THE LEADING TECHNOLOGY IN STANDARDIZED
TIMBER CONNECTOR SYSTEMS

SHERPA®

www.sherpa-connector.com

Design Guide

Project: Finansparken | Photo: Jan Inge Hega

05/2026

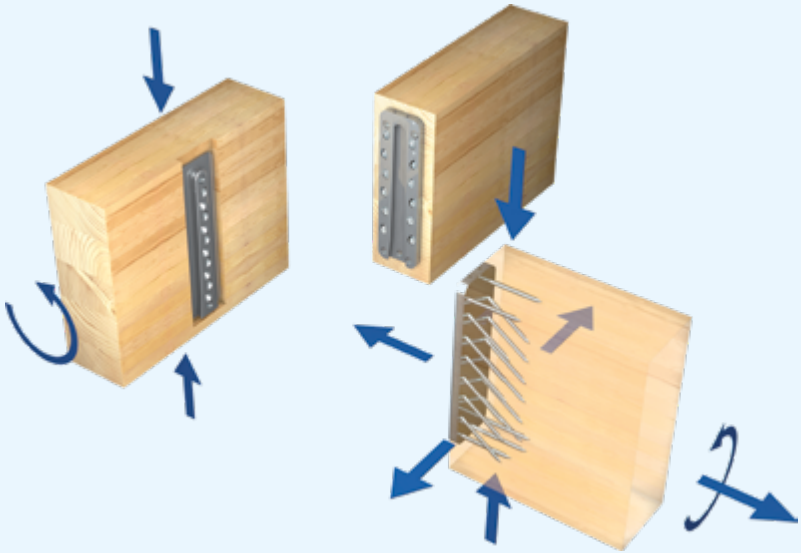
EFFICIENT, FLEXIBLE, SECURE.

SHERPA FOR WALLS, CEILINGS AND SUPPORTING FRAMEWORK

HOW IT WORKS

SHERPA connectors consist of two aluminium plates, joined friction-locked according to the principle of a classic dovetail connection.

This ingeniously simple system permits safe load absorption in, opposite and across the direction of insertion. Tensile and compressive forces are absorbed with equal ease, and the accommodation of momentary stress is also guaranteed.



APPLICATIONS OF SHERPA

TIMBER ENGINEERING · CARPORTS · STEEL-WOOD · CONCRETE-WOOD · FURNITURE CONSTRUCTION · SUNROOMS · STAIRS · CARPENTER CONSTRUCTIONS

SUCCESS IN CONSTRUCTION

The mature and tested SHERPA technology permits efficient & competitive planning and execution of demanding tasks throughout the construction industry.

The range of applications stretch from nodal points in timber engineering, connection situations to other building materials such as steel or concrete, through to conservatories, carports and stairs.

The broad product family delivers a tailored, secure and economic solution for any task. The high level of prefabrication and the rapid assembly of these standardised connectors guarantee economic implementation of the most varied projects.

THE BENEFITS ARE PERFECTLY EVIDENT:

- **Security based on a certified system**
- **Multifunctional in strength and application**
- **Standardised and simple calculation**
- **High level of prefabrication**
- **Rapid assembly**

INGENIOUS SUPPORT

YOUR REQUEST

Carpenters
Civil engineers
Architects
Do-it-yourself
Trading
Cabinet makers

Information on ...

- size of component
- quality of wood used
- connection angle
- load values (design)

... is welcome

OUR SOLUTION

Recommendations for ...

- the best choice of connectors
- position
- validation
- assembly

... and other aspects

TECHNICAL SUPPORT

Whether per e-mail, phone or videoconference – SHERPA users are welcome to contact our experienced support team consisting of civil engineers and practitioners at any time. Support ranges from simply inquiries to select the appropriate connector to on-site trainings and talks with inspection engineers within large-scale projects.

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support@sherpa-connector.com

HBM Bernd Strahammer

Dipl.-Ing. Noah Keller, BSc

CONNEXTOR - ONE PROJECT. ONE DESIGN KIT. SHERPA

The generated verification documents are prepared in a reviewable format. They can be exported as PDFs or, if necessary, sent directly to SHERPA Support for technical coordination. The platform is available free of charge.

TENDER TEXT

In order to support tendering clients, SHERPA offers detail and comprehensive boiler-plates for standard connectors for timber construction. These texts can be easily und quickly adapted to any given connection situation. Minimum requirements regarding load-bearing capacity and appearances as well as rigidness and fire protection are considered.

SOFTWARE CONNECTION

In order to support SHERPA users during work preparation and scheduling, all connectors can be downloaded in the usual design and woodwork programs. The whole SHERPA connector product range is available on SHERPA website for download as 2D or 3D geometrical files.

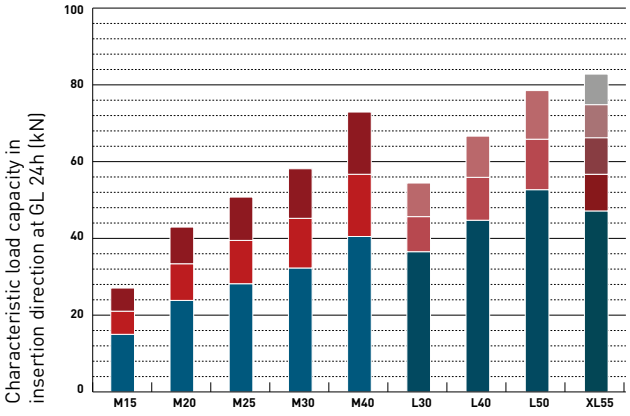
VARIABILITY IN SCREW LENGTH AND DENSITY

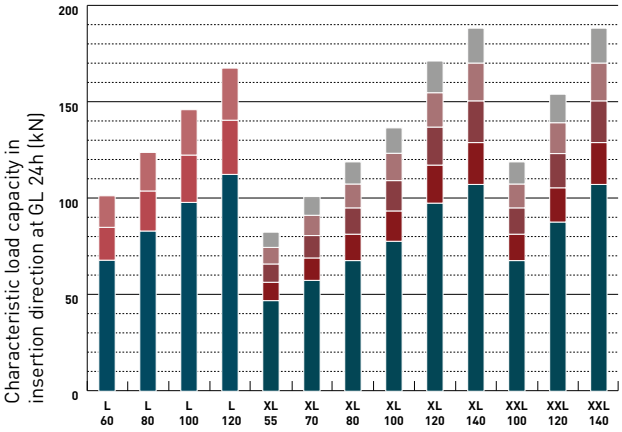
EXTENDED LOAD CARRYING CAPACITY OF THE CONNECTORS

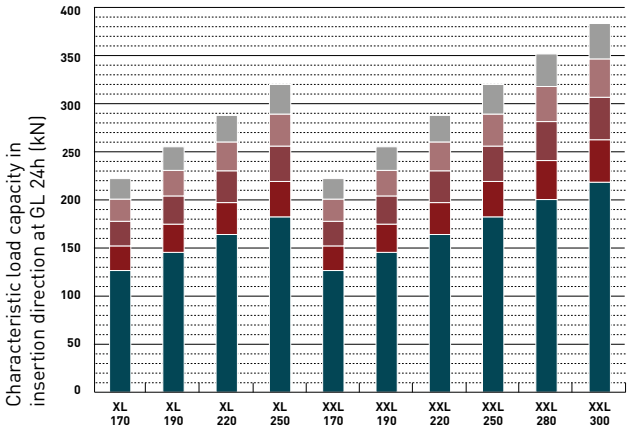
Table for Conversion based on GL24h	k_{dens} Bulk density correction factor		
	R_1 and R_2	R_{45}	R_{tor}
C24	0,806	0,953	0,829
C30	0,861	0,993	0,864
GL24c	0,958	0,974	0,974
GL24h	**1,000**	**1,000**	**1,000**
GL28c	1,010	1,006	1,006
GL28h	1,082	1,051	1,051

Notes: Absolute values of ETA-12/0067 must not be increased or maximum values exceeded ($R_{1,k,max}$, $R_{2,d,max}$, and $R_{3,k}$).

VARIABLE SCREW LENGTHS OF THE SHERPA SERIES M, L, XL AND XXL







M-Series

Ø 6,5 [mm]	Length [mm]	n_s
	105	1,80
	85	1,40
	65 *	**1,00**

L-Series

Ø 8,0 [mm]	Length [mm]	n_s
	140	1,49
	120	1,25
	100 *	**1,00**

XL / XXL-Series

Ø 8,0 [mm]	Length [mm]	n_s
	200	1,250
	180	1,130
	160 *	**1,000**
	140	0,856
	120	0,712

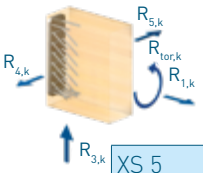
* Standard screw length

Carrying capacity in relation to the screw lengths used is calculated as follows:

$$R_{k;s} = n_s \cdot R_k$$

R_k ..... Characteristic load-bearing capacity value for standard screw length
$R_{k;s}$ ..... Characteristic value for carrying capacity for the screw length used

CHARACTERISTIC LOAD CAPACITY OF THE SHERPA SERIES XS TO XXL



	Dimensions			Screws	min. cross-section [1]		charact. load capacity values at GL 24h [2]					Screws
	mm						kN				kNmm	kN
	W	H	T	4,5 x 50	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XS 5	30	50	12	12	50/80	50/80	4,0	6,3	3,76	3,4	62	9,8
XS 10		70		18	50/100	50/100	7,0	11,9		5,2	123	18,3
XS 15		90		21	50/120	50/120	8,5	14,5		6,2	185	22,3
XS 20		110		25	50/140	50/140	11,5	19,7		7,1	258	30,2
	W	H	T	4,5 x 50	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
S 5	40	50	12	12	50/80	60/80	4,0	6,3	5,67	3,4	69	9,8
S 10		70		18	50/100	60/100	7,0	11,9		5,2	134	18,3
S 15		90		21	50/120	60/120	8,5	14,5		6,2	196	22,3
S 20		110		25	50/140	60/140	11,5	19,7		7,1	271	30,2
	W	H	T	6,5 x 65 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
M 15	60	90	14	16	65/120	80/120	9,0	15,0	8,95	8,5	284	23,6
M 20		110		20	65/140	80/140	14,0	23,8		10,1	397	37,3
M 25		130		23	65/160	80/160	16,5	28,2		11,7	530	44,0
M 30		150		26	65/180	80/180	18,5	32,3		13,4	683	50,5
M 40		170		30	65/200	80/200	23,0	40,5		15,0	853	63,3
	W	H	T	8,0 x 100 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
L 30	80	150	18	15	100/180	100/180	21,0	36,5	17,5	15,4	812	69,3
L 40		170		18	100/200	100/200	25,5	44,7		18,4	1 087	84,7
L 50		210		21	100/240	100/240	30,0	52,6		21,4	1 539	99,7
L 60		250		25	100/280	100/280	39,0	68,1		24,3	2 066	129,2
L 80		290		29	100/320	100/320	47,5	83,3		27,3	2 661	158,0
L 100		330		33	100/360	100/360	56,0	98,2		30,3	3 330	186,1
L 120		370		37	100/400	100/400	60,0	112,7		33,2	4 074	213,8
	W	H	T	8,0 x 160 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XL 55	120	250	20	18	160/280	140/280	60,0 [4]	66,2	40,6	27,8	2 691	65,0
XL 70		290		21	160/320	140/320	60,0	80,9		32,2	3 583	79,5
XL 80		330		24	160/360	140/360	60,0	95,3		36,6	4 591	93,6
XL 100		370		25	160/400	140/400	60,0	109,5		36,6	4 982	107,6
XL 120		410		29	160/440	140/440	60,0	137,3		41,1	6 051	134,9
XL 140		450		32	160/480	140/480	60,0	150,9		45,5	7 218	148,3
XL 170		490		36	160/520	140/520	60,0	177,9		49,9	8 504	174,7
XL 190		530		40	160/560	140/560	60,0	204,3		54,4	9 911	200,7
XL 220		570		44	160/600	140/600	60,0	230,5		58,7	11 438	226,4
XL 250		610		48	160/640	140/640	60,0	256,2		63,3	13 087	251,7
	W	H	T	8,0 x 160 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XXL 100	140	290	20	22	160/320	160/320	60,0	95,3	40,6	32,1	3 616	93,6
XXL 120		330		27	160/360	160/360	60,0	123,5		38,8	4 678	121,3
XXL 140		370		32	160/400	160/400	60,0	150,9		45,4	5 978	148,3
XXL 170		410		37	160/440	160/440	60,0	177,9		52,2	7 425	174,7
XXL 190		450		42	160/480	160/480	60,0	204,3		58,8	9 083	200,7
XXL 220		490		47	160/520	160/520	60,0	230,5		65,6	10 888	226,4
XXL 250		530		52	160/560	160/560	60,0	256,2		72,2	12 909	251,7
XXL 280		570		54	160/600	160/600	60,0	281,6		72,2	14 070	276,7
XXL 300		610		59	160/640	160/640	60,0	306,9		78,9	16 328	301,5

[1] Minimum cross-sections apply for standard screw length if the upper edge of the main and secondary beams are installed flush. MB | Main beam SB | Secondary beam
[2] For static calculations the characteristics of the respectively valid ETA must be taken into account and depend on the timber quality and the screw length used.
[3] Alternative screw lengths: Series M: 6.5 x 85, 6.5 x 105, Series L: 8 x 120,8 x 140, Series XL/XXL: 8 x 120,8 x 140, 8 x 180,8 x 200
[4] The characteristic load-bearing capacity $R_{1,k}$ must be taken from or calculated based on the valid ETA for all densities < 385 kg/m³. / XL 55 with GL 24h is $R_{1,k}$ = 44,6 kN

ASSEMBLY INSTRUCTION XS - XXL SERIES

Taking into account the respective edge distances, the connector plate with the greater number of screws - the plate with the groove - is always screwed onto the end grain wood.

VISIBLE CONNNECTION

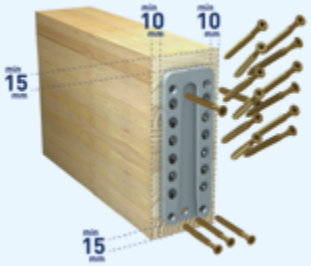
The connector plates are face-mounted to the main and secondary members and therefore visible. To ensure a proper fi t, it is recommended to pre-drill the positioning screws. The diameter of the pilot hole may not exceed the core diameter of the screw.

Series	min. secondary beam width in mm
M	80
L	100
XL	140
XXL	160

CONCEALED CONNECTION

OPTION 1

Recessing in main beam



Recommended screw torque

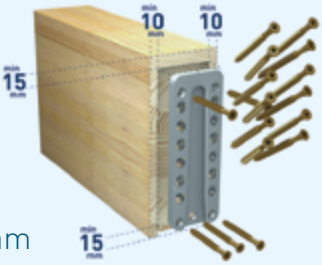
XS - S .....M_T = 1,5 Nm
M .....M_T = 2,5 Nm
L .....M_T = 5,0 Nm
XL - XXL .....M_T = 10,0 Nm
Min.: Screw head is in contact with counter sink

Housing depth

XS- to M- connectors, the housing has to be 1 mm less deep then the total thickness of the installed connector.
L- to XXL-connectors, the housing has to be 3mm less deep then the total thickness of the installed connector.

OPTION 2

Recessing in secondary beam



M	min. beam height in mm		
	6.5 x 65*	6.5 x 85	6.5 x 105
M 15	120	160	180
M 20	140	180	200
M 25	160	200	220
M 30	180	220	240
M 40	200	240	260

L	min. beam height in mm		
	8 x 100*	8 x 120	8 x 140
L 30	180	220	240
L 40	200	240	260
L 50	240	280	300
L 60	280	320	340
L 80	320	360	380
L 100	360	400	420
L 120	400	440	460

XL	min. beam height in mm	
	8 x 120/140 8 x 160*/180	8 x 200
XL 55	280	300
XL 70	320	340
XL 80	360	380
XL 100	400	420
XL 120	440	460
XL 140	480	500
XL 170	520	540
XL 190	560	580
XL 220	600	620
XL 250	640	660

The specifications regarding the required beam heights also apply to the DUO variants from page 14 onwards.

XXL	min. beam height in mm	
	8 x 120/140 8 x 160*/180	8 x 200
XXL 100	320	360
XXL 120	360	400
XXL 140	400	440
XXL 170	440	480
XXL 190	480	520
XXL 220	520	560
XXL 250	560	600
XXL 280	600	640
XXL 300	640	680

* Standard screw length

The minimum cross-section width of each series for the secondary beam is retained even with longer bolts.

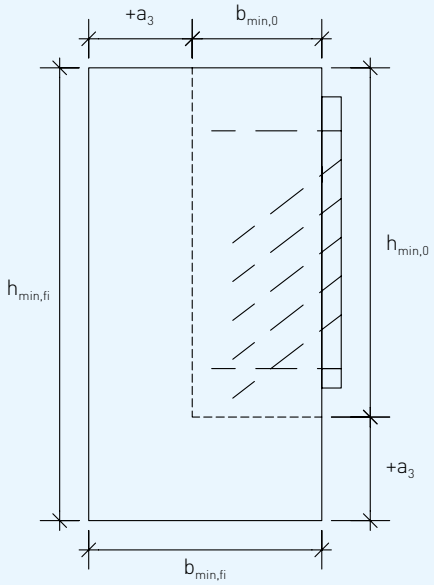
FIRE RESISTANCE UP TO R120

The following criteria **must** be met for fire design documentation:

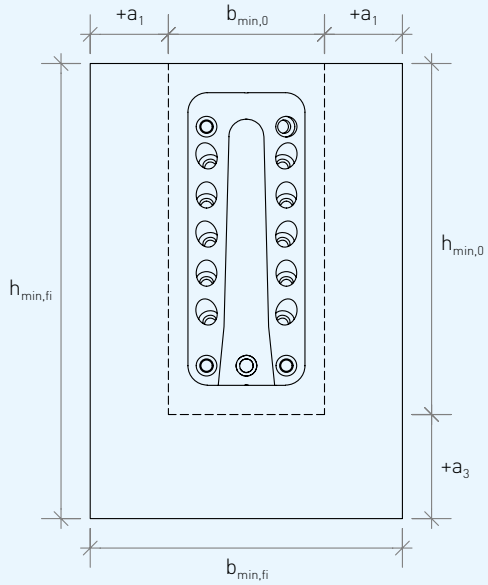
Joint Design
The gap between the components to be connected must be ⩽5 mm by milling.
or
the fire protection tape SHERPA Fire Stop 2.5 is used with minimum widths according to the adjacent table.

t in mm	Minimum width of penetration seal in mm	
	Option 1	Option 2
30	1 x 20	-
60	2 x 20	1 x 40
90	3 x 20	1 x 60
120	4 x 20	1 x 80

Minimum cross-section
It is important to ensure that there is sufficient wood cover for the screws used, depending on the classification R30 to R120. For this purpose, the values +a1 and +a3 from the ETA-12/0067 must be taken into account as follows.



