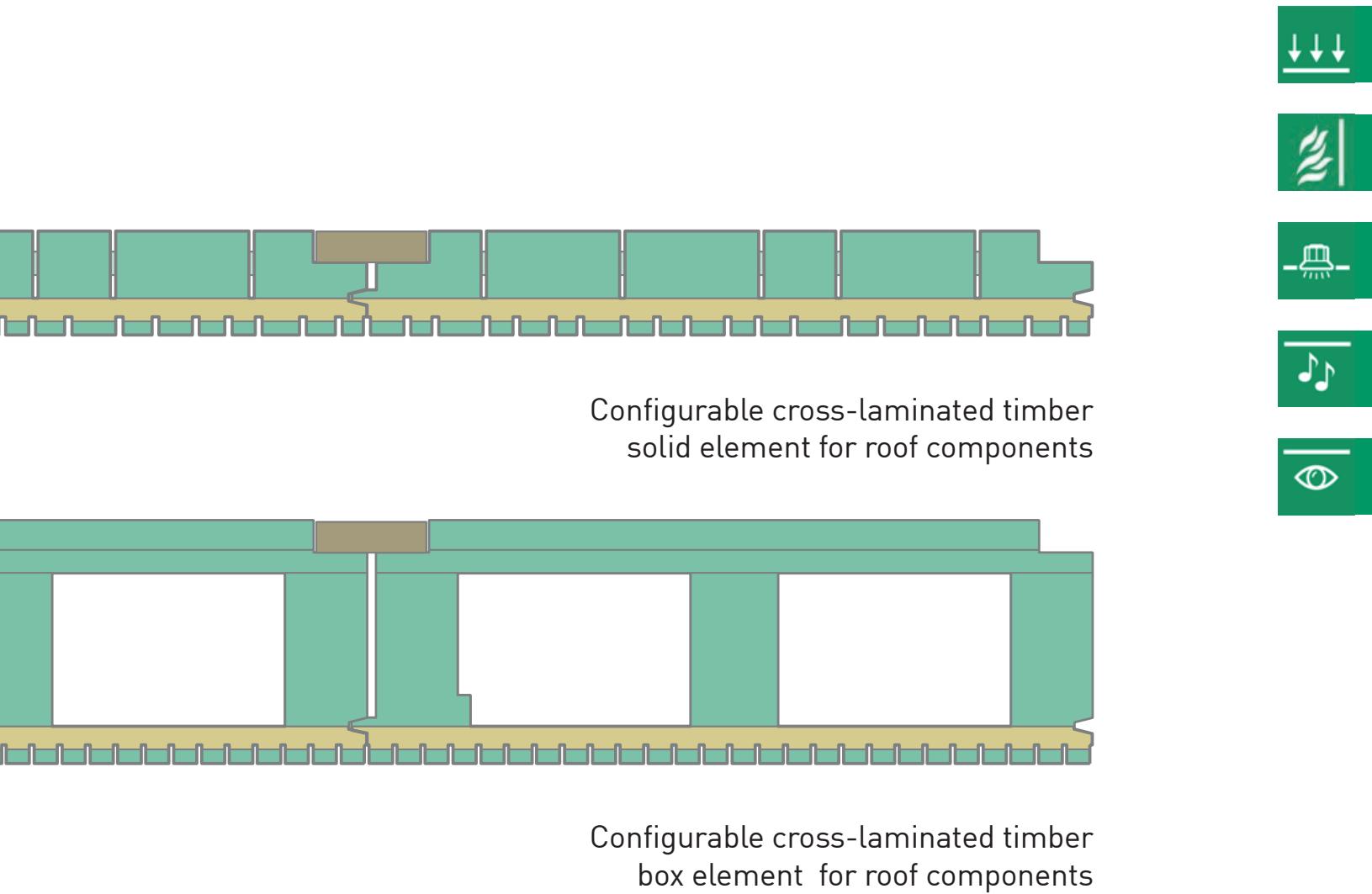


LIGNO® Block Q-x / Block Q3-x

Technical Data



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LIGNO ■ TREND®

For sustainable building in timber.

Components with LIGNO® Block-x

Introduction

Load-bearing roof's shear panel with thermal insulation

In both **flat roofs** and **pitched roofs**, cross-laminated timber box elements from Lignotrend, as area-forming elements with a visible surface, act simultaneously as a load-bearing panel and a statically stiffening plate ► [page 33](#).
The supporting structure is simple: In hall roofs, the element strips lie directly on the beam construction without purlins; in smaller buildings they usually lie directly on the walls, either parallel to the roof ridge or in the direction of the roof pitch.

The latest generation of the roof elements from Lignotrend is flexibly configurable for individual requirements – for example in fire resistance in the case of special requirements up to F90-B. ► www.lignotrend.com/configurator.

The elements have high dimensionally stable: Transverse layers in the upper and lower chord of the box element make the element tolerant to construction-related wood moisture changes. Thus, a homogeneous joint pattern is created with acoustic profiles even over the joints.

Visible surface

The production of the roof elements with real wood visual quality is available in several alternatives, no subsequent interior finishing necessary. Knotless silver fir is unique.

Openings, e.g. for installing luminaires, can be prepared ex works. Also cable routes, conduits, cables and even ventilation ducts can be pre-installed.. [Surfaces](#) ► [page 11](#)

Thermal insulation

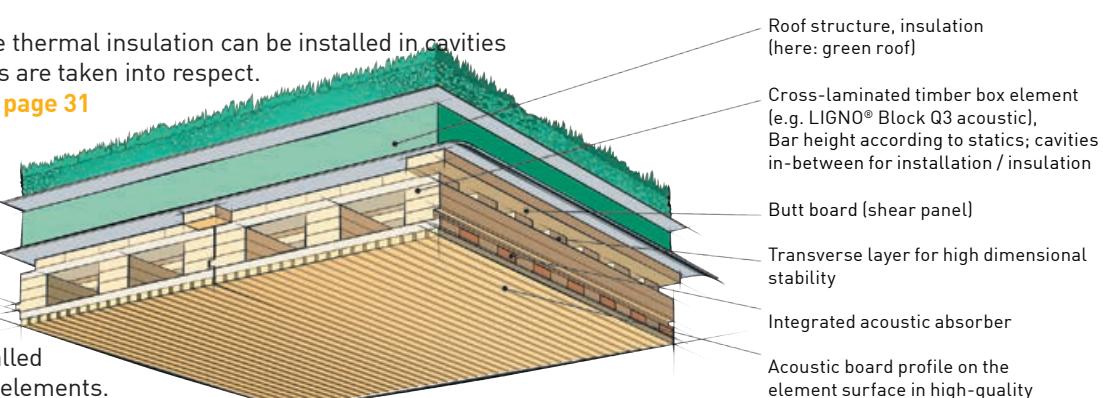
Also in flat roofs a part of the thermal insulation can be installed in cavities if the laws of building physics are taken into respect.

[Building physics](#) ► [page 7](#), [page 31](#)

Room acoustics

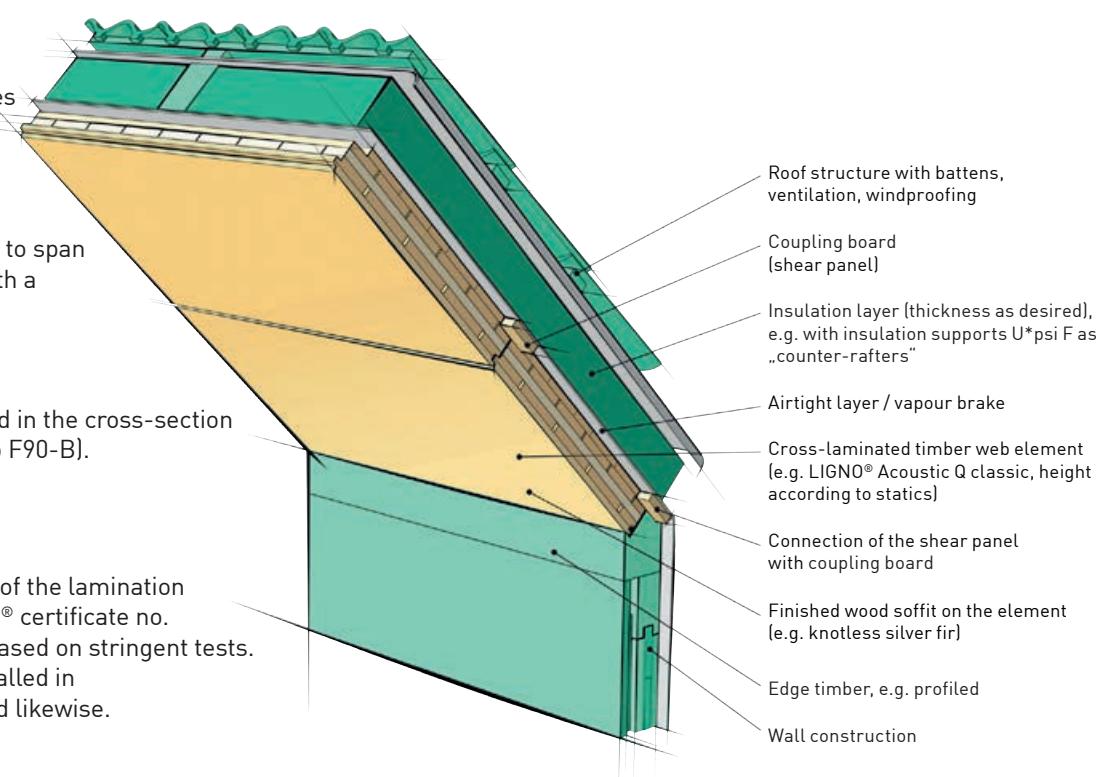
In case of requirements for a reduction of noise level and reverberation (e.g. in the construction of halls, schools or offices), an acoustic absorber is installed during the production of the elements.
The visible layer is profiled accordingly with slats.

[Acoustic profile](#) ► [from page 9](#)



Span

Architectural design becomes flexible due to free spans. Elements can be prepared in the factory for local reinforcements and hidden joists. BV elements are used to span large rooms, if necessary with a slight camber.



Fire resistance

Additional layers are inserted in the cross-section for fire resistances (F30-B to F90-B).

[Additional layer](#) ► [page 8](#)

Green building

The harmlessness to health of the lamination is certified by the natureplus® certificate no. 0211-0606-014-1, which is based on stringent tests. The wood fibre material installed in acoustic elements is certified likewise.

Configuration procedure

Phase 1

Based on your requirements, preselect the component features:



Thermal insulation / Roof structure



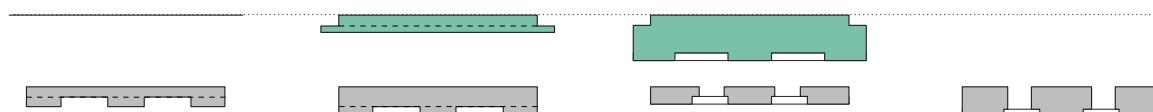
etc.

► from page 27

Selection of the component structure: Tested superstructures, e.g. for increased noise protection, including low frequency, and for thermal insulation if applicable.



Implementation as a solid or box element

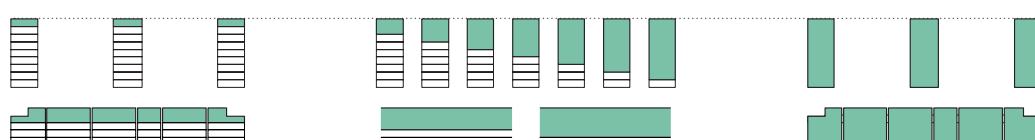


► page 6

Selection of top side/element shape: As a level surface for the roof structure. For the longitudinal/transverse installation layout in open ducts: transition to top sides shown in grey ► [Data sheet LIGNO® Rippe-x](#)



Statics



► page 6

Definition of the approximate bar height (pre-dimensioning with Lignotrend LTB-x and DC Statik dimensioning program), Decision between box and solid elements : From normal to large span widths, with vibration verification.



Fire resistance



► page 8

Arrangement of the so-called additional layer for fire protection F0-B to F90-B, bulkhead solutions for cable/pipe feed-throughs.



Installation space / additional absorber



► page 8

If necessary: selection of the so-called plus layer. Additional channels for cables/pipes/built-in components underneath the fire-protection layer.



Surface and room acoustics



► from page 9

Definition of the component soffit: Various types of timber including knotless, closed surfaces, acoustic slats/board profiles, integrated acoustic absorbers.

Phase 2

To determine the cross-sectional height, static dimensioning is carried out with the LTB-x and DC Statik dimensioning program ► [page 7](#).

Your Lignotrend consultant will be glad to do that for you.

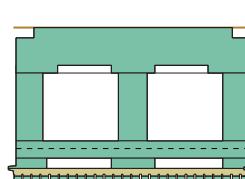


LIGNO®
Configurable CLT

Example roof configuration for very large span width	Example roof configuration for medium span width	Example roof configuration for normal span width	Example roof configuration for low load
R _w according to specific structure U according to insulation	R _w according to specific structure U according to insulation	R _w according to specific structure U according to insulation	R _w according to specific structure U according to insulation
High upper chord, closed longitudinal channel LIGNO® Block Q3_bv	Closed upper chord longitudinal channel underneath LIGNO® Block Q3	Closed upper chord longitudinal channel underneath LIGNO® Block Q3	Closed upper chord, no cavities LIGNO® Block Q
High bars for large span width or high load	Medium-height bars for medium span width or moderate load	Medium-height bars for medium span width or moderate load	Solid middle layer for small/medium span width or low load
F30-B with additional layer _z26	F60-B with additional layer _z53	F0-B without additional layer _z0	Fire resistance according to proof without additional layer _z0
_p26 26 mm high installation space	_p53 53 mm high installation space	_p0 no additional installation space	_p0 no additional installation space
_a50g Acoustic absorber _625-20-4 Slat profile _WTL Silver fir, patterned _buv Light protection	_a50g Acoustic absorber _625-18n38-4 nature slat profile _EI Oak knotless _b0 untreated	_a0 without absorber _625-621-4 Closed soffit _WTL Silver fir, patterned _buv Light protection	_a0 without absorber _625-20-4 Slat profile, low absorbing _WTE Silver fir, economy _b0 untreated

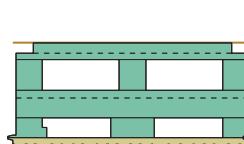
Roof component
for very large span width

LIGNO® Block Q3-x



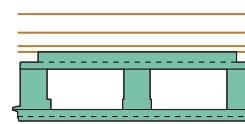
Roof component
for medium span width

LIGNO® Block Q3-x



Roof component
for normal span width

LIGNO® Block Q3-x



Roof component
for low load

LIGNO® Block Q-x





Configuration of the bar/element height Pre-dimensioning



Element height (pre-dimensioning)

LIGNO® Block Q-x – solid element

During the configuration, the element height is initially estimated.

The bar height results from the selection of the remaining configuration options, see tables ► [from page 20](#).

low load	small span width	medium span width
----------	------------------	-------------------

high load	small span width	medium span width
-----------	------------------	-------------------

Element height	70	90	110	130
-----------------------	-----------	-----------	------------	------------



Element height (pre-dimensioning)

LIGNO® Block Q3-x – box element

During the configuration, the element height is initially estimated.

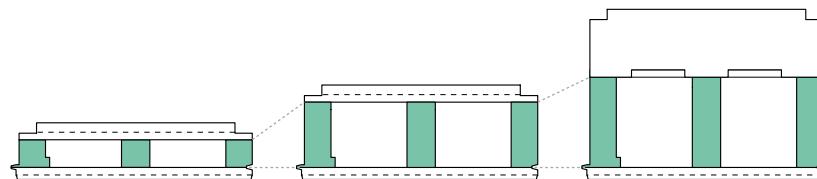
The bar height results from the selection of the remaining configuration options, see tables ► [from page 12](#).

low load	small span width	medium span width	large span width
----------	------------------	-------------------	------------------

high load	small span width	medium span width	large span width
-----------	------------------	-------------------	------------------

small span width with vibration verification	medium span width with vibration verification	large span width with vibration verification
---	--	---

Element height	150	170	190	210	230	250	270	290	310	330	350	370	390	410	410	450
-----------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	------------



Configuration of the bar/element height

Static dimensioning



Element height (direct load-capacity verification)

With the free **LTB-x dimensioning software or DC Statik**, a configuration can be created with realistic pre-dimensioning and a verifiable proof. Download from
[▶ www.lignotrend.com/lbt](http://www.lignotrend.com/lbt)

For the so-called “**hot dimensioning**” (fire resistances F30-B, F60-B and F90-B), a second, **separate verification** is to be carried out in which the theoretical residual cross-section is to be taken into account.



Plate load capacity

The **statically effective plate** is formed by coupling the element strips with butt boards. Softwood **butt boards** (C24, cross section 95 mm x 26.5 mm) as delivered as standard. These are fastened on site, for example with clamps. In the case of higher stresses, they can be replaced by veneered plywood strips, for example. Additional stiffening boards or diagonals are not usually necessary! **A static verification of the plate is necessary.**

▶ Characteristic values from page 33

Insulation

Configuration of the cavities

Thermal insulation

With the box element LIGNO® Block Q3-x in the configurations listed below, the cavities can ex works be filled with **thermal insulation** in order to reduce the height of the overall component. Since no vapour barrier is arranged on the warm side of the element due to the wood surface, attention must in particular be paid to the moisture balance in the construction. For thermal insulation and vapour values see ▶ page 31

When used in non-ventilated flat roof constructions, the building physics must be carefully considered, especially if - due to the element filling - more than 1/3 of the thermal insulation is to be placed inside of the vapour barrier that lies itself on the cold side of the element. A building physics simulation is then necessary.

	150	170	190	210	230	250	270	290	310	330	350-450
<u>s0</u> unfilled cavity	-	-	-	-	-	-	-	-	-	-	-
<u>smw</u>	<input type="checkbox"/>										
cavity with mineral wool mats	<input checked="" type="checkbox"/>										
<u>sze</u>	-	-	<input checked="" type="checkbox"/>								
cavity with cellulose flakes	-	-	-	<input checked="" type="checkbox"/>							
<input checked="" type="checkbox"/> _smw	-	-	<input checked="" type="checkbox"/>								
<input checked="" type="checkbox"/> _smw/_sze	-	-	-	-	<input checked="" type="checkbox"/>						
<u>z0_p0</u>	<input checked="" type="checkbox"/>										
<u>z26_p0</u>	<input checked="" type="checkbox"/>										
<u>z26_p26</u>	-	-	<input checked="" type="checkbox"/>								
<u>z26_p53</u>	-	-	-	<input checked="" type="checkbox"/>							
<u>z53_p0</u>	-	-	<input checked="" type="checkbox"/>								
<u>z53_p26</u>	-	-	-	<input checked="" type="checkbox"/>							
<u>z53_p53</u>	-	-	-	-	<input checked="" type="checkbox"/>						
<u>z80_p0</u>	-	-	-	<input checked="" type="checkbox"/>							
<u>z80_p26</u>	-	-	-	-	<input checked="" type="checkbox"/>						
<u>z80_p53</u>	-	-	-	-	-	-	<input checked="" type="checkbox"/>				

Configuration of the fire resistance

Configuration of the lower installation area

Additional layers for fire resistance

For a calculable behaviour in case of fire, closed timber layers of different thicknesses are located above the soffit. They isolate the upper, load-bearing cross-sectional area from the soffit with acoustic absorber or from the lower installation area.

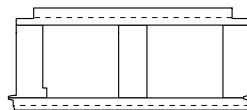
Plus layers for lower installation area

The lowering of the soffit using so-called plus layers enables the flexible layout of cables/pipes without having to penetrate the fire protection level. They increase the sound absorption capacity and allow the installation of spots. To further optimize the frequency response of sound absorption, a plus variant with filling can be configured. However, this option does not allow for the routing of cables.

