: 50 mm)
11. Plasterboard panel (t: 12,5 mm)
12. Resilient profile: **XYLOFON**
13. Perimeter band: **SILENT EDGE**
14. Fastening system:
    HBS 8 x 240 mm, 300 mm spacing
    TITAN SILENT 800 mm spacing

IMPACT SOUND NOISE INSULATION

f [Hz]	L_n [dB]
50	69,6
63	64,5
80	66,9
100	57,4
125	52,7
160	50,1
200	51,5
250	46,2
315	42,0
400	41,0
500	38,9
630	36,8
800	34,7
1000	30,4
1250	27,4
1600	24,2
2000	21,9
2500	22,7
3150	22,1
4000	20,6
5000	19,4

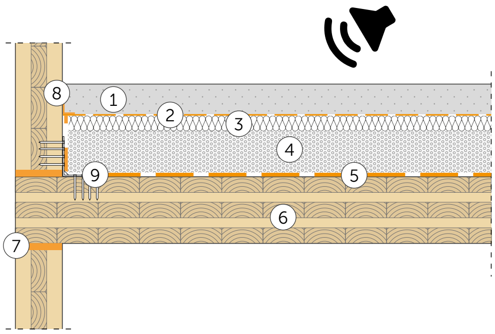
$L_{n,w}(C_I)$ = **44 (1) dB**

IIC = **62**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M02

LABORATORY MEASUREMENT | CLT FLOOR 3

AIRBORNE SOUND INSULATION
REFERENCE STANDARD: ISO 10140-2 AND EN ISO 717-1.



FLOOR SLAB

Surface = 31,17 m^2
Mass = 418,3 kg/m^2
Receiving room volume = 81,2 m^3

1. Concrete screed (2400 kg/m^3) (t: 60 mm)
2. BARRIER SD150
3. Mineral wool insulation s' ≤ 10 MN/m^3 (110 kg/m^3) (t: 30 mm)
4. Compact gravel fill with cement (1800 kg/m^3) (t: 80 mm)
5. **SILENT FLOOR BYTUM** (t: 5 mm)
6. CLT (t: 160 mm)
7. Resilient profile: **XYLOFON**
8. Perimeter band: **SILENT EDGE**
9. Fastening system:
   HBS 8 x 240 mm, 300 mm spacing
   TITAN SILENT 800 mm spacing

AIRBORNE SOUND INSULATION

f [Hz]	R [dB]
50	9,2
63	28,3
80	35,5
100	46,3
125	43,7
160	45,7
200	47,7
250	46,4
315	45,9
400	44,9
500	46,7
630	47,5
800	50,4
1000	55,7
1250	58,1
1600	61,6
2000	62,7
2500	64,4
3150	66,3
4000	69
5000	71

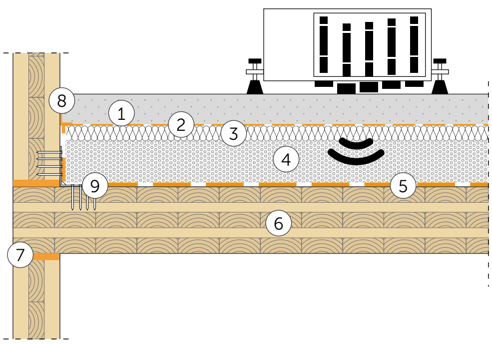
$R_w(C;C_{tr})$ = **53 (-1;-3) dB**   STC = **53**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M03

LABORATORY MEASUREMENT | CLT FLOOR 3

IMPACT SOUND INSULATION

REFERENCE STANDARD ISO 10140-3 AND EN ISO 717-2.