Main beam
- $b_{min,fi} = b_{min,0} + (+a_3)$
- $h_{min,fi} = h_{min,0} + (+a_3)$



Secondary beam
- $b_{min,fi} = b_{min,0} + 2 \cdot (+a_1)$
- $h_{min,fi} = h_{min,0} + (+a_3)$

For torsionally rigid connections with Sherpa types M, L, XL, and XXL (excluding M15, M20, L30, L40, XL55, XL70, XXL100, XXL 120, or XXL140), a reduction of the specified values for +a3 by 10 mm is possible.

Optionally, by applying the fire protection paint Fire Shield, a reduction of the values +a1 and +a3 by 10 mm each can be made, regardless of the exposure condition condition.

R30 AND R60 - CHARACTERISTIC LOAD CAPACITY AND MINIMUM CROSS-SECTIONS M - XXL

	Load capacity values at GL 24hin kN [2]				Minimum cross-sections for R30 in mm [1] [3]				Minimum cross-sections for R60 in mm [1] [3]			
	η = 0,44		η = 0,33		η = 0,44		η = 0,33		η = 0,44		η = 0,33	
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
M 15	4,0	6,9	3,0	5,2	95/150	120/150	85/140	100/140	115/170	180/170	105/160	160/160
M 20	6,2	11,0	4,6	8,3	95/170	120/170	85/160	100/160	115/190	180/190	105/180	160/180
M 25	7,3	13,0	5,4	9,8	95/180	120/180	85/170	100/170	115/200	180/200	105/190	160/190
M 30	8,1	14,9	6,1	11,2	95/200	120/200	85/190	100/190	115/220	180/220	105/210	160/210
M 40	10,1	18,7	7,6	14,0	95/220	120/220	85/210	100/210	115/240	180/240	105/230	160/230
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
L 30	9,2	16,9	6,9	12,6	130/210	120/210	120/200	120/200	150/230	180/230	140/220	160/220
L 40	11,2	20,6	8,4	15,5	130/230	120/230	120/220	120/220	150/250	180/250	140/240	160/240
L 50	13,2	24,3	9,9	18,2	130/260	120/260	120/250	120/250	150/280	180/280	140/270	160/270
L 60	17,2	31,5	12,9	23,6	130/300	120/300	120/290	120/290	150/320	180/320	140/310	160/310
L 80	20,9	38,5	15,7	28,9	130/340	120/340	120/330	120/330	150/360	180/360	140/350	160/350
L 100	24,6	45,4	18,5	34,0	130/380	120/380	120/370	120/370	150/400	180/400	140/390	160/390
L 120	26,4	52,1	19,8	39,0	130/420	120/420	120/410	120/410	150/440	180/440	140/430	160/430
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XL 55	20,6	30,6	15,4	22,9	180/300	160/300	180/300	150/300	200/320	220/320	200/320	200/320
XL 70	26,4	37,4	19,8	28,0	180/340	160/340	180/340	150/340	200/360	220/360	200/360	200/360
XL 80	26,4	44,0	19,8	33,0	180/370	160/370	180/370	150/370	200/390	220/390	200/390	200/390
XL 100	26,4	50,6	19,8	37,9	180/410	160/410	180/410	150/410	200/430	220/430	200/430	200/430
XL 120	26,4	63,4	19,8	47,6	180/450	160/450	180/450	150/450	200/470	220/470	200/470	200/470
XL 140	26,4	69,7	19,8	52,3	180/490	160/490	180/490	150/490	200/510	220/510	200/510	200/510
XL 170	26,4	82,2	19,8	61,6	180/530	160/530	180/530	150/530	200/550	220/550	200/550	200/550
XL 190	26,4	94,4	19,8	70,8	180/570	160/570	180/570	150/570	200/590	220/590	200/590	200/590
XL 220	26,4	106,5	19,8	79,9	180/610	160/610	180/610	150/610	200/630	220/630	200/630	200/630
XL 250	26,4	118,3	19,8	88,8	180/650	160/650	180/650	150/650	200/670	220/670	200/670	200/670
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XXL 100	26,4	44,0	19,8	33,0	180/340	180/340	180/340	170/340	200/360	240/360	200/360	220/360
XXL 120	26,4	57,1	19,8	42,8	180/380	180/380	180/380	170/380	200/400	240/400	200/400	220/400
XXL 140	26,4	69,7	19,8	52,3	180/420	180/420	180/420	170/420	200/440	240/440	200/440	220/440
XXL 170	26,4	82,2	19,8	61,6	180/450	180/450	180/450	170/450	200/470	240/470	200/470	220/470
XXL 190	26,4	94,4	19,8	70,8	180/490	180/490	180/490	170/490	200/510	240/510	200/510	220/510
XXL 220	26,4	106,5	19,8	79,9	180/530	180/530	180/530	170/530	200/550	240/550	200/550	220/550
XXL 250	26,4	118,3	19,8	88,8	180/570	180/570	180/570	170/570	200/590	240/590	200/590	220/590
XXL 280	26,4	130,1	19,8	97,6	180/610	180/610	180/610	170/610	200/630	240/630	200/630	220/630
XXL 300	26,4	141,8	19,8	106,4	180/650	180/650	180/650	170/650	200/670	240/670	200/670	220/670

[1] Minimum timber cross-sections apply to the standard screw length when the upper edge of the main and secondary beams are flush mounted. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the quality of the wood and the length of the screws used.
[3] The reduction of +a3 by 10 mm, possible for torsionally rigid connections excluding M15, M20, L30, L40, XL55, XL70, XXL100, XXL 120, and XXL140, is taken into account.
[4] $R_{1,d,fi}$ values are maximum values that CANNOT be increased by using different wood densities or longer system screws.

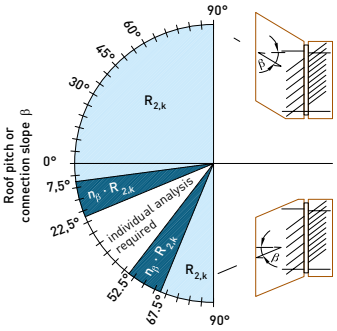
R90 AND R120 - CHARACTERISTIC LOAD CAPACITY AND MINIMUM CROSS-SECTIONS M - XXL

	Load capacity values at GL 24h in kN [2]				Minimum cross-sections for R90 in mm [1] [3]				Minimum cross-sections for R120 in mm [1] [3]			
	η = 0,44		η = 0,33		η = 0,44		η = 0,33		η = 0,44		η = 0,33	
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$ [5]	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$ [5]	MB	SB	MB	SB	MB	SB	MB	SB
M 15	4,0	12,5	3,0	9,4	190/260	220/260	180/250	200/250	210/280	280/280	210/280	240/280
M 20	6,2	19,8	4,6	14,9	190/280	220/280	180/270	200/270	210/300	280/300	210/300	240/300
M 25	7,3	23,4	5,4	17,6	190/290	220/290	180/280	200/280	210/310	280/310	210/310	240/310
M 30	8,1	26,8	6,1	20,1	190/310	220/310	180/300	200/300	210/330	280/330	210/330	240/330
M 40	10,1	33,6	7,6	25,2	190/330	220/330	180/320	200/320	210/350	280/350	210/350	240/350
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
L 30	9,2	16,9	6,9	12,6	180/260	220/260	170/250	200/250	190/270	280/270	180/260	260/260
L 40	11,2	20,6	8,4	15,5	180/280	220/280	170/270	200/270	190/290	280/290	180/280	260/280
L 50	13,2	24,3	9,9	18,2	180/310	220/310	170/300	200/300	190/320	280/320	180/310	260/310
L 60	17,2	31,5	12,9	23,6	180/350	220/350	170/340	200/340	190/360	280/360	180/350	260/350
L 80	20,9	38,5	15,7	28,9	180/390	220/390	170/380	200/380	190/400	280/400	180/390	260/390
L 100	24,6	45,4	18,5	34,0	180/430	220/430	170/420	200/420	190/440	280/440	180/430	260/430
L 120	26,4	52,1	19,8	39,0	180/470	220/470	170/460	200/460	190/480	280/480	180/470	260/470
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XL 55	20,6	30,6	15,4	22,9	230/350	260/350	220/340	240/340	260/380	300/380	250/370	280/370
XL 70	26,4	37,4	19,8	28,0	230/390	260/390	220/380	240/380	260/420	300/420	250/410	280/410
XL 80	26,4	44,0	19,8	33,0	230/420	260/420	220/410	240/410	260/450	300/450	250/440	280/440
XL 100	26,4	50,6	19,8	37,9	230/460	260/460	220/450	240/450	260/490	300/490	250/480	280/480
XL 120	26,4	63,4	19,8	47,6	230/500	260/500	220/490	240/490	260/530	300/530	250/520	280/520
XL 140	26,4	69,7	19,8	52,3	230/540	260/540	220/530	240/530	260/570	300/570	250/560	280/560
XL 170	26,4	82,2	19,8	61,6	230/580	260/580	220/570	240/570	260/610	300/610	250/600	280/600
XL 190	26,4	94,4	19,8	70,8	230/620	260/620	220/610	240/610	260/650	300/650	250/640	280/640
XL 220	26,4	106,5	19,8	79,9	230/660	260/660	220/650	240/650	260/690	300/690	250/680	280/680
XL 250	26,4	118,3	19,8	88,8	230/700	260/700	220/690	240/690	260/730	300/730	250/720	280/720
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XXL 100	26,4	44,0	19,8	33,0	220/380	280/380	220/380	260/380	250/410	320/410	250/410	300/410
XXL 120	26,4	57,1	19,8	42,8	220/420	280/420	220/420	260/420	250/450	320/450	250/450	300/450
XXL 140	26,4	69,7	19,8	52,3	220/460	280/460	220/460	260/460	250/490	320/490	250/490	300/490
XXL 170	26,4	82,2	19,8	61,6	220/490	280/490	220/490	260/490	250/520	320/520	250/520	300/520
XXL 190	26,4	94,4	19,8	70,8	220/530	280/530	220/530	260/530	250/560	320/560	250/560	300/560
XXL 220	26,4	106,5	19,8	79,9	220/570	280/570	220/570	260/570	250/600	320/600	250/600	300/600
XXL 250	26,4	118,3	19,8	88,8	220/610	280/610	220/610	260/610	250/640	320/640	250/640	300/640
XXL 280	26,4	130,1	19,8	97,6	220/650	280/650	220/650	260/650	250/680	320/680	250/680	300/680
XXL 300	26,4	141,8	19,8	106,4	220/690	280/690	220/690	260/690	250/720	320/720	250/720	300/720

[1] Minimum timber cross-sections apply to the standard screw length when the upper edge of the main and secondary beams are flush mounted. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the quality of the wood and the length of the screws used.
[3] The reduction of +a3 by 10 mm, possible for torsionally rigid connections excluding M15, M20, L30, L40, XL55, XL70, XXL100, XXL 120, and XXL140, is taken into account.
[4] $R_{1,d,fi}$ values are maximum values that CANNOT be increased by using different wood densities or longer system screws.
[5] The minimum screw length for R90 and R120 is according to ETA 100 mm. Therefore, in the M-Series, only the system screw 6.5x105 mm can be used.

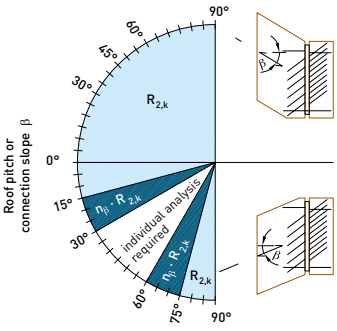
CHARACTERISTIC LOAD CAPACITY $R_{2,K}$ AT RIDGE CONNECTION FOR XS - XXL

Roof pitch β	0° ≤ β ≤ 7,5° / 67,5° ≤ β ≤ 90°	10° / 65°	12,5° / 62,5°	15° / 60°	17,5° / 57,5°	20° / 55°	22,5° / 52,5°	22,5° < β < 52,5°
n_β	1,0	$0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°}$						individual analysis required
	$n_\beta \cdot R_{2,k}$ in kN at GL 24h and standard screw length							
XS 5 / S5	6,3	6,0	5,6	5,2	4,9	4,5	4,1	
XS 10 / S10	11,9	11,2	10,5	9,8	9,1	8,4	7,7	
XS 15 / S15	14,5	13,7	12,8	12,0	11,1	10,3	9,4	
XS 20 / XS 20	19,7	18,6	17,4	16,3	15,1	14,0	12,8	
M 15	15,0	14,1	13,3	12,4	11,5	10,6	9,8	
M 20	23,8	22,4	21,0	19,7	18,3	16,9	15,5	
M 25	28,2	26,5	24,9	23,2	21,6	20,0	18,3	
M 30	32,3	30,4	28,5	26,6	24,7	22,9	21,0	
M 40	40,5	38,1	35,7	33,4	31,0	28,7	26,3	
L 30	36,5	34,4	32,2	30,1	28,0	25,8	23,7	
L 40	44,7	42,1	39,5	36,9	34,3	31,6	29,0	
L 50	52,6	49,6	46,5	43,4	40,3	37,3	34,2	
L 60	68,1	64,2	60,2	56,2	52,2	48,3	44,3	
L 80	83,3	78,4	73,6	68,7	63,8	59,0	54,1	
L 100	98,2	92,4	86,7	81,0	75,3	69,5	63,8	
L 120	112,7	106,1	99,5	93,0	86,4	79,8	73,3	



$$n_\beta = \begin{cases} 1 & \text{for } 22{,}5° \leq \lvert \alpha_{sherpa} - \beta \rvert \\ 0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°} & \text{for } 7{,}5° \leq \lvert \alpha_{sherpa} - \beta \rvert < 22{,}5° \\ \text{individual analysis required} & \text{for } \lvert \alpha_{sherpa} - \beta \rvert < 7{,}5° \end{cases}$$

Roof pitch β	0° ≤ β ≤ 15° / 75° ≤ β ≤ 90°	17,5° / 72,5°	20° / 70°	22,5° / 67,5°	25° / 65°	27,5° / 62,5°	30° / 60°	30° < β < 60°
n_β	1,0	$0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°}$						individual analysis required
	$n_\beta \cdot R_{2,k}$ in kN at GL 24h and standard screw length							
XL 55	66,2	62,3	58,4	54,6	50,7	46,9	43,0	
XL 70	80,9	76,2	71,5	66,8	62,0	57,3	52,6	
XL 80	95,3	89,8	84,2	78,6	73,1	67,5	62,0	
XL 100	109,5	103,1	96,7	90,3	83,9	77,5	71,2	
XL 120	137,3	129,3	121,3	113,2	105,2	97,2	89,2	
XL 140	150,9	142,1	133,3	124,5	115,7	106,9	98,1	
XL 170	177,9	167,5	157,1	146,7	136,4	126,0	115,6	
XL 190	204,3	192,4	180,5	168,5	156,6	144,7	132,8	
XL 220	230,5	217,0	203,6	190,1	176,7	163,3	149,8	
XL 250	256,2	241,2	226,3	211,3	196,4	181,5	166,5	
XXL 100	95,3	89,8	84,2	78,6	73,1	67,5	62,0	
XXL 120	123,5	116,3	109,1	101,9	94,7	87,5	80,3	
XXL 140	150,9	142,1	133,3	124,5	115,7	106,9	98,1	
XXL 170	177,9	167,5	157,1	146,7	136,4	126,0	115,6	
XXL 190	204,3	192,4	180,5	168,5	156,6	144,7	132,8	
XXL 220	230,5	217,0	203,6	190,1	176,7	163,3	149,8	
XXL 250	256,2	241,2	226,3	211,3	196,4	181,5	166,5	
XXL 280	281,6	265,2	248,8	232,3	215,9	199,5	183,0	
XXL 300	306,9	289,0	271,1	253,2	235,3	217,4	199,5	



$$n_\beta = \begin{cases} 1 & \text{for } 30° \leq \lvert \alpha_{sherpa} - \beta \rvert \\ 0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°} & \text{for } 15° \leq \lvert \alpha_{sherpa} - \beta \rvert < 30° \\ \text{individual analysis required} & \text{for } \lvert \alpha_{sherpa} - \beta \rvert < 15° \end{cases}$$

β ..... the roof pitch
α_{Sherpa} ..... The angle of the angled screws
XS-L 37,5°
XL-XXL 45,0°

n_β ..... Based on kax according to Schmid ETA-12/0373 or public publication by Brandner, Ringhofer, and Scheibenreiter (IHF 2019)