_z0

Unmodified
base body

LIGNO® Block Q3



_p0

no plus layer

_p26

Plus layer
for 26 mm installation space
underneath the fire protection layer

_p53

Plus layer
for 53 mm installation space
underneath the fire protection layer

_z26

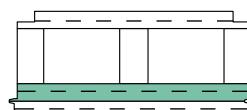
26,5 mm high
additional layer for
fire resistance

for
F30-B

according to National
Technical Approval

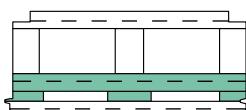
_z26_p0

LIGNO® Block Q3 from a height of
150



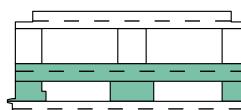
_z26_p26

LIGNO® Block Q3 from a height of
170



_z26_p53

LIGNO® Block Q3 from a height of
190



_z53

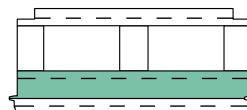
53 mm high addi-
tional layer for fire
resistance

for
F60-B

according to National
Technical Approval

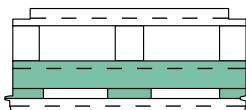
_z53_p0

LIGNO® Block Q3 from a height of
170



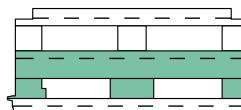
_z53_p26

LIGNO® Block Q3 from a height of
190



_z53_p53

LIGNO® Block Q3 from a height of
210



_z80

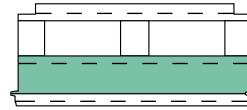
80 mm high addi-
tional layer for fire
resistance

for
F90-B

according to National
Technical Approval

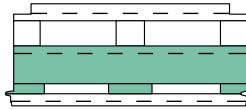
_z80_p0

LIGNO® Block Q3 from a height of
190



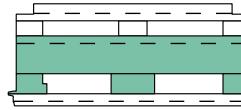
_z80_p26

LIGNO® Block Q3 from a height of
230



_z80_p53

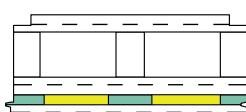
LIGNO® Block Q3 from a height of
250



_p26mw

_p26ha

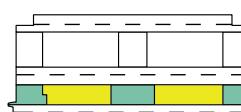
26 mm more sound absorption



_p53mw

_p53ha

53 mm more sound absorption



Isolated additional
layer for increased
sound absorption
below the fire protec-
tion layer (e.g.; with
mineral wool or
hemp)

Configuration of the element soffit Acoustic profile, absorber _a50g



Sound-absorbing slat profiles

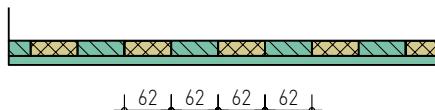
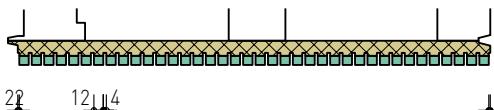
To achieve a sound-absorbing effect of the element surface on the room side, the wood surface can be profiled ex works with joints. The transverse layer located underneath is then fitted with an absorber.

Transverse layer _a50g

with soft wood fibre acoustic absorber
(50% of area)

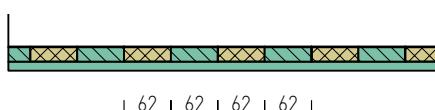
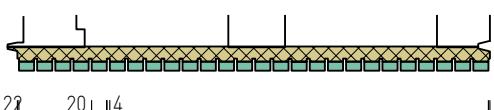
625-12-4

12 mm slat, 4 mm joint



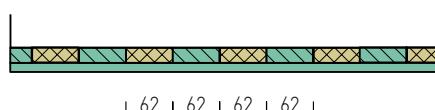
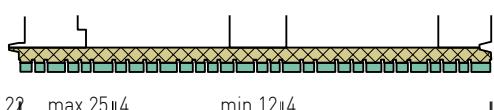
625-20-4

20 mm slat, 4 mm joint



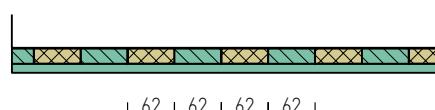
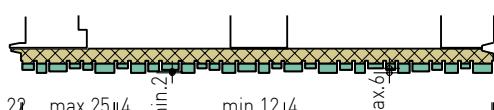
625-12 n 25-4

nature profile: Slat width from 12 to 25 mm in irregular sequence, 4 mm joint



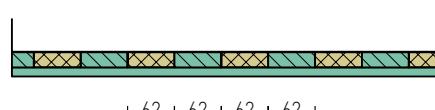
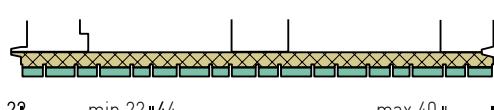
625-12 n 25-4:3D

nature 3D profile: like profile 625-nature-4, but slats additionally graduated in height by 2, 4 or 6 mm



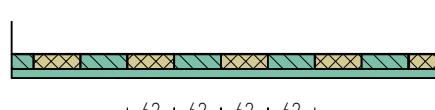
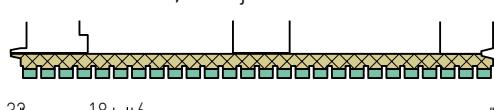
625-22 n40-4

nature-Profil: Slat width from 20 to 40 mm in irregular sequence, 4 mm joint



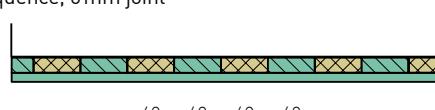
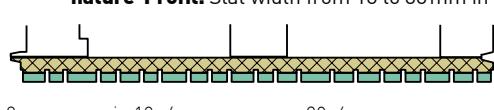
625-18-6

18 mm slat, 6 mm joint



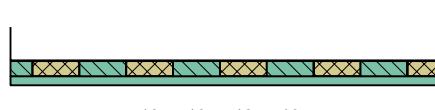
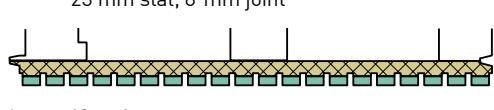
625-18 n 38-6

nature-Profil: Slat width from 18 to 38 mm in irregular sequence, 6 mm joint



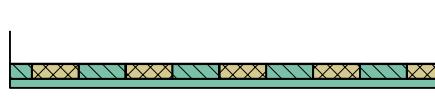
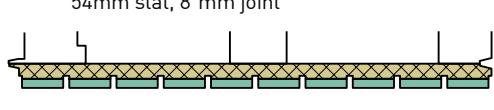
625-23-8

23 mm slat, 8 mm joint



625-54-8

54mm slat, 8 mm joint



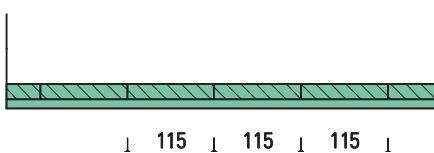
Configuration of the element soffit Low absorbent and closed profiles

Low sound-absorbent slat profiles

If a slat surface is desired, but a low sound absorption is sufficient, no acoustic absorber is placed in the transverse layer. Cross-sectional structure of the **profile variants otherwise analogous to the absorbent variants**.

Transverse layer _a0

with solid wood transverse layer, no absorber

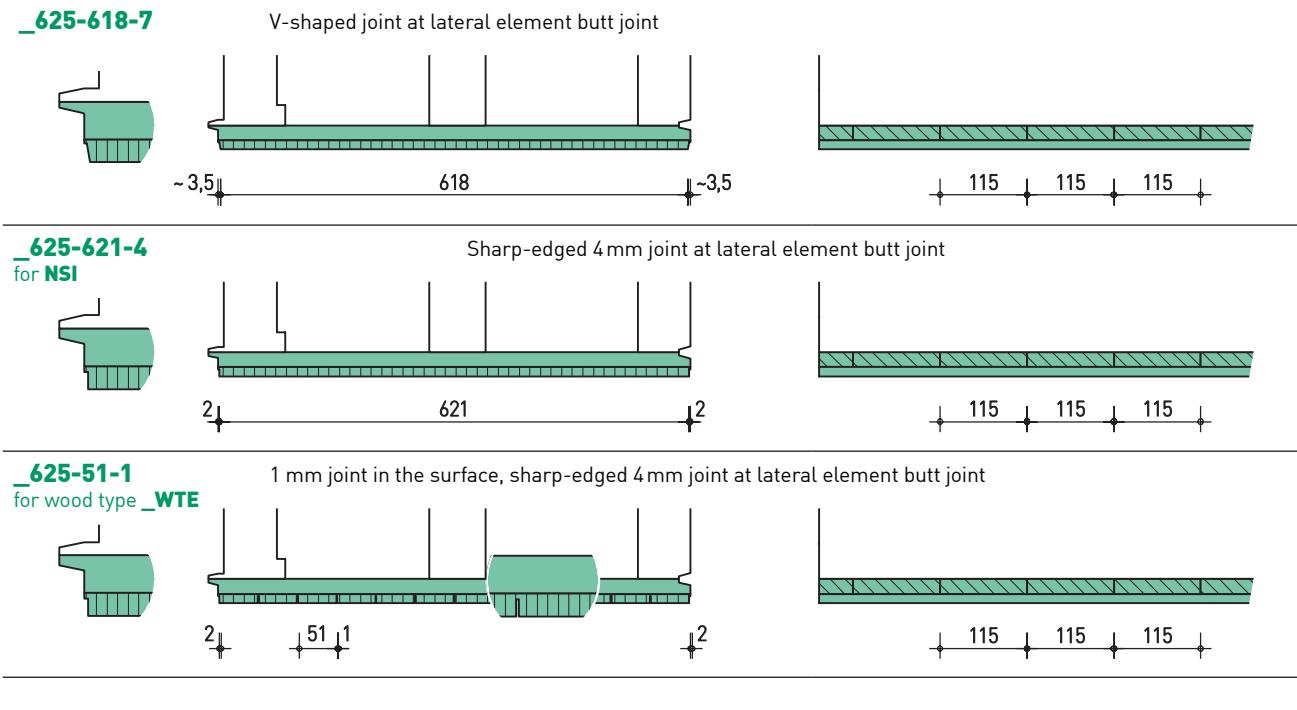


Laminar, closed real wood soffit

The element soffit can also be implemented with a closed real wood surface over the element width of 625 mm.

Transverse layer _a0

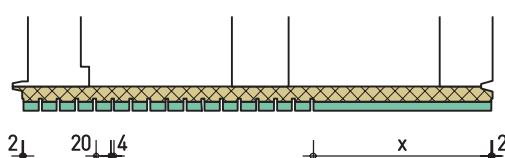
with solid wood transverse layer, no absorber



Special versions (on request)

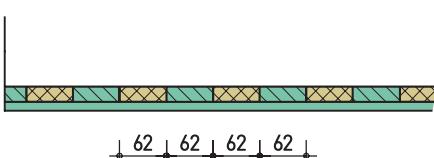
Profiling of partial surfaces

Only a part of the soffit is scored.



Transverse layer _a50g or _a0

Transverse layer with or without absorber



Acoustic perforation

Drilling the soffit,
provided this is technically feasible.

Transverse layer _a50g or _a0

Transverse layer with or without absorber

Configuration of the element soffit

Type of timber, surface treatment

High-quality real wood soffit

With most types of timber, the single-layer boards used for the visible layer of the elements consist of lamella sections, which are connected lengthwise by vertical or horizontal finger-joints. Approx. every 2.87 m, the elements are coupled by a general butt joint, which is recognisable close up as a fine line over the 625 mm element width.

- The technical data sheet „LIGNO® surfaces“ contains a precise description of the timber character



Silver fir knotless, patterned	<u>WTL</u>	Vivid pattern, variation in brightness and colour
Silver fir knotless, patterned, impregnated	<u>WTL-i</u>	Like WTL, but impregnated for flame retardancy. <u>Only in conjunction with acoustic profile</u> . Required on the load-bearing element only in special cases.
Silver fir knotless, plain	<u>WTS</u>	Like WTL, but with less variation, finer grain. <u>Availability limited, please enquire about delivery time</u> .
Silver fir knotless, economy	<u>WTE</u>	Like WTL, but with wood irregularities. <u>Only in connection with the profile 625-51-1 and with acoustic profiles</u> .
Spruce knotless, plain	<u>FIS</u>	Comparable with WTS, but very little colour variation
Spruce knotless, plain, impregnated	<u>FIS-i</u>	Like FIS, but impregnated for flame retardancy. <u>Only in conjunction with acoustic profile</u> . Required on the load-bearing element only in special cases.
Spruce knotty (A qual.)	<u>FI-ä</u>	Grade with knots, homogeneous pattern, continuous lamellae without finger-joints. <u>Note: Knots may be conspicuous with narrow slat profiles</u> .
Knotless oak	<u>EI</u>	Vivid pattern, variation in the brightness, lamella joint visible only as a line (horizontal finger joints). <u>Availability/stock limited, please enquire about delivery time</u> .
Larch	<u>LÄS</u>	Vivid pattern, slight variation in brightness
Other types of timber		Should the element soffit be designed with a different type of timber? Contact the Lignotrend consultant; he will check the feasibility.

Inexpensive soffit without visible quality requirement

If the ceiling soffit is to be clad on site with plasterboard or implemented with a suspended ceiling, wood in a non-visible quality is used for the lowest layer.

Industrial quality	<u>NSI</u>	Single boards laid with joints or single-layer plates that are unsuitable for visible qualities. Different types of timber can be mixed in elements or pickings.
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Surface treatment

Light-protection primer, colourless	Glaze for light-coloured woods: Colourless UV-protection primer to prevent darkening of the wood. Suitable for interior use (not classified as toxic). Final treatment necessary if washout cannot be ruled out. Make: Adler Lignovit Interior UV 100 LT5.
Other surface treatments	An on-site application is recommended for other final treatments of the surface.

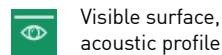
Basic element configuration of box element

Fire resistance F0-B

LIGNO® Block Q3_z0_p0

Height	Recom-mended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
150	≤ 15 m	45	73,0	50	45	0,047	2,8
170	≤ 15 m	45	93,0	54	49	0,059	3,6
190	≤ 18 m	45	113,0	57	52	0,072	4,3
210	≤ 18 m	45	133,0	61	56	0,085	5,1
230	≤ 18 m	45	153,0	64	59	0,098	5,9
250	≤ 18 m	45	173,0	68	63	0,111	6,6
270	≤ 18 m	45	193,0	71	66	0,123	7,4
290	≤ 18 m	45	213,0	75	70	0,136	8,2
310	≤ 18 m	60	218,0	85	80	0,136	8,2
330	≤ 18 m	60	238,0	88	83	0,149	8,9
350	≤ 18 m	60	258,0	92	87	0,162	9,7
370	≤ 18 m	80	258,0	102	97	0,162	9,7
390	≤ 18 m	100	258,0	112	107	0,162	9,7
410	≤ 18 m	120	258,0	122	117	0,162	9,7
430	≤ 18 m	140	258,0	132	127	0,162	9,7
450	≤ 18 m	160	258,0	142	137	0,162	9,7
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

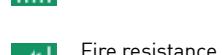
Configuration options



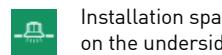
Visible surface,
acoustic profile



▶ from page 9
Fire resistance
F30-B up to F90-B

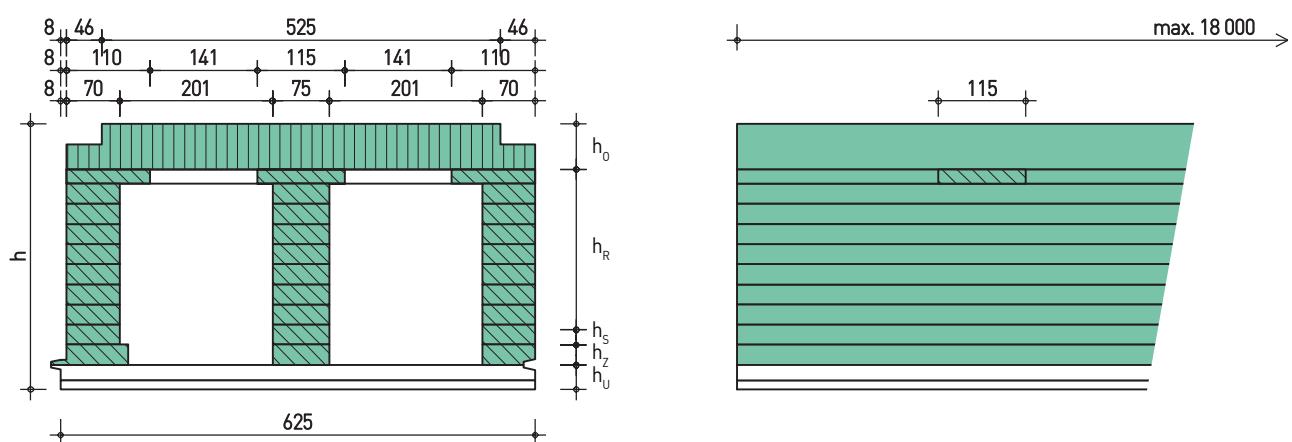
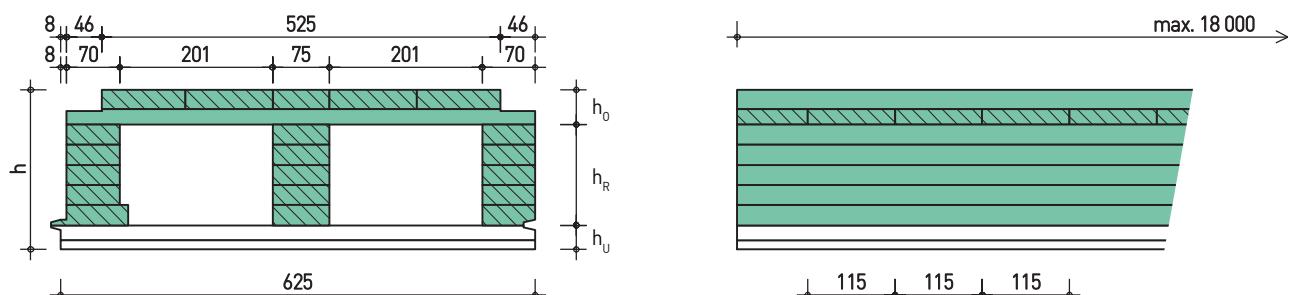


▶ page 8
(Examples on page 13-18)



▶ page 8
Improvement of the sound
absorption

No additional layer **_z0** h_z - Transversal layer h_s -
No plus layer **_p0** h_p - Surface h_u 32 mm



Basic element configuration of box element

Fire resistance F30-B

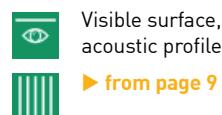
LIGNO® Block Q3_z26_p0

Height	Recom-mended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
150	≤ 15 m	45	26,5	65	60	0,017	1,0
170	≤ 15 m	45	46,5	69	64	0,030	1,8
190	≤ 18 m	45	66,5	72	67	0,043	2,6
210	≤ 18 m	45	86,5	76	71	0,056	3,3
230	≤ 18 m	45	106,5	79	74	0,068	4,1
250	≤ 18 m	45	126,5	83	78	0,081	4,9
270	≤ 18 m	45	146,5	86	81	0,094	5,6
290	≤ 18 m	45	166,5	90	85	0,107	6,4
310	≤ 18 m	60	171,5	100	95	0,107	6,4
330	≤ 18 m	60	191,5	103	98	0,120	7,2
350	≤ 18 m	60	211,5	107	102	0,132	7,9
370	≤ 18 m	80	211,5	117	112	0,132	7,9
390	≤ 18 m	100	211,5	127	122	0,132	7,9
410	≤ 18 m	120	211,5	137	132	0,132	7,9
430	≤ 18 m	140	211,5	147	142	0,132	7,9
450	≤ 18 m	160	211,5	157	152	0,132	7,9
mm		mm	kg/m²	kg/m²	m³/m²	kg/m²	

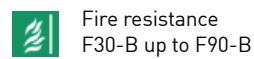
Additional layer **_z26** h_z 26,5 mm
 No plus layer **_p0** h_p -