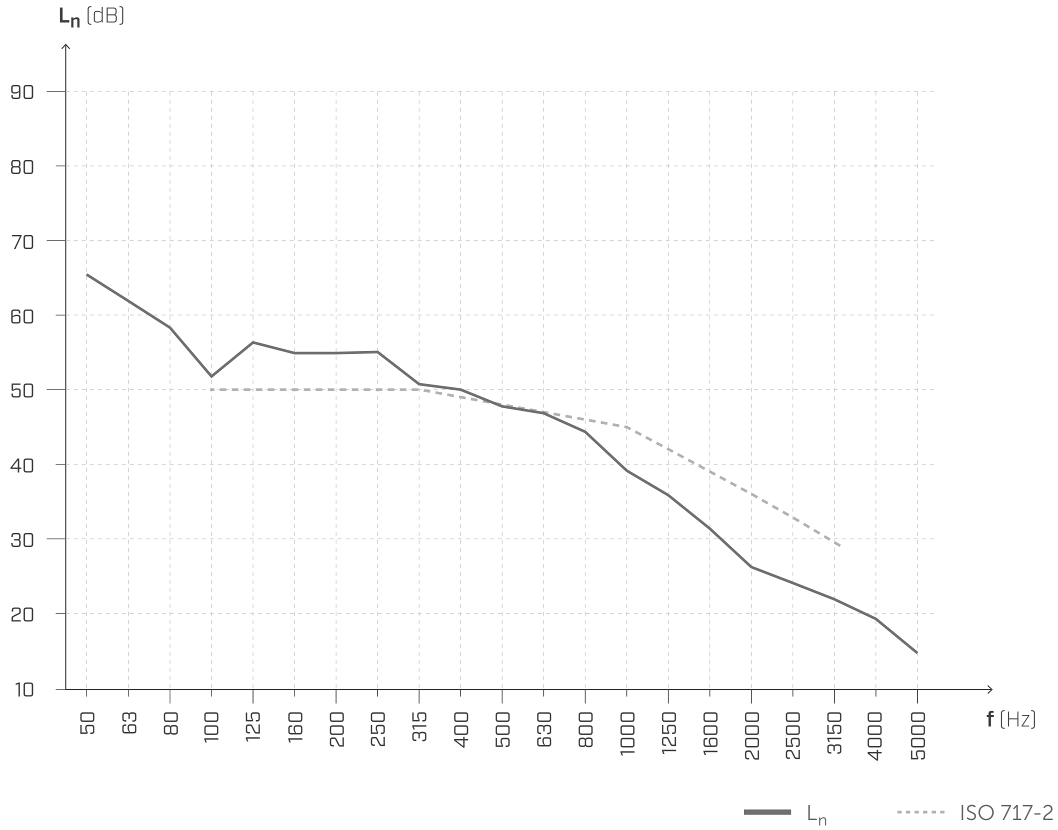


FLOOR SLAB

Surface = 31,17 m^2
Mass = 418,3 kg/m^2
Receiving room volume = 81,2 m^3

1. Concrete screed (2400 $kg/m^{3)}$ (t: 60 mm)
2. BARRIER SD150
3. Mineral wool insulation s' ≤ 10 MN/m^3 (110 kg/m^3) (t: 30 mm)
4. Compact gravel fill with cement (1800 kg/m^3) (t: 80 mm)
5. **SILENT FLOOR BYTUM** (t: 5 mm)
6. CLT (t: 160 mm)
7. Resilient profile: **XYLOFON**
8. Perimeter band: **SILENT EDGE**
9. Fastening system:
   HBS 8 x 240 mm, 300 mm spacing
   TITAN SILENT 800 mm spacing

IMPACT SOUND NOISE INSULATION



f [Hz]	L_n [dB]
50	65,6
63	62,7
80	58,2
100	51,7
125	57,6
160	55,0
200	55,0
250	55,1
315	51,3
400	50,1
500	47,8
630	47,2
800	44,8
1000	39,3
1250	36,0
1600	32,6
2000	26,1
2500	24,6
3150	23,3
4000	19,7
5000	14

$L_{n,w}(C_I)$ = **48 (0) dB**

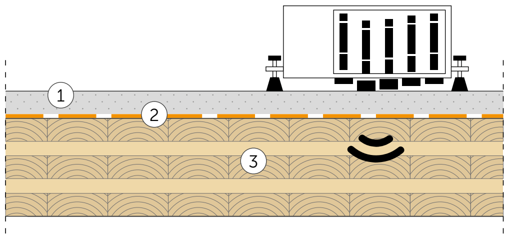
IIC = **62**

Testing laboratory: Akustik Center Austria, Holzforschung Austria
Test protocol: 2440_02_2017_M03

LABORATORY MEASUREMENT | CLT FLOOR 4

IMPACT SOUND INSULATION

REFERENCE STANDARD ISO 10140-3 AND EN ISO 717-2.