CHARACTERISTIC LOAD CAPACITY OF SHERPA SERIES M - XXL IN CONSTRUCTION BEECH

	Geometry			Screws	min. cross-section [1]		Load capacity values at 730 kg/m³ [2]					
	mm						kN					kNmm
	B	H	D	6,5 x 65 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
M 15	60	90	14	16	65/120	80/120	9,0	42,2	23,6	8,95	11,7	391
M 20		110		20	65/140	80/140	14,0	67,0	37,3		13,9	547
M 25		130		23	65/160	80/160	16,5	79,2	44,0		16,2	729
M 30		150		26	65/180	80/180	18,5	90,7	50,5		18,5	940
M 40		170		30	65/200	80/200	23,0	113,7	63,3		20,7	1 174
	B	H	D	8,0 x 100 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
L 30	80	150	18	15	100/180	100/180	21,0	102,6	69,3	17,5	21,2	1 118
L 40		170		18	100/200	100/200	25,5	125,6	84,7		25,3	1 496
L 50		210		21	100/240	100/240	30,0	147,9	99,7		29,5	2 119
L 60		250		25	100/280	100/280	39,0	191,6	129,2		33,5	2 845
L 80		290		29	100/320	100/320	47,5	234,1	158,0		37,5	3 664
L 100		330		33	100/360	100/360	56,0	276,0	186,1		41,7	4 585
L 120		370		37	100/400	100/400	60,0	316,8	213,8		45,8	5 609
	B	H	D	8,0 x 120	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
XL 55	120	250	20	18	120/280	140/280	60,0	132,5	65,0	40,6	27,3	2 295
XL 70		290		21	120/320	140/320	60,0	162,0	79,5		31,6	3 056
XL 80		330		24	120/360	140/360	60,0	190,9	93,6		35,9	3 915
XL 100		370		25	120/400	140/400	60,0	219,2	107,6		35,9	4 886
XL 120		410		29	120/440	140/440	60,0	274,9	134,9		40,3	5 934
XL 140		450		32	120/480	140/480	60,0	302,2	148,3		44,6	7 079
XL 170		490		36	120/520	140/520	60,0	356,1	174,7		49,0	8 340
XL 190		530		40	120/560	140/560	60,0	409,1	200,7		53,4	9 720
XL 220		570		44	120/600	140/600	60,0	461,5	226,4		57,6	11 218
XL 250		610		48	120/640	140/640	60,0	512,9	251,7		62,1	12 835
	B	H	D	8,0 x 120	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
XXL 100	140	290	20	22	120/320	160/320	60,0	190,9	93,6	40,6	31,5	3 547
XXL 120		330		27	120/360	160/360	60,0	247,3	121,3		38,1	4 588
XXL 140		370		32	120/400	160/400	60,0	302,2	148,3		44,5	5 863
XXL 170		410		37	120/440	160/440	60,0	356,1	174,7		51,2	7 281
XXL 190		450		42	120/480	160/480	60,0	409,1	200,7		57,7	8 908
XXL 220		490		47	120/520	160/520	60,0	461,5	226,4		64,3	10 678
XXL 250		530		52	120/560	160/560	60,0	512,9	251,7		70,8	12 660
XXL 280		570		54	120/600	160/600	60,0	563,9	276,7		70,8	13 799
XXL 300		610		59	120/640	160/640	60,0	614,6	301,5		77,4	16 013

[1] Minimum timber cross-sections apply to the standard screw length when the upper edge of the main and secondary beams are flush mounted.
MB | Main beam SB | Secondary beam

[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the wood quality and the length of the screws used.
Example Pollmeier Construction Beech GL75 according to ETA-14/0354 with ρ_k = 730 kg/m³

[3] Alternative screw lengths: Series M: 6.5 x 85, Series L: 8 x 120

[4] The characteristic load-bearing capacity $R_{1,k}$ must be taken from or calculated based on the valid ETA for all wood densities < 385 kg/m³.

[5] $R_{2,k,730} = R_{2,k,C24} \cdot (730/350)^{1,7} \cdot n_s$

[6] $R_{2,d,max} = VF \cdot F_{tens,k} / \gamma_{M2} \cdot (\sin\alpha + 0,25 \cdot \cos\alpha) \cdot n_{SchrS}^{0,9} \cdot k_{sys}$ for HT with γ_{M2} = 1,25 and k_{sys} = 1,0

[7] $R_{45,k,730} = R_{45,k,C24} \cdot n_s \cdot k_{dens}$

[8] $R_{tor,k,730} = R_{tor,k,C24} \cdot n_s \cdot k_{dens}$

FEATURES FOR THE SHERPA CS SERIES

The ratings apply providing that the component thickness for the respective connector does not fall short of the minimum value.
Furthermore, reinforcement must be fitted to limit the gap between components to w_k = 0.3 mm.
Any mortar layer, if present, to even out unevenness between the concrete and the SHERPA connector must be greater than the standard in "ETAG 001" 3 mm (as per CEN/TS 1992-4 half anchor bolt diameter). The compression strength of the mortar layer must be at least 30 N/mm². If these conditions are not fulfilled, the support capabilities are to be determined as per ETAG 001, Appendix C.

	Dimensions				Values $R_{2,d}$ in kN									
	Geometry			Screws	to timber SB		to concrete for C 25/30						to steel	
	mm			Pcs.	mm [1]	kN	Fischer Ultracut FBS II SK				FH II-SK		DIN EN ISO 10462 [3]	
	W	H	T	6,5 x 65	GL 24h	k_{mod}/γ_M [2]	Pcs.	6 x 60/5					Pcs.	M6 8.8
M 15 CS	60	90	20	9	80/120	9,2	4	24,0					4	30,8
M 20 CS		110		11	80/140	14,5	4	24,0					4	30,8
M 25 CS		130		13	80/160	17,1	4	24,0					4	30,8
M 30 CS		150		15	80/180	19,7	6	33,2					6	46,3
M 40 CS		170		17	80/200	24,7	6	36,0					6	46,3

	W	H	T	8,0 x 100	GL 24h	k_{mod}/γ_M [2]	Pcs.	8x80					Pcs.	M10 8.8
L 30 CS	80	150	29	9	100/180	22,2	4	42,6					4	89,0
L 40 CS		170		11	100/200	27,2	4	46,1					4	89,0
L 50 CS		210		13	100/240	32,0	6	53,0					6	133,6
L 60 CS		250		15	100/280	41,5	6	59,9					6	133,6
L 80 CS		290		17	100/320	50,7	6	66,9					6	133,6
L 100 CS		330		19	100/360	59,8	8	73,8					8	178,2
L 120 CS		370		21	100/400	68,7	8	80,7					8	178,2

	W	H	T	8,0 x 160	GL 24h	k_{mod}/γ_M [2]	Pcs.	8x80	Pcs.	10x80	Pcs.	12/15	Pcs.	M10 8.8
XL 55 CS	120	250	29	10	140/280	40,3	6	66,9	4	56,2	4	63,1	6	133,6
XL 70 CS		290		12	140/320	49,2	6	74,9	4	60,8	4	71,2	6	133,6
XL 80 CS		330		14	140/360	58,0	8	82,9	6	72,1	6	79,4	8	178,2
XL 100 CS		370		14	140/400	66,7	8	90,8	6	80,0	6	87,5	8	178,2
XL 120 CS		410		16	140/440	83,6	8	98,8	6	88,0	6	95,6	8	178,2
XL 140 CS		450		18	140/480	91,9	8	101,2	6	91,2	6	103,8	8	178,2
XL 170 CS		490		20	140/520	108,3	8	101,2	6	91,2	6	109,8	8	178,2
XL 190 CS		530		22	140/560	124,4	10	122,7	8	111,8	8	120,0	10	222,7
XL 220 CS		570		24	140/600	140,3	10	126,5	8	119,7	8	128,2	10	222,7
XL 250 CS		610		26	140/640	156,0	10	126,5	8	123,0	8	131,5	10	222,7

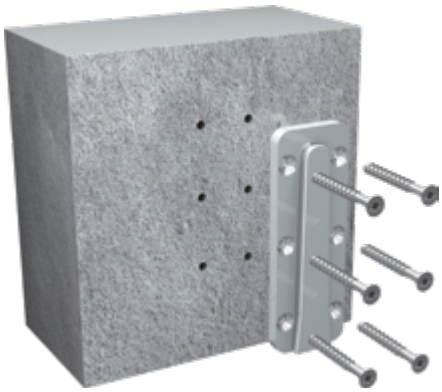
	W	H	T	8,0 x 160	GL 24h	k_{mod}/γ_M [2]	Pcs.	8x80					Pcs.	M10 8.8
XXL 100 CS	140	290	29	15	160/320	58,0	6	75,9					10	222,7
XXL 120 CS		330		15	160/360	75,2	8	88,4					12	267,2
XXL 140 CS		370		18	160/400	91,9	8	93,2					12	267,2
XXL 170 CS		410		21	160/440	108,3	10	107,2					14	311,8
XXL 190 CS		450		24	160/480	124,4	10	112,4					14	311,8
XXL 220 CS		490		27	160/520	140,3	10	121,0					18	400,9
XXL 250 CS		530		30	160/560	156,0	10	126,6					18	400,9
XXL 280 CS		570		30	160/600	171,5	10	126,5					18	400,9
XXL 300 CS		610		33	160/640	186,9	10	126,5					18	400,9

[1] Minimum cross-section [2] k_{mod} = 0,8; γ_M = 1,3 [3] replaced DIN 7991

The values are rated values in kN of the connection to the reinforced concrete quality C 20/25 observing the minimum distance and minimum component thickness. The rating was carried out using Fischer Fixperience 2.7.266.9/C-FIX 1.121.0.0/ database version 2023.12.14.12.55 - the files are available for download from our website.

The specified load values in concrete and on steel must be verified on-site in any case, as not all boundary conditions can be captured in advance. For the design on steel, assembly with through bolts and nuts was assumed. Connection to the timber cross-section must be considered and evaluated separately, depending on the timber quality

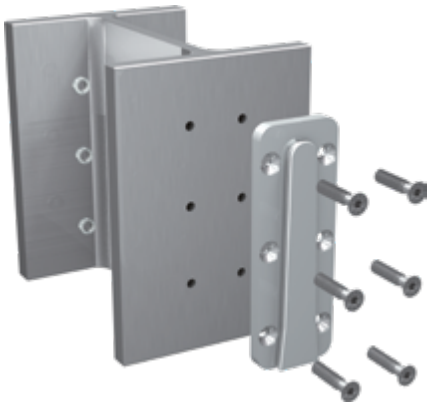
ASSEMBLY INSTRUCTION CS SERIES



CONNECTION TO REINFORCED CONCRETE

The bore holes must be vertical to the assembly level and sufficiently deep. The assembly instruction of the used fastener needs to be respected. The following through-holes or counterbores for concrete screws or metal splay dowels were provided as follows:

M.....	7,9 / 15,4 mm	e.g. Fischer FBS II 6 x 60/5 SK
L.....	11,0 / 21,0 mm	e.g. Fischer FBS II 8 x 80/30/15 SK
XL.....	11,0 / 21,0 mm	e.g. Fischer FBS II 8 x 80/30/15 SK
XL.....	14,0 / 26,0 mm	e.g. Fischer FH II 12/15 SK
XL.....	14,0 / 26,0 mm	e.g. Fischer FBS II 10 x 80/25/15 SK
XXL.....	11,0 / 21,0 mm	e.g. Fischer FBS II 8 x 80/30/15 SK



CONNECTION TO STEEL

The boreholes need to be created according to the state-of-the-art in steel constructions. With regards to the connection to elements in steel it needs to be made sure that there is sufficient space for the positioning of screw-nuts. The following steel bolts can be used:

M.....	7,9 / 15,4 mm	DINEN ISO 10642	M 6
L.....	11,0 / 21,0 mm	DINEN ISO 10642	M 10
XL.....	11,0 / 21,0 mm	DINEN ISO 10642	M 10
XXL.....	11,0 / 21,0 mm	DINEN ISO 10642	M 10

The basic principle is that pin-shaped connecting elements can be freely chosen for connections with the system connectors of the CS series. The verification of, for example, metal dowels, concrete screws, or structural steel screws must be carried out by the planner or user. The load-bearing capacity of the wood-side connector part can be optimized similarly to the wood-wood connection, for example, by increasing the screw length. For special applications, the CS series is also available as a DUO variant upon request.

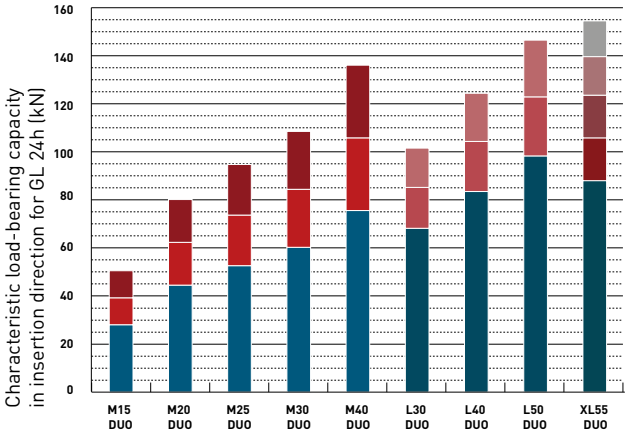
VARIABILITY IN SCREW LENGTH AND WOOD DENSITY

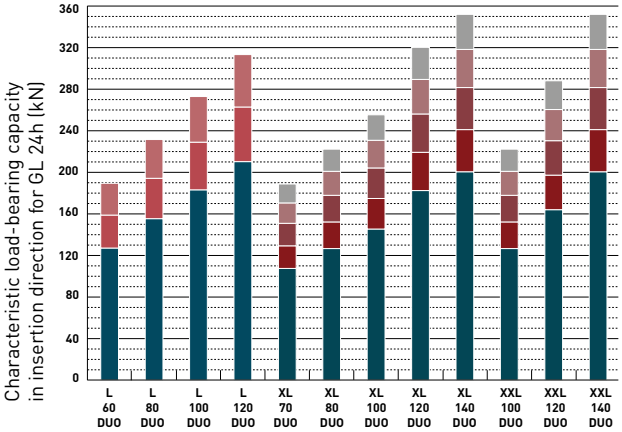
INCREASED LOAD CAPACITY VALUES OF THE CONNECTORS.

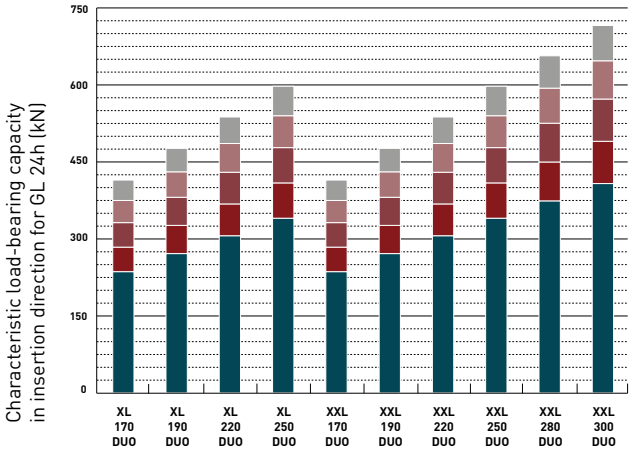
Table for conversion based on GL24h.	k_{dens} density correction factor		
	R_1 und R_2	R_{45}	R_{tor}
C24	0,806	0,953	0,829
C30	0,861	0,993	0,864
GL24c	0,958	0,974	0,974
GL24h	**1,000**	**1,000**	**1,000**
GL28c	1,010	1,006	1,006
GL28h	1,082	1,051	1,051

Notes: Absolute values of ETA-12/0067 must not be increased or maximum values exceeded ($R_{1,k,max}$, $R_{2,d,max}$ and $R_{3,k}$)

VARIABLE SCREW LENGTH FOR SHERPA SERIES M, L, XL, AND XXL DUO







M-Series

Ø 6,5 [mm]	Length [mm]	n_s
	105	1,80
	85	1,40
	65 *	**1,00**

L-Series

Ø 8,0 [mm]	Length [mm]	n_s
	140	1,49
	120	1,25
	100 *	**1,00**

XL / XXL-Series

Ø 8,0 [mm]	Length [mm]	n_s
	200	1,250
	180	1,130
	160 *	**1,000**
	140	0,856
	120	0,712

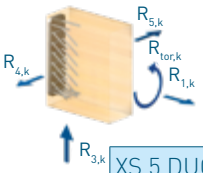
* standard screw length

The load-bearing capacity based on the used screw length is calculated as follows:

$$R_{k;s} = n_s \cdot R_k$$

R_k..... Characteristic load-bearing capacity value for standard screw length
$R_{k;s}$..... Characteristic value for carrying capacity for the screw length used