Transversal layer h_s 20 mm
 Surface h_u 32 mm

Configuration options



Visible surface,
acoustic profile
► from page 9



Fire resistance
F30-B up to F90-B

► page 8

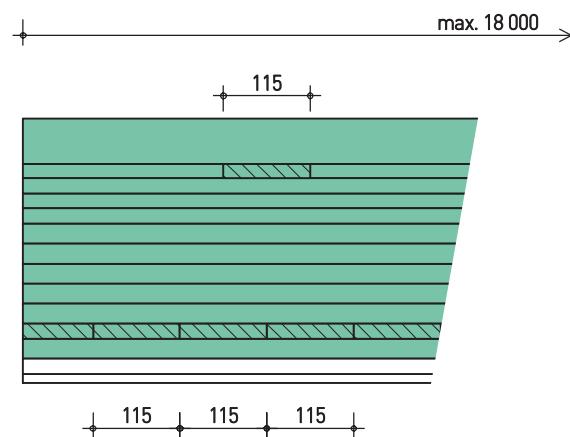
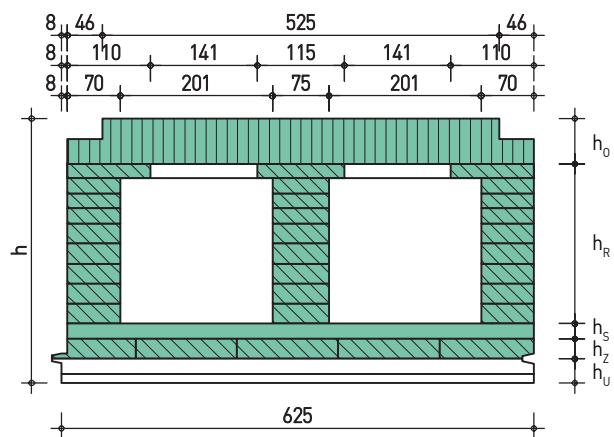
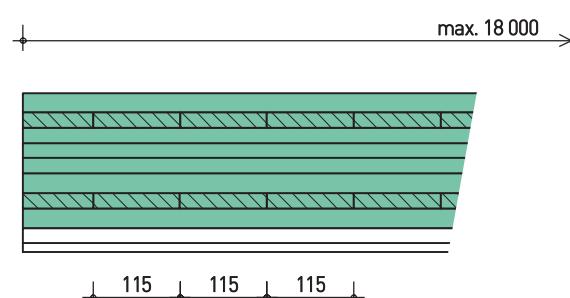
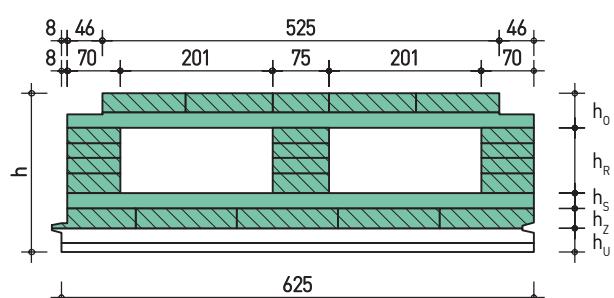
(Examples on page 13-18)



Installation space
on the underside



Improvement of the sound
absorption
► page 8

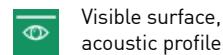


Basic element configuration of box element F30-B with installation area underneath the fire protection level

LIGNO® Block Q3_z26_p26

Height	Recom-mended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
170	≤ 15 m	45	20,0	70	65	0,013	0,8
190	≤ 18 m	45	40,0	73	68	0,026	1,5
210	≤ 18 m	45	60,0	77	72	0,039	2,3
230	≤ 18 m	45	80,0	80	75	0,051	3,1
250	≤ 18 m	45	100,0	84	79	0,064	3,8
270	≤ 18 m	45	120,0	87	82	0,077	4,6
290	≤ 18 m	45	140,0	91	86	0,090	5,4
310	≤ 18 m	60	145,0	101	96	0,090	5,4
330	≤ 18 m	60	165,0	104	99	0,102	6,1
350	≤ 18 m	60	185,0	108	103	0,115	6,9
370	≤ 18 m	80	185,0	118	113	0,115	6,9
390	≤ 18 m	100	185,0	128	123	0,115	6,9
410	≤ 18 m	120	185,0	138	133	0,115	6,9
430	≤ 18 m	140	185,0	148	143	0,115	6,9
450	≤ 18 m	160	185,0	158	153	0,115	6,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

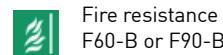
Configuration options



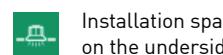
Visible surface,
acoustic profile



▶ from page 9
Fire resistance
F60-B or F90-B



▶ page 8
(Examples on page 17)



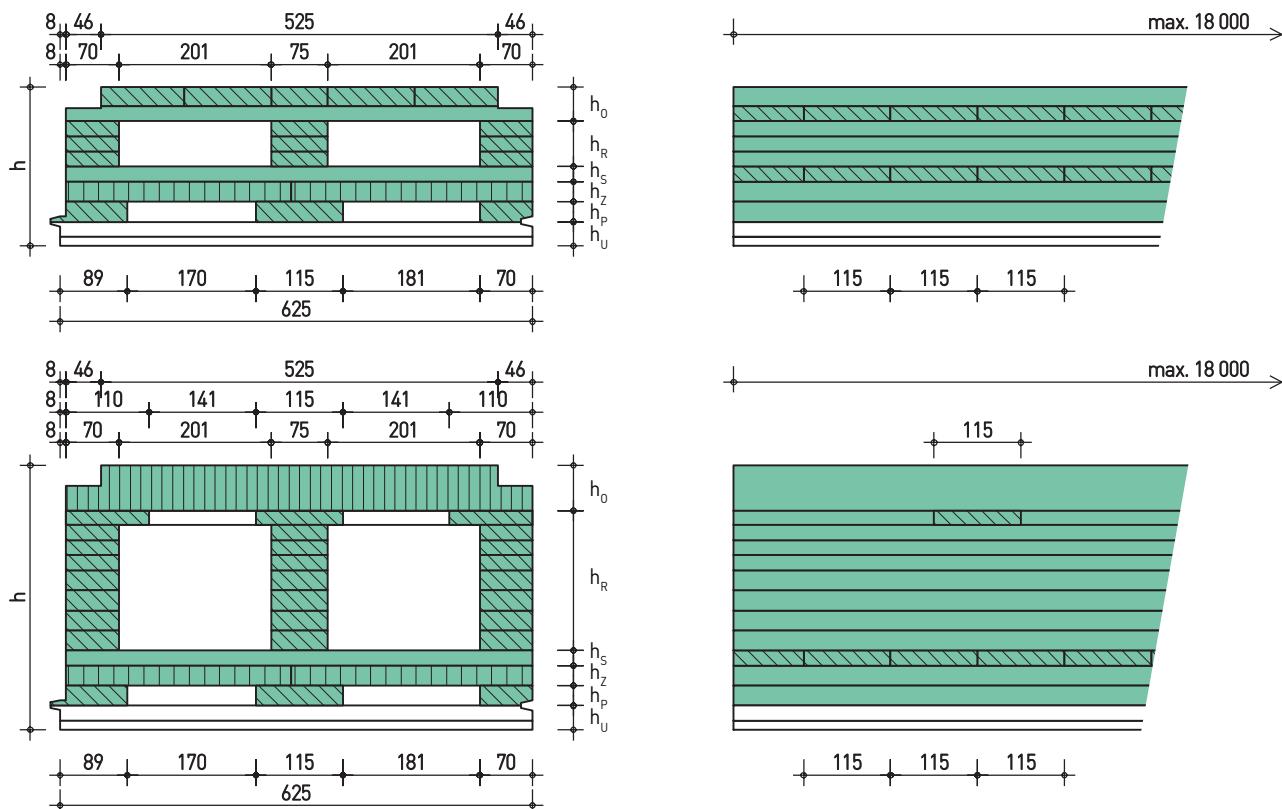
Installation space
on the underside



Improvement of the sound
absorption

▶ page <AE>

Additional layer **_z26** h_z 26,5 mm Transversal layer h_s 20 mm
Plus layer **_p26** h_p 26,5 mm Surface h_u 32 mm



LIGNO® Block Q3_z26_p53

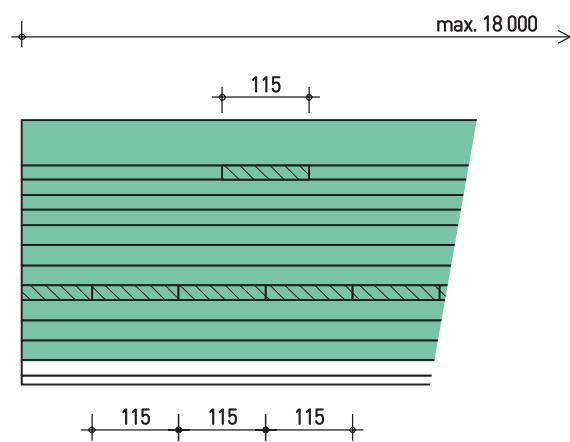
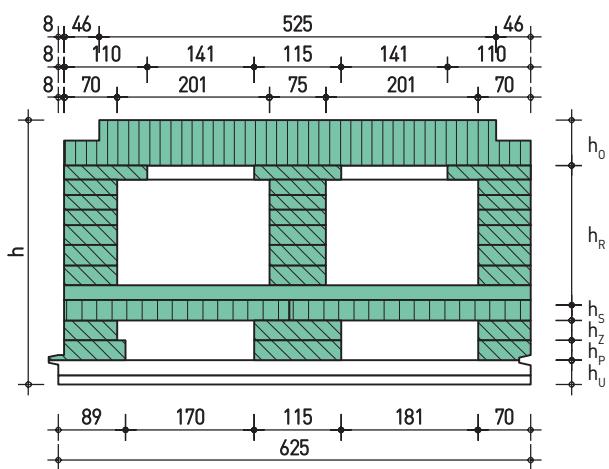
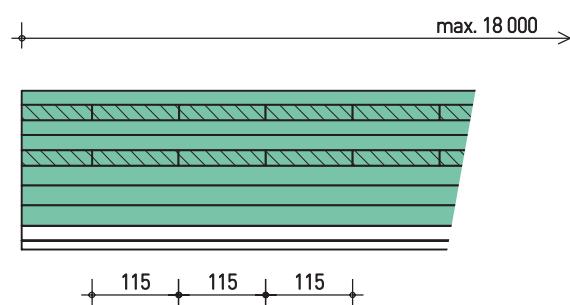
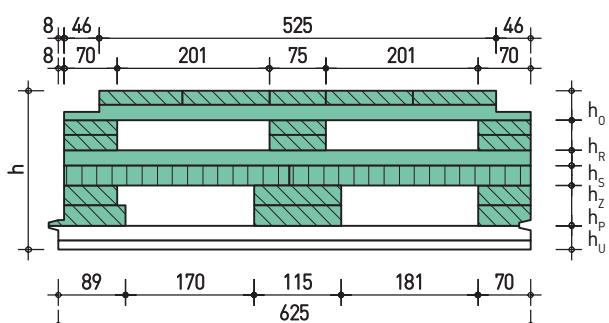
Height	Recom-mended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
190	≤ 18 m	38,5	20,0	73	67	0,013	0,8
210	≤ 18 m	38,5	40,0	76	71	0,026	1,5
230	≤ 18 m	45	53,5	81	76	0,034	2,0
250	≤ 18 m	45	73,5	85	80	0,047	2,8
270	≤ 18 m	45	93,5	88	83	0,060	3,6
290	≤ 18 m	45	113,5	92	87	0,073	4,4
310	≤ 18 m	60	118,5	102	97	0,073	4,4
330	≤ 18 m	60	138,5	105	100	0,085	5,1
350	≤ 18 m	60	158,5	109	104	0,098	5,9
370	≤ 18 m	80	158,5	119	114	0,098	5,9
390	≤ 18 m	100	158,5	129	124	0,098	5,9
410	≤ 18 m	120	158,5	139	134	0,098	5,9
430	≤ 18 m	140	158,5	149	144	0,098	5,9
450	≤ 18 m	160	158,5	159	154	0,098	5,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

Additional layer **_z26** h_z 26,5 mmTransversal layer h_s

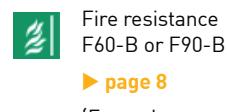
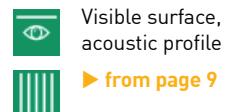
20 mm

Plus layer **_p53** h_p 53 mmSurface h_u

32 mm



Configuration options



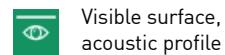
Basic element configuration of box element

Fire resistance F60-B

LIGNO® Block Q3_z53_p0

Height	Recom-mended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
170	≤ 15 m	45	20,0	77	72	0,013	0,8
190	≤ 18 m	45	40,0	81	76	0,026	1,5
210	≤ 18 m	45	60,0	84	79	0,039	2,3
230	≤ 18 m	45	80,0	88	83	0,051	3,1
250	≤ 18 m	45	100,0	92	86	0,064	3,8
270	≤ 18 m	45	120,0	95	90	0,077	4,6
290	≤ 18 m	45	140,0	99	93	0,090	5,4
310	≤ 18 m	60	145,0	109	103	0,090	5,4
330	≤ 18 m	60	165,0	112	107	0,103	6,2
350	≤ 18 m	60	185,0	116	111	0,115	6,9
370	≤ 18 m	80	185,0	126	121	0,115	6,9
390	≤ 18 m	100	185,0	136	131	0,115	6,9
410	≤ 18 m	120	185,0	146	141	0,115	6,9
430	≤ 18 m	140	185,0	156	151	0,115	6,9
450	≤ 18 m	160	185,0	166	161	0,115	6,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

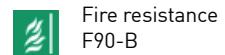
Configuration options



Visible surface,
acoustic profile



► from page 9
Fire resistance
F90-B



(Examples on page 18)



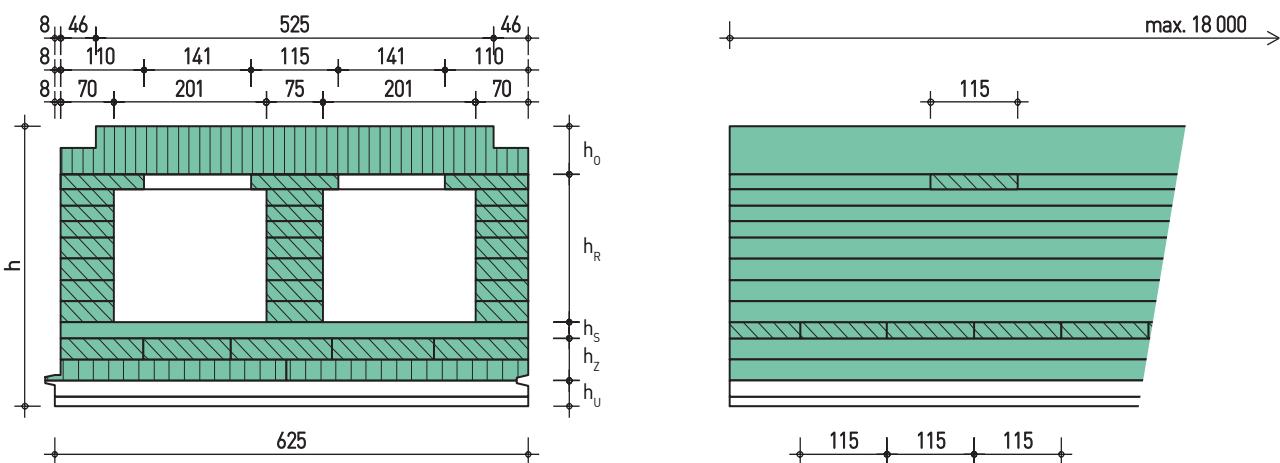
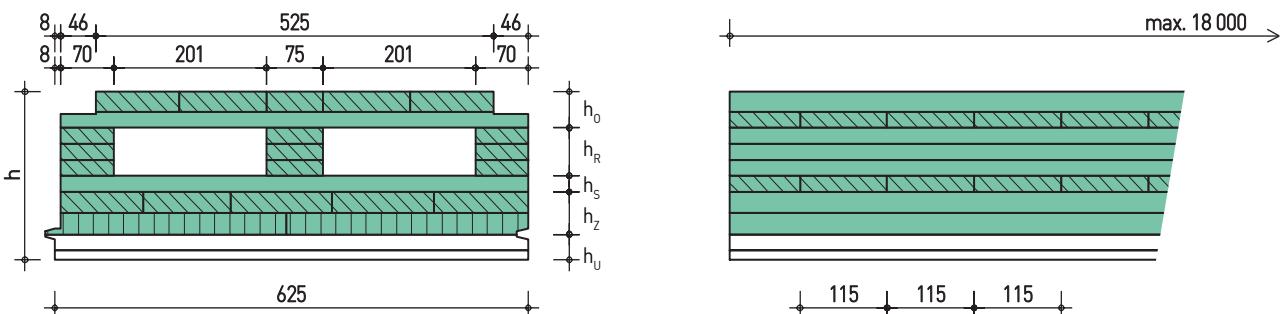
Installation space
on the underside

Improvement of the sound
absorption

► page 8

Additional layer **_z53** h_z 53 mm
No plus layer **_p0** h_p -

Transversal layer h_s 20 mm
Surface h_u 32 mm



Basic element configuration of box element F60-B with installation area underneath the fire protection level

LIGNO® Block Q3_z53_p26

Height	Recom-mended maximum length	Upper chord h_o	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
190	≤ 18 m	38,5	20,0	80	75	0,013	0,8
210	≤ 18 m	38,5	40,0	84	79	0,026	1,5
230	≤ 18 m	45	53,5	89	84	0,034	2,0
250	≤ 18 m	45	73,5	93	88	0,047	2,8
270	≤ 18 m	45	93,5	96	91	0,060	3,6
290	≤ 18 m	45	113,5	100	95	0,073	4,4
310	≤ 18 m	60	118,5	110	105	0,073	4,4
330	≤ 18 m	60	138,5	113	108	0,085	5,1
350	≤ 18 m	60	158,5	117	112	0,098	5,9
370	≤ 18 m	80	158,5	127	122	0,098	5,9
390	≤ 18 m	100	158,5	137	132	0,098	5,9
410	≤ 18 m	120	158,5	147	142	0,098	5,9
430	≤ 18 m	140	158,5	157	152	0,098	5,9
450	≤ 18 m	160	158,5	167	162	0,098	5,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

Additional layer **z53**

h_z 53 mm

Transversal layer h_s

20 mm

Plus layer **p26**

h_p 26,5 mm

Surface h_u

32 mm

LIGNO® Block Q3_z53_p53

Height	Recom-mended maximum length	Upper chord h_o	Web h_R	Dead weight		Cavity	Bulk weight 1400 kg/m³
				Closed surface	Acoustic surface		
210	≤ 15 m	25,5	26,5	89	84	0,000	0,0
230	≤ 18 m	45	27,0	90	85	0,017	1,0
250	≤ 18 m	45	47,0	93	88	0,030	1,8
270	≤ 18 m	45	67,0	97	92	0,043	2,6
290	≤ 18 m	45	87,0	100	95	0,056	3,3
310	≤ 18 m	60	92,0	111	105	0,056	3,3
330	≤ 18 m	60	112,0	114	109	0,068	4,1
350	≤ 18 m	60	132,0	118	112	0,081	4,9
370	≤ 18 m	80	132,0	128	123	0,081	4,9
390	≤ 18 m	100	132,0	138	133	0,081	4,9
410	≤ 18 m	120	132,0	148	143	0,081	4,9
430	≤ 18 m	140	132,0	158	153	0,081	4,9
450	≤ 18 m	160	132,0	168	163	0,081	4,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

