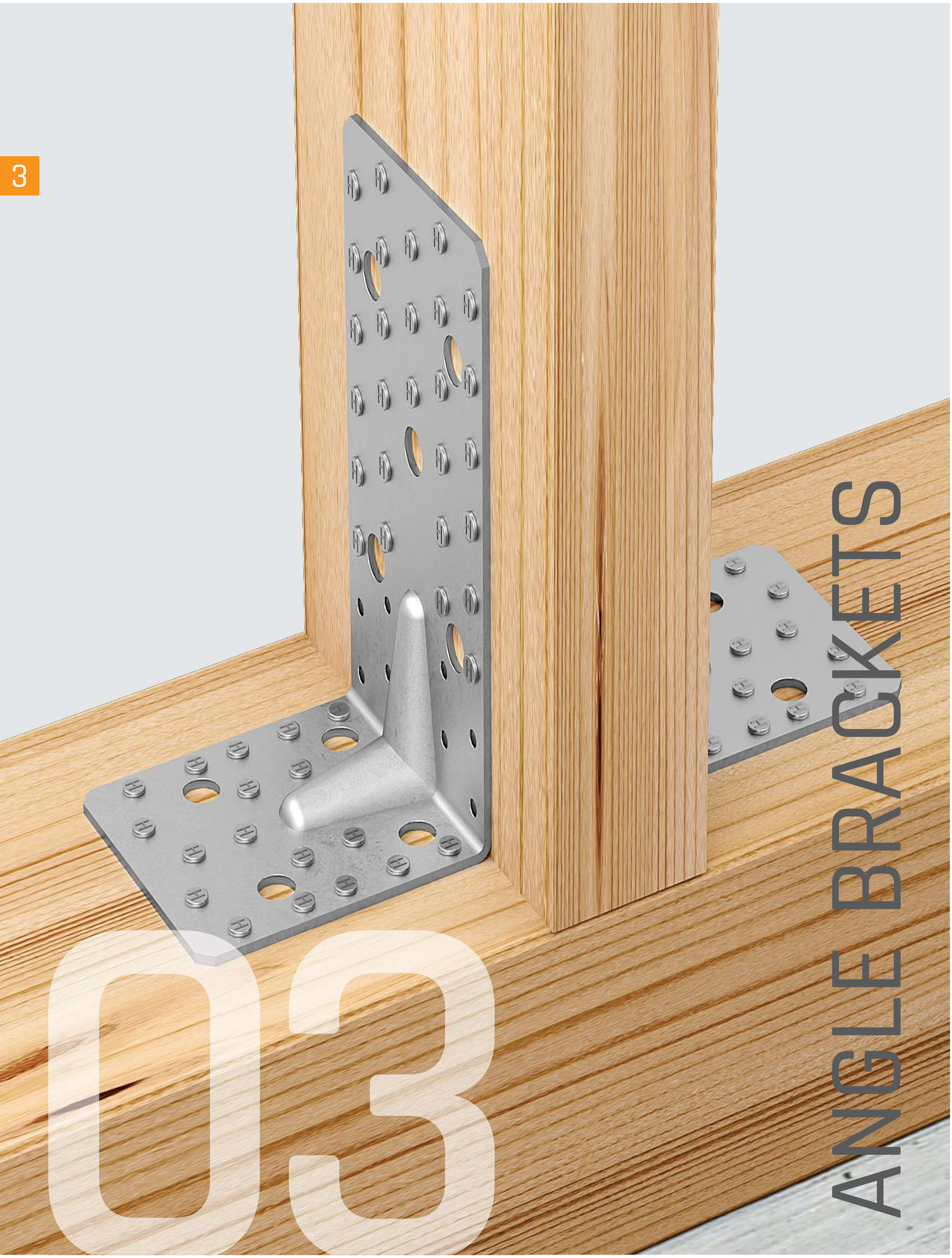


03 ANGLE BRACKETS

GREENLINE TOPLINE

3

ANGLE BRACKETS

ANGLE BRACKETS TOP 80 / TOP 120

Advantages

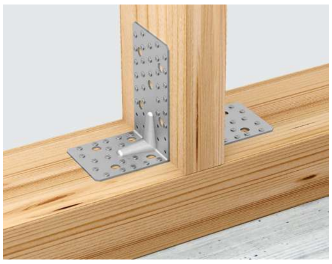
- No bothersome centre rib during processing
- Optimised hole pattern
- Full nail fitting always possible
- High stability due to special, discreet corrugation
- Type 80 as an alternative to the "size 90 bracket"
- **GREENLINE** = resource-saving manufacturing

Introduction to statics **from page 110** / Products & statics **from page 120**

ANGLE BRACKET 110/170 S

Advantages

- Universal use for higher loads
- 9 bolt holes Ø 13 mm
- Perfectly suited to take loads F_2 and F_3



Introduction to statics **from page 110** / Products & statics **from page 132**

ANGLE BRACKET TOP KR 90E (EXTRA)

Advantages

- 40 % lighter in comparison to 90 x 90 x 65 x 2.5 mm
- High stability due to raised edge on both sides
- Versatile in use
- Alternative to different brackets such as 70 x 70 x 55 mm and 90 x 90 x 65 mm (for use under consideration of the necessary loads)
- Very good for loads due to the outer rib F_2/F_3 and F_1 suitable

Introduction to statics **from page 110** / Products & statics **from page 124**

ANGLE BRACKETS KR

Advantages

- For connections between timber/timber; timber/concrete For use on timber/masonry etc.
- Due to the ribs in the bending radius, KR angle brackets are very sturdy, economical and affordable in use for extreme loads
- By making use of the Greenline series, you receive products with resource-saving manufacturing. This gives you an ecologically and economic advantage

Introduction to statics **from page 110** / Products & statics **from page 134**

ANGLE BRACKETS

ASSORTMENT

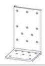
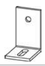
3

		Height [mm]	Length [mm]	Width [mm]	Basics Statik & Diagramme from page	Products & Statik from page	Products Made of V4A from page
ANGLE BRACKET TOP 80/120	250 GD Z275, NKL 2	80-120	60	55	110	120	
ANGLE BRACKET 70X70X2.0	250 GD Z275, NKL 2, A4 1.4571, NKL 3	70	70	55	110	122	293
ANGLE BRACKET 70X70 GREENLINE	350 GD Z275, NKL 2	70	70	55	110	122	
ANGLE BRACKET TOP KR90E	250 GD Z275, NKL 2	95	85	65	110	124	
ANGLE BRACKET 90X90X2.5	250 GD Z275, NKL 2, A4 1.4571, NKL 3	90	90	65	110	128	293
ANGLE BRACKET 90X90 GREENLINE	350 GD Z275, NKL 2	90	90	65	110	126	
ANGLE BRACKET 100X100X3.0	250 GD Z275, NKL 2, A4 1.4571, NKL 3	100	100	90	110	130	293
ANGLE BRACKET 100X100 GREENLINE	350 GD Z275, NKL 2	105	105	90	110	130	
STRUT CONNECTOR 135 DEGREES	250 GD Z275, NKL 2	90-100	90-100	65-90		132	
ANGLE BRACKET TYPE 110/170L	250 GD Z275, NKL 2	170	110	95	110	132	
ANGLE BRACKET KR 3 MM	250 GD Z275, NKL 2	95-285	88	65	110	134	
ANGLE BRACKET KR 4 MM	235 JR verzinkt, NKL 2	95-285	88	65	110	134	
ANGLE BRACKET TYPE 50/80	250 GD Z275, NKL 2	90	50	50-80	110	138	
ANGLE BRACKET TYPE 110	250 GD Z275, NKL 2	90	50	110	110	138	
ANGLE BRACKET TYPE 55/80	250 GD Z275, NKL 2	80	60	55	110	140	
ANGLE BRACKET TYPE 60/100	250 GD Z275, NKL 2	100	60	60	110	140	
CONSOLE ANGLE	350 GD Z275, NKL 2	120-200	54	60	110	142	
ANGLE BRACKET TYPE 40/45	250 GD Z275, NKL 2	50-90	50-90	40-45	110	144	
ANGLE BRACKET TYPE 40/90	250 GD Z275, NKL 2, A4 1.4571, NKL 3	90	90	40	110	146	294
ANGLE BRACKET TYPE 40/120	250 GD Z275, NKL 2	120	95	40	110	146	
ANGLE BRACKET TYPE 692	250 GD Z275, NKL 2	65	65	90	110	146	