FLOOR SLAB

Surface = 13,71 m^2
Surface mass = 215,1 kg/m^2
Receiving room volume = 60,1 m^3

1. Concrete screed (2600 kg/m^3) (t: 50 mm)
2. SILENT FLOOR BYTUM (t: 5 mm)
3. CLT (t: 200 mm)

IMPACT SOUND INSULATION

f [Hz]	L_n [dB]
50	60,5
63	60,0
80	59,4
100	69,1
125	68,0
160	70,7
200	72,1
250	69,4
315	69,2
400	67,3
500	65,4
630	63,6
800	62,8
1000	60,8
1250	60,2
1600	59,0
2000	58,8
2500	57,4
3150	55,6
4000	52,2
5000	47,8

$L_{n,w}(C_I)$ = **66 (-2) dB**

$\Delta L_{n,w}(C_I)$ = -20 dB(1)

IIC = **44**

ΔIIC = +20(2)

Testing laboratory: Building Physics Lab | Libera Università di Bolzano
Test protocol: Pr. 2022-rothoLATE2-L4

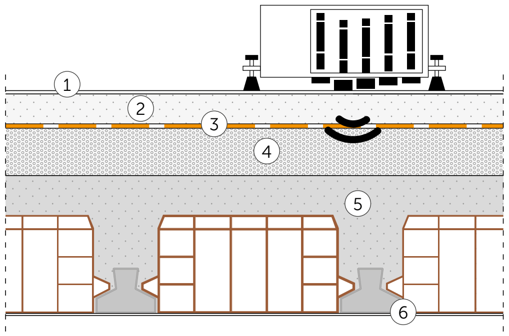
NOTES:
(1) Decrease due to the addition of layers no. 1 and no. 2.
(2) Increase due to the addition of layers no. 1 and no. 2.

ON-SITE MEASUREMENT | CONCRETE FLOOR 1

IMPACT SOUND INSULATION
REFERENCE STANDARD UNI-EN 10708-3 AND ISO 717-2.