Additional layer **z53**

h_z 53 mm

Transversal layer h_s

20 mm

Plus layer **p53**

h_p 53 mm

Surface h_u

32 mm

Configuration options



Visible surface, acoustic profile

► from page 9



Fire resistance F90-B

► page 8



Installation space on the underside



Improvement of the sound absorption

► page 8

Configuration options



Visible surface, acoustic profile

► from page 9

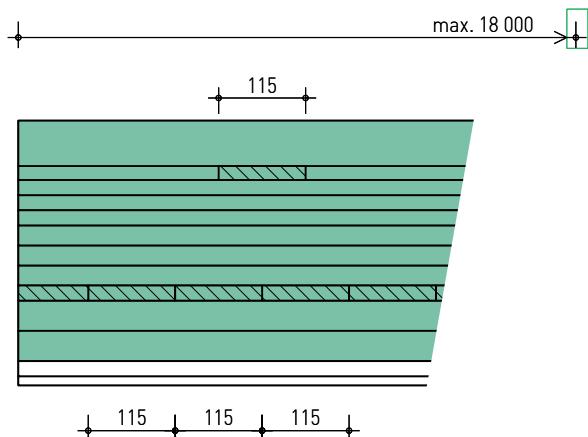
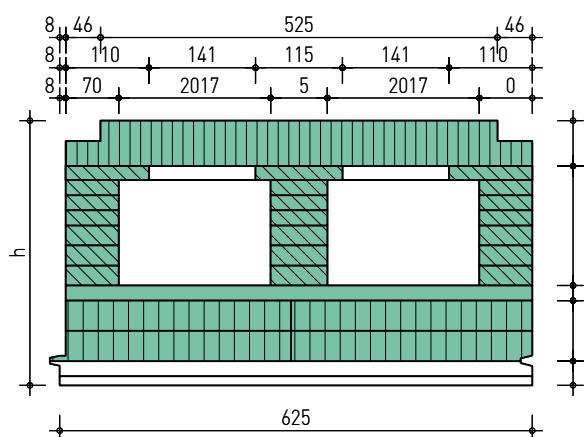
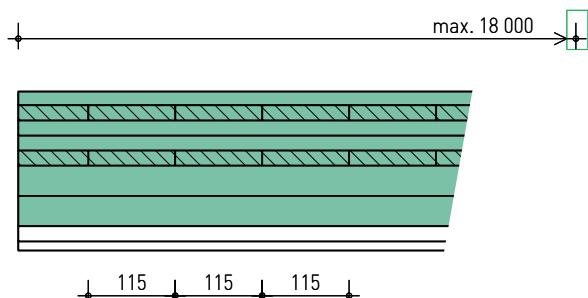
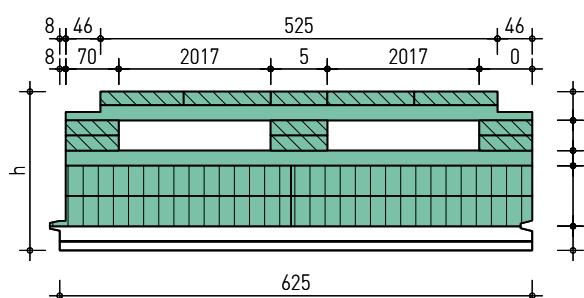
Basic element configuration of box element Fire resistance F90-B

LIGNO® Block Q3_z80_p0

Height	Recommended maximum length	Upper chord h_0	Web h_R	Dead weight		Cavity	Filling weight at 60 kg/m³
				Closed surface	Acoustic surface		
190	≤ 18 m	38	20,0	88	83	0,013	0,8
210	≤ 18 m	38	40,0	91	86	0,026	1,5
230	≤ 18 m	45	53,0	97	92	0,034	2,0
250	≤ 18 m	45	73,0	100	95	0,047	2,8
270	≤ 18 m	45	93,0	104	99	0,060	3,6
290	≤ 18 m	45	113,0	107	102	0,073	4,4
310	≤ 18 m	60	118,0	117	112	0,072	4,3
330	≤ 18 m	60	138,0	121	116	0,085	5,1
350	≤ 18 m	60	158,0	124	119	0,098	5,9
370	≤ 18 m	80	158,0	134	129	0,098	5,9
390	≤ 18 m	100	158,0	144	139	0,098	5,9
410	≤ 18 m	120	158,0	155	149	0,098	5,9
430	≤ 18 m	140	158,0	165	160	0,098	5,9
450	≤ 18 m	160	158,0	175	170	0,098	5,9
mm		mm	mm	kg/m²	kg/m²	m³/m²	kg/m²

Additional layer <u>z80</u>	h_z	80 mm	Transversal layer h_s
No plus layer <u>p0</u>	h_p	-	Surface h_u

Universal layer h_s 20 mm
 Surface h_u 32 mm



Configuration options



Visible surface,
acoustic profile

► from page 9



Installation space
on the underside



Improvement of the sound absorption

► page 8

Element configuration of solid element

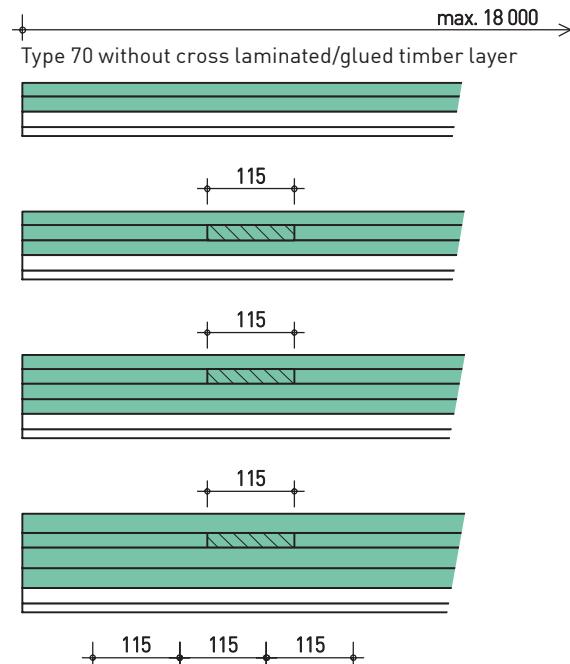
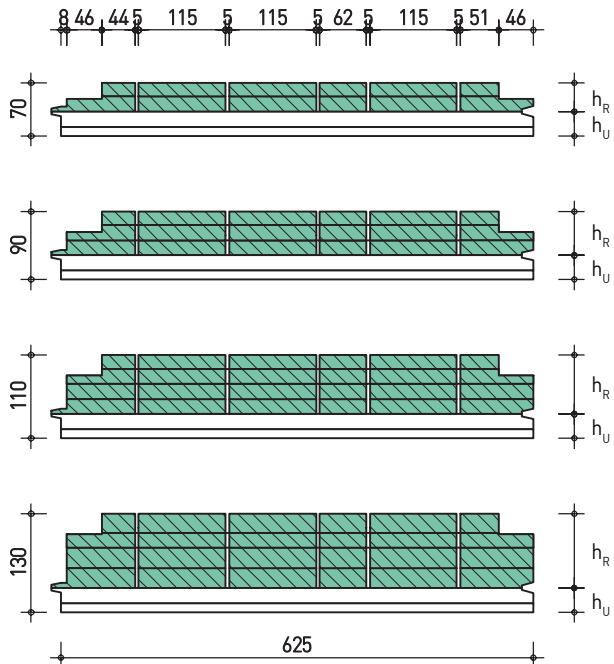
Visual quality

LIGNO® Block Q_z0_p0				
Height	Recom-mended maximum length	Web	Dead weight	
		h_R	Closed surface	Acoustic surface
70	≤ 9 m	38,0	33	28
90	≤ 12 m	58,0	43	38
110	≤ 15 m	78,0	53	48
130	≤ 15 m	98,0	62	57
mm		mm	kg/m ²	kg/m ²

Configuration options

-  Visible surface, acoustic profile
-  ▶ from page 9

Additional layer **_z0** h_z -
 No plus layer **_p0** h_p -
 Surface h_u 32 mm



Characteristic values

Acoustic absorption

Key absorption figures

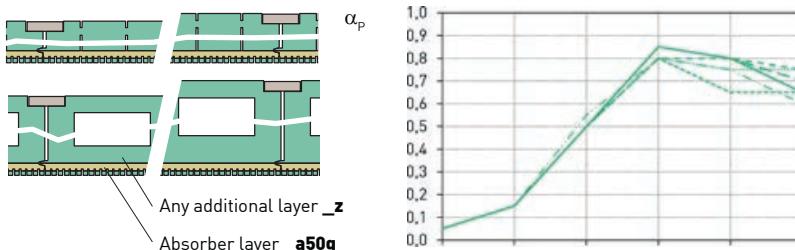
Subsequent interior finishing work for room acoustics absorbing suspended ceilings is rendered superfluous if the element is configured with an acoustic slat profile, see ▶ page 9. Natural soft wood fibre material is used as the absorber material. To improve the low-frequency properties, optional cavity insulation is inserted in the plus layer if necessary. Test report ▶ www.lignotrend.com

LIGNO® Block Q-x

LIGNO® Block Q3-x _z26/z53/z80_p0_a50g

All element heights

Additional layer is located directly behind the absorber layer,
limited low-frequency absorption.



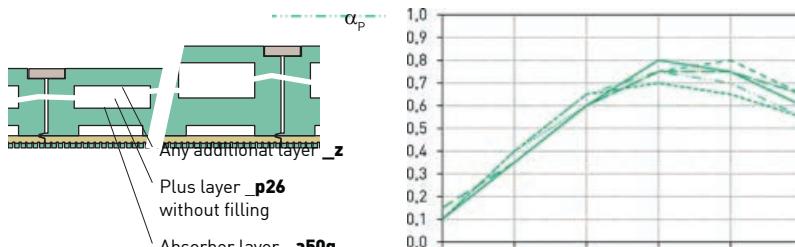
Profile	α_w	NRC	SAA	SAK	Shape	α_p	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,45	0,55	0,56	D	MH	-----	0,05	0,15	0,50	0,80	0,80	0,75
625-18-6	0,45	0,55	0,56	D	MH	---	0,05	0,15	0,50	0,85	0,80	0,65
625-23-8	0,45	0,55	0,56	D	MH	-----	0,05	0,15	0,50	0,85	0,80	0,70
625-20-4	0,45	0,55	0,53	D	MH	-----	0,05	0,15	0,50	0,80	0,65	0,65
nature: 625-12n25-4	0,45	0,55	0,56	D	MH	-----	0,05	0,15	0,50	0,80	0,75	0,75
nature: 625-18n38-6	0,45	0,55	0,56	D	MH	.....	0,05	0,15	0,55	0,80	0,75	0,60

LIGNO® Block Q3-x

_z26/z53/z80_p26_a50g

All element heights

Plus layer with cavity behind the absorber layer,
improved low-frequency absorption.



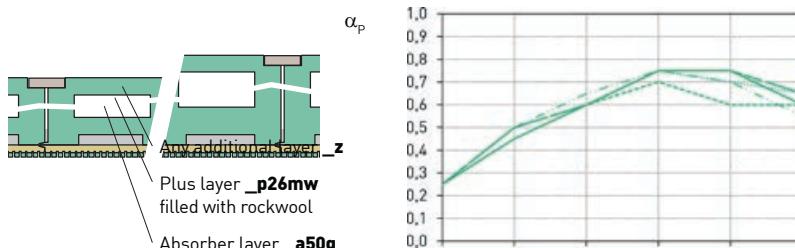
Profile	α_w	NRC	SAA	SAK	Shape	α_p	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,62	C		-----	0,10	0,35	0,60	0,75	0,80	0,65
625-18-6	0,60	0,60	0,62	C		---	0,10	0,35	0,60	0,80	0,75	0,60
625-23-8	0,60	0,60	0,62	C		-----	0,15	0,35	0,60	0,75	0,75	0,65
625-20-4	0,65	0,60	0,59	C		-----	0,10	0,40	0,65	0,70	0,65	0,55
nature: 625-12n25-4	0,65	0,60	0,62	C		.....	0,10	0,40	0,60	0,75	0,75	0,65
nature: 625-18n38-6	0,65	0,60	0,62	C		-----	0,10	0,40	0,65	0,75	0,70	0,55

LIGNO® Block Q3-x

_z26/z53/z80_p26mw_a50g

All element heights

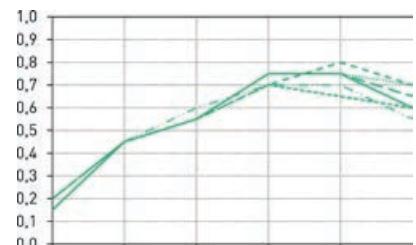
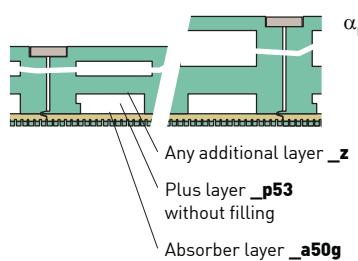
Plus layer with partly rockwool-insulated cavity
behind the absorber layer, improved low-frequency absorption.



Profile	α_w	NRC	SAA	SAK	Shape	α_p	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,70	0,65	0,64	C		-----	0,25	0,50	0,60	0,75	0,75	0,65
625-18-6	0,65	0,65	0,64	C		---	0,25	0,45	0,60	0,75	0,75	0,60
625-23-8	0,70	0,65	0,64	C		-----	0,25	0,50	0,60	0,75	0,75	0,65
625-20-4	0,65	0,60	0,61	C		-----	0,25	0,50	0,60	0,70	0,60	0,60
nature: 625-12n25-4	0,70	0,65	0,64	C		.....	0,25	0,50	0,60	0,75	0,70	0,65
nature: 625-18n38-6	0,70	0,65	0,64	C		-----	0,25	0,50	0,65	0,75	0,70	0,55


**LIGNO® Block Q3-x
_z26/z53/z80_p53_a50g**

All element heights

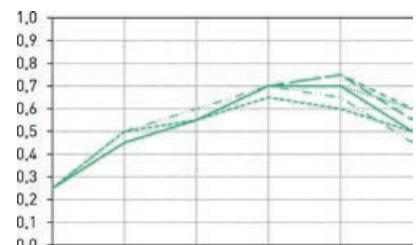
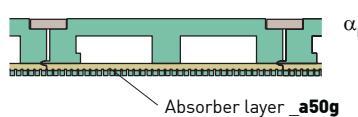


Plus layer with cavity behind the absorber layer,
improved low-frequency absorption.

Profile	α_w	NRC	SAA	SAK	Shape		125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,65	0,60	0,62	C		dashed	0,20	0,45	0,55	0,70	0,80	0,70
625-18-6	0,65	0,60	0,62	C		solid	0,15	0,45	0,55	0,75	0,75	0,60
625-23-8	0,65	0,60	0,62	C		dashed	0,20	0,45	0,55	0,75	0,75	0,65
625-20-4	0,65	0,60	0,59	C		dotted	0,20	0,45	0,55	0,70	0,65	0,60
nature: 625-12n25-4	0,65	0,60	0,62	C		dotted	0,15	0,45	0,55	0,75	0,75	0,70
nature: 625-18n38-6	0,65	0,60	0,62	C		dash-dot	0,20	0,45	0,60	0,70	0,70	0,55

**LIGNO® Block Q3-x
_z0_p0_a50g**

Element height 150

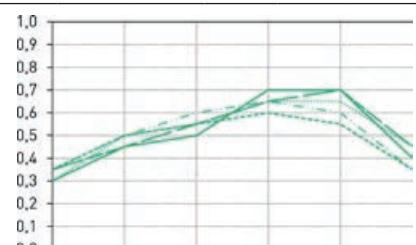
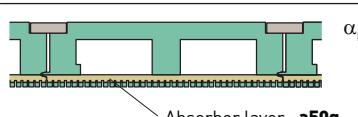


Behind the absorber layer is the
element cavity with a height of 73 mm.

Profile	α_w	NRC	SAA	SAK	Shape		125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,65	0,60	0,60	C		dashed	0,25	0,45	0,55	0,70	0,75	0,60
625-18-6	0,60	0,60	0,60	C		solid	0,25	0,45	0,55	0,70	0,70	0,50
625-23-8	0,65	0,60	0,60	C		dashed	0,25	0,45	0,55	0,70	0,75	0,55
625-20-4	0,60	0,55	0,57	C		dotted	0,25	0,50	0,55	0,65	0,60	0,50
nature: 625-12n25-4	0,65	0,60	0,60	C		dotted	0,25	0,45	0,55	0,70	0,70	0,60
nature: 625-18n38-6	0,60	0,60	0,60	C		dash-dot	0,25	0,50	0,60	0,70	0,65	0,45

**LIGNO® Block Q3-x
_z0_p0_a50g**

Element height 170



Behind the absorber layer is the
element cavity with a height of 93 mm.

Profile	α_w	NRC	SAA	SAK	Shape		125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,59	C		dashed	0,35	0,45	0,55	0,65	0,70	0,45
625-18-6	0,55	0,60	0,59	D		solid	0,30	0,45	0,50	0,70	0,70	0,40
625-23-8	0,60	0,60	0,59	C		dashed	0,35	0,45	0,55	0,65	0,70	0,45
625-20-4	0,55	0,55	0,55	D		dotted	0,35	0,50	0,55	0,60	0,55	0,35
nature: 625-12n25-4	0,60	0,60	0,58	C		dotted	0,30	0,50	0,55	0,65	0,65	0,45
nature: 625-18n38-6	0,55	0,60	0,59	D		dash-dot	0,35	0,50	0,60	0,65	0,60	0,35

Online room acoustics calculation for investigating the room acoustics properties of rooms

► www.lignotrend.com/raumakustik-rechner

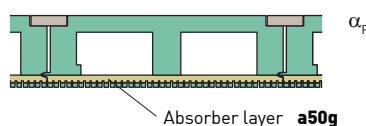
Note: This calculation software merely determines the absorber area required for the described cubature and does not make any statement regarding the location of the absorber areas in the room. The results should therefore be regarded as an orientation and are not a substitute for an expert in room acoustics (e.g. specialist engineer).

Characteristic values

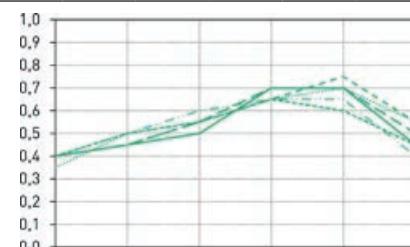
Acoustic absorption (Continuation)

LIGNO® Block Q3-x _z0_p0_a50g

Element height 190



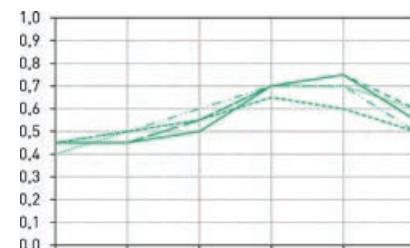
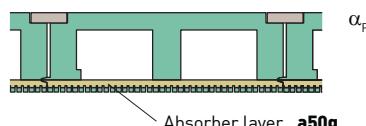
Behind the absorber layer is the element cavity with a height of 113 mm.



Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,65	0,60	0,60	C		0,40	0,45	0,55	0,65	0,75	0,55
625-18-6	0,55	0,60	0,59	D		0,40	0,45	0,50	0,70	0,70	0,45
625-23-8	0,60	0,60	0,59	C		0,40	0,45	0,55	0,70	0,70	0,50
625-20-4	0,60	0,55	0,57	C		0,40	0,50	0,55	0,65	0,60	0,45
nature: 625-12n25-4	0,65	0,60	0,59	C		0,35	0,50	0,55	0,65	0,70	0,55
nature: 625-18n38-6	0,60	0,60	0,60	C		0,40	0,50	0,60	0,65	0,65	0,40

LIGNO® Block Q3-x _z0_p0_a50g

Element height 210

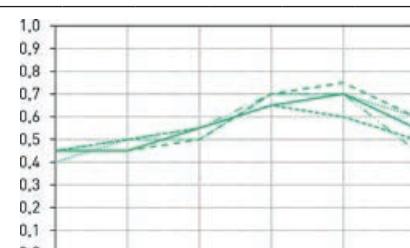
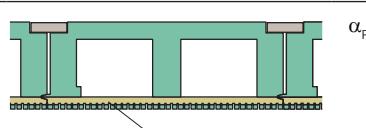


Behind the absorber layer is the element cavity with a height of 133 mm.

Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,59	C		0,45	0,45	0,55	0,70	0,75	0,60
625-18-6	0,60	0,60	0,61	C		0,45	0,45	0,50	0,70	0,75	0,55
625-23-8	0,65	0,60	0,61	C		0,45	0,45	0,55	0,70	0,75	0,55
625-20-4	0,60	0,60	0,58	C		0,45	0,50	0,55	0,65	0,60	0,50
nature: 625-12n25-4	0,65	0,60	0,61	C		0,40	0,50	0,55	0,70	0,70	0,60
nature: 625-18n38-6	0,65	0,60	0,61	C		0,45	0,50	0,60	0,70	0,70	0,50

LIGNO® Block Q3-x _z0_p0_a50g

Element height 230

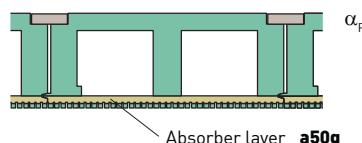


Behind the absorber layer is the element cavity with a height of 153 mm.