CHARACTERISTIC LOAD CAPACITY OF SHERPA SERIES XS - XXL DUO



	Dimensions			Screws	min. cross-section [1]		charact. load capacity values at GL 24h [2]					Screws
	mm						kN				kNmm	kN
	W	H	T	4,5 x 50	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XS 5 DUO	60	50	12	24	50/80	80/80	7,5	11,8	7,02	6,7	124	18,3
XS 10 DUO		70		36	50/100	80/100	13,1	22,2		10,5	245	34,1
XS 15 DUO		90		42	50/120	80/120	15,9	27,1		12,4	369	41,6
XS 20 DUO		110		50	50/140	80/140	21,5	36,8		14,3	516	56,4
	W	H	T	4,5 x 50	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
S 5 DUO	80	50	12	24	50/80	100/80	7,5	11,8	10,6	6,7	138	18,3
S 10 DUO		70		36	50/100	100/100	13,1	22,2		10,5	268	34,1
S 15 DUO		90		42	50/120	100/120	15,9	27,1		12,4	392	41,6
S 20 DUO		110		50	50/140	100/140	21,5	36,8		14,3	541	56,4
	W	H	T	6,5 x 65 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
M 15 DUO	120	90	14	32	65/120	140/120	16,8	28,0	16,7	17,0	568	44,0
M 20 DUO		110		40	65/140	140/140	26,1	44,5		20,1	795	69,6
M 25 DUO		130		46	65/160	140/160	30,8	52,6		23,5	1 059	82,1
M 30 DUO		150		52	65/180	140/180	34,5	60,2		26,8	1 366	94,3
M 40 DUO		170		60	65/200	140/200	42,9	75,5		30,0	1 705	118,2
	W	H	T	8,0 x 100 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
L 30 DUO	160	150	18	30	100/180	180/180	39,2	68,1	32,7	30,8	1 624	129,3
L 40 DUO		170		36	100/200	180/200	47,6	83,4		36,7	2 173	158,1
L 50 DUO		210		42	100/240	180/240	56,0	98,2		42,8	3 077	186,0
L 60 DUO		250		50	100/280	180/280	72,8	127,1		48,7	4 132	241,1
L 80 DUO		290		58	100/320	180/320	88,6	155,4		54,5	5 322	294,8
L 100 DUO		330		66	100/360	180/360	104,5	183,2		60,6	6 660	347,3
L 120 DUO		370		74	100/400	180/400	112,0	210,3		66,5	8 147	399,0
	W	H	T	8,0 x 160 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XL 55 DUO	240	250	20	36	160/280	260/280	112,0 [4]	123,4	75,8	55,6	5 382	121,3
XL 70 DUO		290		42	160/320	260/320	112,0	151,0		64,4	7 167	148,4
XL 80 DUO		330		48	160/360	260/360	112,0	177,9		73,2	9 181	174,7
XL 100 DUO		370		50	160/400	260/400	112,0	204,3		73,2	9 964	200,8
XL 120 DUO		410		58	160/440	260/440	112,0	256,1		82,2	12 101	251,7
XL 140 DUO		450		64	160/480	260/480	112,0	281,6		91,0	14 436	276,7
XL 170 DUO		490		72	160/520	260/520	112,0	331,9		99,8	17 007	326,0
XL 190 DUO		530		80	160/560	260/560	112,0	381,2		108,9	19 822	374,5
XL 220 DUO		570		88	160/600	260/600	112,0	430,1		117,5	22 877	422,5
XL 250 DUO		610		96	160/640	260/640	112,0	478,0		126,7	26 174	469,7
	W	H	T	8,0 x 160 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$	$R_{3,k,max}$	$R_{45,k}$	$R_{tor,k}$	$R_{2,d,max}$
XXL 100 DUO	280	290	20	44	160/320	300/320	112,0	177,9	75,8	64,2	7 233	174,7
XXL 120 DUO		330		54	160/360	300/360	112,0	230,4		77,6	9 355	226,4
XXL 140 DUO		370		64	160/400	300/400	112,0	281,6		90,8	11 956	276,7
XXL 170 DUO		410		74	160/440	300/440	112,0	331,9		104,5	14 849	326,0
XXL 190 DUO		450		84	160/480	300/480	112,0	381,2		117,7	18 165	374,5
XXL 220 DUO		490		94	160/520	300/520	112,0	430,1		131,1	21 775	422,5
XXL 250 DUO		530		104	160/560	300/560	112,0	478,00		144,3	25 817	469,7
XXL 280 DUO		570		108	160/600	300/600	112,0	525,5		144,3	28 140	516,3
XXL 300 DUO		610		118	160/640	300/640	112,0	572,7		157,7	32 656	562,6

[1] Minimum timber cross-sections apply to the standard screw length when the upper edge of the main and secondary beams is mounted flush. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the wood quality and the length of the screws used.
[3] Alternative screw lengths: Series M: 6.5 x 85, 6.5 x 105, Series L: 8 x 120,8 x 140, Series XL/XXL: 8 x 120,8 x 140, 8 x 180,8 x 200
[4] The characteristic load-bearing capacity $R_{1,k}$ must be taken from or calculated according to the valid ETA for all wood densities < 385 kg/m³. / XL 55 with GL 24h is $R_{1,k}$ = 83,1 kN

R30 AND R60 – CHARACTERISTIC LOAD CAPACITY AND MINIMUM CROSS-SECTIONS M - XXL DUO

	Load capacity values at GL 24h in kN [2]				Minimum cross-sections for R30 in mm [1] [3]				Minimum cross-sections for R60 in mm [1] [3]			
	η = 0,44		η = 0,33		η = 0,44		η = 0,33		η = 0,44		η = 0,33	
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
M 15 DUO	7,4	12,9	5,5	9,7	95/150	180/150	85/140	160/140	115/170	240/170	105/160	220/160
M 20 DUO	11,5	20,5	8,6	15,4	95/170	180/170	85/160	160/160	115/190	240/190	105/180	220/180
M 25 DUO	13,5	24,3	10,2	18,2	95/180	180/180	85/170	160/170	115/200	240/200	105/190	220/190
M 30 DUO	15,2	27,8	11,4	20,9	95/200	180/200	85/190	160/190	115/220	240/220	105/210	220/210
M 40 DUO	18,9	34,9	14,2	26,2	95/220	180/220	85/210	160/210	115/240	240/240	105/230	220/230
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
L 30 DUO	17,2	31,5	12,9	23,6	130/210	200/210	120/200	200/200	150/230	260/230	140/220	240/220
L 40 DUO	20,9	38,5	15,7	28,9	130/230	200/230	120/220	200/220	150/250	260/250	140/240	240/240
L 50 DUO	24,6	45,4	18,5	34,0	130/260	200/260	120/250	200/250	150/280	260/280	140/270	240/270
L 60 DUO	32,0	58,7	24,0	44,1	130/300	200/300	120/290	200/290	150/320	260/320	140/310	240/310
L 80 DUO	39,0	71,8	29,3	53,8	130/340	200/340	120/330	200/330	150/360	260/360	140/350	240/350
L 100 DUO	46,0	84,6	34,5	63,5	130/380	200/380	120/370	200/370	150/400	260/400	140/390	240/390
L 120 DUO	49,3	97,2	36,9	72,9	130/420	200/420	120/410	200/410	150/440	260/440	140/430	240/430
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XL 55 DUO	38,4	57,0	28,8	42,8	180/300	280/300	180/300	270/300	200/320	340/320	200/320	320/320
XL 70 DUO	49,3	69,8	36,9	52,3	180/340	280/340	180/340	270/340	200/360	340/360	200/360	320/360
XL 80 DUO	49,3	82,2	36,9	61,6	180/370	280/370	180/370	270/370	200/390	340/390	200/390	320/390
XL 100 DUO	49,3	94,4	36,9	70,8	180/410	280/410	180/410	270/410	200/430	340/430	200/430	320/430
XL 120 DUO	49,3	118,3	36,9	88,8	180/450	280/450	180/450	270/450	200/470	340/470	200/470	320/470
XL 140 DUO	49,3	130,1	36,9	97,6	180/490	280/490	180/490	270/490	200/510	340/510	200/510	320/510
XL 170 DUO	49,3	153,3	36,9	115,0	180/530	280/530	180/530	270/530	200/550	340/550	200/550	320/550
XL 190 DUO	49,3	176,1	36,9	132,1	180/570	280/570	180/570	270/570	200/590	340/590	200/590	320/590
XL 220 DUO	49,3	198,7	36,9	149,0	180/610	280/610	180/610	270/610	200/630	340/630	200/630	320/630
XL 250 DUO	49,3	220,8	36,9	165,6	180/650	280/650	180/650	270/650	200/670	340/670	200/670	320/670
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XXL 100 DUO	49,3	82,2	36,9	61,6	180/340	320/340	180/340	310/340	200/360	380/360	200/360	360/360
XXL 120 DUO	49,3	106,5	36,9	79,8	180/380	320/380	180/380	310/380	200/400	380/400	200/400	360/400
XXL 140 DUO	49,3	130,1	36,9	97,6	180/420	320/420	180/420	310/420	200/440	380/440	200/440	360/440
XXL 170 DUO	49,3	153,3	36,9	115,0	180/450	320/450	180/450	310/450	200/470	380/470	200/470	360/470
XXL 190 DUO	49,3	176,1	36,9	132,1	180/490	320/490	180/490	310/490	200/510	380/510	200/510	360/510
XXL 220 DUO	49,3	198,7	36,9	149,0	180/530	320/530	180/530	310/530	200/550	380/550	200/550	360/550
XXL 250 DUO	49,3	220,8	36,9	165,6	180/570	320/570	180/570	310/570	200/590	380/590	200/590	360/590
XXL 280 DUO	49,3	242,8	36,9	182,1	180/610	320/610	180/610	310/610	200/630	380/630	200/630	360/630
XXL 300 DUO	49,3	264,6	36,9	198,5	180/650	320/650	180/650	310/650	200/670	380/670	200/670	360/670

[1] Minimum timber cross-sections apply to the standard screw length when the top edge of the main and secondary beams are flush-mounted. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the timber quality and the length of the screws used.
[3] The reduction of +a3 by 10 mm, possible for torsionally rigid connections except for M15, M20, L30, L40, XL55, XL70, XXL100, XXL 120, and XXL140, is taken into account.
[4] For $R_{1,d,fi}$ these are maximum values that CANNOT be increased by using different wood densities or longer system screws.

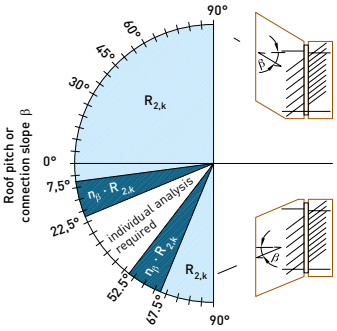
R90 AND R120 – CHARACTERISTIC LOAD CAPACITY AND MINIMUM CROSS-SECTIONS M - XXL DUO

	Load capacity values at GL 24h in kN [2]				Minimum cross-sections for R90 in mm [1] [3]				Minimum cross-sections for R120 in mm [1] [3]			
	η = 0,44		η = 0,33		η = 0,44		η = 0,33		η = 0,44		η = 0,33	
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$ [5]	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$ [5]	MB	SB	MB	SB	MB	SB	MB	SB
M 15 DUO	7,4	12,9	5,5	9,7	190/260	280/260	180/250	260/250	210/280	340/280	210/280	300/280
M 20 DUO	11,5	20,5	8,6	15,4	190/280	280/280	180/270	260/270	210/300	340/300	210/300	300/300
M 25 DUO	13,5	24,3	10,2	18,2	190/290	280/290	180/280	260/280	210/310	340/310	210/310	300/310
M 30 DUO	15,2	27,8	11,4	20,9	190/310	280/310	180/300	260/300	210/330	340/330	210/330	300/330
M 40 DUO	18,9	34,9	14,2	26,2	190/330	280/330	180/320	260/320	210/350	340/350	210/350	300/350
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
L 30 DUO	17,2	31,5	12,9	23,6	180/260	300/260	170/250	280/250	190/270	360/270	180/260	340/260
L 40 DUO	20,9	38,5	15,7	28,9	180/280	300/280	170/270	280/270	190/290	360/290	180/280	340/280
L 50 DUO	24,6	45,4	18,5	34,0	180/310	300/310	170/300	280/300	190/320	360/320	180/310	340/310
L 60 DUO	32,0	58,7	24,0	44,1	180/350	300/350	170/340	280/340	190/360	360/360	180/350	340/350
L 80 DUO	39,0	71,8	29,3	53,8	180/390	300/390	170/380	280/380	190/400	360/400	180/390	340/390
L 100 DUO	46,0	84,6	34,5	63,5	180/430	300/430	170/420	280/420	190/440	360/440	180/430	340/430
L 120 DUO	49,3	97,2	36,9	72,9	180/470	300/470	170/460	280/460	190/480	360/480	180/470	340/470
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XL 55 DUO	38,4	57,0	28,8	42,8	230/350	380/350	220/340	360/340	260/380	420/380	250/370	400/370
XL 70 DUO	49,3	69,8	36,9	52,3	230/390	380/390	220/380	360/380	260/420	420/420	250/410	400/410
XL 80 DUO	49,3	82,2	36,9	61,6	230/420	380/420	220/410	360/410	260/450	420/450	250/440	400/440
XL 100 DUO	49,3	94,4	36,9	70,8	230/460	380/460	220/450	360/450	260/490	420/490	250/480	400/480
XL 120 DUO	49,3	118,3	36,9	88,8	230/500	380/500	220/490	360/490	260/530	420/530	250/520	400/520
XL 140 DUO	49,3	130,1	36,9	97,6	230/540	380/540	220/530	360/530	260/570	420/570	250/560	400/560
XL 170 DUO	49,3	153,3	36,9	115,0	230/580	380/580	220/570	360/570	260/610	420/610	250/600	400/600
XL 190 DUO	49,3	176,1	36,9	132,1	230/620	380/620	220/610	360/610	260/650	420/650	250/640	400/640
XL 220 DUO	49,3	198,7	36,9	149,0	230/660	380/660	220/650	360/650	260/690	420/690	250/680	400/680
XL 250 DUO	49,3	220,8	36,9	165,6	230/700	380/700	220/690	360/690	260/730	420/730	250/720	400/720
	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	$R_{1,d,fi}$ [4]	$R_{2,d,fi}$	MB	SB	MB	SB	MB	SB	MB	SB
XXL 100 DUO	49,3	82,2	36,9	61,6	220/380	420/380	220/380	400/380	250/410	460/410	250/410	440/410
XXL 120 DUO	49,3	106,5	36,9	79,8	220/420	420/420	220/420	400/420	250/450	460/450	250/450	440/450
XXL 140 DUO	49,3	130,1	36,9	97,6	220/460	420/460	220/460	400/460	250/490	460/490	250/490	440/490
XXL 170 DUO	49,3	153,3	36,9	115,0	220/490	420/490	220/490	400/490	250/520	460/520	250/520	440/520
XXL 190 DUO	49,3	176,1	36,9	132,1	220/530	420/530	220/530	400/530	250/560	460/560	250/560	440/560
XXL 220 DUO	49,3	198,7	36,9	149,0	220/570	420/570	220/570	400/570	250/600	460/600	250/600	440/600
XXL 250 DUO	49,3	220,8	36,9	165,6	220/610	420/610	220/610	400/610	250/640	460/640	250/640	440/640
XXL 280 DUO	49,3	242,8	36,9	182,1	220/650	420/650	220/650	400/650	250/680	460/680	250/680	440/680
XXL 300 DUO	49,3	264,6	36,9	198,5	220/690	420/690	220/690	400/690	250/720	460/720	250/720	440/720

[1] Minimum timber cross-sections apply to the standard screw length when the top edge of the main and secondary beams are flush-mounted. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the timber quality and the length of the screws used.
[3] The reduction of +a3 by 10 mm, possible for torsionally rigid connections except for M15, M20, L30, L40, XL55, XL70, XXL100, XXL 120, and XXL140, is taken into account.
[4] For $R_{1,d,fi}$ these are maximum values that CANNOT be increased by using different wood densities or longer system screws.
[5] The minimum screw length for R90 and R120 is according to ETA 100 mm. Therefore, only the system screw 6.5 x 105 mm can be used for the M series.

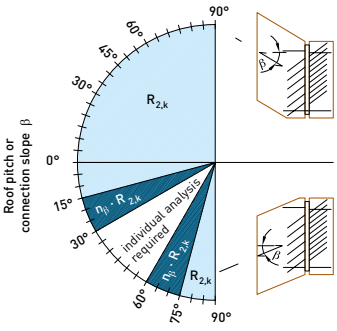
CHARACTERISTIC LOAD CAPACITY $R_{2,K}$ AT RIDGE CONNECTION FOR XS - XXL DUO

Roof pitch β	**0° ≤ β ≤ 7,5°** **67,5° ≤ β ≤ 90°**	**10°** **65°**	**12,5°** **62,5°**	**15°** **60°**	**17,5°** **57,5°**	**20°** **55°**	**22,5°** **52,5°**	**22,5° < β < 52,5°**
n_β	**1,0**	**$0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°}$**						**individual analysis required**
	$n_\beta \cdot R_{2,k}$ in kN at GL 24h and standard screw length							
XS5 / S5 DUO	11,8	11,1	10,4	9,7	9,1	8,4	7,7	
XS10 / S10 DUO	22,2	20,9	19,6	18,3	17,0	15,7	14,5	
XS15 / S15 DUO	27,1	25,5	23,9	22,4	20,8	19,2	17,6	
XS20 / XS20 DUO	36,8	34,7	32,5	30,4	28,2	26,1	23,9	
M 15 DUO	28,0	26,4	24,8	23,1	21,5	19,9	18,2	
M 20 DUO	44,5	41,9	39,3	36,7	34,1	31,5	28,9	
M 25 DUO	52,6	49,5	46,4	43,4	40,3	37,2	34,2	
M 30 DUO	60,2	56,7	53,2	49,7	46,2	42,7	39,1	
M 40 DUO	75,5	71,1	66,7	62,3	57,9	53,5	49,1	
L 30 DUO	68,1	64,1	60,1	56,2	52,2	48,2	44,3	
L 40 DUO	83,4	78,5	73,6	68,8	63,9	59,1	54,2	
L 50 DUO	98,2	92,5	86,7	81,0	75,3	69,6	63,8	
L 60 DUO	127,1	119,7	112,3	104,9	97,5	90,1	82,6	
L 80 DUO	155,4	146,3	137,3	128,2	119,1	110,1	101,0	
L 100 DUO	183,2	172,5	161,8	151,1	140,5	129,8	119,1	
L 120 DUO	210,3	198,0	185,8	173,5	161,2	149,0	136,7	



$$n_\beta = \begin{cases} 1 & \text{for } 22{,}5° \leq \lvert \alpha_{sherpa} - \beta \rvert \\ 0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°} & \text{for } 7{,}5° \leq \lvert \alpha_{sherpa} - \beta \rvert < 22{,}5° \\ \text{individual analysis required} & \text{for } \lvert \alpha_{sherpa} - \beta \rvert < 7{,}5° \end{cases}$$