ANGLE BRACKETS

ASSORTMENT

3

		Symbols	Height	Length	Width	Basics Statics & Diagrams from page	Products & Statics from page	Products Made of V4A from page
NAIL PLATE BRACKET		CE, 250 GD Z275, NKL 2, A4 1.4571, NKL 3, Timber/timber	40-200	40-100	20-100		148	294
EXTRA THICK 4 MM		CE, 250 GD Z275, NKL 2, Timber/timber	130-160	70	80-100	110	150	
MOUNTING BRACKET		CE, 250 GD Z275, NKL 2, Timber/timber, Timber/concrete	90	60	60	110	152	
ENTRANCE DOOR BRACKET		250 GD Z275, NKL 2, Timber/timber	70	30	60		158	
Z-CONNECTOR		250 GD Z275, NKL 2, Timber/timber, Timber/concrete	40	75	30		158	
CHAIR BRACKET		250 GD Z275, NKL 2, Timber/timber	25-120	25-120	15-20		159	
ANGLE BRACKET THICK 3-5 MM		250 GD Z275, NKL 2, Timber/timber	40-180	40-180	20		159	
CONCRETE BRACKET		235 JR feuerverzinkt, NKL 2, Timber/concrete	75-150	75	60		156	
CORNER ANGLE BRACKET		250 GD Z275, NKL 2, Timber/timber	40	40	100-250		158	

CE symbol

250 GD Z275 **Steel with indication of the steel quality and galvanisation**

A4 1.4571 **Stainless steel with material number**

Timber/timber connection

Timber/concrete-connection

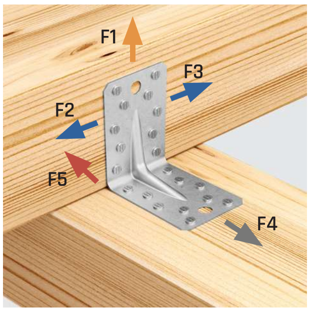
NKL 1 **Usage class 1**
Moisture content in the building materials that corresponds to a temperature of 20˚ C and a relative humidity of the ambient air that only exceeds a value of 65% for a few weeks per year, e.g. in the case of buildings that are closed on all sides and heated.
Comment: In UC 1, the average moisture content of most softwoods does not exceed 12 %.

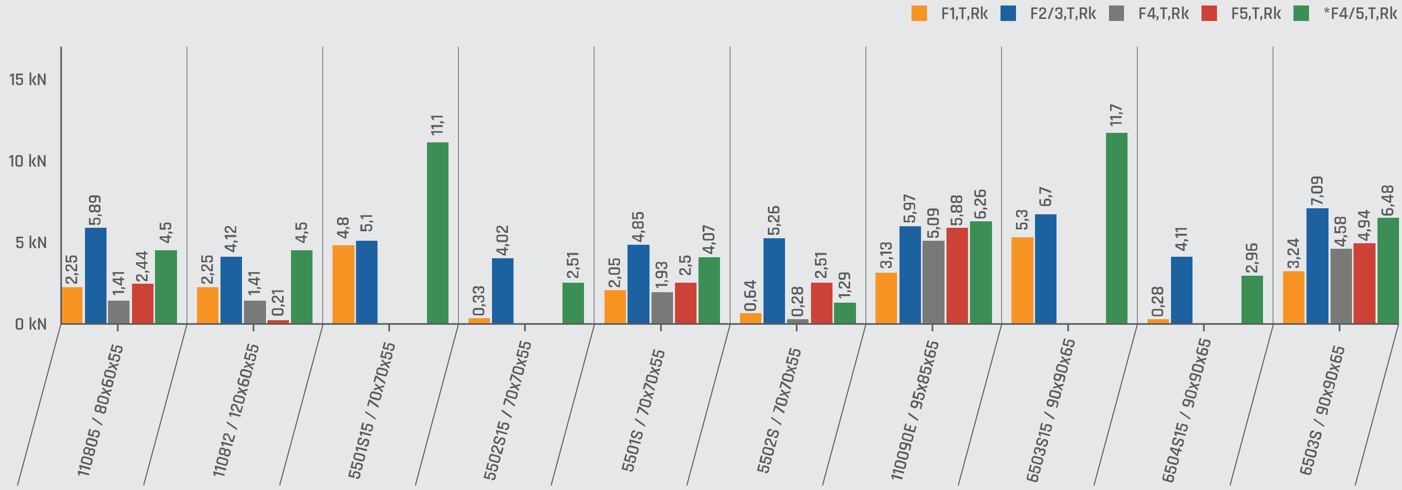
NKL 2 **Usage class 2**
Moisture content in the building materials that corresponds to a temperature of 20˚ C and a relative humidity of the ambient air that only exceeds a value of 85% for a few weeks per year, e.g. in the case of open buildings covered by a roof.
Comment: In UC 2, the average moisture content of most softwoods does not exceed 20 %.

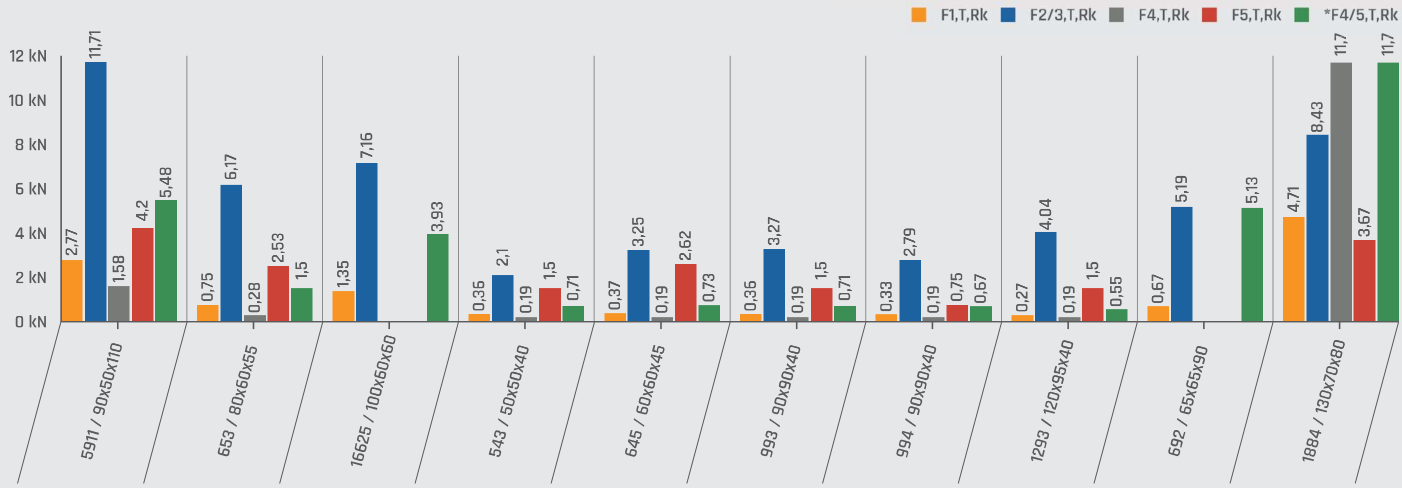
NKL 3 **Usage class 3**
Includes climatic conditions that lead to higher moisture contents than in UC 2, e.g. structures that are exposed to the weather without protection.
Eurocode 5 / DIN EN 1995-1-1 section 2.3.1.3