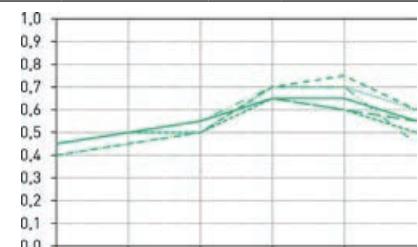
Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,61	C		0,45	0,45	0,50	0,70	0,75	0,60
625-18-6	0,65	0,60	0,59	C		0,45	0,45	0,55	0,65	0,70	0,55
625-23-8	0,65	0,60	0,59	C		0,45	0,45	0,55	0,65	0,70	0,55
625-20-4	0,60	0,55	0,57	C		0,45	0,50	0,55	0,65	0,60	0,50
nature: 625-12n25-4	0,60	0,60	0,60	C		0,40	0,50	0,50	0,70	0,70	0,60
nature: 625-18n38-6	0,60	0,60	0,61	C		0,45	0,50	0,55	0,70	0,70	0,45


**LIGNO® Block Q3-x
_z0_p0_a50g**

Element height 250



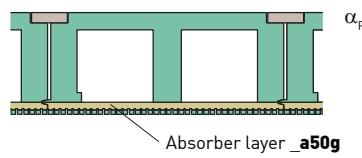
Behind the absorber layer is the element cavity with a height of 173 mm.



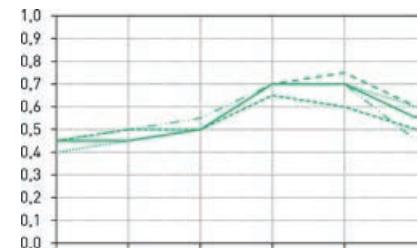
Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,60	C		0,40	0,45	0,50	0,70	0,75	0,60
625-18-6	0,65	0,55	0,57	C		0,45	0,50	0,55	0,65	0,65	0,55
625-23-8	0,60	0,55	0,57	C		0,45	0,50	0,55	0,65	0,60	0,55
625-20-4	0,60	0,55	0,57	C		0,45	0,50	0,50	0,65	0,60	0,50
nature: 625-12n25-4	0,60	0,60	0,60	C		0,40	0,45	0,50	0,70	0,70	0,60
nature: 625-18n38-6	0,60	0,60	0,60	C		0,45	0,50	0,55	0,70	0,70	0,45

**LIGNO® Block Q3-x
_z0_p0_a50g**

Element height 270



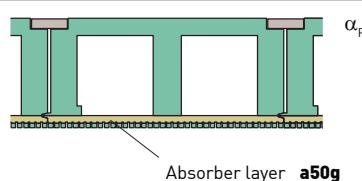
Behind the absorber layer is the element cavity with a height of 193 mm.



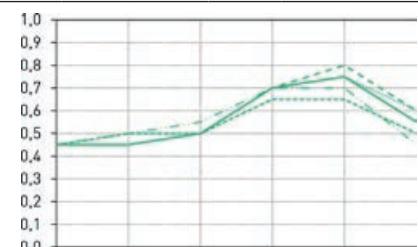
Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,60	C		0,45	0,45	0,50	0,70	0,75	0,60
625-18-6	0,60	0,60	0,59	C		0,45	0,45	0,50	0,70	0,70	0,55
625-23-8	0,60	0,60	0,59	C		0,45	0,45	0,50	0,70	0,70	0,55
625-20-4	0,60	0,55	0,57	C		0,45	0,50	0,50	0,65	0,60	0,50
nature: 625-12n25-4	0,60	0,60	0,60	C		0,40	0,45	0,50	0,70	0,70	0,60
nature: 625-18n38-6	0,60	0,60	0,60	C		0,45	0,50	0,55	0,70	0,70	0,45

**LIGNO® Block Q3-x
_z0_p0_a50g**

Element height 290



Behind the absorber layer is the element cavity with a height of 213 mm.



Profile	α_w	NRC	SAA	SAK	Shape	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz
625-12-4	0,60	0,60	0,60	C		0,45	0,45	0,50	0,70	0,80	0,60
625-18-6	0,60	0,60	0,60	C		0,45	0,45	0,50	0,70	0,75	0,55
625-23-8	0,60	0,60	0,60	C		0,45	0,45	0,50	0,70	0,75	0,55
625-20-4	0,60	0,55	0,57	C		0,45	0,50	0,50	0,65	0,65	0,50
nature: 625-12n25-4	0,60	0,60	0,60	C		0,45	0,50	0,50	0,70	0,75	0,60
nature: 625-18n38-6	0,60	0,60	0,61	C		0,45	0,50	0,55	0,70	0,70	0,45

Online room acoustics calculation for investigating the room acoustics properties of rooms

► www.lignotrend.com/raumakustik-rechner

Note: This calculation software merely determines the absorber area required for the described cubature and does not make any statement regarding the location of the absorber areas in the room. The results should therefore be regarded as an orientation and are not a substitute for an expert in room acoustics (e.g. specialist engineer).

Sound insulation Requirements

Requirements for airborne and impact sound insulation of ceilings (examples)

Component	Noise protection	according to DIN 4109		according to SIA 181 (2006) ⁴	
		Airborne sound R'w	Impact sound L'n,w	Airborne sound D'i	Impact sound L'
Detached houses: Ceilings	normal	≥ 50 dB ¹	≤ 56 dB ¹	≥ 52 dB	≤ 53 dB
	increased	≥ 55 dB ¹	≤ 46 dB ^{1,2}	≥ 55 dB	≤ 50 dB
Multi-storey houses with apartments / work rooms: Apartment isolating ceiling, ceilings between common rooms	normal	≥ 54 dB	≤ 53 dB	not possible	not possible
	increased	≥ 55 dB ¹	≤ 46 dB ¹	≥ 55 dB	≤ 50 dB
Schools: Ceilings between classrooms or similar rooms	normal	≥ 55 dB	≤ 53 dB	≥ 57 dB	≤ 48 dB
	increased	≥ 55 dB ³	≤ 46 dB ³	≥ 60 dB	≤ 45 dB

¹ Recommendation from Supplement 2 of DIN 4109

² Softly elastic floor coverings may be allowed for

³ Ceiling between classrooms and "particularly loud" rooms

⁴ Values apply to moderate noise sensitivity.

In case of higher sensitivity, the requirements are stricter in each case by 5 dB.

The currently valid DIN 4109 does not yet contain a requirement for taking into account the C_i value. According to SIA 181, it can be taken into account by including it in the usage agreement with the building owner.

Requirements for the airborne sound insulation of exterior components (examples)

according to DIN 4109

according to SIA 181 (2006) ²

Airborne sound attenuation $R'_{w,res}$			
Noise level range (decisive exterior noise level)	Office rooms	Living rooms, hotel rooms, classrooms	Wards in hospitals
I	56 to 60 dB	≥ 30 dB	≥ 30 dB
II	61 to 65 dB	≥ 30 dB	≥ 35 dB
III	66 to 70 dB	≥ 35 dB	≥ 40 dB
IV	71 to 75 dB	≥ 40 dB	≥ 45 dB
V	76 to 80 dB	≥ 45 dB	≥ 50 dB
VI	≥ 50 dB	1	1

¹ The requirements must be defined here on the basis of the local conditions.

Degree of disturbance due to exterior noise	Requirements for protection against airborne sound D_e		
	low sensitivity	medium sensitivity	high sensitivity
small	≥ 22 dB	≥ 27 dB	≥ 32 dB
considerable to very strong	≥ L_r -38 dB (L_r -30 dB)	≥ L_r -33 dB (L_r -25 dB)	≥ L_r -28 dB (L_r -20 dB)
(Values in brackets apply to the night)			
L_r : Assessment level according to the regulation of the Noise Protection Ordinance			

² The specified values represent the normal requirement, increased requirement in each case 3 dB stricter.

Characteristic values with regard to building physics (heat/humidity)

The usage case of the (upwardly open) LIGNO Rippe cross-laminated timber web element as an exterior component is comparatively rare and usually only occurs in the case of ceilings that run from the interior to the areas of loggias or roof patios.

In this case the Lignotrend consultants and the engineers from the Lignotrend internal Technical Service can also provide **thermal conductivities** and **vapour diffusion resistance figures** for ceiling elements as well as support with the detailed planning where necessary.

Sound insulation performance Roof elements



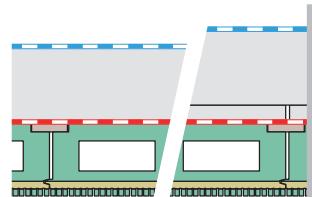
Airborne sound in roof components

Roof components made of LIGNO® achieve good values for the sound insulation value R_w , if necessary also with regard to the normalized impact sound pressure level $L_{n,w}$ even without cladding on the underside. Only products equivalent in terms of noise-relevant may be used in the structure to these characteristic products specified in the test reports (e.g. density, dynamic stiffness)!

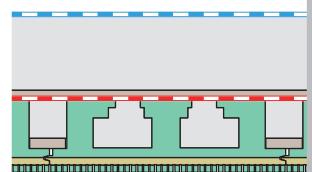
Specified values are laboratory values, **a reserve is therefore to be taken into account in the verification for flanking sound transmission!** The following must be adhered to: existing $R'_{w} \geq$ required R'_{w} as well as existing $L'_{n,w} \leq$ required $L'_{n,w}$.

Test reports ► www.lignotrend.com

Membrane roof



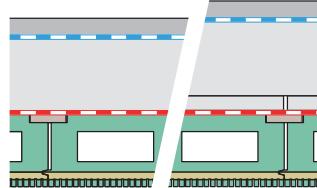
Covering	2,5 mm	Synthetic roofing felt (EVA)	2,5 mm	Synthetic roofing felt (EVA)
Insulation	200 mm	Thermal insulation EPS	200 mm	Thermal insulation Rockwool, two-layer
		Vapour barrier		Vapour barrier
Load-bearing element	LIGNO® CLT, element type and ballasting according to left column			
without ballasting e.g. CLT box module LIGNO® Block Q3-x_z26_p0-190 (Dead weight approx. 66 kg/m ²)	$R_w [C; C_{tr}] = 38 \text{ dB}$ {0;-3}			
	18-0021112-PR01 PB 21-F01-04-de-01			
with ballasting (90 kg/m²) 40 mm concrete slabs on 5mm attic protection mat e.g. CLT box module LIGNO® Block Q3-x_z26_p0-190 (Dead weight approx. 66 kg/m ²)	$R_w [C; C_{tr}] = 47 \text{ dB}$ {-2;-6} $L_{n,w} = 45 \text{ dB}$ $C_{I,50-2500} = +3 \text{ dB}$			
	18-0021112-PR01 PB 37-F01-04-de-01			



Load-bearing element	Structure as above, but additionally 22mm OSB 4	Structure as above, but additionally 22mm OSB 4
with filling (approx. 98 kg/m²) z.B. CLT web module LIGNO® Rippe Q3-x_z26_p0-190 (Dead weight approx. 57 kg/m ²)	$R_w [C; C_{tr}] = 45 \text{ dB}$ {0;-3}	$R_w [C; C_{tr}] = 56 \text{ dB}$ {-2;-5}

Sound insulation performance Roof elements (Continuation)

Pebble roof



Covering	50 mm	Pebble
Roof sealing	2,5 mm	EPDM-roofing felt
Insulation	200 mm	Thermal insulation EPS Vapour barrier
Load-bearing element	LIGNO® CLT	element type and ballasting according to left column

without ballasting

e.g. CLT box module
LIGNO® Block Q3-x_z26_p0-190
(Dead weight approx. 66 kg/m²)

$$R_w [C; C_{tr}] = \mathbf{55 \text{ dB}} (-2;-7)$$

18-0021112-PR01
PB 19-F01-04-de-01

with filling (90 kg/m²)

40 mm concrete slabs on 5 mm attic protection mat

e.g. CLT box module
LIGNO® Block Q3-x_z26_p0-190
(Dead weight approx. 66 kg/m²)

$$R_w [C; C_{tr}] = \mathbf{62 \text{ dB}} (0;-5)$$

18-0021112-PR01
GAS 01-F01-04-de-01

Load-bearing element	Structure as above, but additionally 22mm OSB 4
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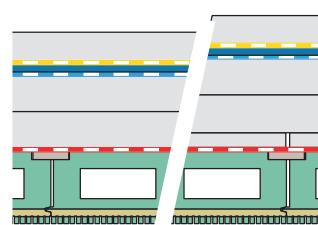
with filling (approx. 98 kg/m²)

e.g. CLT web module
LIGNO® Rippe Q3-x_z26_p0-190
(Eigengewicht ca. 57 kg/m²)

$$R_w [C; C_{tr}] = \mathbf{64 \text{ dB}} (-2;-6)$$

18-0021112-PR01
GAS 01-F01-04-de-01

Green roof



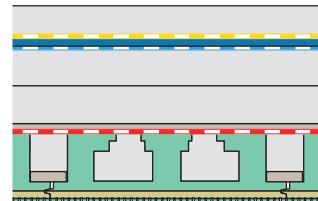
80 mm	Mineral substrate
25 mm	Drainage mat
5 mm	Attic protection mat
2,5 mm	Synthetic roofing felt (EVA)
200 mm	Thermal insulation Rockwool, two-layer
	Vapour barrier
	LIGNO® CLT, element type and ballasting according to left column

$$R_w [C; C_{tr}] = \mathbf{49 \text{ dB}} (0;-3)$$

18-0021112-PR01
GAS 01-F01-04-de-01

$$R_w [C; C_{tr}] = \mathbf{55 \text{ dB}} (0;-5)$$

18-0021112-PR01
GAS 01-F01-04-de-01



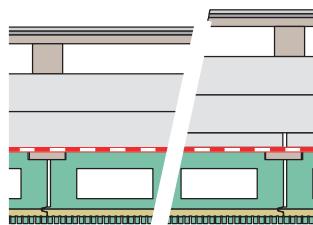
Load-bearing element	Structure as above, but additionally 22mm OSB 4
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$$R_w [C; C_{tr}] = \mathbf{55 \text{ dB}} (0;-4)$$

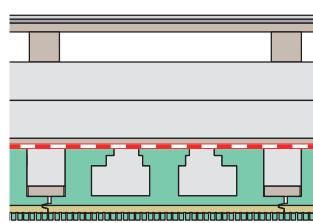
18-0021112-PR01
GAS 01-F01-04-de-01



Tin roof



Covering	0,7 mm Sheet metal covering 3 mm Bitumen membrane 24mm Boarding 80mm Square timbers	0,7 mm Sheet metal covering 3 mm Bitumen membrane 24mm Boarding 80 mm Square timbers
Insulation	200 mm Thermal insulation Rockwool, two-layer Vapour barrier	200 mm Thermal insulation wood fibre, two-layer Vapour barrier
Load-bearing element	LIGNO® CLT, element type and ballasting according to left column	LIGNO® CLT, element type and ballasting according to left column
without ballasting	$R_w [C; C_{tr}] = 53 \text{ dB} (-2;-8)$ e.g. CLT box module LIGNO® Block Q3-x_z26_p0-190 (Dead weight approx. 66 kg/m²) 18-0021112-PR01 GAS 01-F01-04-de-01	$R_w [C; C_{tr}] = 53 \text{ dB} (-2;-7)$ 18-0021112-PR01 PB 22-F01-04-de-01
with filling (90 kg/m²) 40 mm concrete slabs on 5 mm attic protection mat	$R_w [C; C_{tr}] = 62 \text{ dB} (-4;-10)$ e.g. CLT box module LIGNO® Block Q3-x_z26_p0-190 (Dead weight approx. 66 kg/m²) 18-0021112-PR01 GAS 01-F01-04-de-01	$R_w [C; C_{tr}] = 62 \text{ dB} (-4;-10)$ 18-0021112-PR01 GAS 01-F01-04-de-01



Load-bearing element	Structure as above, but additionally 22 mm OSB 4	Structure as above, but additionally 22 mm OSB 4
with filling (approx. 98 kg/m²)	$R_w [C; C_{tr}] = 60 \text{ dB} (-2;-7)$ e.g. CLT web module LIGNO® Rippe Q3-x_z26_p0-190 (Dead weight approx. 57 kg/m²) 18-0021112-PR01 GAS 01-F01-04-de-01	$R_w [C; C_{tr}] = 60 \text{ dB} (-2;-7)$ 18-0021112-PR01 GAS 01-F01-04-de-01

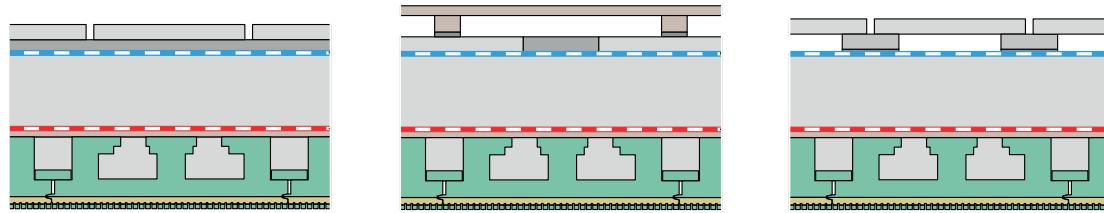
Noise protection characteristic values Roof patios, sound-insulating flat roofs



Impact sound and airborne sound in accessible roof components

When used in roof patios made of LIGNO®, superstructures with LIGNO® Rippe Q3-x are used into which a weight filling can be installed from above. They also achieve good values for the normalized impact sound pressure level $L_{n,w}$ and for the sound insulation index R_w , even without cladding on the underside.

Various superstructures, see ► **Technical Date sheet LIGNO Rippe-x**



Secondary sound paths

Special versions on the support above sensitive partition walls

The extent of the secondary sound paths depends on the implementation of the roof itself at the respective node as well as the structure and sound insulation of the adjoining wall components.

The complete interruption of the beam at delicate detail points is usually most favourable. Good characteristic values can also be achieved through suitable separation of the chambers and the installation of a local chamber filling of gravel or foam.

Design proposals ► page 38.

On request we will provide a **combination matrix for the respectively relevant flank transmission assessment variable D_{n,f,w}** for the verification of many combinations of LIGNO® Block and cross-laminated timber walls in different thicknesses as well as timber frame walls.

The ► engineers from our internal Technical Service will advise you on the carrying out of the verification or implementation.