Roof pitch β	**0° ≤ β ≤ 15°** **75° ≤ β ≤ 90°**	**17,5°** **72,5°**	**20°** **70°**	**22,5°** **67,5°**	**25°** **65°**	**27,5°** **62,5°**	**30°** **60°**	**30° < β < 60°**
n_β	**1,0**	**$0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°}$**						**individual analysis required**
	$n_\beta \cdot R_{2,k}$ in kN at GL 24h and standard screw length							
XL 55 DUO	123,4	116,2	109,0	101,8	94,6	87,4	80,2	
XL 70 DUO	151,0	142,2	133,4	124,6	115,8	107,0	98,2	
XL 80 DUO	177,9	167,5	157,1	146,7	136,4	126,0	115,6	
XL 100 DUO	204,3	192,4	180,4	168,5	156,6	144,7	132,8	
XL 120 DUO	256,1	241,2	226,3	211,3	196,4	181,4	166,5	
XL 140 DUO	281,6	265,2	248,8	232,3	215,9	199,5	183,1	
XL 170 DUO	331,9	312,5	293,2	273,8	254,4	235,1	215,7	
XL 190 DUO	381,2	359,0	336,7	314,5	292,3	270,0	247,8	
XL 220 DUO	430,1	405,0	379,9	354,8	329,7	304,6	279,6	
XL 250 DUO	478,0	450,1	422,3	394,4	366,5	338,6	310,7	
XXL 100 DUO	177,9	167,5	157,1	146,7	136,4	126,0	115,6	
XXL 120 DUO	230,4	217,0	203,6	190,1	176,7	163,2	149,8	
XXL 140 DUO	281,6	265,2	248,8	232,3	215,9	199,5	183,1	
XXL 170 DUO	331,9	312,5	293,2	273,8	254,4	235,1	215,7	
XXL 190 DUO	381,2	359,0	336,7	314,5	292,3	270,0	247,8	
XXL 220 DUO	430,1	405,0	379,9	354,8	329,7	304,6	279,6	
XXL 250 DUO	478,0	450,1	422,3	394,4	366,5	338,6	310,7	
XXL 280 DUO	525,5	494,8	464,2	433,5	402,9	372,2	341,6	
XXL 300 DUO	572,7	539,3	505,9	472,5	439,1	405,7	372,3	



$$n_\beta = \begin{cases} 1 & \text{for } 30° \leq \lvert \alpha_{sherpa} - \beta \rvert \\ 0{,}3 + 0{,}7 \cdot \frac{\lvert \alpha_{Sherpa} - \beta \rvert}{30°} & \text{for } 15° \leq \lvert \alpha_{sherpa} - \beta \rvert < 30° \\ \text{individual analysis required} & \text{for } \lvert \alpha_{sherpa} - \beta \rvert < 15° \end{cases}$$

β ..... the roof pitch
α_{Sherpa} ..... the angle of the oblique screws
XS-L 37,5°
XL-XXL 45,0°

n_β ..... based on k_{ax} according to Schmid ETA-12/0373 or public publication by Brandner, Ringhofer, and Scheibenreiter (IHF 2019)

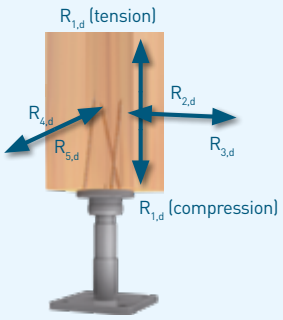
CHARACTERISTIC LOAD CAPACITY OF SHERPA SERIES M - XXL DUO IN CONSTRUCTION BEECH

	Geometry			Screws	min. cross-section [1]		Load capacity at 730 kg/m³ [2]					
	mm						kN					kNmm
	W	H	T	6,5 x 65 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
M 15 DUO	120	90	14	32	65/120	140/120	16,8	78,8	44,0	16,7	23,4	783
M 20 DUO		110		40	65/140	140/140	26,1	125,0	69,6		27,7	1 095
M 25 DUO		130		46	65/160	140/160	30,8	147,8	82,1		32,4	1 459
M 30 DUO		150		52	65/180	140/180	34,5	169,3	94,3		37,0	1 880
M 40 DUO		170		60	65/200	140/200	42,9	212,3	118,2		41,3	2 348
	W	H	T	8,0 x 100 [3]	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
L 30 DUO	160	150	18	30	100/180	180/180	39,2	191,4	129,3	32,7	42,5	2 236
L 40 DUO		170		36	100/200	180/200	47,6	234,4	158,1		50,5	2 992
L 50 DUO		210		42	100/240	180/240	56,0	276,1	186,0		58,9	4 237
L 60 DUO		250		50	100/280	180/280	72,8	357,5	241,1		67,0	5 690
L 80 DUO		290		58	100/320	180/320	88,6	436,9	294,8		75,1	7 328
L 100 DUO		330		66	100/360	180/360	104,5	515,0	347,3		83,5	9 171
L 120 DUO		370		74	100/400	180/400	112,0	591,2	399,0		91,6	11 219
	W	H	T	8,0 x 120	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
XL 55 DUO	240	250	20	36	120/280	260/280	112,0	247,2	121,3	75,8	54,5	4 590
XL 70 DUO		290		42	120/320	260/320	112,0	302,4	148,4		63,2	6 112
XL 80 DUO		330		48	120/360	260/360	112,0	356,2	174,7		71,8	7 830
XL 100 DUO		370		50	120/400	260/400	112,0	409,0	200,8		71,8	9 772
XL 120 DUO		410		58	120/440	260/440	112,0	512,9	251,7		80,6	11 868
XL 140 DUO		450		64	120/480	260/480	112,0	563,9	276,7		89,3	14 158
XL 170 DUO		490		72	120/520	260/520	112,0	664,5	326,0		97,9	16 680
XL 190 DUO		530		80	120/560	260/560	112,0	763,3	374,5		106,8	19 441
XL 220 DUO		570		88	120/600	260/600	112,0	861,2	422,5		115,2	22 436
XL 250 DUO		610		96	120/640	260/640	112,0	957,2	469,7		124,3	25 670
	W	H	T	8,0 x 120	MB	SB	$R_{1,k,max}$ [4]	$R_{2,k}$ [5]	$R_{2,d,max}$ [6]	$R_{3,k,max}$	$R_{45,k}$ [7]	$R_{tor,k}$ [8]
XXL 100 DUO	280	290	20	44	120/320	300/320	112,0	356,2	174,7	75,8	63,0	7 093
XXL 120 DUO		330		54	120/360	300/360	112,0	461,4	226,4		76,1	9 175
XXL 140 DUO		370		64	120/400	300/400	112,0	563,9	276,7		89,1	11 726
XXL 170 DUO		410		74	120/440	300/440	112,0	664,5	326,0		102,4	14 563
XXL 190 DUO		450		84	120/480	300/480	112,0	763,3	374,5		115,4	17 815
XXL 220 DUO		490		94	120/520	300/520	112,0	861,2	422,5		128,6	21 356
XXL 250 DUO		530		104	120/560	300/560	112,0	957,2	469,7		141,5	25 320
XXL 280 DUO		570		108	120/600	300/600	112,0	1 052	516,3		141,5	27 597
XXL 300 DUO		610		118	120/640	300/640	112,0	1 147	562,6		154,7	32 027

[1] Minimum timber cross-sections apply to the standard screw length when the upper edge of the main and secondary beams are flush mounted. MB | Main beam SB | Secondary beam
[2] For structural design calculations, the characteristic values of the respective valid ETA must be considered. These depend on the wood quality and the length of the screws used. Example Pollmeier Construction Beech GL75 according to ETA-14/0354 with ρ_k = 730 kg/m³
[3] Alternative screw lengths: Series M: 6.5 x 85, Series L: 8 x 120
[4] The characteristic load-bearing capacity $R_{1,k}$ must be taken from or calculated based on the valid ETA for all wood densities < 385 kg/m³.
[5] $R_{2,k,730} = R_{2,k,C24} \cdot (730/350)^{1,7} \cdot n_s$
[6] $R_{2,d,max} = VF \cdot F_{tens,k} / \gamma_{M2} \cdot (\sin\alpha + 0,25 \cdot \cos\alpha) \cdot n_{SchrS}^{0,9} \cdot k_{sys}$ for HT with γ_{M2} = 1,25 and k_{sys} = 1,0
[7] $R_{45,k,730} = R_{45,k,C24} \cdot n_s \cdot k_{dens}$
[8] $R_{tor,k,730} = R_{tor,k,C24} \cdot n_s \cdot k_{dens}$

FEATURES FOR THE SHERPA POWER BASE

The below-specified load-bearing capacities are based on ETA-15/0540 as issued by the Austrian Institute of Building Technology on 26 February 2021. Dimensional specifications are provided in the assembly instructions. The specified values refer to service classes 1 and 2 according to EN 1995-1-1. The power base product is intended for use with low to medium corrosive load according to EN ISO 12944-2.



EXPLANATION OF THE DENOMINATION

PB – PB - Power Base

L – M - adjustment area 90 to 130 mm
L - adjustment area 150 to 200 mm
XL - adjustment area 200 to 300 mm

130 – e.g.: **130** = max. rated value of load-bearing capacity kN

C – C - "Cone" - divisible and adjustable under full load
F - "Flange" - adjustable under full load

EXAMPLE „PB L 130 C"

VARIANTS FOR EMBEDDING IN CONCRETE ALSO AVAILABLE

Power Base C Plus and Top

γ_M Wood = 1,30
γ_M Steel = 1,25

Rated values for carrying capability in kN with C24
All values apply up to the maximum permissible height in the adjustment range.

	$R_{1,d}$ Compression					$R_{1,d;160}$ Tension [3]		$R_{1,d;180}$ Tension [3]		$R_{23,d}$ and $R_{45,d}$				
k_{mod}	0,6	0,7	0,8	0,9	1,0	0,9	1,0	0,9	1,0	0,6	0,7	0,8	0,9	1,0
[1] M 125 F	70,2	81,8	93,5	105,2	116,9									
[1] L 125 F	70,2	81,8	93,5	105,2	116,9				**30,2**			**2,03**		
[1] XL 95 F	70,2	81,8	93,5	**95,0**	**95,0**									
[1] L 130 C	70,2	81,8	93,5	105,2	116,9	22,6	25,1	27,8		1,98	2,30	2,63	2,96	3,29
[2] L 140 C	85,4	99,6	113,8	128,1	**138,0**				30,9	2,43	2,83	3,24	3,64	4,05
[1] XL 120 C	70,2	81,8	93,5	105,2	116,9					0,99	1,16	1,32	1,49	1,65
[2] XL 140 C	85,4	99,6	113,8	128,1	**138,0**					2,43	2,83	3,24	3,64	4,05
ATTENTION: The specified values do not factor in a buckling of the column!								**Failure of steel elements**						

γ_M Wood = 1,30
γ_M Steel = 1,25

Rated values for carrying capability in kN with GL 24h
All values apply up to the maximum permissible height in the adjustment range.

	$R_{1,d}$ Compression					$R_{1,d;160}$ Tension [3]		$R_{1,d;180}$ Tension [3]		$R_{23,d}$ and $R_{45,d}$				
k_{mod}	0,6	0,7	0,8	0,9	1,0	0,9	1,0	0,9	1,0	0,6	0,7	0,8	0,9	1,0
[1] M 125 F	75,7	88,3	100,9	113,6	**125,0**									
[1] L 125 F	75,7	88,3	100,9	113,6	126,2			30,0	**30,2**			**2,03**		
[1] XL 95 F	75,7	88,3	**95,0**	**95,0**	**95,0**									
[1] L 130 C	75,7	88,3	100,9	113,6	126,2	24,4	27,1			2,13	2,49	2,84	3,20	3,55
[2] L 140 C	92,1	107,5	122,9	**138,0**	**138,0**			30,0	33,4	2,62	3,06	3,49	3,93	4,37
[1] XL 120 C	75,7	88,3	100,9	113,6	**120,0**					1,07	1,25	1,43	1,61	1,78
[2] XL 140 C	92,1	107,5	122,9	**138,0**	**138,0**					2,62	3,06	3,49	3,93	4,37
ATTENTION: The specified values do not factor in a buckling of the column!								**Failure of steel elements**						

L 130 C Plus see L 130 C if connection depth tube min. 160 mm
L 120 C Top see L 120 C if embedment depth threaded rod min. 160 mm
L 130 C Top see L 130 C if embedment depth threaded rod min. 160 mm

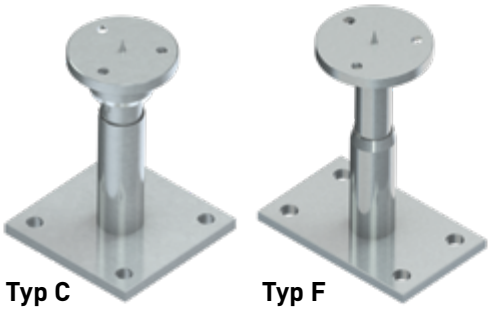
[1] Head plate Ø 96 mm, minimum cross-section of foundation 120/120/Ø 120 mm with screw length 160 mm, 140/140/Ø 140 mm with screw length 180 mm.

[2] Head plate Ø 106 mm, minimum cross-section of foundation 120/120/Ø 120 mm with screw length 160 mm, 140/140/Ø 140 mm with screw length 180 mm.

[3] Footnote 3: Tensile load permissible only for short and very short duration of load (γ_M = 1,25)

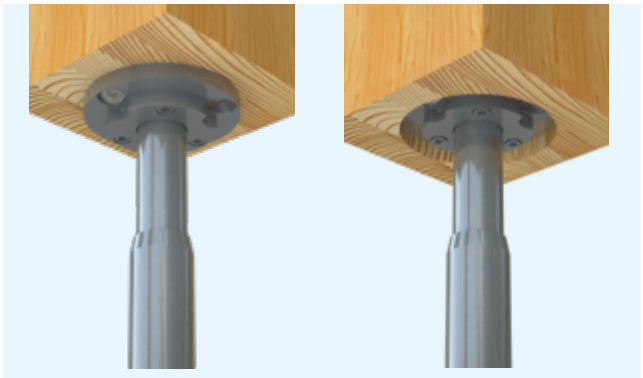
ASSEMBLY INSTRUCTIONS

The SHERPA Power Base C & F with a centre point and angular screw connection facilitates easy and precise assembly. The connection is suitable for supports made of solid wood and glued-laminated timber. The screws are placed such that they are invisible and weatherproof. Contrary to Power Base F, head plate of type C can be screwed off when mounted on pillar.



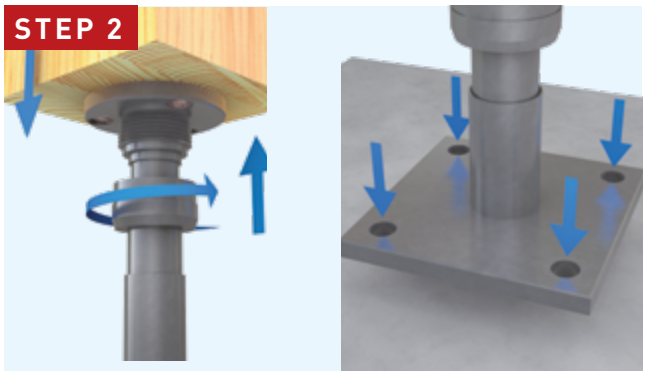
STEP 1

Power Base C - End plate visible / invisible
The end plate should be centered on the face and secured with three SHERPA special screws 8 x 160 or 8 x 180 mm at a 25° angle. Retracting the end plate into the support improves the protection of the structure of the wood (t= 12 mm / Ø 96 or Ø 106 mm).



Power Base F - End plate visible / invisible
The end plate should be centered on the face and secured with three SHERPA special screws 8 x 160 or 8 x 180 mm at a 25° angle. Retracting the end plate into the support improves the protection of the structure of the wood (t= 20 mm / Ø 96 mm).

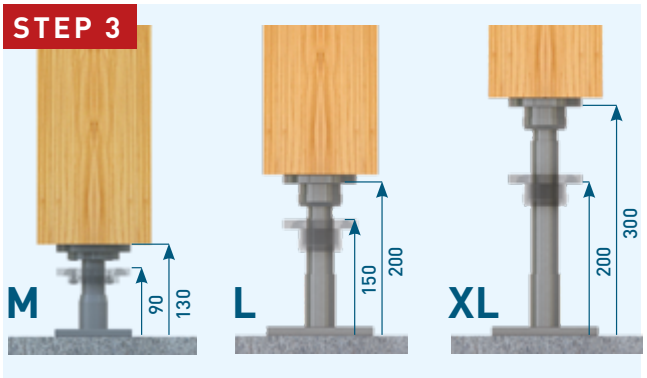
STEP 2



ASSEMBLY AND ANCHORING

The cone is used to place the end plate of the **Power Base C** accurately on the sub-structure. The joining of the two parts takes place with the coupling nut (open-end wrench 55 mm).
The connection between head plate and foundation of the **Power Base F** is carried out via a fl ange ring and three socket screws.
Disassembling is possible but not compulsory. The base plate is optionally secured with four expansion, adhesive, or screw anchors, through the Ø 15 mm holes.

STEP 3



INFINITELY VARIABLE HEIGHT SETTING

Manufacturing tolerances and settlings in the building can be adjusted even when under load.

Open-end wrench:
Power Base C ..... SW 32 resp. 36 mm
Power Base F ..... SW 26 mm

Possible height settings are:
M ..... 90 - 130 mm
L ..... 150 - 200 mm
XL ..... 200 - 300 mm

FEATURES FOR THE SHERPA EFCON

The main purpose of the SHERPA EFCON facade connector is to fix timber constructions to a load-bearing subbase such as exterior walls of new or existing buildings. It enables mounting and fixing of prefab facade elements in timber construction for building ecologically high-grade and energy efficient building envelopes.