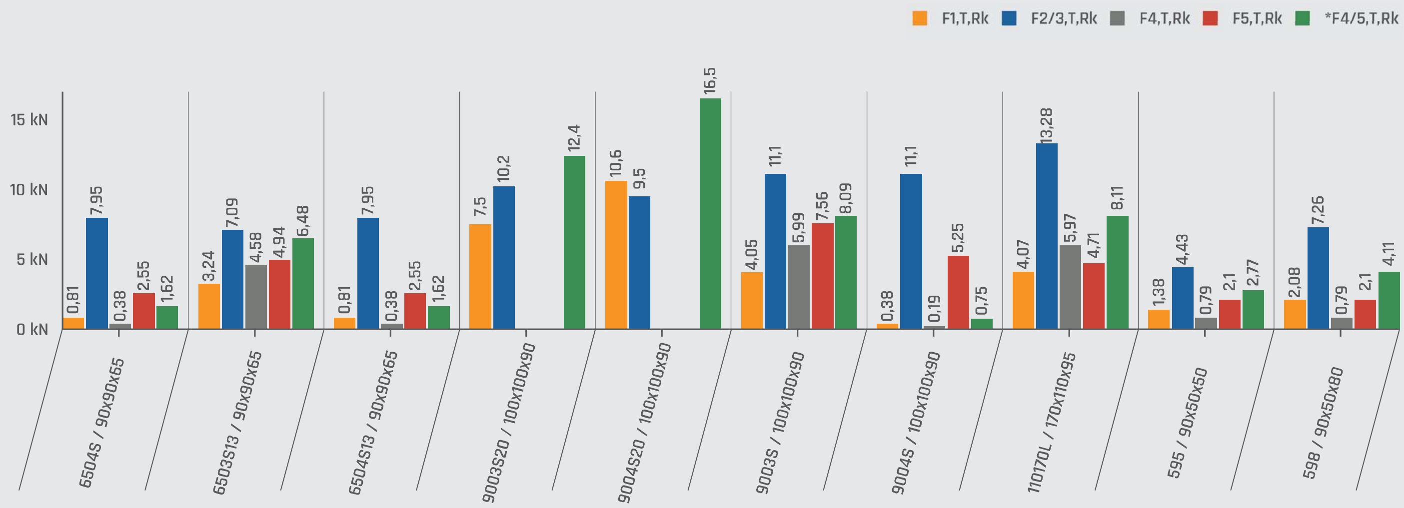
ANGLE BRACKETS

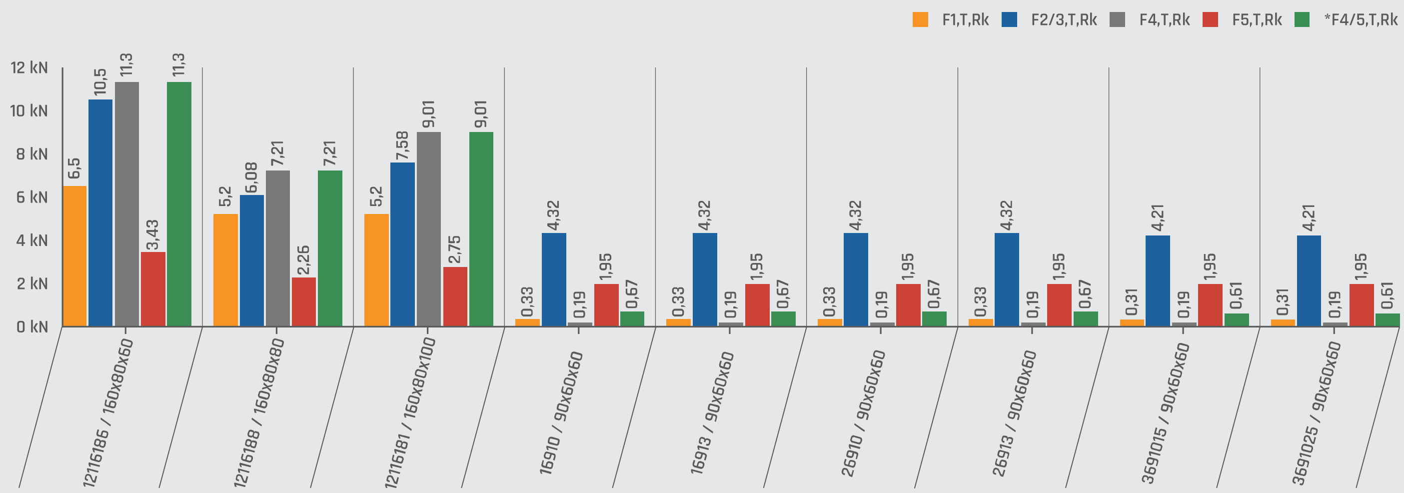
STATICS DIAGRAM








F1,T,Rk
F2/3,T,Rk
F4,T,Rk
F5,T,Rk
*F4/5,T,Rk
15 kN
10 kN
5 kN
0 kN
0,81 7,95 0,38 2,55 1,62
3,24 7,09 4,58 4,94 6,48
0,81 7,95 0,38 2,55 1,62
7,5 10,2 12,4
10,6 9,5 16,5
4,05 11,1 5,99 7,56 8,09
0,38 11,1 0,19 5,25 0,75
4,07 13,28 5,97 4,71 8,11
1,38 4,43 0,79 2,1 2,77
2,08 7,25 0,79 2,1 4,11
6504S / 90x90x65
6503S13 / 90x90x65
6504S13 / 90x90x65
9003S20 / 100x100x90
9004S20 / 100x100x90
9003S / 100x100x90
9004S / 100x100x90
110170L / 170x110x95
595 / 90x50x50
598 / 90x50x80


F1,T,Rk
F2/3,T,Rk
F4,T,Rk
F5,T,Rk
*F4/5,T,Rk
12 kN
10 kN
8 kN
6 kN
4 kN
2 kN
0 kN
6,5 10,5 11,3 3,43 11,3
5,2 6,08 7,21 2,26 7,21
5,2 7,58 9,01 2,75 9,01
0,33 4,32 0,19 1,95 0,67
0,33 4,32 0,19 1,95 0,67
0,33 4,32 0,19 1,95 0,67
0,33 4,32 0,19 1,95 0,67
0,31 4,21 0,19 1,95 0,61
0,31 4,21 0,19 1,95 0,61
12116186 / 160x80x60
12116188 / 160x80x80
12116181 / 160x80x100
16910 / 90x60x60
16913 / 90x60x60
26910 / 90x60x60
26913 / 90x60x60
3691015 / 90x60x60
3691025 / 90x60x60

ANGLE BRACKETS

TECHNICAL FEATURES

3

Geometry

H	Height (mm)
L	Length (mm)
B	Width (mm)
S	Material thickness (mm)

Tables

n_a	Number of connecting elements
NB	Nail pattern
Full	Maximum number of connecting elements
Partial	Minimum number of connecting elements

Timber connecting element

$Ø_{(mm)}$	Diameter of connecting element
$L_{(mm)}$	Length of connecting element
⇄	Grain direction in the wood component

Connecting element concrete/ steel

Bo	Dowels/bolts

Load directions

F_1 ↑	Force at a right angle to the connector level, lifting force
F_2 ←	Force in rod direction
F_3 →	Force in rod direction
F_4 ↖	Force in direction of the angle bracket
F_5 ↘	Force away from the angle bracket

CE symbol

250 GD Z275 **Steel with indication of the steel quality and galvanisation**

A4 1.4571 **Stainless steel with material number**

Timber/timber connection

Timber/concrete-connection

NKL 1 **Usage class 1**
Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 65% for a few weeks per year, e.g. in the case of buildings that are closed on all sides and heated.
Comment: In UC 1, the average moisture content of most softwoods does not exceed 12 %.

NKL 2 **Usage class 2**
Moisture content in the building materials that corresponds to a temperature of 20° C and a relative humidity of the ambient air that only exceeds a value of 85% for a few weeks per year, e.g. in the case of open buildings covered by a roof.
Comment: In UC 2, the average moisture content of most softwoods does not exceed 20 %.