Building physics

Thermal conductivity, Water vapour diffusion



LIGNO® Block Q3

	<u>_z0_p0</u>		<u>_z26_p0</u>		<u>_z26_p26</u>		<u>_z26_p53</u>										
	Cavity empty		Cavity insulated		Cavity empty		Cavity insulated		Cavity empty		Cavity insulated		Cavity empty		Cavity insulated		
Height	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁	
150	0,95	0,199	1,47	0,129	1,03	0,146	1,28	0,117									
170	0,98	0,174	1,76	0,097	1,07	0,165	1,59	0,107	1,19	0,143	1,36	0,125					
190	1,00	0,191	2,05	0,093	1,09	0,174	1,89	0,101	1,23	0,155	1,67	0,114	1,19	0,159	1,38	0,138	
210	1,02	0,207	2,34	0,099	1,11	0,189	2,18	0,096	1,26	0,167	1,98	0,106	1,23	0,171	1,70	0,124	
230	1,03	0,224	2,62	0,088	1,13	0,203	2,47	0,093	1,28	0,179	2,27	0,101	1,30	0,177	1,95	0,118	
250	1,05	0,240	2,92	0,086	1,15	0,218	2,76	0,091	1,30	0,193	2,56	0,097	1,32	0,189	2,26	0,111	
270	1,05	0,257	3,20	0,085	1,16	0,233	3,04	0,089	1,31	0,206	2,86	0,095	1,34	0,202	2,56	0,105	
290	1,06	0,273	3,48	0,083	1,17	0,248	3,33	0,087	1,33	0,219	3,15	0,092	1,35	0,215	2,86	0,102	
310	1,18	0,264	3,68	0,084	1,28	0,241	3,53	0,088	1,44	0,215	3,35	0,093	1,47	0,211	3,05	0,102	
330	1,18	0,279	3,97	0,083	1,29	0,255	3,82	0,086	1,46	0,227	3,63	0,091	1,48	0,223	3,35	0,099	
350	1,19	0,294	4,25	0,082	1,30	0,269	4,10	0,085	1,47	0,239	3,92	0,089	1,49	0,235	3,64	0,096	
370	1,35	0,274	4,42	0,084	1,46	0,253	4,27	0,087	1,62	0,228	4,09	0,091	1,65	0,225	3,80	0,097	
390	1,51	0,259	4,59	0,085	1,62	0,241	4,44	0,088	1,77	0,219	4,25	0,092	1,80	0,217	3,97	0,098	
410	1,67	0,246	4,77	0,086	1,77	0,232	4,60	0,089	1,93	0,213	4,42	0,093	1,95	0,210	4,13	0,099	
430	1,83	0,236	4,93	0,087	1,92	0,224	4,77	0,090	2,08	0,207	4,58	0,094	2,10	0,205	4,86	0,100	
450	1,97	0,228	5,03	0,088	2,08	0,217	4,93	0,091	2,23	0,202	4,74	0,095	2,25	0,199	4,45	0,101	
mm	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	

	<u>_z53_p0</u>		<u>_z53_p26</u>		<u>_z53_p53</u>		<u>_z80_p0</u>											
	Cavity empty		Cavity insulated		Cavity empty		Cavity insulated		Cavity empty		Cavity insulated		Cavity empty		Cavity insulated			
Height	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁		
170	1,22	0,139	1,39	0,123											1,36	0,139	1,54	0,124
190	1,26	0,151	1,70	0,112	1,34	0,142	1,51	0,126										
210	1,28	0,164	2,00	0,105	1,38	0,153	1,83	0,115	1,33	0,158	1,34	0,156	1,40	0,149	1,85	0,113		
230	1,31	0,176	2,29	0,100	1,45	0,159	2,08	0,111	1,46	0,157	1,74	0,132	1,42	0,162	2,05	0,112		
250	1,33	0,188	2,59	0,097	1,47	0,169	2,38	0,105	1,49	0,168	2,06	0,122	1,45	0,173	2,35	0,106		
270	1,34	0,201	2,88	0,094	1,49	0,181	2,68	0,101	1,52	0,178	2,37	0,114	1,52	0,177	2,70	0,099		
290	1,36	0,214	3,17	0,092	1,51	0,192	2,98	0,097	1,53	0,189	2,67	0,109	1,54	0,188	3,00	0,097		
310	1,47	0,210	3,37	0,092	1,63	0,191	3,17	0,098	1,65	0,188	2,87	0,108	1,66	0,187	3,19	0,097		
330	1,49	0,222	3,66	0,090	1,64	0,201	3,47	0,095	1,67	0,198	3,17	0,104	1,67	0,197	3,48	0,095		
350	1,50	0,234	3,94	0,089	1,65	0,212	3,76	0,093	1,68	0,208	3,46	0,101	1,69	0,207	3,77	0,093		
370	1,65	0,224	4,11	0,090	1,81	0,205	3,92	0,094	1,83	0,202	3,62	0,102	1,84	0,201	3,94	0,094		
390	1,80	0,216	4,27	0,091	1,96	0,199	4,08	0,096	1,98	0,197	3,78	0,103	1,99	0,196	4,10	0,095		
410	1,96	0,209	4,44	0,092	2,11	0,194	4,24	0,097	2,13	0,192	3,94	0,104	2,14	0,191	4,26	0,096		
430	2,11	0,204	4,60	0,093	2,26	0,190	4,41	0,098	2,28	0,188	4,10	0,105	2,29	0,188	4,42	0,097		
450	2,26	0,199	4,76	0,094	2,41	0,187	4,57	0,099	2,43	0,185	4,26	0,106	2,44	0,184	4,58	0,098		
mm	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK		

The values given were determined in accordance with EN ISO 6946:2003-10 (heat flow upwards). They refer to the component layer „filled or unfilled roof element“, ignoring any superstructure. In most building physics calculation programs, LIGNO® elements can be defined as an intrinsic material with the „equivalent“ thermal conductivity eq λ determined from the heat transmission resistance as well as element height and bulk density.

LIGNO® Block Q3

		_z80_p26		_z80_p53				
		Cavity empty		Cavity insulated		Cavity empty		
Height	R ₁	λ ₁	R ₁	λ ₁	R ₀	λ ₀	R ₁	λ ₁
150								
170								
190								
210								
230	1,66	0,138	1,93	0,119				
250	1,70	0,147	2,25	0,111	1,71	0,146	1,9	0,132
270	1,73	0,157	2,56	0,105	1,75	0,155	2,23	0,121
290	1,75	0,166	2,87	0,101	1,77	0,163	2,54	0,114
310	1,87	0,166	3,07	0,101	1,90	0,163	2,74	0,113
330	1,89	0,175	3,37	0,098	1,92	0,172	3,06	0,108
350	1,91	0,184	3,67	0,095	1,94	0,181	3,36	0,104
370	2,06	0,179	3,83	0,096	2,09	0,177	3,53	0,105
390	2,22	0,176	4,00	0,098	2,25	0,174	3,69	0,106
410	2,37	0,173	4,17	0,098	2,40	0,171	3,85	0,106
430	2,25	0,170	4,33	0,099	2,56	0,168	4,01	0,107
450	2,68	0,168	4,49	0,100	2,71	0,166	4,18	0,108
mm	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK	m ² W/K	W/mK

Water vapour diffusion**all configurations**

Height	$\mu_{eq,max} / \mu_{eq,min}$	$s_{D,min} / s_{D,max}$
150	40 / 12,7	6,0 / 1,9
170	40 / 11,3	6,8 / 1,9
190	40 / 10,2	7,6 / 1,9
210	40 / 9,4	8,4 / 2,0
230	40 / 8,6	9,2 / 2,0
250	40 / 8,0	10,0 / 2,0
270	40 / 7,5	10,8 / 2,0
290	40 / 7,1	11,6 / 2,0
310	40 / 8,5	12,4 / 2,7
330	40 / 8,1	13,2 / 2,7
350	40 / 7,7	14,0 / 2,7
370	40 / 9,4	14,8 / 3,5
390	40 / 11,0	15,6 / 4,3
410	40 / 12,4	16,4 / 5,1
430	40 / 13,7	17,2 / 5,9
450	40 / 14,9	18,0 / 6,7
mm		m

LIGNO® Block Q

		_z0_p0		_z0_p0_nsi			
Height	R ₀	λ ₀	R ₀	λ ₀			
70	0,53	0,130					
90	0,69	0,130					
110	0,85	0,130	0,85	0,130			
130	1,00	0,130	1,00	0,130			
mm	m ² W/K	W/mK	m ² W/K	W/mK			

Water vapour diffusion**all configurations**

Height	$\mu_{eq,max} / \mu_{eq,min}$	$s_{D,max} / s_{D,min}$
70	40 / 1	2,8 / 0,07
90	40 / 1	3,6 / 0,09
110	40 / 1	4,4 / 0,11
130	40 / 1	5,2 / 0,13
mm		m

For the water vapour diffusion resistance, the lower values $\mu_{eq,min}$ or $s_{D,min}$ are given for the „most open“ state, in which the vapour can diffuse without hindrance through air layers to the inner surface of the element's upper girder, for instance in the axis of the cavity of an element with acoustic profile. For the upper value $\mu_{eq,max}$ or $s_{D,max}$ w, a solid wood layer in element thickness was applied correspondingly in the axis of one of the webs. With high insulated elements, the modelling of three layers with cover plates and insulation layer provides more realistic results.

Flat roof structure as non-ventilated flat roof

Part of the thermal insulation can be installed in the load-bearing element ex works.

Caution with non-ventilated flat roofs (warm roofs) in which a seal is arranged over the insulation and an airtight, vapour blocking interior seal between the element and the insulation. Such a structure can work in terms of building physics, even without a further vapour-tight layer on the inside of the roof element, if about 2/3 of the insulation lies above the element. **The finished acoustic profile respectively therefore doesn't need to be covered! Depending on the structure or shading of the roof, a dynamic calculation of the moisture balance is useful in case of doubt.**

If insulating materials such as soft wood fibre or cellulose are used, it may be possible to transfer even more insulation into the cavity of the element without the structure becoming too moist. A verification through detailed considerations extending beyond the calculation according to Glaser.

Bracing panels

Construction

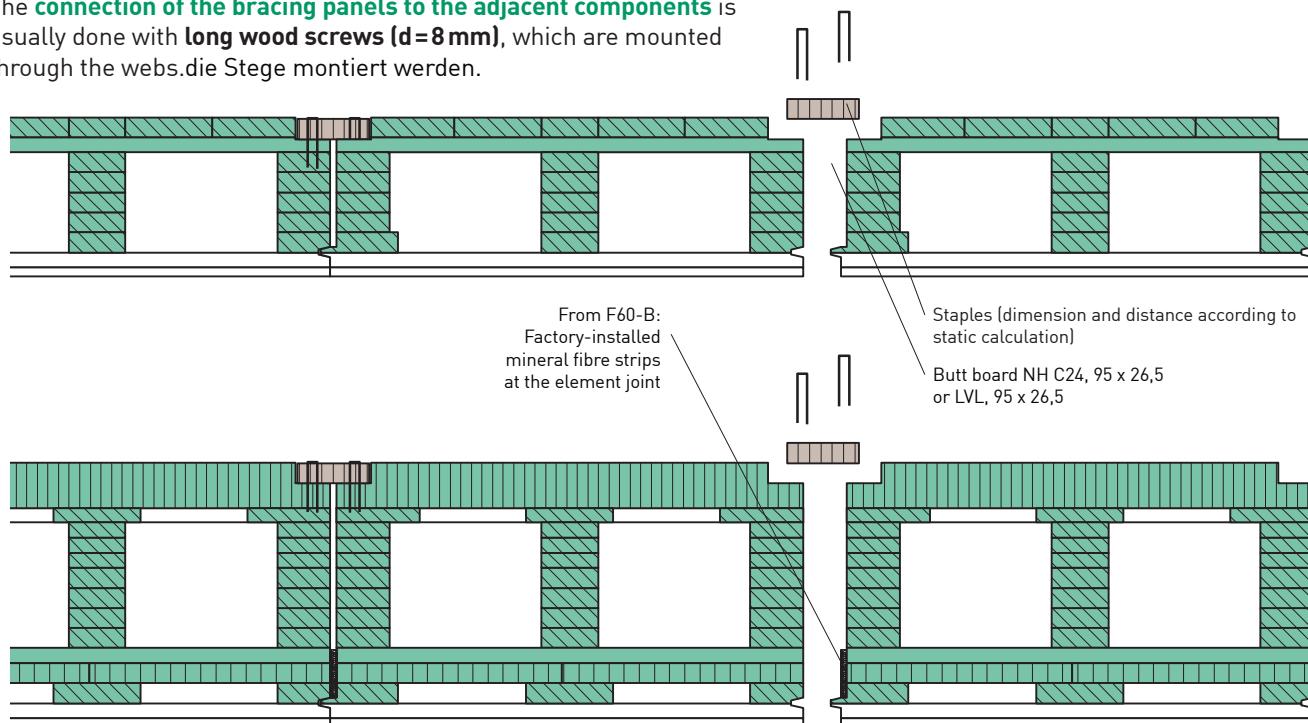


Coupling

Coupling is done by means of a butt board at the **lateral butt joint of the elements**. Solid wood boards (strength class at least C24, cross-section 95 mm x 26.5 mm) are delivered as standard. In the case of elements with acoustic profile or with larger stresses, they can be replaced by stripes of LVL, for example. Additional bracing by boards or diagonals usually aren't necessary.

The butt boards are connected to both adjacent elements with **staples** or – less common – with wood screws (dimension and distance of the connectors as specified in the static calculation).

The **connection of the bracing panels to the adjacent components** is usually done with **long wood screws (d=8 mm)**, which are mounted through the webs.
die Stege montiert werden.



**The butt boards are used as boards for the transport pallets when delivering.
Use the dismantled pallets for the element joint!**

Static verification

In particular, the following points must be taken into account when verifying ceiling plates:

- Load-bearing capacity of the elements as well as of butt board and connection means
- Plate edge belt
- Connection joints to neighbouring components
- Resilience of the connection means/plate deformation

Sample statics ► www.lignotrend.com.

The Technical Dept. is available for support with the verification.

Load capacity values

Coupling board C24 (95 mm x 26.5 mm)	acceptable shear flow	R _k	53	kN/m						
Clamps	Distance	e	3	5	7,5	10	15	100	cm	
1,80 x 63	acceptable shear flow	R _k	20,63	3,5	8,25	7,0	4,13	0,70	kN/m	
Wood screws	Distance	e	10	20	30	50	100	200	cm	
d = 6 mm	acceptable shear flow	R _k	12,6	6,30	4,20	2,52	1,26	0,63	kN/m	
d = 8 mm	acceptable shear flow	R _k	22,2	11,1	7,39	4,44	2,22	1,11	kN/m	

Plate characteristic values

LIGNO® Block Q3

Load capacity and rigidity values

The characteristic values from the following tables are entered in the plate verification. Since, as a rule, depending on the load case transverse to or parallel with the element strips, either the complete number of whole elements or **exactly one edge element are applied for the load dissipation, the values for the shear load capacity of the elements per element in the laying width of 0.625 m are specified**, not on the 1 m-wide plate surface.

LIGNO® Block Q3

z0_p0

Height	I _z	M _{R,k,z}	V _{R,k,xy}	GA _{ef}
150	108,7	55,6	34,3	4441
170	129,8	66,5	34,3	4441
190	151,0	77,3	34,3	4441
210	172,1	88,1	34,3	4441
230	193,2	98,9	34,3	4441
250	214,3	109,7	34,3	4441
270	235,5	120,5	3,0	4441
290	256,6	131,4	3,0	4441
310	356,4	182,4	3,0	25814
330	377,5	193,3	3,0	25814
350	398,7	204,1	3,0	25814
370	437,8	224,1	3,0	34329
390	476,9	244,1	3,0	42844
410	516,1	264,2	3,0	51358
430	555,2	284,2	3,0	59873
450	594,4	304,3	3,0	68387
mm	10 ³ cm ⁴	kNm	kN	kN

z26_p0

z26_p26

z26_p53

Height	I _z	M _{R,k,z}	V _{R,k,xy}	GA _{ef}	I _z	M _{R,k,z}	V _{R,k,xy}	GA _{ef}	I _z	M _{R,k,z}	V _{R,k,xy}	GA _{ef}
150	109,9	56,2	85,0	40797								
170	131,0	67,1	85,0	40797	132,8	68,0	64,3	33588				
190	152,2	77,9	85,0	40797	153,9	78,8	64,3	33588	155,8	79,7	64,3	33588
210	173,3	88,7	85,0	40797	175,1	89,6	64,3	33588	176,9	90,6	64,3	33588
230	194,4	99,5	85,0	40797	196,2	100,4	64,3	33588	198,0	101,4	64,3	33588
250	215,5	110,3	85,0	40797	217,3	111,3	64,3	33588	219,2	112,2	64,3	33588
270	236,6	121,1	85,0	40797	238,4	122,1	64,3	33588	240,3	123,0	64,3	33588
290	257,8	132,0	85,0	40797	259,6	132,9	64,3	33588	261,4	133,8	64,3	33588
310	357,6	183,0	73,0	62170	359,4	184,0	52,3	54961	361,2	184,9	52,3	54961
330	378,7	193,8	73,0	62170	380,5	194,8	52,3	54961	382,3	195,7	52,3	54961
350	399,8	204,7	73,0	62170	401,6	205,6	52,3	54961	403,5	206,5	52,3	54961
370	439,0	224,7	73,0	70685	440,8	225,6	52,3	63476	442,6	226,6	52,3	63476
390	478,1	244,7	73,0	79200	479,3	245,7	52,3	71990	481,8	246,6	52,3	71990
410	517,3	264,8	73,0	87714	519,1	265,7	52,3	80505	520,9	266,6	52,3	80505
430	556,4	284,8	73,0	96229	558,2	285,8	52,3	89019	560,1	286,7	52,3	89019
450	595,6	304,9	73,0	104743	597,4	305,8	52,3	97534	599,2	306,7	52,3	97534
mm	10 ³ cm ⁴	kNm	kN	kN	10 ³ cm ⁴	kNm	kN	kN	10 ³ cm ⁴	kNm	kN	kN

LIGNO® Block Q3

<u>_z53_p0</u>				<u>_z53_p26</u>				<u>_z53_p53</u>				
Height	I_z	M_{R,k,z}	V_{R,k,xy}	GA_{ef}	I_z	M_{R,k,z}	V_{R,k,xy}	GA_{ef}	I_z	M_{R,k,z}	V_{R,k,xy}	GA_{ef}
170	154,9	79,3	85,0	52079								
190	176,0	90,1	85,0	52079	177,8	91,0	64,3	44870				
210	197,1	100,9	85,0	52079	199,0	101,8	64,3	44870				
230	218,3	111,7	85,0	52079	220,1	112,7	64,3	44870	221,9	113,9	64,3	44870
250	239,4	122,5	85,0	52079	241,2	123,5	64,3	44870	243,0	124,4	64,3	44870
270	260,5	133,4	85,0	52079	262,3	134,3	64,3	44870	264,2	135,2	64,3	44870
290	281,6	144,2	85,0	52079	283,5	145,1	64,3	44870	285,3	146,0	64,3	44870
310	381,4	195,3	73,0	73452	383,3	196,2	52,3	66243	385,1	197,1	52,3	66243
330	402,6	206,1	73,0	73452	404,4	207,0	52,3	66243	406,2	207,9	52,3	66243
350	423,9	216,9	73,0	73452	425,5	217,8	52,3	66243	427,3	218,8	52,3	66243
370	462,8	236,9	73,0	81967	464,7	237,9	52,3	74757	466,5	238,8	52,3	74757
390	502,0	257,0	73,0	90481	503,8	257,9	52,3	83272	505,6	258,8	52,3	83272
410	541,1	277,0	73,0	98996	543,0	277,9	52,3	91787	544,8	278,9	52,3	91787
430	580,3	297,0	73,0	107511	582,1	298,0	52,3	100301	583,9	298,9	52,3	100301
450	619,4	317,1	73,0	116025	621,3	318,0	52,3	108816	623,1	318,9	52,3	108816
mm	10^3cm^4	kNm	kN	kN	10^3cm^4	kNm	kN	kN	10^3cm^4	kNm	kN	kN

_z80_p0**_z80_p26****_z80_p53**

Height	I_z	M_{R,k,z}	V_{R,k,xy}	GA_{ef}	I_z	M_{R,k,z}	V_{R,k,xy}	GA_{ef}	I_z	M_{R,k,z}		
170												
190	200,3	102,5	85,0	63574								
210	221,5	113,4	85,0	63574								
230	242,6	124,2	85,0	63574	244,4	125,1	64,3	56364				
250	263,7	135,0	85,0	63574	265,5	135,9	64,3	56364	267,4	136,9	64,3	
270	284,8	145,8	85,0	63574	286,7	146,7	64,3	56364	288,5	147,7	64,3	
290	306,0	156,6	85,0	63574	307,8	157,6	64,3	56364	309,6	158,5	64,3	
310	405,8	207,7	73,0	84947	407,6	208,6	52,3	77738	409,4	209,6	52,3	
330	426,9	218,5	73,0	84947	428,7	219,5	52,3	77738	430,5	220,4	52,3	
350	448,0	229,3	73,0	84947	449,8	230,3	52,3	77738	451,7	231,2	52,3	
370	487,2	249,4	73,0	93462	489,0	250,3	52,3	86252	490,8	251,2	52,3	
390	526,3	269,4	73,0	101976	528,1	270,3	52,3	94767	530,0	271,3	52,3	
410	565,5	289,5	73,0	110491	567,3	290,4	52,3	103281	569,1	291,3	52,3	
430	604,6	309,5	73,0	119005	606,4	310,4	52,3	111796	608,3	311,4	52,3	
450	643,8	329,5	73,0	127520	645,6	330,5	52,3	120311	647,4	331,4	52,3	
mm	10^3cm^4	kNm	kN	kN	10^3cm^4	kNm	kN	kN	10^3cm^4	kNm	kN	kN

Plate characteristic values LIGNO® Block Q

LIGNO® Block Q

_z0_p0

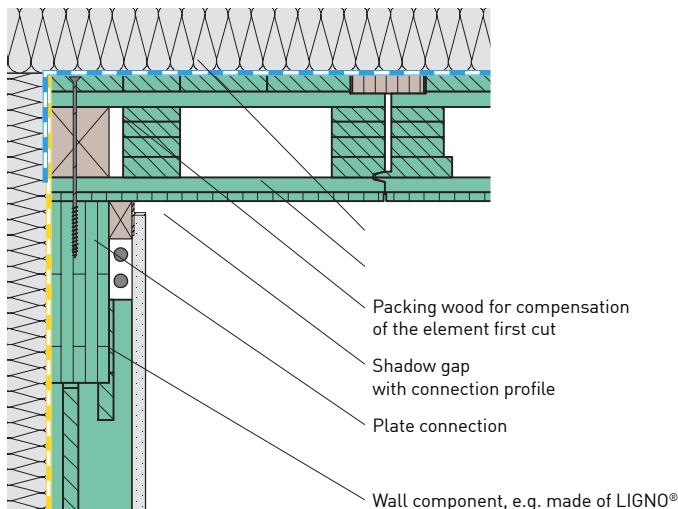
Height	I_z	$M_{R,k,z}$	$V_{R,k,xy}$	GA_{ef}
70	60,9	33,1	9,6	1 112
90	100,0	54,5	9,6	1 112
110	139,1	75,8	9,6	1 112
130	178,3	97,1	9,6	1 112
mm	10^3 cm^4	kNm	kN	kN