The SHERPA EFCON facade connector consists of two components. This connector enables fixing and adjusting facade elements in a friction-type and precise manner. Horizontal and vertical wind forces, dead load and earthquake loads, if any, can be diverted to the substructure.

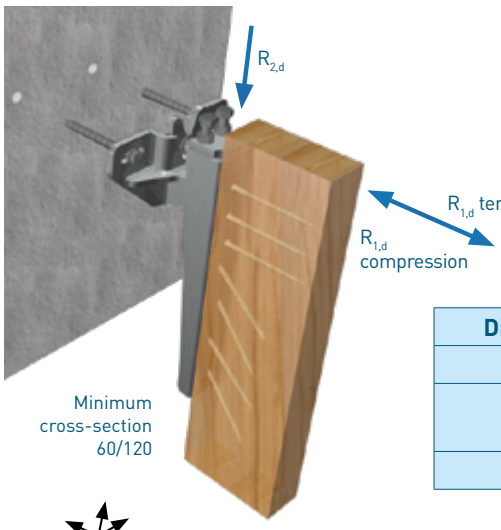
		Rated values for carrying capability in kN with C24[1) 2)]					
		$R_{1,d}$ compression	$R_{1,d}$ tension	$R_{2,d}$			
	k_{mod}	1,0	1,0	0,6	0,7	0,8	0,9
screw lengths	140	20,2	20,2	17,7	20,6	22,8	22,8
	160			20,6			
	180			22,8	22,8		
	200						
				Failure of steel elements			

[1)] γ_M= 1,3

[2)] The connection to the supporting structure must be proven separately. Evidence for combined stress is additionally necessary

		Rated values for carrying capability in kN with C24[2) 3)]					
		$R_{1,d}$ compression	$R_{1,d}$ tension	$R_{2,d}$			
	k_{mod}	1,0	1,0	0,6	0,7	0,8	0,9
screw lengths	140	24,5	20,2	21,0	22,8	22,8	22,8
	160			22,8			
	180						
	200						
				Failure of steel elements			

[3)] γ_M= 1,3



	EFCON component 1 for supporting structure
Dimensions (b/h/l)	210 / 135 / 95 mm
Drill holes	2x elongated hole 13,2 x 40 mm
Fasteners	2 pcs. expansion anchor or screw anchor bolts or injection anchor
Material	S235 JR-Fe/Zn12/C

	EFCON component 2 for facade element
Dimensions (b/h/l)	60 / 365 / 54 mm
Fasteners metal	1 pc. hexagon screw[4)] M12x1.5x70 8.8 as per MBN 10105 incl. nut with flange M12x1.5 as per MBN 13023
Height adjustment metal	2 pcs. hexagon screw[4)] M12 8.8 as per EN ISO 4017 incl. counter nut M12 as per EN ISO 4032
Fasteners wood	4 pcs. c 45° 7 pcs. special screws 8x 120/140/160/180

[4)] width across flat AF 18

ASSEMBLY INSTRUCTIONS

1 According to the substructure, component 1 is fixed with screw anchors, expansion anchors or injection anchors to the load-bearing exterior wall or ceiling. The „ears" of component 1 serve as guiding aid for positioning the flange head screw of component 2 when hanging it up

2 In the factory, component 2 on the facade element is fixed to the timber frame construction rack by means of threehorizontal and four 45° slanted, fully threated screws. The prefab facade elements are hung by connecting the two components.

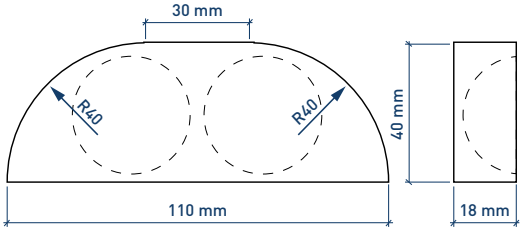
3 The vertical adjusting screws and horizontal flange head screw enable setting the right position in two directions. The oblang holes of component 1 enable positioning in the 3rd direction. Due to the more than 13 mm tolerance in the 3 directions, roughness and imperfections of the substructure could be compensated for.

FEATURES FOR THE SHERPA CLT CONNECTOR

The following load-bearing capacity values are based on the ETA-18/0083, issued by the Austrian Institute of Construction Technology on March 23, 2018. The SHERPA CLT connector is a coupling element for angle joints, t-joints and longitudinal joints, wall to ceiling connections, as well as ceiling joints. Optimised for three-layer and five-layer cross-laminated timber elements, the SHERPA CLT connector can be mounted flush in solid wood or glulam already in the preinstallation phase, enabling ready-for-installation delivery to the construction site. The CLT connector must be milled flush into cross laminated timber or glulam. The load capacity according to ETA can only be guaranteed when using SHERPA special screws

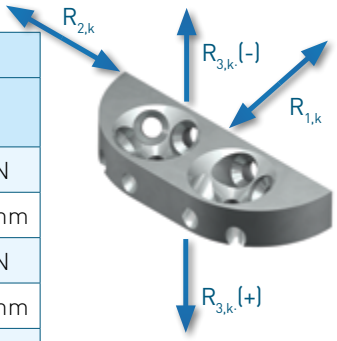
GEOMETRY

CLT-Connector	
Dimensions	18 x 40 x 110 mm
Connecting material	8 Stk. 8,0 x 100 / 120 / 140 mm 2 Stk. 6,5 x 65 mm



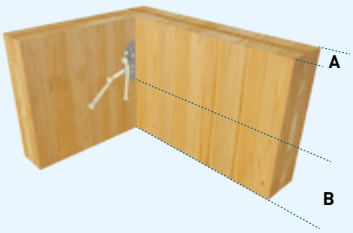
TECHNICAL DATA

Configuration			Characteristic value		
			Interlayer ≤ 12 mm	Compriband ≤ 2 mm	
Normal forces	Carrying capability	$R_{1,k}$	18,80 [1]		kN
	Stiffness	K_{ser}	9.750		N/mm
Shear force on the surface	Carrying capability	$R_{2,k}$	10,00 [1]		kN
	Stiffness	K_{ser}	3.300		N/mm
Shear force from the surface (positive)	Carrying capability	$R_{3,k}(+)$	16,00 [1]	16,50 [1]	kN
	Stiffness	K_{ser}	3.600		N/mm
Shear force from the surface (negative)	Carrying capability	$R_{3,k}(-)$	5,30	7,00	kN
	Stiffness	K_{ser}	870	1.000	N/mm

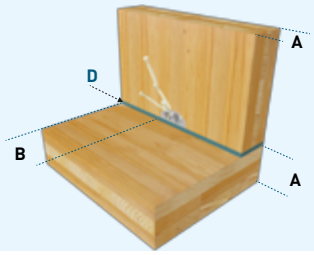


[1] Characteristic load capacities for screw length l = 100 mm. This can be multiplied by the screw length factor n_s = 1.22 for screw lengths l = 120 mm or n_s = 1.44 for screw lengths l = 140 mm.

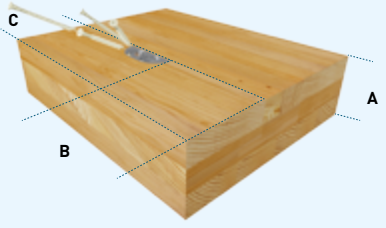
WALL - WALL



CEILING - WALL



CEILING - CEILING



A Minimum thickness 100/120/140 mm and maximum thickness 120/140/160 mm respectively from the connector top edge for screw lengths 100/120/140 mm; if necessary, countersink the connector deeper.
B edge distance: min. 80 mm
C min. 100 mm
D Interlayer (e.g. Regufoam): max. 12 mm | Compression hardness: min. 0,2 N/mm² | Static elasticity modulus: min. 1,0 N/mm²

INSTALLATION INSTRUCTIONS

Countersink connector 18 mm (flush) or deeper as required in solid timber or glulam.
Max. distance between the CLT connectors: e_{max} = 2 m
2 pcs. special screws 6.5 x 65
4 pcs. special screws 8.0 x 100 / 120 / 140 (fasten to solid wood / glulam)
4 pcs. special screws 8.0 x 100 / 120 / 140 (mount on the second element)

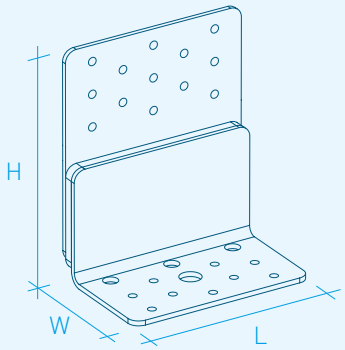
THE SILENT TIMBER CONNECTOR

SHERPA SONUS

ETA-24/0969

SHERPA stands for leading technology in standardised timber connector systems. The new SONUS sound insulation technology also lives up to this standard. As the first product of its kind, the bracket ("B" for "Bracket") revolutionises connection technology in timber construction when it comes to sound insulation.

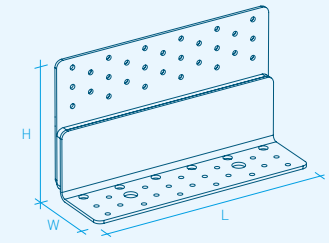
	Sonus M	Sonus L
Fastener	**Quantity (pcs.)**	**Quantity (pcs.)**
Shanked nails 4 x 60 mm	22	48
Shanked nails 4 x 60 mm & Special screws 8 x 120 mm	22 3	48 6
Fittings screws 5 x 50 mm	22	48
Fittings screws 5 x 50 mm & Special screws 8 x 120 mm	22 3	48 6



SONUS M 990 B

115 x 75 x 140 mm (L x W x H)
Art.-Nr. 10000037415

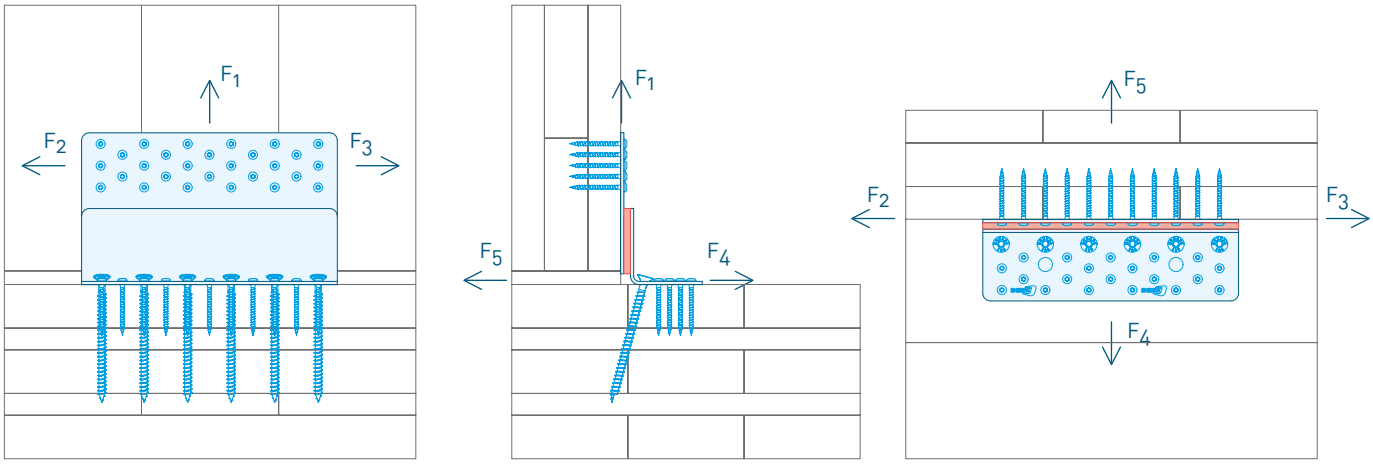
	F_1		$F_{2/3}$		F_4		F_5	
	$R_{1,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{2/3,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{4,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{5,k}$ [kN]	$K_{ser,mean}$ [kN/mm]
Shanked nails 4 x 60 mm	5,80	1,34	7,55	0,92	10,5	2,79	1,25	-
Shanked nails 4 x 60 mm & Special screws 8 x 120 mm	17,8	2,45	10,6	1,42	14,8	2,40	2,34	-
Fittings screws 5 x 50 mm	7,73	1,38	7,55	0,92	10,5	2,79	2,33	0,24
Fittings screws 5 x 50 mm & Special screws 8 x 120 mm	17,9	2,43	10,6	1,42	14,8	2,40	4,38	0,33

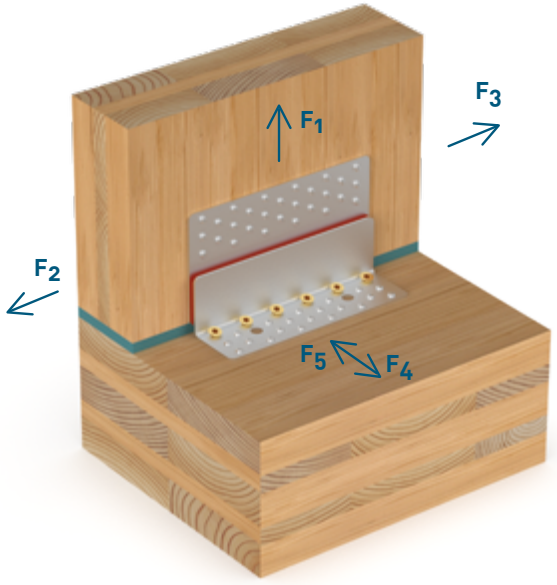


SONUS L 990 B

235 x 75 x 140 mm (L x W x H)
Art.-Nr. 10000037416

	F_1		$F_{2/3}$		F_4		F_5	
Verbindungmittel	$R_{1,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{2/3,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{4,k}$ [kN]	$K_{ser,mean}$ [kN/mm]	$R_{5,k}$ [kN]	$K_{ser,mean}$ [kN/mm]
Shanked nails 4 x 60 mm	11,8	2,47	27,3	3,14	20,6	5,22	2,84	-
Shanked nails 4 x 60 mm & Special screws 8 x 120 mm	34,9	4,57	32,4	4,00	29,7	4,79	4,70	-
Fittings screws 5 x 50 mm	16,7	2,78	27,3	3,14	20,6	5,22	5,32	0,50
Fittings screws 5 x 50 mm & Special screws 8 x 120 mm	36,6	4,83	33,9	4,69	29,7	4,79	8,79	0,61





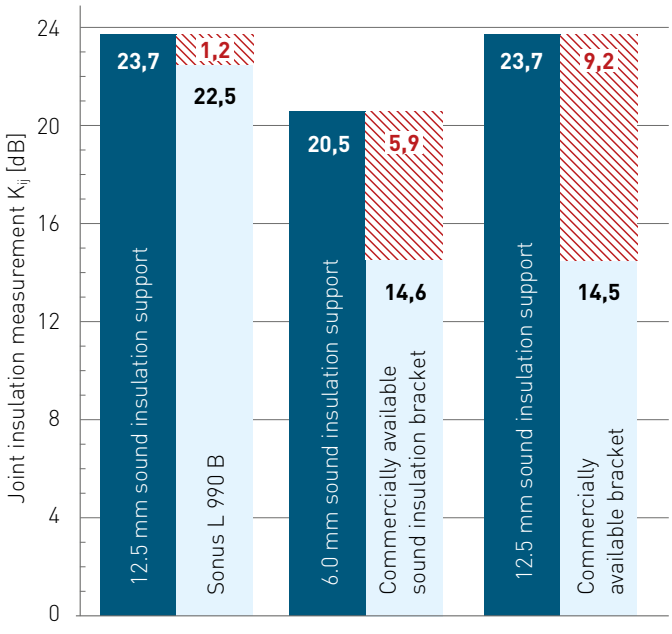
BENEFITS

- Optimum sound insulation
- High load capacity
- Tested system
- Easy assembly
- Top sound decoupling

PERFORMANCE COMPARISON

L-joint in CLT wall (100 mm) and CLT ceiling (140 mm) with sound insulation support tested in 1:1 format and with load application of 0.18 N/mm².

Joint insulation measurement K_{ij} tested in each case with and without elbow connector with comparable load capacity $R_{2/3,k}$ (kN/running metre).

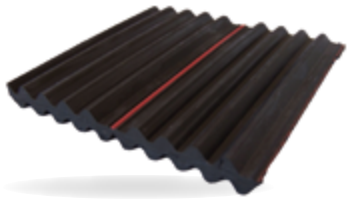


With sound insulation support only

With sound insulation support and elbow connector

Joint insulation measurement modified by elbow connector (ΔK_{ij})

BI-TRAPEZ BEARING



bi-trapezoidal bearings insulate structure-borne sound and vibrations to a major extent. They are made of quality-monitored elastomer on the basis of the synthetic rubber ethylene-propylene-dien-mixed polymer (EPDM).