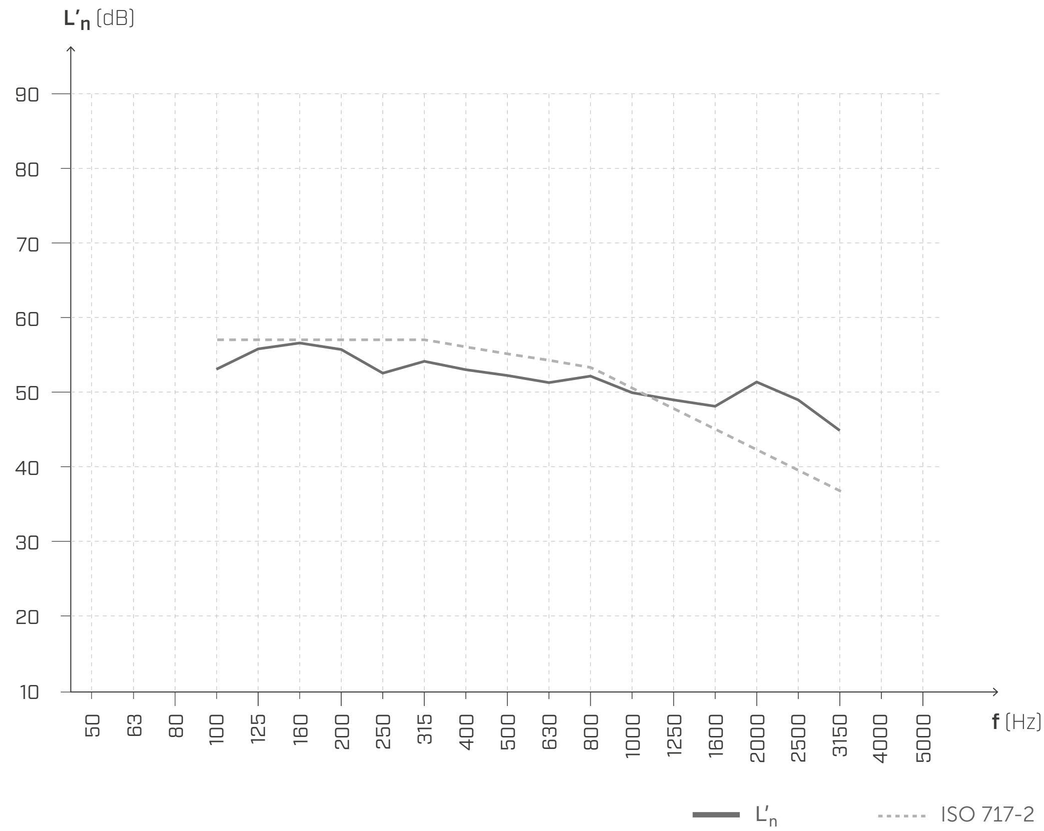
FLOOR SLAB

Receiving room volume = 30,43 m^3



1. Ceramic flooring (t: 15 mm)
2. Sand and concrete screed (t: 60 mm)
3. **SILENT FLOOR BYTUM** (t: 10 mm) + **SILENT EDGE**
4. Light screed (t: 80 mm)
5. Concrete floor (t: 240 mm + 40 mm)
6. Plaster (t: 15 mm)

IMPACT SOUND INSULATION



f [Hz]	L'n [dB]
50	-
63	-
80	-
100	53,9
125	56,2
160	56,8
200	53,7
250	52,2
315	53,1
400	52,4
500	52,0
630	51,2
800	51,8
1000	50,6
1250	49,0
1600	48,7
2000	51,5
2500	49,0
3150	45,4
4000	-
5000	-

$L'_{n,w}(C_I)$ = **55 (-1) dB**

$NISR_{ASTM}$ = **55**

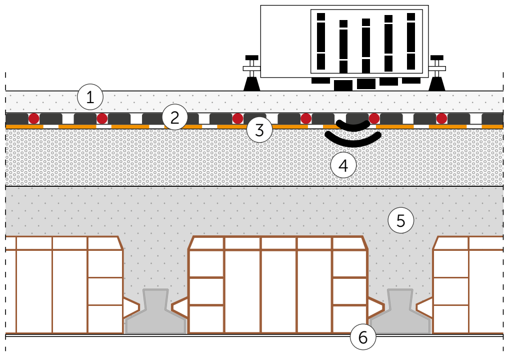
Testing laboratory: Rothoblaas Technical Department
Measurement date: 08/03/2010

ON-SITE MEASUREMENT | CONCRETE FLOOR 2

IMPACT SOUND INSULATION
REFERENCE STANDARD UNI-EN 10708-3 AND ISO 717-2.

FLOOR SLAB

Receiving room volume = 33.90 m^3



1. Concrete screed (t: 40 mm)
2. Radiant floor system panel
3. **SILENT FLOOR BYTUM** (t: 5 mm)
4. Light screed (t: 100 mm)
5. Concrete floor (t: 240 mm + 50 mm)
6. Plaster (t: 15 mm)

IMPACT SOUND INSULATION

f [Hz]	L'n [dB]
50	-
63	-
80	-
100	52,4
125	53,4
160	54,1
200	52,6
250	52,9
315	53,4
400	55,8
500	56,7
630	57,3
800	55,8
1000	53,1
1250	52,8
1600	52,4
2000	51,3
2500	50,5
3150	46,5
4000	-
5000	-