NKL 3 **Usage class 3**
Includes climatic conditions that lead to higher moisture contents than in UC 2, e.g. structures that are exposed to the weather without protection.
Eurocode 5 / DIN EN 1995-1-1 section 2.3.1.3

Design

$F_{1,Ed}$	Design load for load direction 1 in kN
$F_{2/3,Ed}$	Design load for load direction 2 or 3 in kN
$F_{4,Ed}$	Design load for load direction 4 in kN
$F_{5,Ed}$	Design load for load direction 5 in kN
$F_{4/5,Ed}$	Design load for load direction 4 or 5 in kN
$F_{1,Rk}$	Characteristic value of the load capacity in load direction 1 for one or for two angle brackets in kN
$F_{2/3,Rk}$	Characteristic value of the load capacity in load direction 2 or 3 for one or for two angle brackets in kN
$F_{4,Rk}$	Characteristic value of the load capacity in load direction 4 for one angle bracket in kN
$F_{5,Rk}$	Characteristic value of the load capacity in load direction 5 for one angle bracket in kN
$F_{4/5,Rk}$	Characteristic value of the load capacity in load direction 4 or 5 for two angle brackets in kN
$F_{1,Rd}$	Design value of the load capacity in load direction 1 for one or for two angle brackets in kN
$F_{2/3,Rd}$	Design value of the load capacity in load direction 2 or 3 for one or for two angle brackets in kN
$F_{4,Rd}$	Characteristic value of the load capacity in load direction 4 for one angle bracket in kN
$F_{5,Rd}$	Characteristic value of the load capacity in load direction 5 for one angle bracket in kN
$F_{4/5,Rd}$	Characteristic value of the load capacity in load direction 4 or 5 for two angle brackets in kN
$F_{i,Ed}$	Design value of load capacity for one or two angle brackets for the respective load direction "i" (i = 1 to 5) in kN
$F_{i,Rk,T}$	Characteristic value of the load-bearing capacity of the sheet steel-timber connection with GH threaded/anchor nails for the 'i' (i = 1 to 5) in kN respective load direction 'i' (i = 1 to 5) in kN
$F_{i,Rk,S}$	Characteristic value for steel load capacity of the bracket (table value **„S"** oder $F_{Rk,S}$ bzw. $F_{Rd,S}$) for the respective load direction "i" (i = 1 to 5) in kN
k_{mod}	Modification factor for load impact duration and usage class
$\gamma_{M,T}$	Partial safety factor for timber (for Germany: 1.3)
$\gamma_{M,S}$	Partial safety factor for steel for cross-section stresses (for Germany: 1.0)

Dowel design

$k_{i,t,ax}$	Coefficient for calculating the axial load-bearing capacity per bolt, for connecting the bracket to concrete or steel components for the respective Load direction "i" (i = 1 to 5)
$k_{i,t,v}$	Coefficient for calculating the shear load-bearing capacity per bolt, for connecting the bracket to concrete or steel components for the respective Load direction "i" (i = 1 to 5)
$F_{i,Ed}$	Design load on one or two angle brackets for the respective load direction "i" (i = 1 to 5) in kN
$F_{i,Rd}$	Design value of load capacity on one or two angle brackets for the respective load direction "i" (i = 1 to 5) in kN
$F_{i,Ed,B}$	Design value for one bolt or one anchor for the respective load direction "i" (i = 1 to 5) in kN
$F_{i,Rd,B}$	Design value of the load-bearing capacity of the entire connection to concrete or steel with bolts or anchors for the respective Load direction 'i' (i = 1 to 5) in kN (calculation must be carried out separately and is based on the respective approval and standard of the bolts or anchors)

ANGLE BRACKETS

APPLICATIONS

3

Application:
Timber/timber; timber/concrete, steel connections

Materials:

350 GD Z275 | 250 GD Z275 | 235 JR feuerverzinkt | A4 1.4571

Material thicknesses:
1.5 / 2.0 / 2.5 / 3.0 / 4.0 / 6.0 / 8.0 mm
More on request.

Sleeper **Style**

Cross

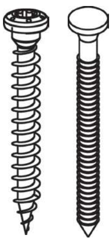
Sleeper **Style**

Sleeper **Concrete**

Sleeper **Concrete**

BSH **Concrete**

For use in usage classes



Connecting element:

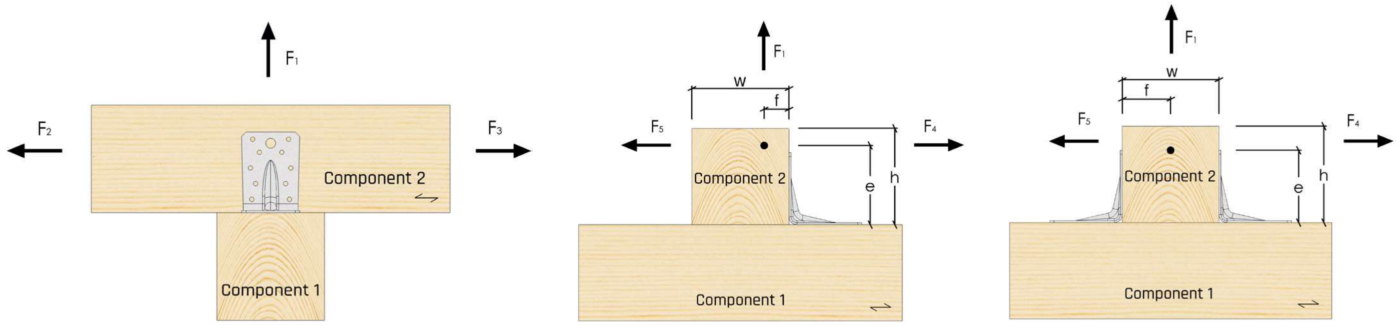
GH threaded nails 4.0 x 35 / 40 / 50 / 60 / 75 / 100 mm
GH screws 5.0 x 25 / 35 / 40 / 50 / 60 / 70 mm

Bolt, dowel or concrete anchor M10, M12

Connecting elements from page 274

ANGLE BRACKETS

LOAD DIRECTIONS



Load F_1:

For the load-bearing capacity of a bracket, the load is applied at spacing f from the contact surface between the bracket and the timber beam is applied (Figure 2). If it is assumed that the timber component is prevented from rotating or if two console angles are arranged, then the eccentricity is f = 0.

Load $F_{2/3}$

Calculation of the load-bearing capacity of one or two angle brackets that are loaded with a force in the direction of the axis of component 2 (Fig. 1).

Load F_4 / F_5 / $F_{4/5}$

In all three cases, the load is applied at a distance e from the contact surface between component 1 and component 2 (Figure 2).
The load cases are considered as a combination of two base load cases.
The first base load case is the lateral load with forces n F_4, F_5 or $F_{4/5}$ with e = 0.
For the arrangement with an angle bracket, the rotation of component 2 is taken into account.
For the arrangement with two angle brackets, the rotation of component 2 is prevented and the load on the beam due to the moment is calculated as the lifting force $F_1 = F_{4/5}$ x e/w. w is thereby the width of component 2

Nail patterns

Partial and full nail fitting or partial and full screw fitting
See nail pattern for the product

Connection over intermediate layers

The characteristic load capacities for the connection with angle brackets indicated in the tables also apply to an intermediate layer between the angle bracket and timber component. The following conditions must be met:

- The intermediate layer must be connected to the timber component without being able to be moved.
- The insert depth of the profiled area of the nail or the thread length of the screw in the timber component must be the same or greater.
- For this, a correspondingly long connecting element must be used.
- The characteristic perforation strength $f_{h,k}$ of the connecting element in the intermediate layer must be the same of greater.