ADVANTAGES:

- Simple processing
- Allows the absorption of high loads
- Parabolic load distribution
- Static range of application (optimum) from 2.5 to 15 N/mm²
- High vibration and structure-borne sound insulating values

Dimensioning for bearing class 2 in accordance with DIN 4141 Part 3				
Bearing thickness t	5 mm	10 mm	15 mm	20 mm
Permissible mean compressive stress perm. σm [N/mm²]	15	10	7	5
Existing bearing spring deflection at perm. σ exist. Δt [mm]	2,2	4,5	7	9,5
Permissible horizontal shear strain perm. u [mm]	2	4	5,5	8

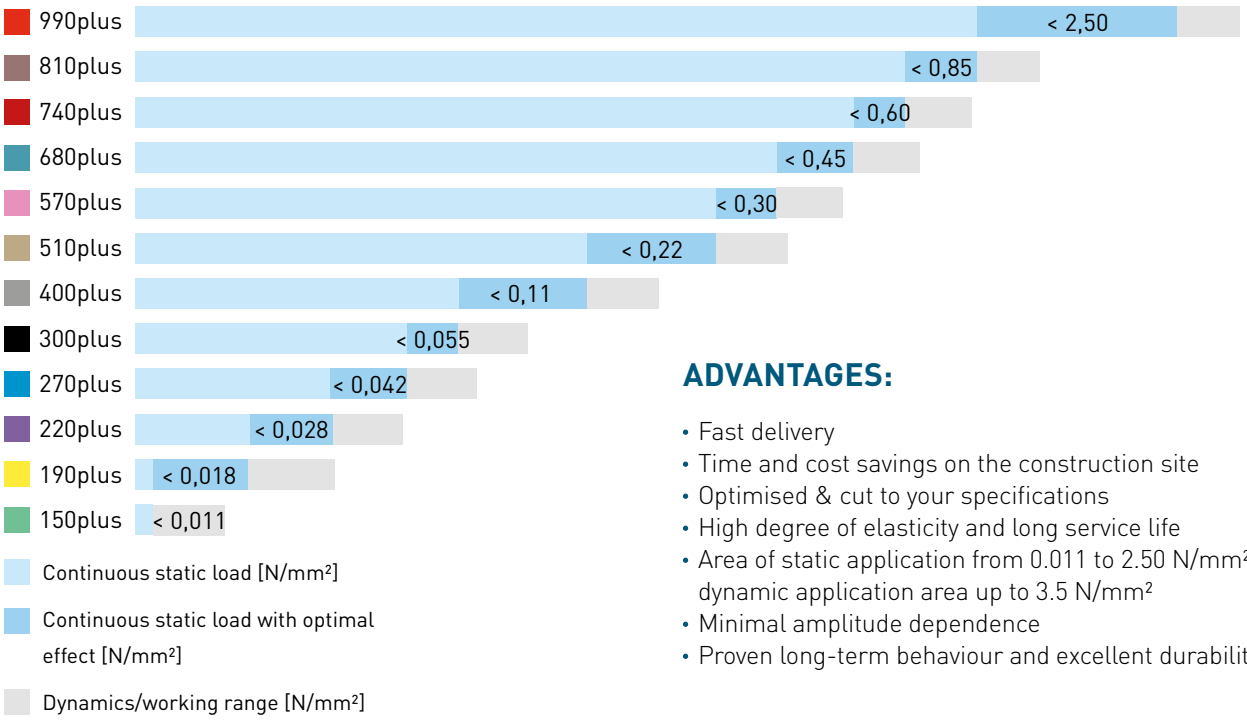
SOUND PROTECTION WITH SHERPA REGUFOAM

With SHERPA Regufoam, the SHERPA product range is being extended by sound protection de-coupling bearings for solid timber (BSP boards) and nogging piece structures

DESCRIPTION OF MATERIAL OF THE SOUNDPROOF BEARINGS

Regufoam is a waterproof, rot-proof and mixed cellular polyurethane foam produced in twelve different strength levels. These various degrees of hardness are distinguished by colour. At the standard thicknesses of 12.5 and 25 mm a wide range of bearing frequencies can be achieved up to 8 Hertz.

SHERPA REGUFOAM



The loads accepted revolve around a sample object. Every construction plan should be preceded by computation by a building physicist/ statistician!

ADVANTAGES:

- Fast delivery
- Time and cost savings on the construction site
- Optimised & cut to your specifications
- High degree of elasticity and long service life
- Area of static application from 0.011 to 2.50 N/mm², dynamic application area up to 3.5 N/mm²
- Minimal amplitude dependence
- Proven long-term behaviour and excellent durability

WHICH SOUND INSULATION BEARING FITS?

It is particularly important to select the correct sound insulation bearing. If a too stiff sound insulation bearing is used, the effect can be lost - as if no sound insulation bearing was used at all. If a too soft sound insulation bearing is selected, it will be compressed too much due to the load and would therefore no longer be effective.

The diagram at the bottom of this page offers a practicable solution to determine the suitable REGUFOAM sound insulation bearing for your application as quickly as possible. The specifications apply exclusively to a wall width of 120 mm. Attention - Different load situations prevail in a building depending on its use. It is therefore up to the planner to determine the decisive load for the design of the sound insulation bearings.

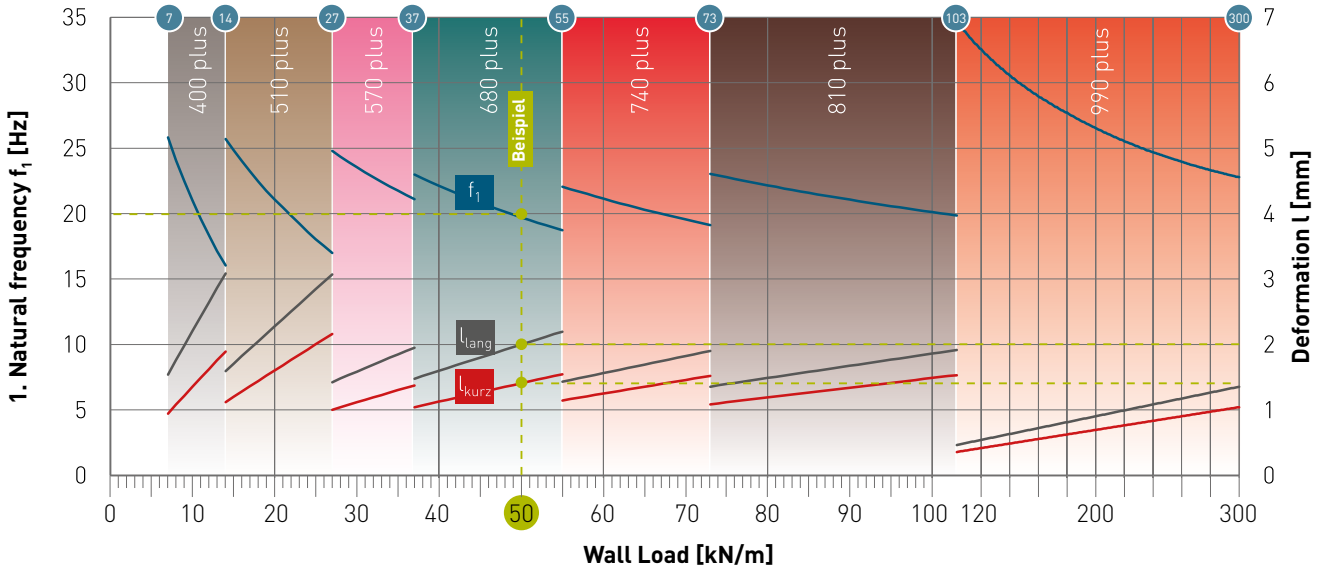
EXAMPLE WITH 50 KN/M WALL LOAD

$$q_{d;quasi\text{-}constant} = g_k + \psi_2 \cdot p_k$$

$$q_d = 34{,}5 + 0{,}3 \cdot 51{,}7 = 50 \ [kN/m]$$

The wall loads decisive for the selection of the sound insulation bearings are to be determined on the basis of the quasi-permanent combination of the actions according to EN 1990, eq. 6.15b. Here, the combination coefficients 2 for the quasi-permanent values of the variable action are to be taken from the national regulations, among others, depending on the use category. With a wall load of 50 kN/m, the "Regufoam 680 plus" sound insulation bearing would therefore be most suitable for use. Furthermore, the natural frequency (f0), the subsidence immediately after the load (lshort) and the subsidence after 10 years (long) can be determined. The current example, with a rated wall load of 50 kN/m, would result in a natural frequency of 20 Hz and the immediate reduction in sound insulation would be 1.4 mm. In 10 years the sinking would increase to 2 mm.

For wall width 120 mm



$$f_0 = \frac{1}{2\pi} \cdot \sqrt{\frac{C}{m}} = \frac{1}{T}$$

T ..... Period in s
f_0 ..... Natural frequency in Hz
C ..... Springconstant in N/m
m ..... mass in kg

$$c = \frac{E \cdot A}{d}$$

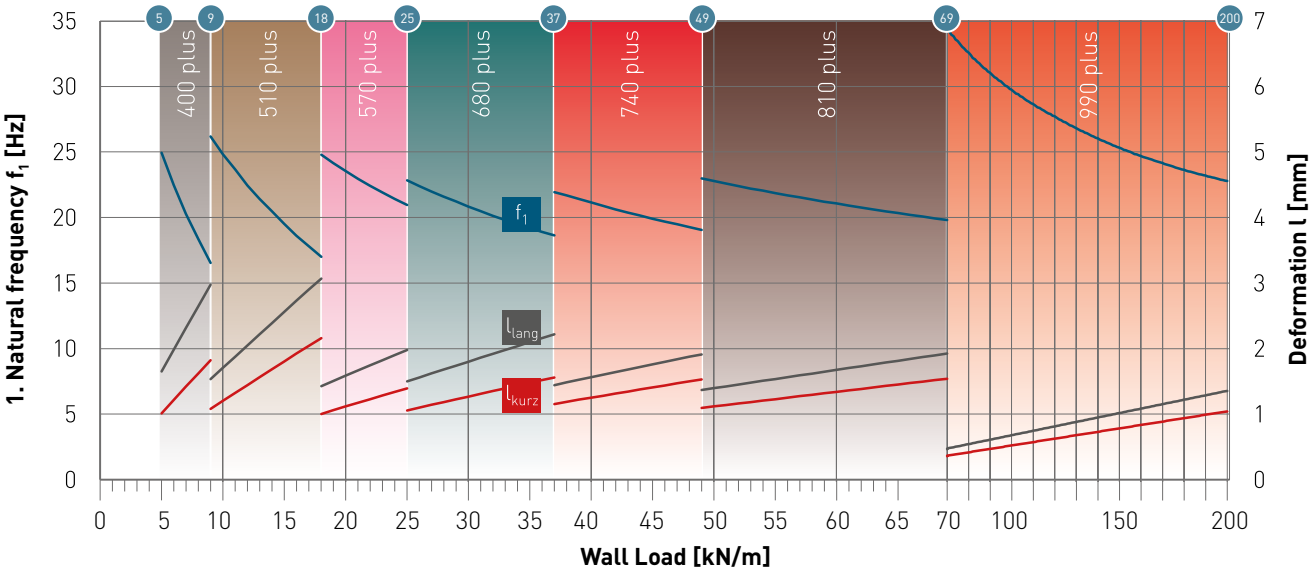
E ..... dynamic E-Modulus in N/mm²
A ..... bearing area in mm²
d..... bearing thickness in mm

$$l_{kurz} = \frac{\sigma_c \cdot d}{E_{stat}} \qquad l_{lang} = \text{Creep Factor} \cdot l_{kurz}$$

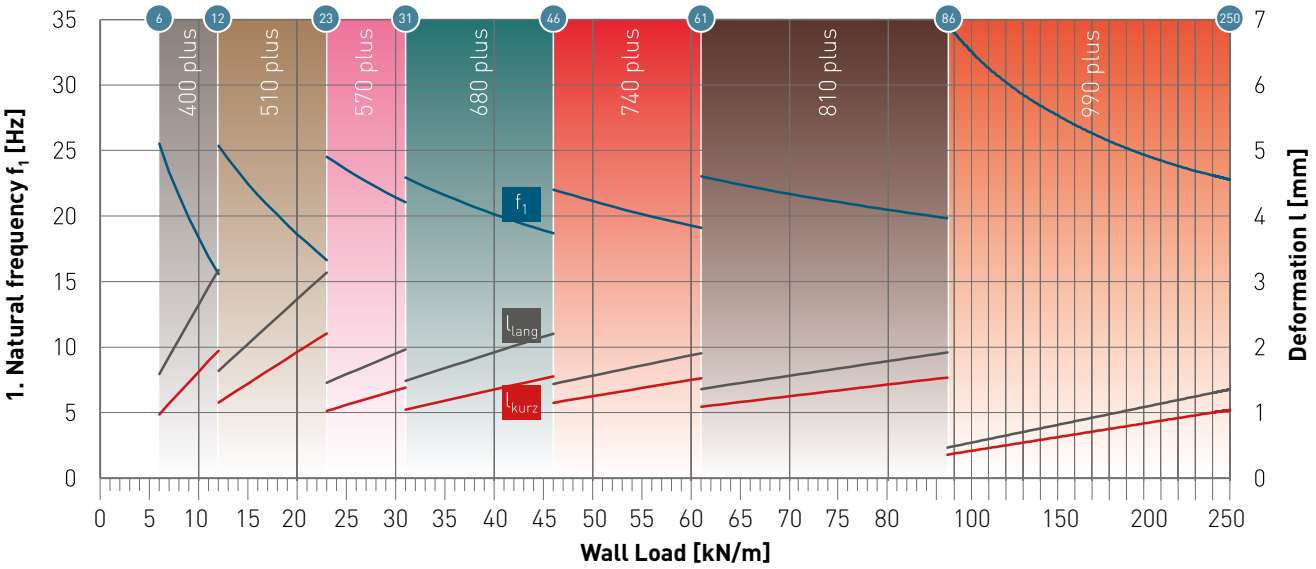
l_{kurz} ..... deflection at t=0 in mm
l_{lang} ..... deflection at t=10a in mm
σ_c ..... compression stress in N/mm²
d ..... bearing thickness in mm
E_{stat}..... static E-Modulus in N/mm²

The E-modules (Estat, Edyn) used to create the contents of the diagram are based on a shape coefficient of q = 2.5 to 6.0, depending on the bearing type, according to the manufacturer's specifications, and cover the constructionally relevant area of application of sound insulation bearings as linear bearings of timber construction elements