$L'_{n,w}(C_I)$ = **57 (-1) dB**

$NISR_{ASTM}$ = **53**

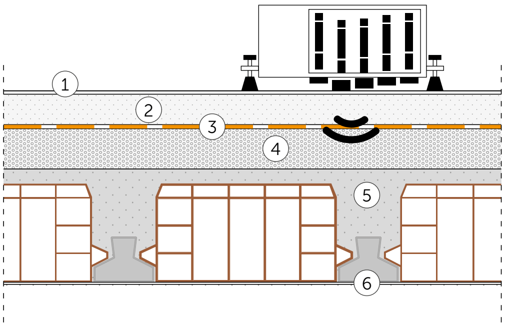
Testing laboratory: Rothoblaas Technical Department
Measurement date: 16/04/2018

ON-SITE MEASUREMENT | CONCRETE FLOOR 3

IMPACT SOUND INSULATION
REFERENCE STANDARD UNI-EN 10708-3 AND ISO 717-2.

FLOOR SLAB

Receiving room volume = 37,30 m^3



1. Ceramic flooring (t: 15 mm)
2. Sand and concrete screed (t: 60 mm)
3. **SILENT FLOOR BYTUM** (t: 5 mm)
4. Concrete screed (t: 70 mm)
5. Concrete floor (t: 200 mm + 40 mm)
6. Plaster (t: 15 mm)

IMPACT SOUND INSULATION

f [Hz]	L'_n [dB]
50	-
63	-
80	-
100	54,3
125	57,4
160	54,5
200	53,6
250	51,8
315	51,4
400	53,2
500	56,7
630	58,5
800	57,3
1000	55,1
1250	54,2
1600	51,9
2000	49,9
2500	48,0
3150	48,7
4000	-
5000	-

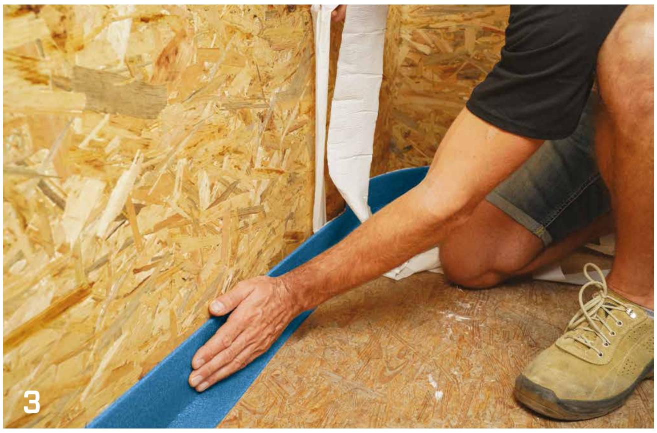
$L'_{n,w}(C_I)$ = **58 (-8) dB**

$NISR_{ASTM}$ = **52**

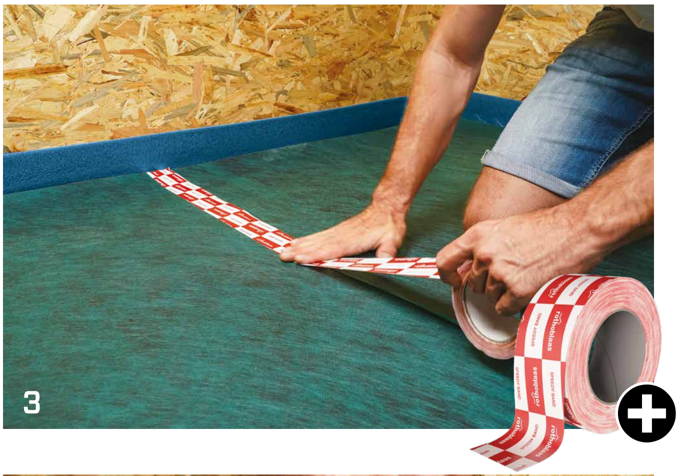
Testing laboratory: Rothoblaas Technical Department
Measurement date: 30/06/2014