Determination of load capacity

The load capacity of connections with angle brackets $F_{i,Rd}$ for the respective load direction "i" (i = 1 to 5) corresponds to the smallest value of:

- The load capacity of the steel sheet-timber connection with GH threaded/anchor nails $F_{i,Rd,T}$,
- Steel load capacity of the bracket $F_{i,Rd,S}$,
- Load-bearing capacity of the connection to concrete or steel with bolts or anchors under consideration of the coefficient $k_{i,t,ax}$ or $k_{i,t,v}$, see section 4.

$$F_{i,Rd} = \min\left\{\frac{k_{mod} \cdot F_{i,Rk,T}}{\gamma_{M,T}}; \frac{F_{i,Rk,S}}{\gamma_{M,S}}; F_{i,Rd,B}\right\}$$

The increased load capacity values of the GH threaded/anchor nails according to ETA-13/0523 apply.
The values of EN14592 apply to angle brackets made of stainless steel.

Connection timber- concrete/ steel

The design load of the respective load direction "i" (i = 1 to 5) $F_{i,Ed,B}$ for one bolt or for one anchor is calculated as follows:

$F_{i,Ed,B} = k_{i,t,ax} \times F_{i,Ed}$ for axial stress on the bolt or anchor
$F_{i,Ed,B} = k_{i,t,v} \times F_{i,Ed}$ for lateral stress on the bolt or anchor

Load in one direction

In case of sole impact of load components F_1, $F_{2/3}$, $F4$ or F_5 or $F_{4/5}$ the proof of interaction must be provided in the following form:

$$\frac{F_{i,Ed}}{F_{i,Rd}} \leq 1$$

Load in several directions

In case of simultaneous impact of load components F_1, $F_{2/3}$, F_4 or F_5 and $F_{4/5}$ the proof of interaction must be provided as follows:
For a bracket, the loads F_4 and F_5 never take effect at the same time.

For one bracket:

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}}\right)^2 + \left(\frac{F_{2/3,Ed}}{F_{2/3,Rd}}\right)^2 + \left(\frac{F_{4,Ed}}{F_{4,Rd}}\right)^2 + \left(\frac{F_{5,Ed}}{F_{5,Rd}}\right)^2 \leq 1$$

For two brackets:

$$\left(\frac{F_{1,Ed}}{F_{1,Rd}}\right)^2 + \left(\frac{F_{2/3,Ed}}{F_{2/3,Rd}}\right)^2 + \left(\frac{F_{4/5,Ed}}{F_{4/5,Rd}}\right)^2 \leq 1$$

General information

The load capacities apply to timbers with a characteristic raw density of 350 kg/m3.
Curvatures of the timber components and joist edges in the area of the angle brackets are not permitted - the wood must be sharp-edged in the area of the bracket.
There must be proof that no gaps occur in the timber component for all load directions according to EN 1995 or an equivalent national standard.

Minimum spacing according to EN 1995-1-1

[mm]		Force parallel to the grain	Force at a right angle to the grain	Force under the bracket α to the grain
		(α = 0°)	(α = 90°)	(α any)
a_1	in grain direction	28	14	(14+14 x cos α)
a_2	Right angle to the grain direction	14	14	14
$a_{3,t}$	End grain with stress	60	40	(40 + 20 x cos α)
$a_{3,c}$	End grain without stress	40	40	40
$a_{4,t}$	Loaded edge	20	28	(20 + 8 x sin α)
$a_{4,c}$	Unloaded edge	20	20	20

Nails Ø 4 mm, without pilot drilling, in nail plates, pk ≤ 420 kg/m³

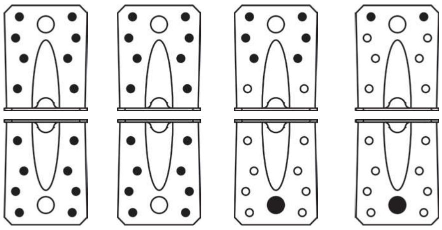
ANGLE BRACKETS

HOLE PATTERNS

3

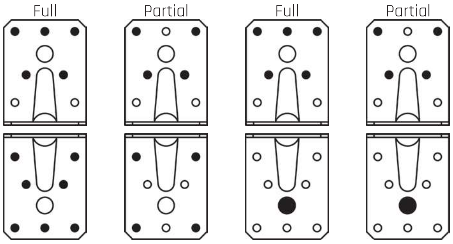
TYPE 55/70S 1.5 GREENLINE with rib
5501S15

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



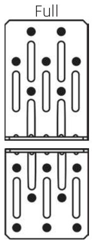
TYPE 55/70 2.0 with rib
5501S

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



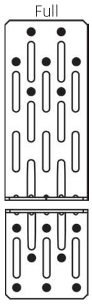
TOP 80
110805

Timber/timber Full



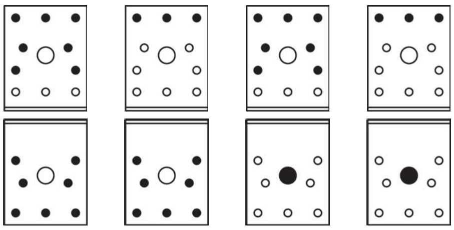
TOP 120
110812

Timber/timber Full



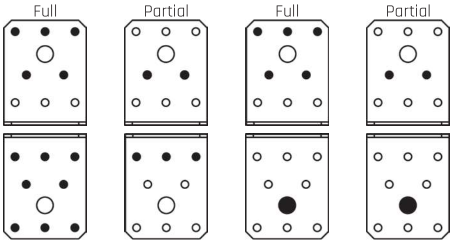
TYPE 55/70S 1.5 GREENLINE without rib
5502S15

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



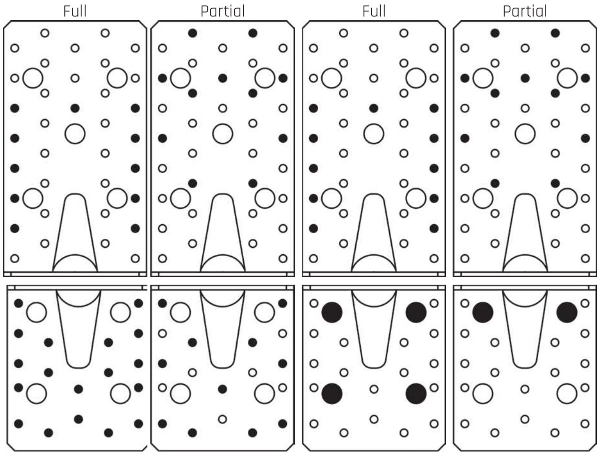
TYPE 55/70 2.0 without rib
5502

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



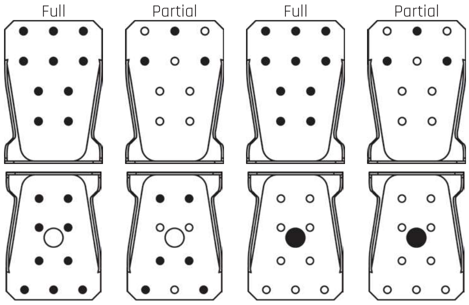
TYP 110/170L
110170L

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



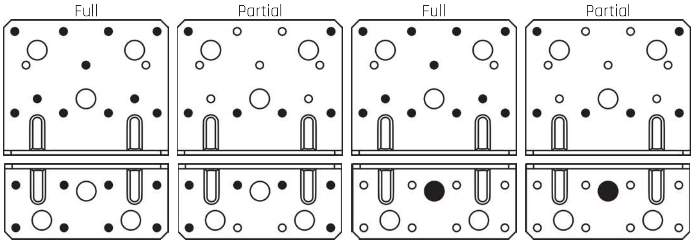
TOP KR 90 E (EXTRA)
110090E

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



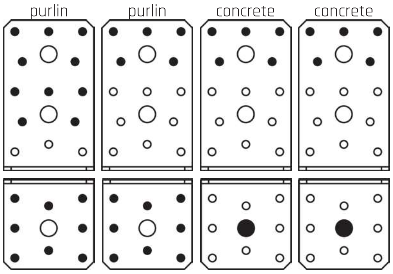
TYP 110
5911

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



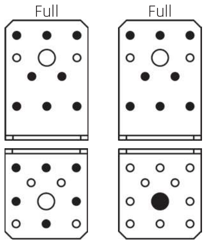
TYP 60/100
16625

Purlin/ purlin | Column/ purlin | Purlin/ concrete | Column/ concrete



TYP 55/80
653

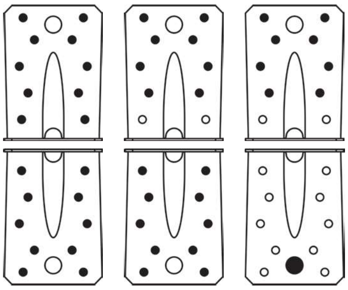
Timber/timber Full | Timber/concrete Full