Design proposals

Support

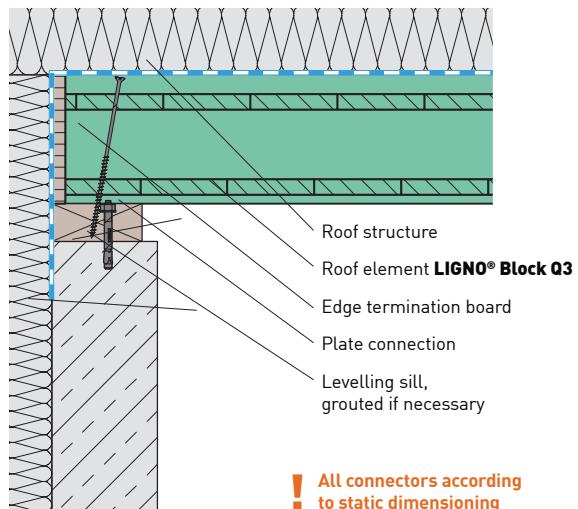
Support on timber

Exterior wall



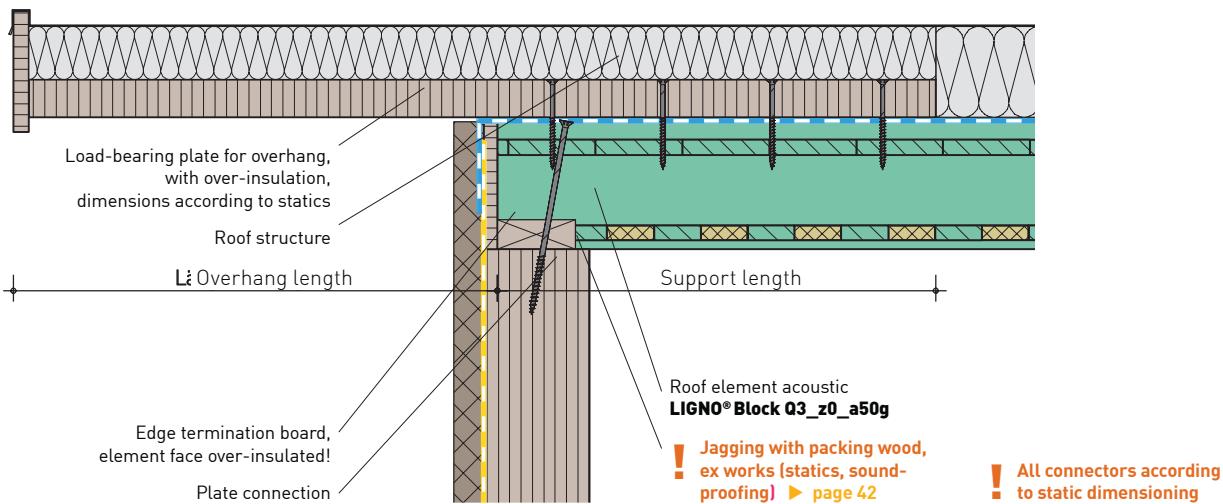
Support on concrete

by means of timber sill



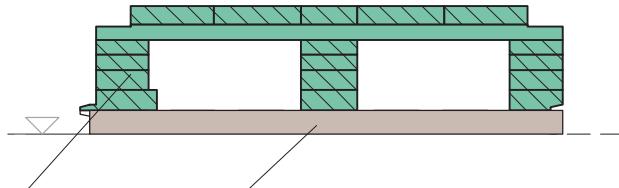
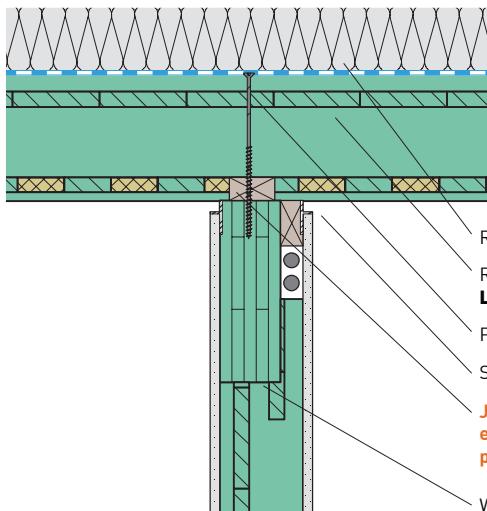
Roof edge with overhang

with complete insulation



Support on timber

Elements with closed surface (noise-decoupled versions) ► [page 38](#)

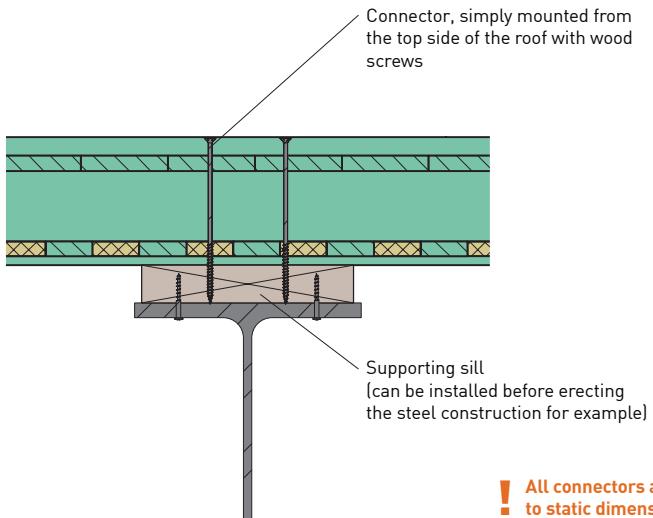


! Notes on non-ventilated flat roof structure
► [page 32](#)

! All connectors according
to static dimensioning

Support: steel beam

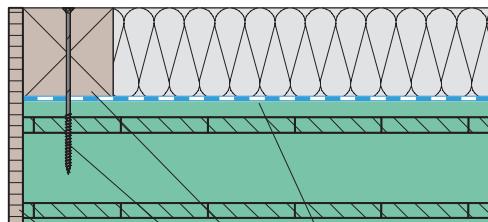
with mounting sill



! All connectors according
to static dimensioning

Free edge / trimmer joist

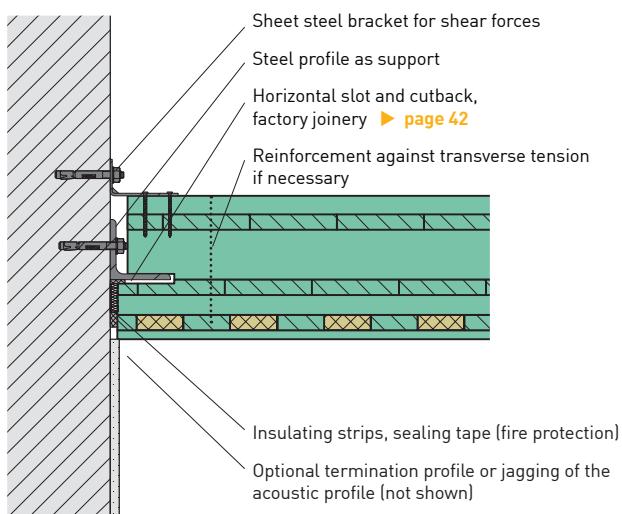
(e.g. at openings, roof edges)



Roof structure and sealing
not fully illustrated
Edge timber
Screw connection for connection
of vertical and, if applicable,
shear forces
Edge board

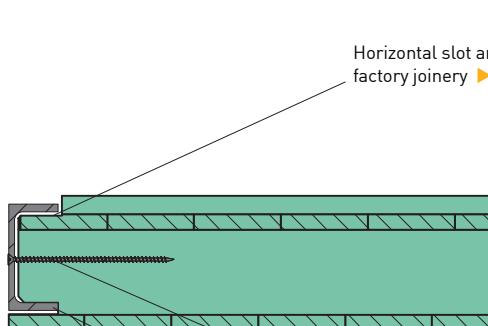
Concrete wall edge support

with steel profile



Free edge / steel profile

e.g. flush-with-ceiling window lintel



Horizontal slot and cutback,
factory joinery ► [page 42](#)

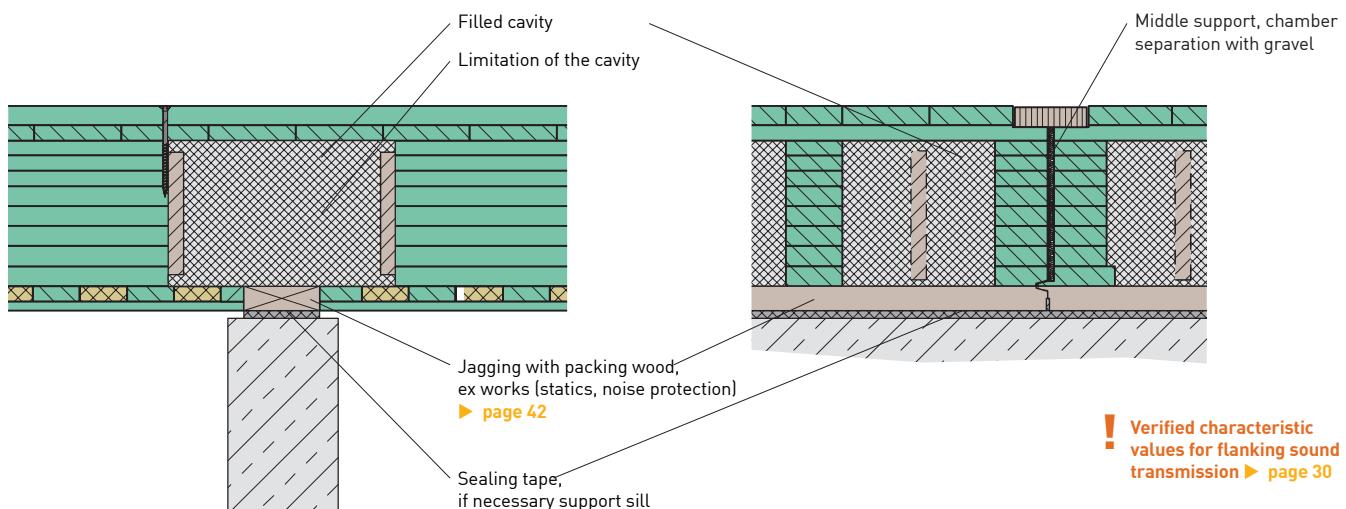
Screw connection to fixing,
e.g. SIHGA GoFix S+
Steel U-profile, e.g. UPE 160

! Connectors, steel profile
according to static dimensioning

Design proposals for interior wall supports (Reduction of flanking sound transmission)

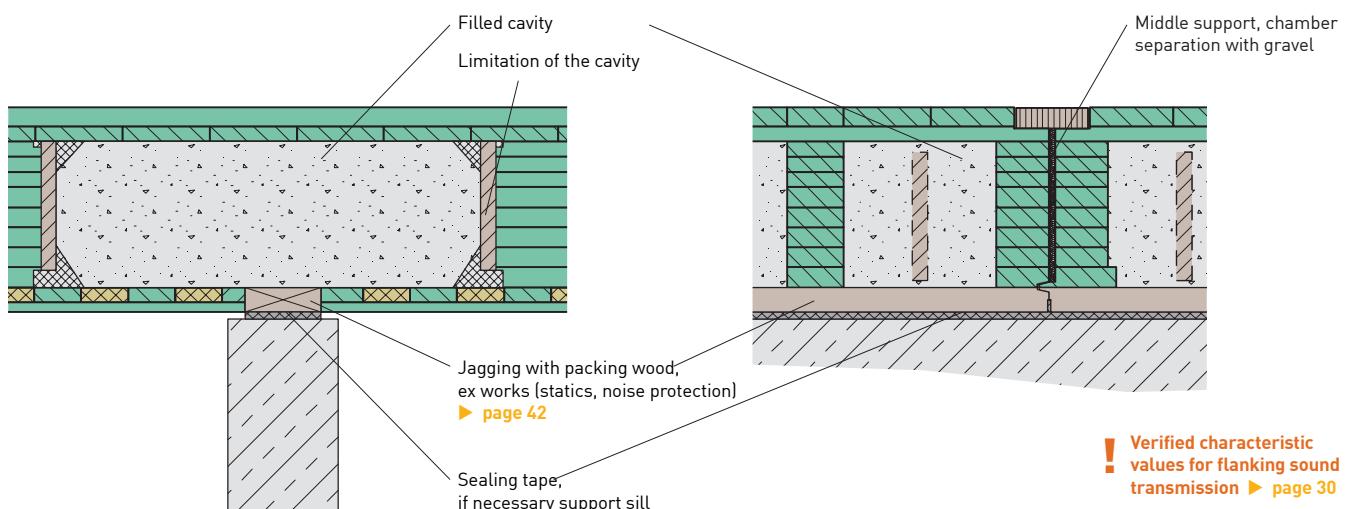
Middle support, chamber separation with foam

Element with acoustic profile, running through, without additional layer **z0**



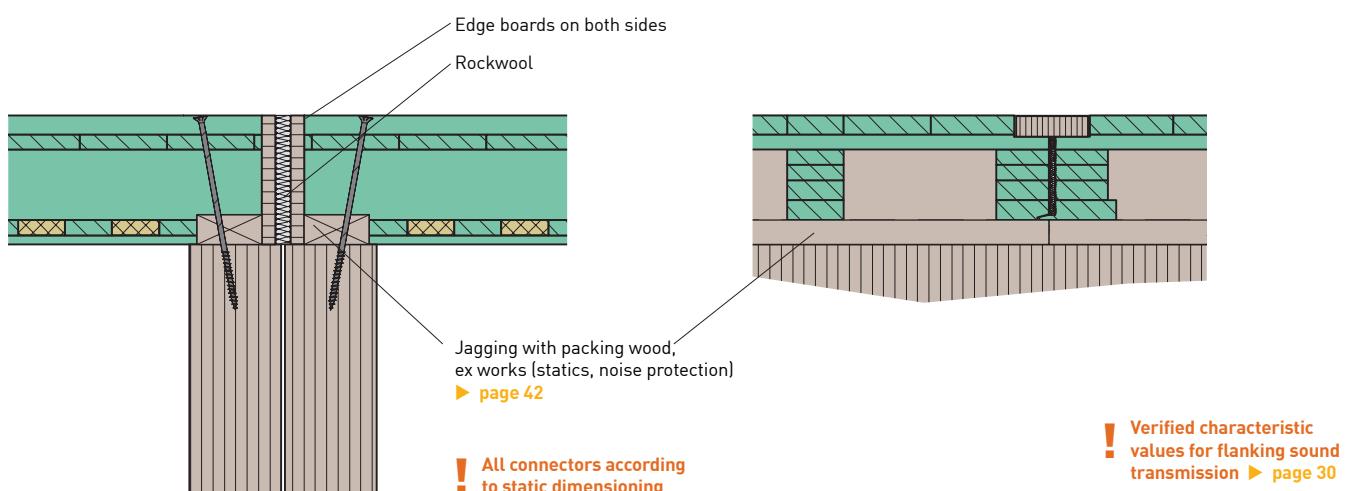
Middle support, chamber separation with gravel