SILENT FLOOR | Recommendations for installation

PERIMETER STRIP INSTALLATION



SINGLE-LAYER UNDERSCREED MEMBRANE INSTALLATION



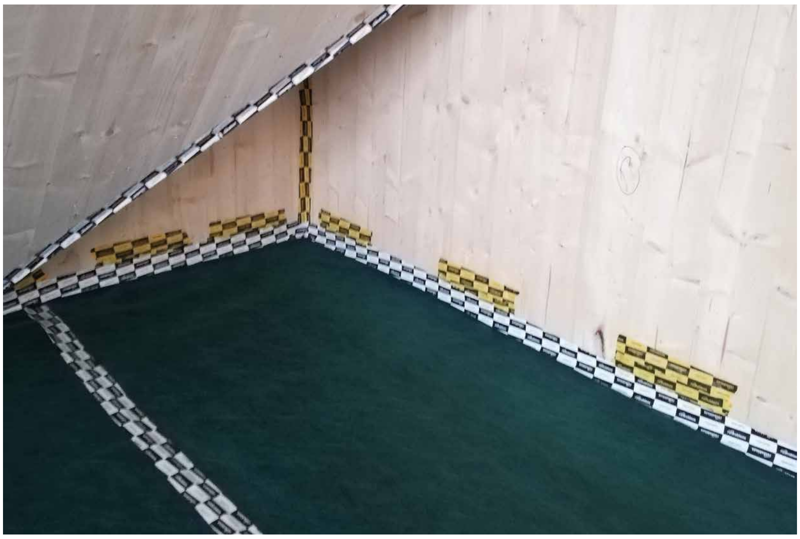
DOUBLE-LAYER UNDERSCREED MEMBRANE INSTALLATION

REFERENCES

SMALL RESIDENTIAL BUILDING

Walberswick (GB)

What could be more magical than imagining the silence of a small CLT residential building set in the peace and quiet of a small village on the Suffolk coast of England? Thanks to our connectors, our resilient XYLOFON profile and the SILENT FLOOR BYTUM underscreed foil. This is a dream come true.

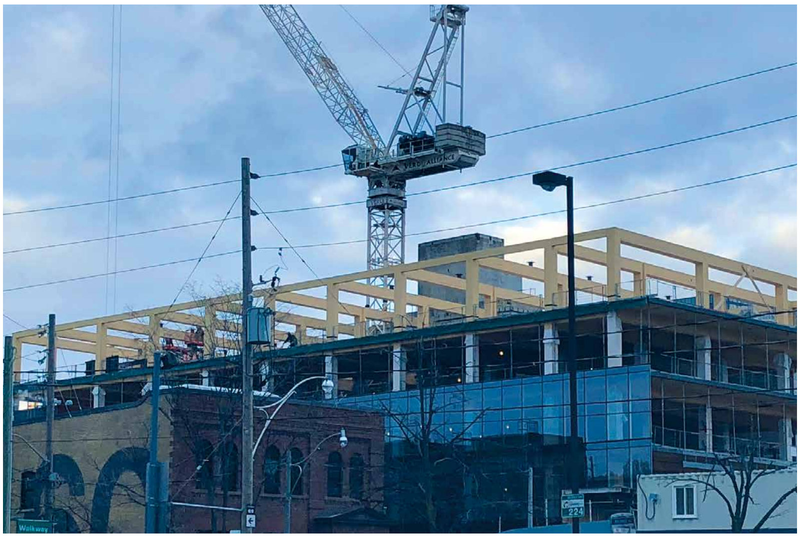


description	small residential building
type of structure	CLT
location	Walberswick (England)
products	XYLOFON, SILENT FLOOR BYTUM

COMMERCIAL BUILDING

Toronto (CA)

In the construction of this new commercial building, SILENT FLOOR BYTUM was used to create a floating screed system to ensure the best acoustic performance of the interior spaces.



description	commercial building
type of structure	mixed
location	Toronto (Ontario, Canada)
products	SILENT FLOOR BYTUM

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