3

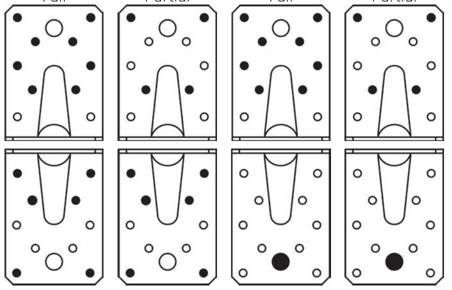
TYPE 65/90S 1.5 GREENLINE with rib
6503S15

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



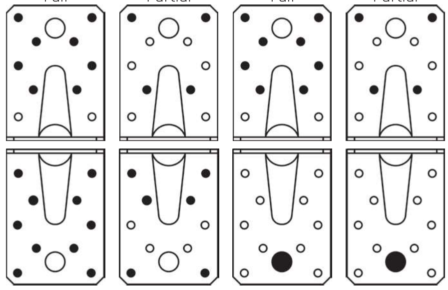
TYPE 65/90 2.5 with rib
6503S

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



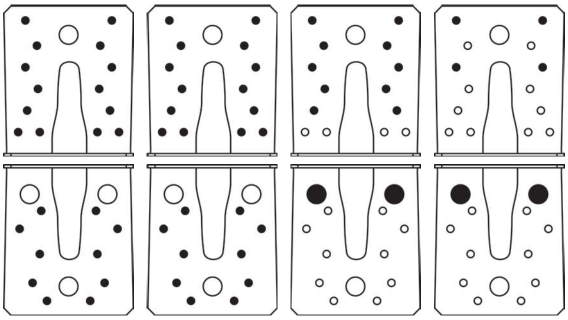
TYPE 65/90S13 with rib / hole Ø 13mm
6503S13

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



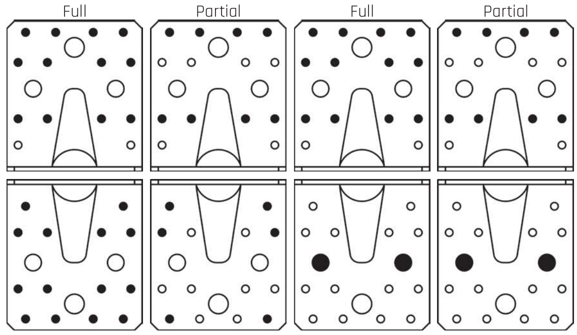
TYPE 90/100S 1.5 GREENLINE with rib
9003S20

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



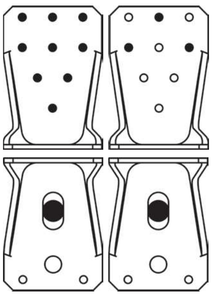
TYPE 90/100S 3.0 with rib
9003S

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



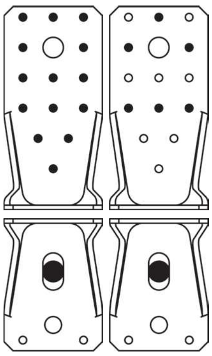
KR slotted hole 95 mm
1100953L / 110953L

Full | Partial



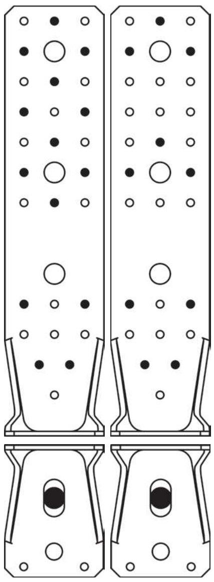
KR slotted hole 135 mm
1101353L / 110135L

Full | Partial



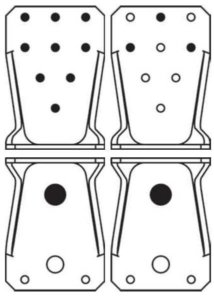
KR slotted hole 285 mm
1102853L / 110285L

Full | Partial



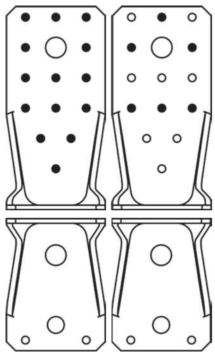
KR round hole 95 mm
1100953 / 110095

Full | Partial



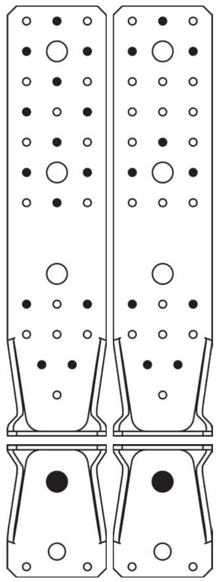
KR round hole 135 mm
1101353 / 110135

Full | Partial

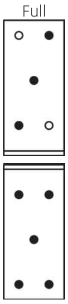


KR round hole 285 mm
1102853 / 110285

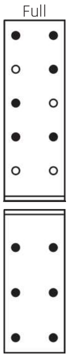
Full | Partial



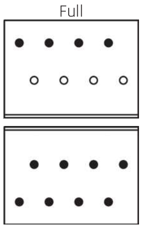
TYPE 40/90
994
Timber/timber
Full



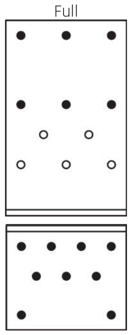
TYPE 40/120
1293
Timber/timber
Full



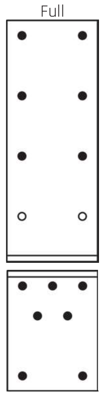
TYPE 692
692
Timber/timber
Full



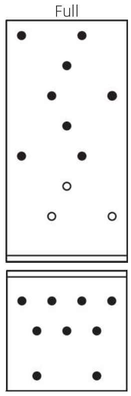
Extra thick
1884
Timber/timber
Full



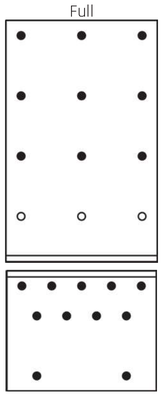
Extra thick
12116186
Timber/timber
Full



Extra thick
12116188
Timber/timber
Full

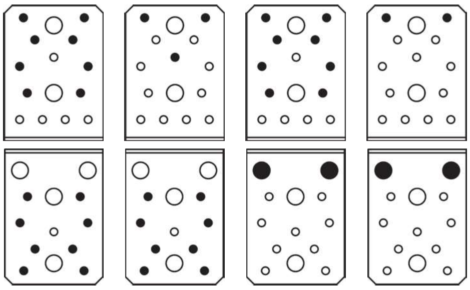


Extra thick
12116181
Timber/timber
Full



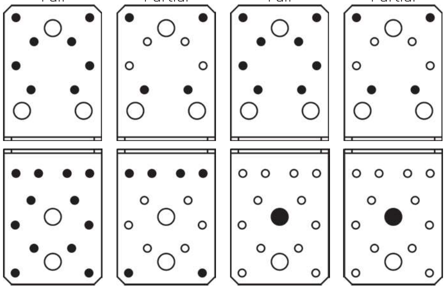
TYPE 65/90S 1.5 GREENLINE without rib
6504S15