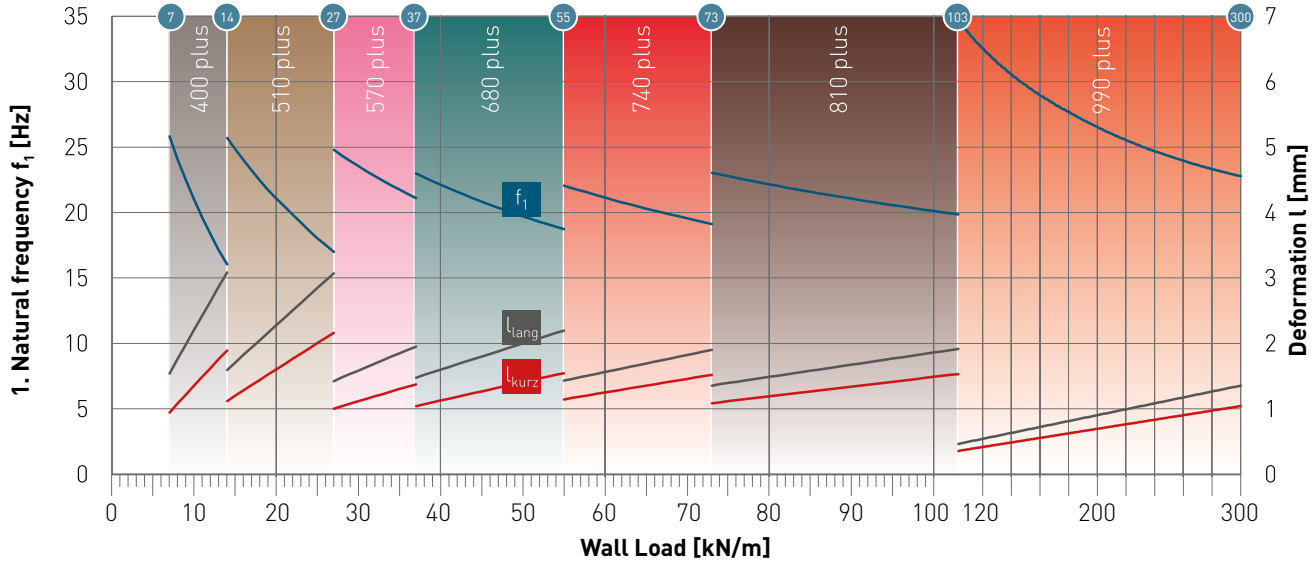
For wall width 80 mm



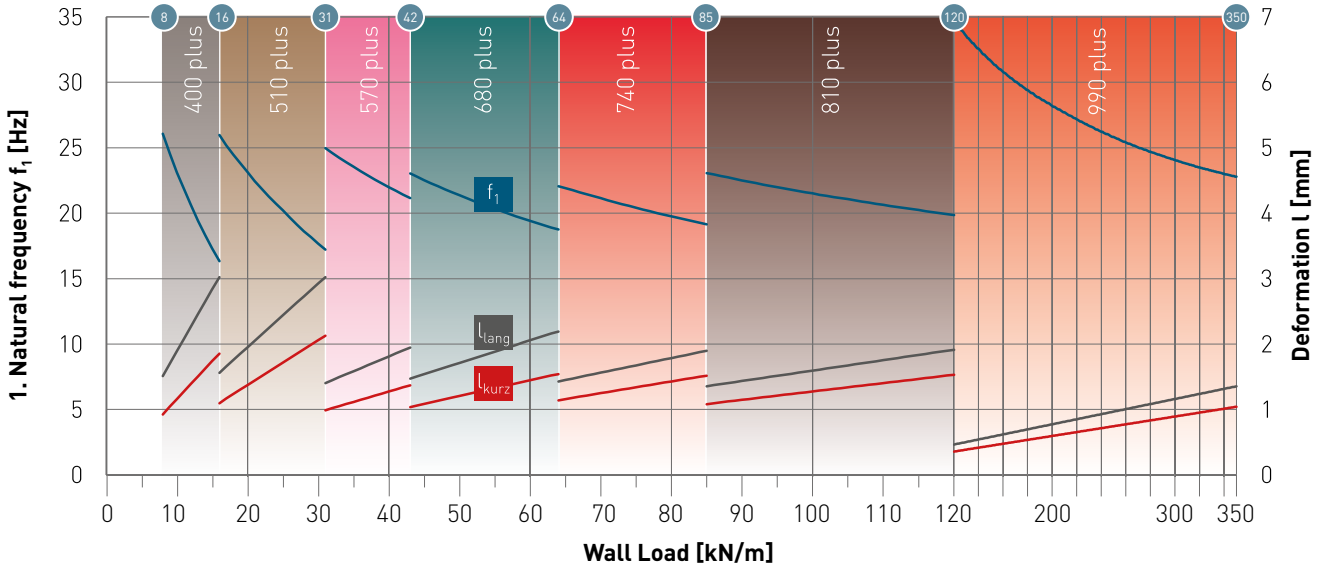
For wall width 100 mm



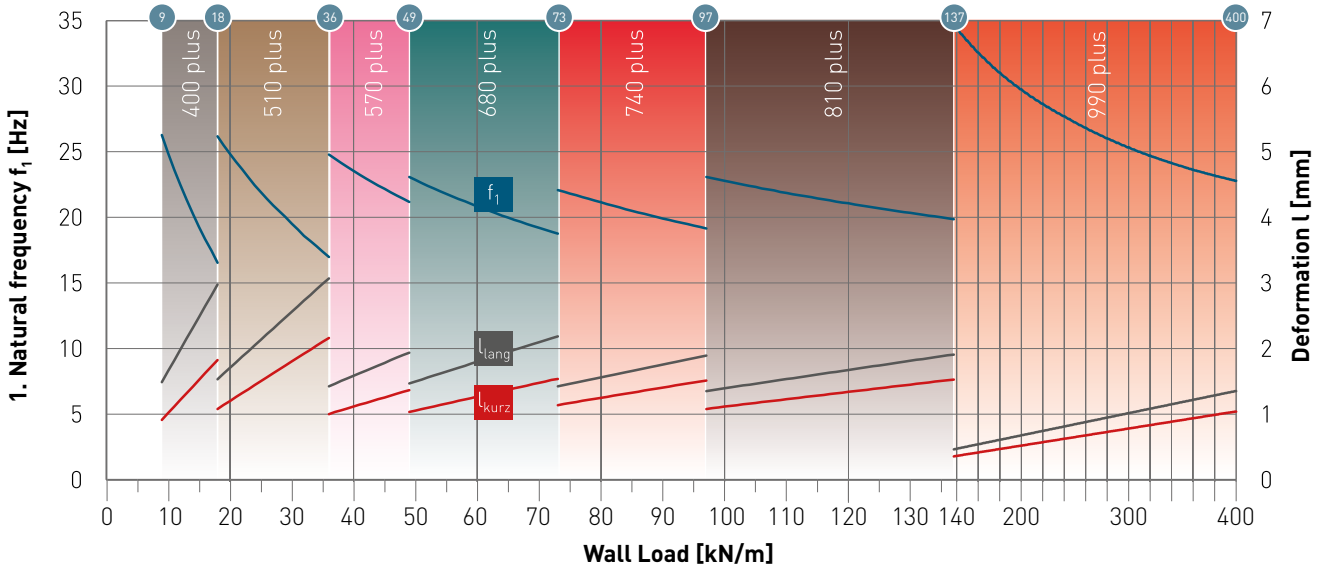
For wall width 120 mm



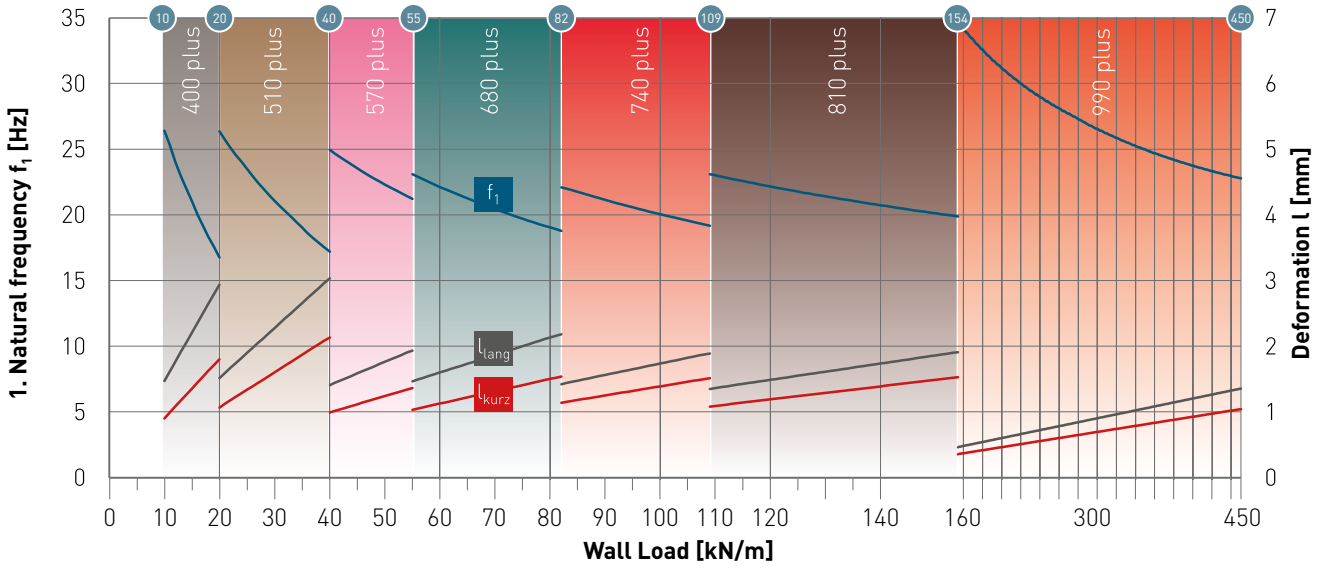
For wall width 140 mm



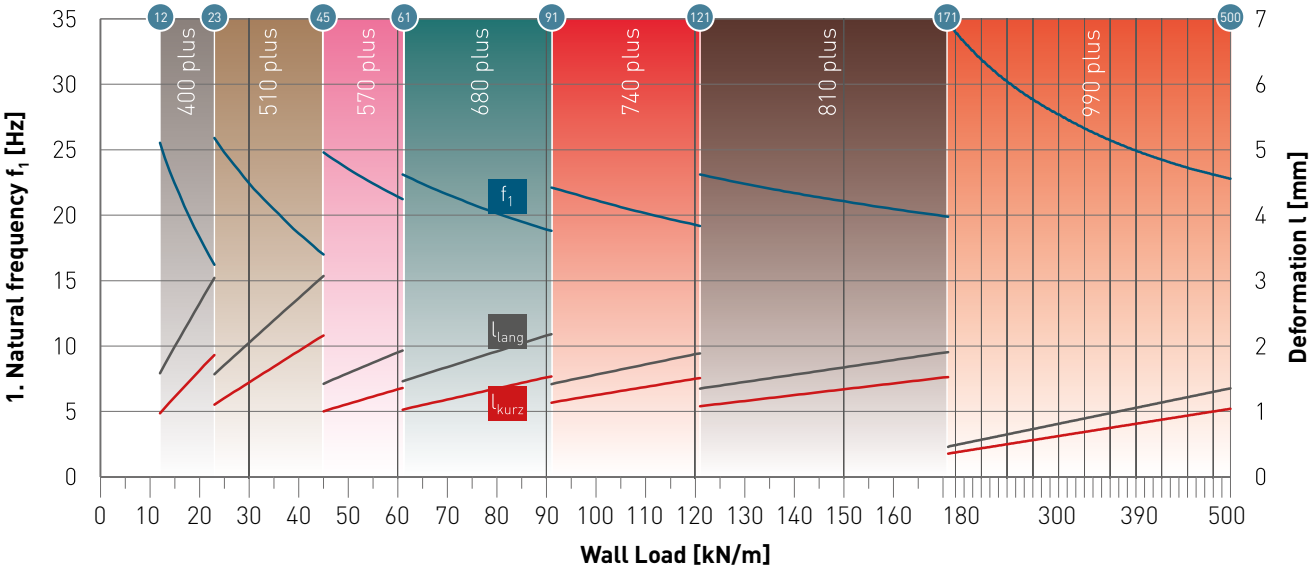
For wall width 160 mm



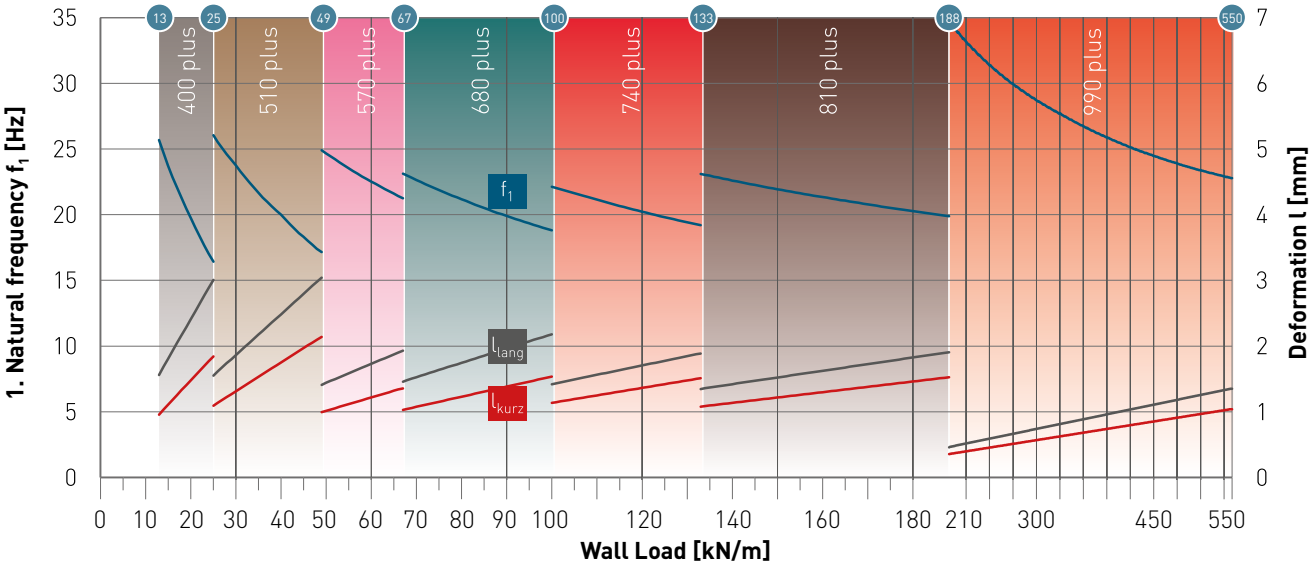
For wall width 180 mm



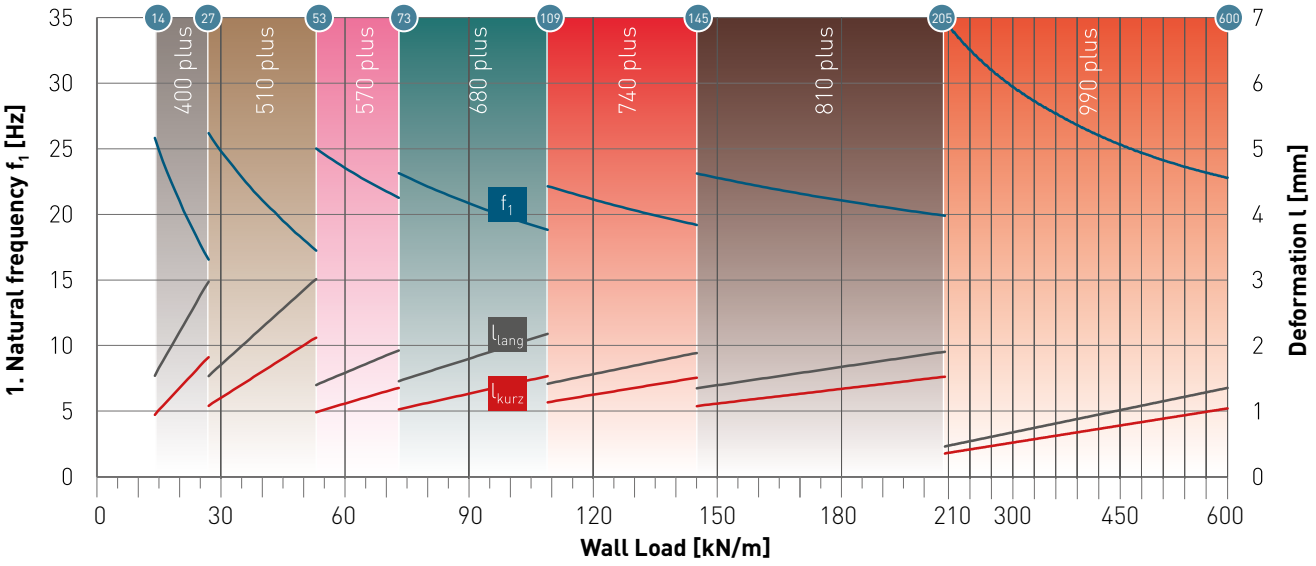
For wall width 200 mm



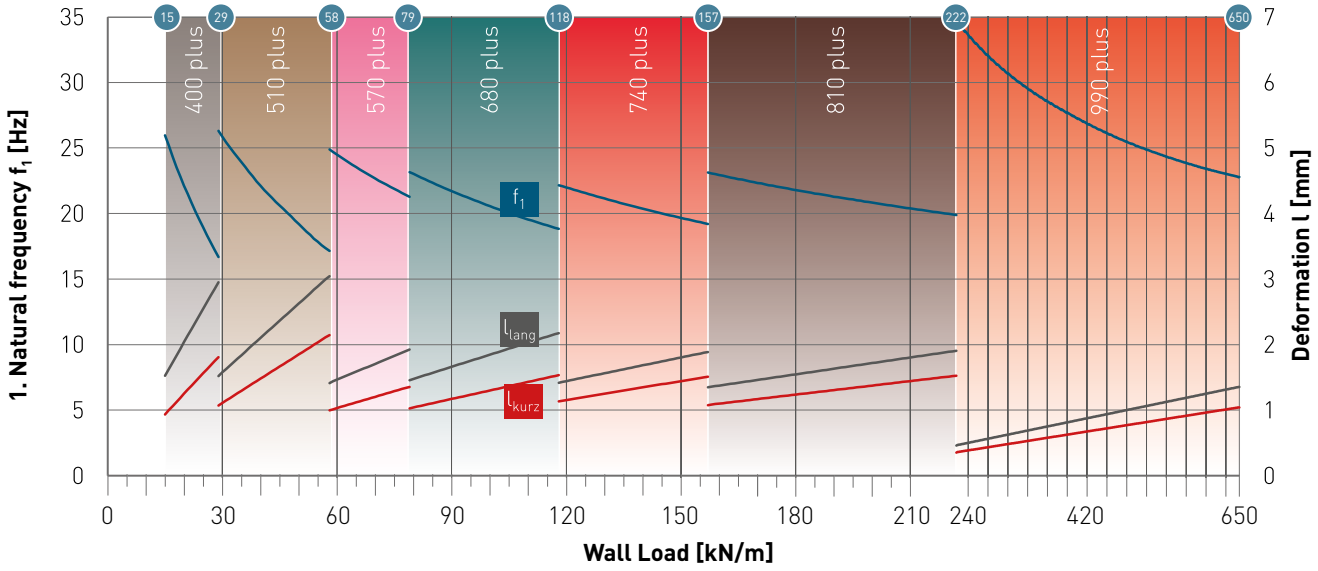
For wall width 220 mm



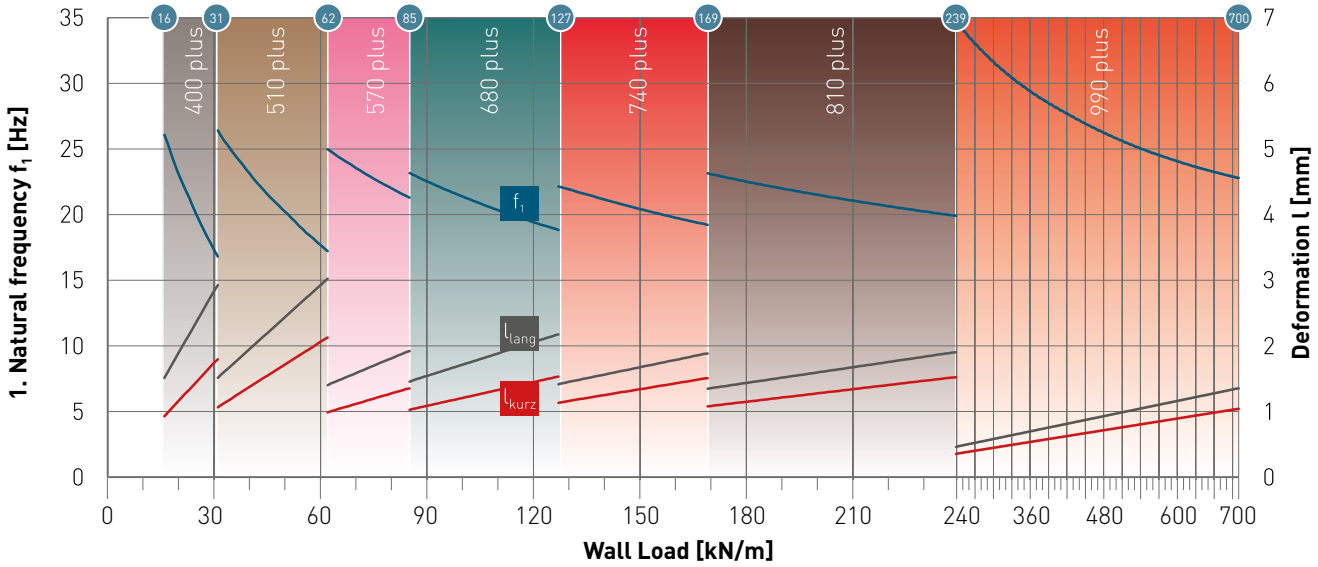
For wall width 240 mm



For wall width 260 mm



For wall width 280 mm



Connected worldwide.

Sherpa Connection Systems is represented in over 70 countries.

260528

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