Element with acoustic profile, running through, without additional layer **z0**



Middle support, elements separated

Element with acoustic profile, separated, without additional layer **z0**

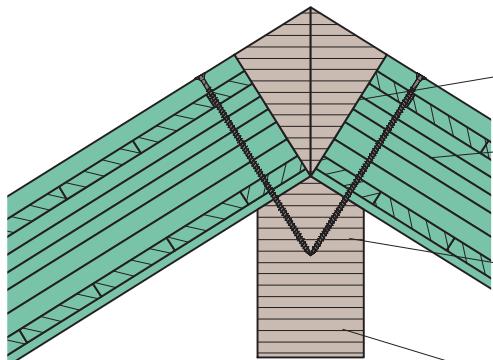


Design proposals

Pitched roof

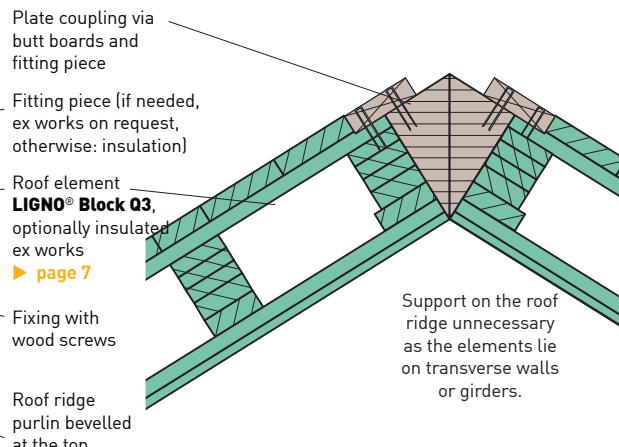
Roof ridge

Elements parallel to gable



Roof ridge

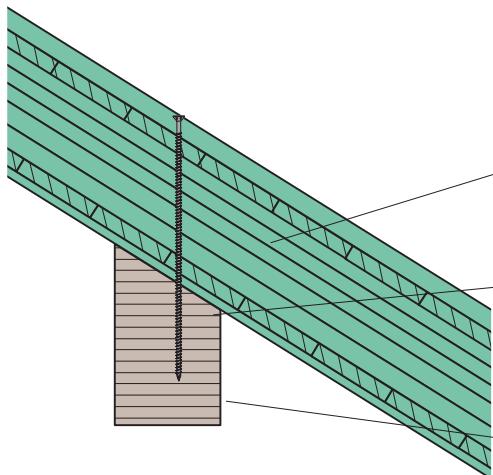
Elements parallel to ridge



! All connectors according to static dimensioning

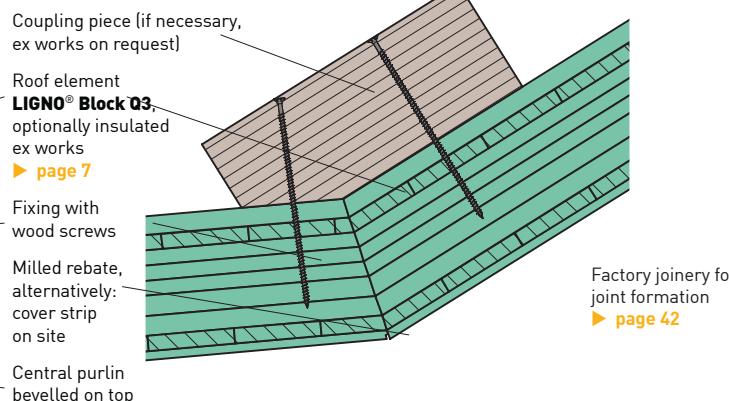
Central support

Elements parallel to gable



Free bend

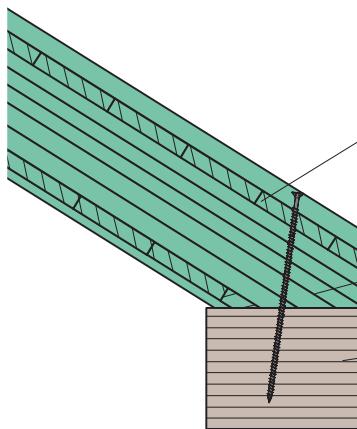
Elements parallel to the gable



! All connectors according to static dimensioning

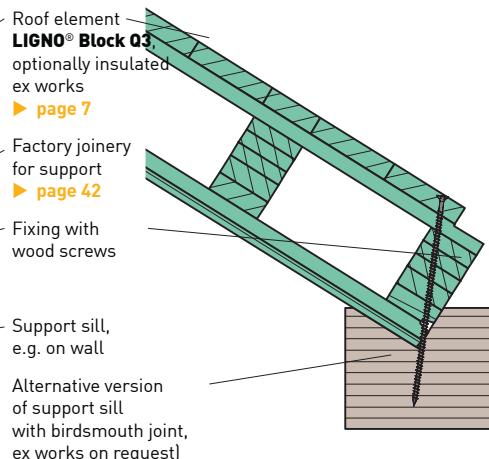
Eaves support

Elements parallel to gable



Eaves support

Elements parallel to ridge

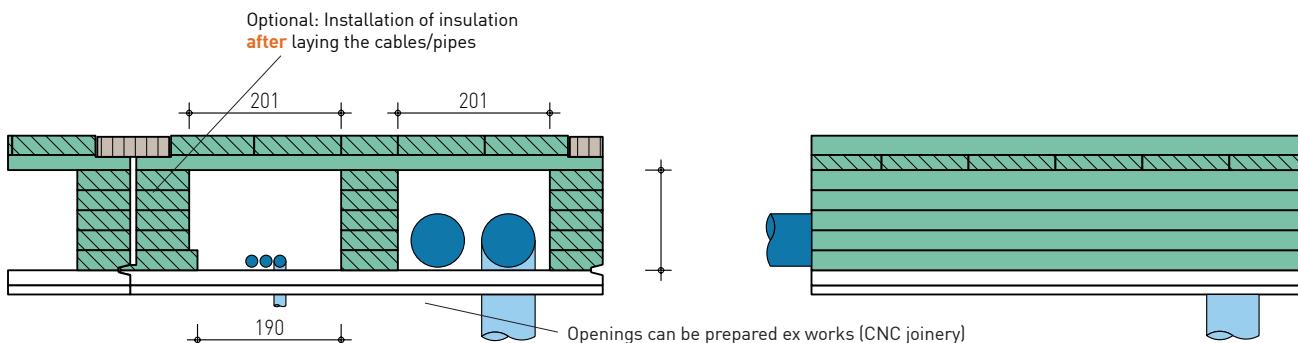


! All connectors according to static dimensioning

Cable/pipe layout Installation options

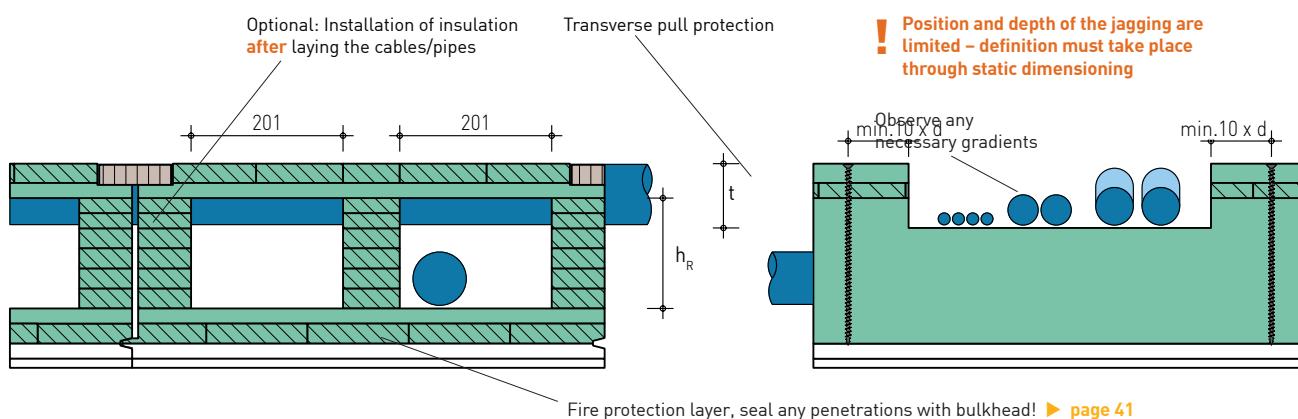
Longitudinal installation (e.g. LIGNO® Block Q3_z0_p0)

in existing ducts, ex works also possible ► page 42



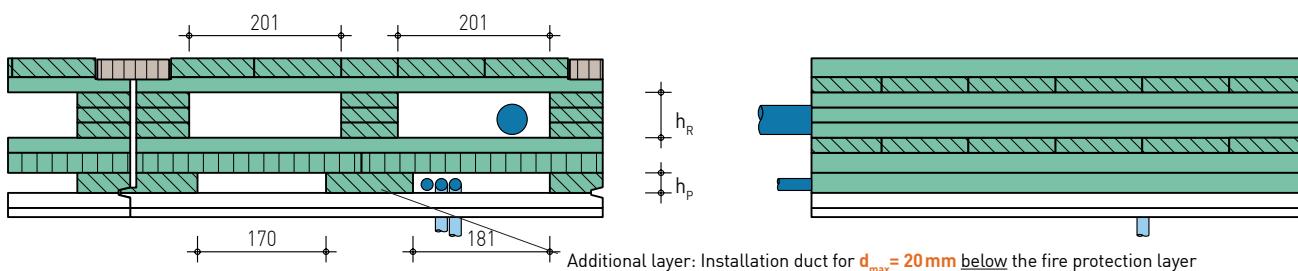
Longitudinal and transverse installation (e.g. LIGNO® Block Q3_z26)

with additional top-sided jaggering and transverse pull protection



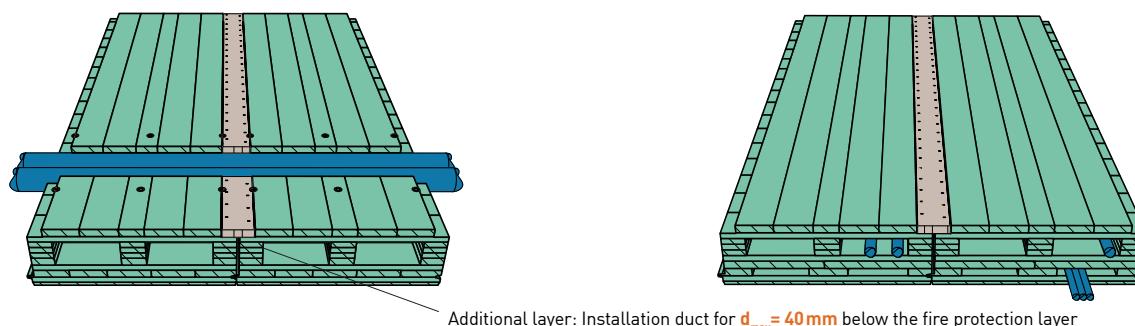
Longitudinal installation (e.g. LIGNO® Block Q3_z26_p26)

above and below the fire protection layer in existing ducts, configuration according to ► page 8



Longitudinal installation in LIGNO® Block Q3_z26_p53

above and below the fire protection layer in existing ducts, configuration according to ► page 8



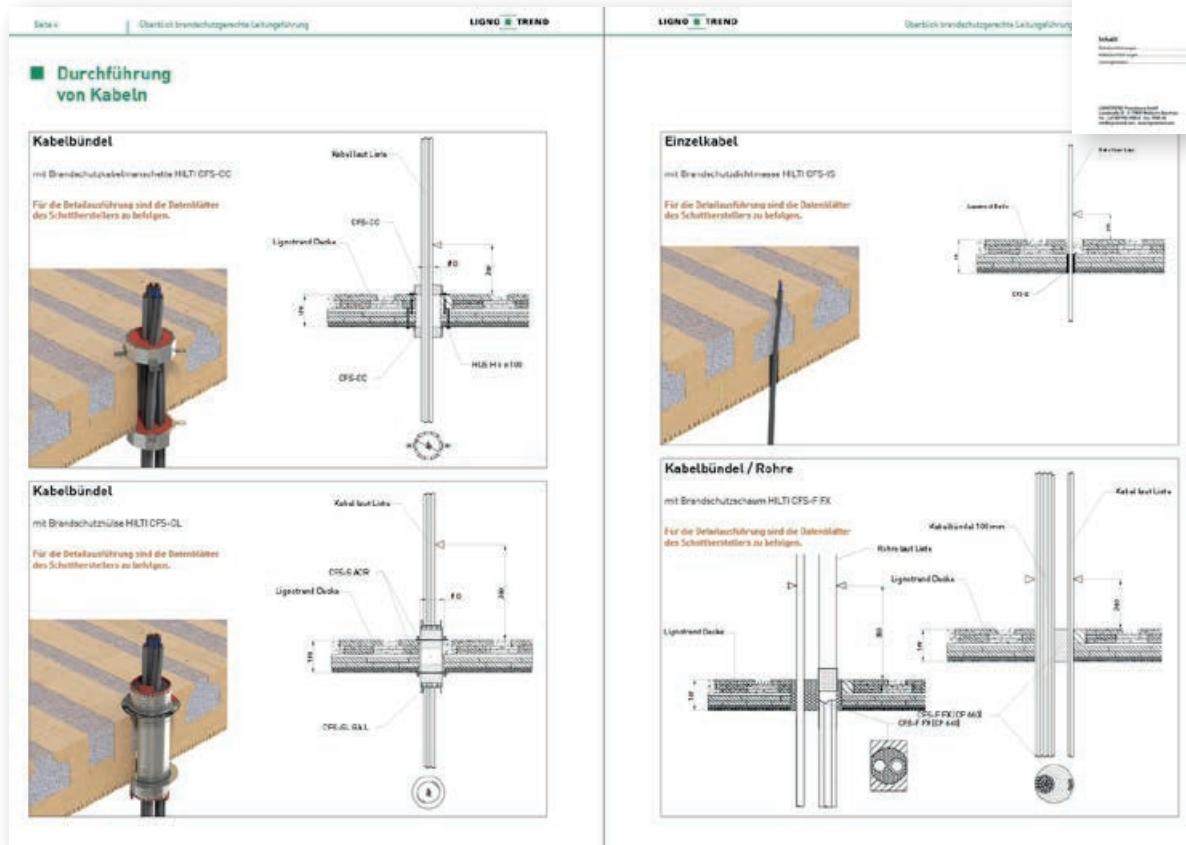


Cable/pipe layout Fire protection compatible bulkhead

Tested detailed solutions

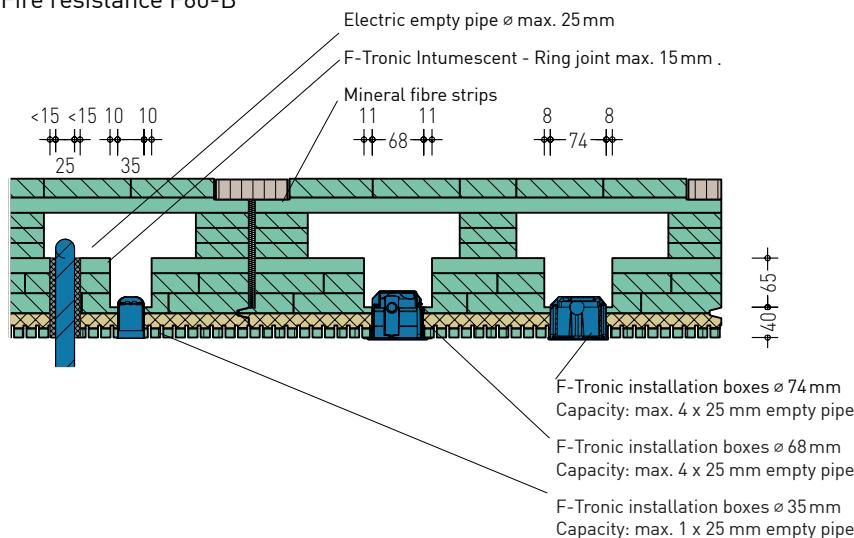
For the feeding of cables/pipes of various types through ceiling components of the fire resistance classes F60-B and F90-B, tested solutions were developed with the bulkhead manufacturer HILTI. For a detailed report, see

► **Data sheet „Fire protection compatible cable/pipe layout“.**



Fire protection socket box F-Tronic (e.g. LIGNO® Block Q3_z53_p0)

Fire resistance F60-B



Ready to mount ex works: Joinery



Preparation of the construction elements ready for installation

The preparation of the LIGNO® elements so that they are ready to mount can be ordered in addition to mere delivery. The scope of the pre-planning depends on the possible degree of prefabrication.

Examples:

- Cutting to size of the elements: mitre cuts, bevel cuts and round cuts
- Machining of the element soffit: Jagging of wall supports, milling of recesses for built-in parts such as luminaires, partition wall rails or similar
- Milling of built-in parts, e.g. trimmer joists, steel beams as flush-with-the-ceiling joist
- Preparation for installations: Drill holes for cable or pipe feed-throughs, openings for installation shafts, insertion of electrical cables or conduits with pull wire or ventilation ducts
- Preassembly of large-area modules (format up to 2.50 m x 18 m)



Eaves support, pitched roof with jagging



Configuration for support on steel profile



Ex works installation of conduits at the level of an additional layer _p26



Ex works installation of ventilation ducts (spiral ducts) in BV elements

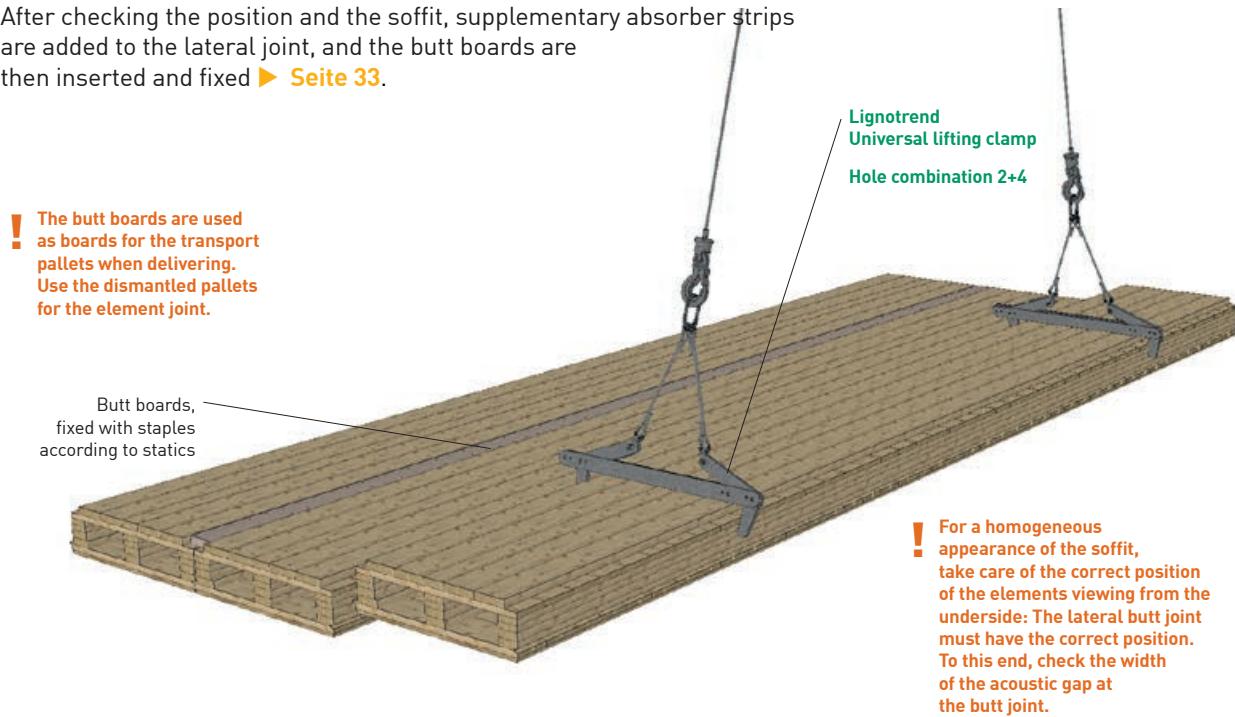


Assembly procedure gerneal

Installation with Lignotrend lifting tool

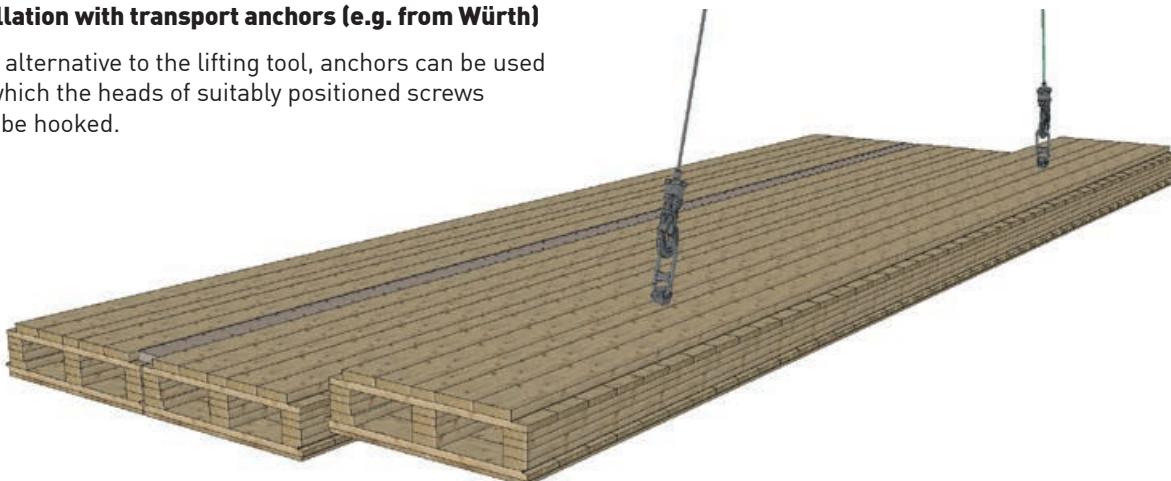
The roof elements are laid stripe by stripe or as large-area modules, pulled together laterally – if necessary, a beam puller or a screw clamp can be used as an aid. After aligning the elements, each element is fixed to the supports.

After checking the position and the soffit, supplementary absorber strips are added to the lateral joint, and the butt boards are then inserted and fixed ► [Seite 33](#).



Installation with transport anchors (e.g. from Würth)

As an alternative to the lifting tool, anchors can be used into which the heads of suitably positioned screws must be hooked.

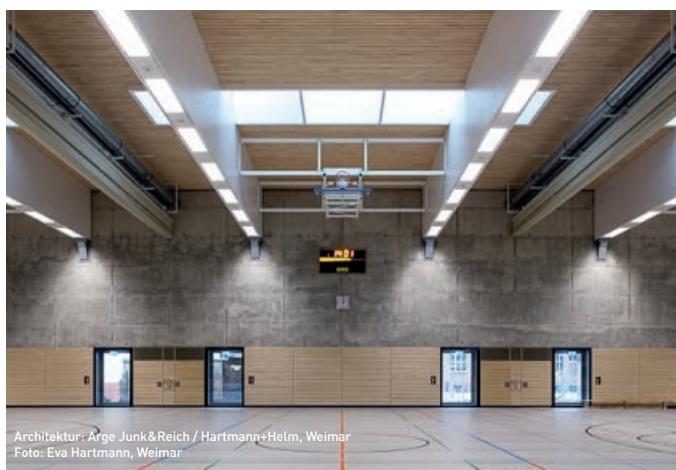


Large-area, preassembled elements

When mounting large-area modules with a width of 1.875 m or 2.50 m respectively, suitable suspension gear or cross bars must be used.



HOTLINE
for questions on installation
+49 7755 9200-0



Processing instructions

Goods receiving / unloading

- Unload the elements from the truck pallet by pallet if possible
- When unloading with a strap:
Insert a board underneath so that the edges of the visible surface are not damaged



Intermediate storage

- Store protected against splash water and level on suitable support wedges
- Protect against moisture and long-term solar irradiation
- No long-term outdoor storage!
(also not under foil, otherwise danger of formation of dew and mould!)



Installation

- To protect the visible surface, use only the illustrated or equivalent lifting tools
- For protection against dirt, wear clean gloves when assembling



Weather protection

- **Keep a large tarpaulin at the ready (for use in case of thunderstorms, for example)**
- **Apply the first sealing layer (e.g. weatherproof vapour barrier) as soon as possible after assembly.**

Coupling the bracing panel

- First insert the supplementary absorber strips in the lateral joint
- Fastening with staples according to statics, see also ► [page 33](#). Bracing panel connection to wall construction with screws according to statics.
- The butt boards are used as boards for the packaging pallets when delivering.
Use the dismantled pallets for the element joint.

Important note:

- **Pay attention to the acoustic gap in the joint when installing.
Before fixing each element: check the butt joint from the underside of the roof!**

In addition, the general application notes on Lignotrend cross-laminated timber products are to be observed.

► **Installation hotline +49 (0) 7755 – 9200-0**