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



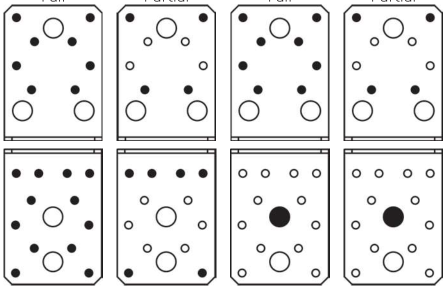
TYPE 65/90 2.5 without rib
6504S

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



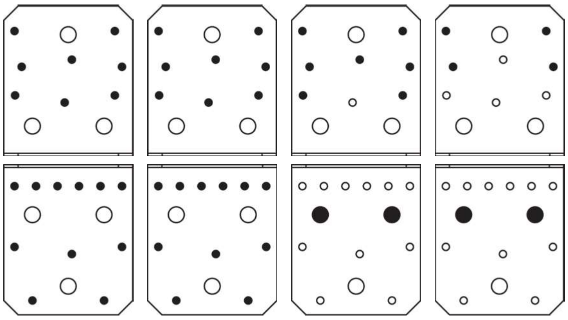
TYPE 65/90S13 without rib / hole Ø 13mm
6504S13

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



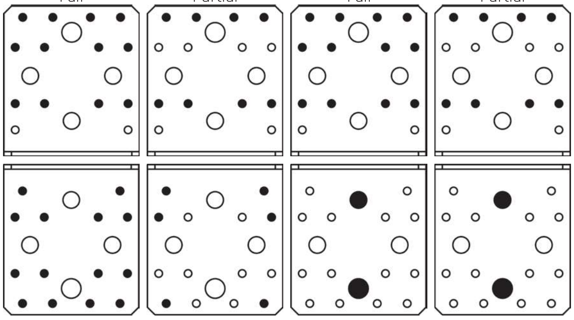
TYP 90/100S 1.5 GREENLINE without rib
9004S20

Purlin/purlin | Column/purlin | Purlin/concrete | Column/concrete



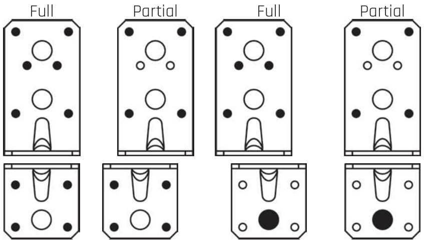
TYPE 90/100S 3.0 without rib
9004S

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



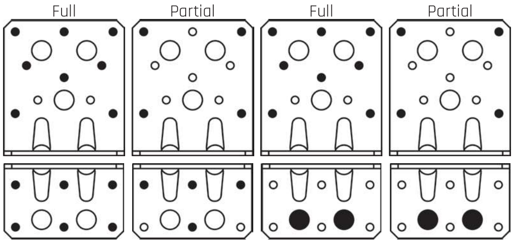
TYPE 50
595

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



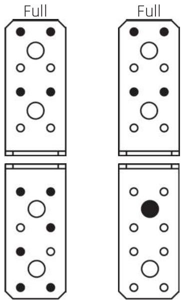
TYPE 80
598

Timber/timber Full | Timber/timber Partial | Timber/concrete Full | Timber/concrete Partial



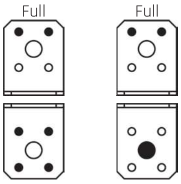
TYPE 40
993

Timber/timber Full | Timber/concrete Full



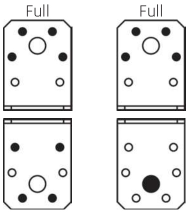
TYPE 40
543

Timber/timber Full | Timber/concrete Full



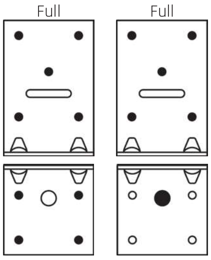
TYPE 45
645

Timber/timber Full | Timber/concrete Full



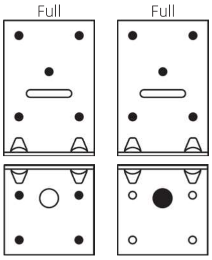
TYPE RL
16910

Timber/timber Full | Timber/concrete Full



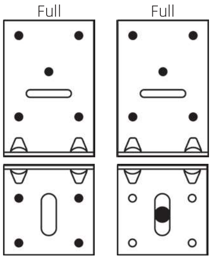
TYPE RL
16913

Timber/timber Full | Timber/concrete Full



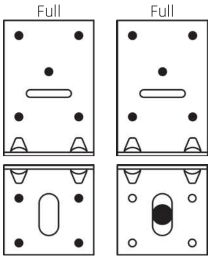
TYPE LL
26910

Timber/timber Full | Timber/concrete Full



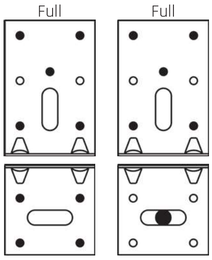
TYP LL
26913

Timber/timber Full | Timber/concrete Full



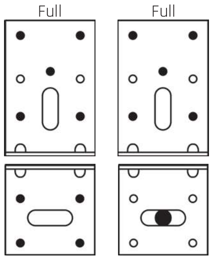
TYPE LLG
3691015

Timber/timber Full | Timber/concrete Full

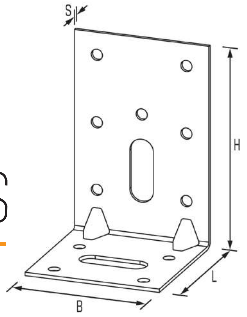


TYPE LLG
3691025

Timber/timber Full | Timber/concrete Full



MOUNTING BRACKETS



ETA-09
0322

NKL 2

250
GD
Z275

TYPE LLG

3

Art. No.	Dimensions [mm]							nN	LL	LL	EAN	Weight	Pallet	PU		
	H	x	L	x	W(B)	x	T(S)	Ø 5	Ø	Ø	4019346	kg				
3691015	90	x	60	x	60	x	1,5	11	10,5x28	10x30	111505	0.092	4800	100	■	■
3691025	90	x	60	x	60	x	2,5	11	10,5x28	10x30	111512	0.154	4800	100	■	■

The angle brackets are mainly suitable for securing the position of columns on concrete slabs, steel beams and timber sleepers. They are also for securing the position of rafters on beams.

The bracket with the slotted hole has the advantage that the processing in the area of the connection allows greater variability. The optimum fit of the bracket is guaranteed by the slotted hole.

MOUNTING BRACKETS TYPE LLG

Timber / Timber

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,s,Rk}$	$F_{2/3,T,Rk}$	$F_{4,T,Rk}$	$F_{4,S,RK}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$^*F_{4/5,T,Rk}$	$^*F_{4/5,S,Rk}$
3691015	90	60	60	1,5	9	Full	4.0x40	0,18	0,18	3,36	0,11	0,11	1,17	0,95	0,37	0,35
							4.0x60	0,31	0,18	4,21	0,19	0,11	1,95	0,95	0,61	0,35
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-
3691025	90	60	60	2,5	9	Full	4.0x40	0,18	0,30	3,36	0,11	0,18	1,17	1,62	0,37	0,60
							4.0x60	0,31	0,30	4,21	0,19	0,18	1,95	1,62	0,61	0,60
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-

Values are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled.

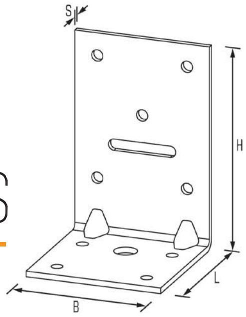
Timber / Concrete

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,S,Rk}$	$k_{1,t,ax}$	$F_{2/3,T,RK}$	$k_{2/3,t,v}$	$F_{4,T,Rk}$	$F_{4,S,Rk}$	$k_{4,t,v}$	$k_{4,t,ax}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$k_{5,t,v}$	$k_{5,t,ax}$	$^*F_{4/5,T,Rk}$	$^*F_{4/5,S,Rk}$	$k_{4/5,t,v}$	$k_{4/5,t,ax}$
3691015	90	60	60	1,5	5	Full	4.0x40	9,45	0,14	7,67	-	-	0,39	0,14	1,00	7,62	1,17	0,95	1,00	0,35	9,00	0,28	1,00	3,83
							4.0x60	11,82	0,14	7,67	-	-	0,65	0,14	1,00	7,62	1,95	0,95	1,00	0,35	15,00	0,28	1,00	3,83
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3691025	90	60	60	2,5	5	Full	4.0x40	9,45	0,24	7,67	-	-	0,39	0,24	1,00	7,62	1,17	1,62	1,00	0,35	9,00	0,48	1,00	3,83
							4.0x60	11,82	0,24	7,67	-	-	0,65	0,24	1,00	7,62	1,95	1,62	1,00	0,35	15,00	0,48	1,00	3,83
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

alues are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled and the values $F_{1,v,k}$, $F_{1,ax,k}$, $F_{2/3,v,k}$ halved.

MOUNTING BRACKETS

TYPE RL



ETA-09 0322

NKL 2

250 GD Z275

Art. No.	Dimensions [mm]							nN	LL	LL	EAN	Weight	Pallet	PU		
	H	x	L	x	W(B)	x	T(S)	Ø 5	Ø	Ø	4019346	kg				
16910	90	x	60	x	60	x	2,5	9	1x10	5x30	110362	0.154	4800	100	■	■
16913	90	x	60	x	60	x	2,5	9	1x12	5x30	110379	0.154	4800	100	■	■

MOUNTING BRACKETS TYPE RL

Timber / Timber

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,s,Rk}$	$F_{2/3,T,Rk}$	$F_{4,T,Rk}$	$F_{4,S,RK}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$^*F_{4/5,T,Rk}$	$^*F_{4/5,S,Rk}$
16910	90	60	60	2,5	9	Full	4.0x40	0,20	0,36	3,43	0,11	0,20	1,17	1,62	0,40	0,72
							4.0x60	0,33	0,36	4,32	0,19	0,20	1,95	1,62	0,67	0,72
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-
16913	90	60	60	2,5	9	Full	4.0x40	0,20	0,36	3,43	0,11	0,20	1,17	1,62	0,40	0,72
							4.0x60	0,33	0,36	4,32	0,19	0,20	1,95	1,62	0,67	0,72
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-

Values are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled.

Timber / Concrete

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,S,Rk}$	$k_{1,t,ax}$	$F_{2/3,T,RK}$	$k_{2/3,t,v}$	$F_{4,T,Rk}$	$F_{4,S,Rk}$	$k_{4,t,v}$	$k_{4,t,ax}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$k_{5,t,v}$	$k_{5,t,ax}$	$^*F_{4/5,T,Rk}$	$^*F_{4/5,S,Rk}$	$k_{4/5,t,v}$	$k_{4/5,t,ax}$
16910	90	60	60	2,5	5	Full	4.0x40	9,45	0,55	5,40	2,44	1,00	0,39	0,37	1,00	8,00	1,17	1,62	1,00	0,39	9,00	1,09	1,00	2,70
							4.0x60	11,82	0,55	5,40	3,40	1,00	0,65	0,37	1,00	8,00	1,95	1,62	1,00	0,39	15,00	1,09	1,00	2,70
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16913	90	60	60	2,5	5	Full	4.0x40	9,45	0,63	4,67	2,44	1,00	0,39	0,44	1,00	6,67	1,17	1,62	1,00	0,39	9,00	1,26	1,00	2,33
							4.0x60	11,82	0,63	4,67	3,40	1,00	0,65	0,44	1,00	6,67	1,95	1,62	1,00	0,39	15,00	1,26	1,00	2,33
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Values are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled and the values $F_{1,v,k}$, $F_{1,ax,k}$, $F_{2/3,v,k}$ halved.

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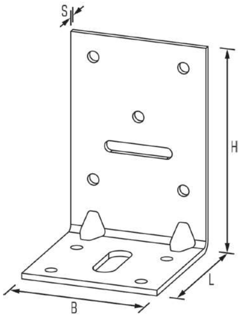
MOUNTING BRACKETS

TYPE LL



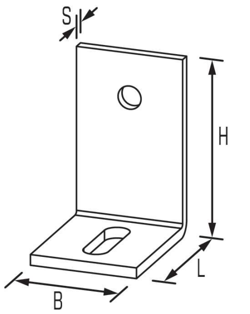
NKL 2

250 GD Z275

3

Art. No.	Dimensions [mm] H	x	L	x	W(B)	x	T(S)	nN Ø 5	LL Ø	LL Ø	EAN 4019346	Weight kg	Pallet	PU		
26910	90	x	60	x	60	x	2,5	9	10x28	5x28	110386	0.154	4800	100	■	■
26913	90	x	60	x	60	x	2,5	9	13x28	5x28	110393	0.154	4800	100	■	■

CONCRETE BRACKETS



NKL 2

235 JR feuerverzinkt

Art. No.	Dimensions [mm] H	x	L	x	W(B)	x	T(S)	Ø	LL	EAN 4019346	Weight kg	Pallet	PU		
110A	75	x	75	x	60	x	6,0	14	14x45	110485	0.371	2000	40		■
111A	100	x	75	x	60	x	6,0	14	14x45	110492	0.432	1440	20		■
112A	150	x	75	x	60	x	8,0	14	14x45	110508	0.741	1000	20		■
115AX	150	x	75	x	60	x	8,0	18	18x45	110003	0.741	1000	20		■

Concrete brackets are suited to fixing timber constructions on concrete. They are available in the standard version with a slotted hole and with an open slotted hole on request. Other dimensions are also available on request.

MOUNTING BRACKETS TYPE LL

Timber / Timber

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,s,Rk}$	$F_{2/3,T,Rk}$	$F_{4,T,Rk}$	$F_{4,S,RK}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$*F_{4/5,T,Rk}$	$*F_{4/5,S,Rk}$
26910	90	60	60	2,5	9	Full	4.0x40	0,20	0,36	3,43	0,11	0,20	1,17	1,62	0,40	0,72
							4.0x60	0,33	0,36	4,32	0,19	0,20	1,95	1,62	0,67	0,72
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-
26913	90	60	60	2,5	9	Full	4.0x40	0,20	0,36	3,43	0,11	0,20	1,17	1,62	0,40	0,72
							4.0x60	0,33	0,36	4,32	0,19	0,20	1,95	1,62	0,67	0,72
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-

Values are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled.

Timber / Concrete

Art. No.	H	L	W(B)	T(S)	na	NB	VM	$F_{1,T,Rk}$	$F_{1,S,Rk}$	$k_{1,t,ax}$	$F_{2/3,T,RK}$	$k_{2/3,t,v}$	$F_{4,T,Rk}$	$F_{4,S,Rk}$	$k_{4,t,v}$	$k_{4,t,ax}$	$F_{5,T,Rk}$	$F_{5,S,Rk}$	$k_{5,t,v}$	$k_{5,t,ax}$	$*F_{4/5,T,Rk}$	$*F_{4/5,S,Rk}$	$k_{4/5,t,v}$	$k_{4/5,t,ax}$
26910	90	60	60	2,5	5	Full	4.0x40	9,45	0,16	9,40	1,66	1,00	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	11,82	0,16	9,40	2,52	1,00	-	-	-	-	-	-	-	-	-	-	-	-
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26913	90	60	60	2,5	5	Full	4.0x40	9,45	0,22	7,23	1,70	1,00	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	11,82	0,22	7,23	2,58	1,00	-	-	-	-	-	-	-	-	-	-	-	-
					-	Partial	4.0x40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
							4.0x60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Values are valid for 1 angle bracket (* 2 angle brackets opposite each other), GH nail, ρk = 350 kg/m³, f = 0 mm, e = 40 mm, b = 80 mm, unit of length in mm, unit for force in kN.
For 2 angle brackets opposite each other, the values $F_{1,T,Rk}$, $F_{1,S,Rk}$, $F_{2/3,T,Rk}$ can be doubled and the values $F_{1,v,k}$, $F_{1,ax,k}$, $F_{2/3,v,k}$ halved.