

Leistungserklärung / Declaration of Performance

18266_00031(03)_2019

- **Eindeutiger Kenncode des Produkttyps / Unique identification code of the product type**
HV2600, HV2610, HV2645, HV2700, HV2710, HV2720, HV2730, HV2775, HV3100, HV3110, HV3120, HV3130, HV3135, HV3140, HVG2600, HVG2610, HVG2620, HVG2630, HVG2650, HVG2655, HVG2700, HVG2710, HVG2720, HVG2730, HVG2760, HVG2770, HVR2645, HVR2650

- **Verwendungszweck(e) / Usage(s)**
Winkel und Niederhalter für Holz-Holz-, Holz-Stahl- oder Holz-Beton-Verbindungen

- **Hersteller / Manufacturer**
Conmetall Meister GmbH
Hafenstraße 26
29223 Celle Germany

- **System(e) zur Bewertung und Überprüfung der Leistungsbeständigkeit / System(s) for evaluating and verifying constancy of performance**
System 2+

- **Europäisch Technische Bewertung / European Technical Assessment**

Europäisches Bewertungsdokument / European evaluation document:

ETAG No.015 04.2013

Europäisch technische Bewertung / European technical evaluation:

ETA-11/0296 16.08.2017

Technische Bewertungsstelle / Technical Assessment Body:

ETA-Danmark A/S

Notifizierte Stelle / Notified body:

0769

- **Wesentliche Merkmale und erklärte Leistung(en) / Essential features and stated performance(s)**

Wesentliches Merkmal <i>Essential features</i>	Leistung <i>Performance</i>	Harmonisierte technische Spezifikation <i>Harmonized technical specification</i>
Charakteristische Tragfähigkeit / <i>Characteristic load-carrying capacity</i>	Annex B	ETA11/0296 P3.1
Steifigkeit / <i>Stiffness</i>	NPD	ETA11/0296 P3.1
Duktilität beim zyklischen Testen / <i>Ductility in cyclic testing</i>	NPD	ETA11/0296 P3.1
Brandverhalten / <i>reaction to fire</i>	A1	ETA11/0296 P3.2 EN 1350-1
Einfluss auf Luftqualität / <i>Influence on air quality</i>	Das Produkt enthält keine gefährlichen Stoffe, die in TR 034 vom März 2012 angegeben sind <i>The product does not contain/release dangerous sub- stances that are stated in TR 034 dated March 2012</i>	ETA11/0296 P. 3.3



Wesentliches Merkmal <i>Essential features</i>	Leistung <i>Performance</i>	Harmonisierte technische Spezifikation <i>Harmonized technical specification</i>
Nachhaltiger Gebrauch natürlicher Ressourcen <i>Sustainable use of natural resources</i>	NPD	ETA11/0297 P.3.7
Allgemeine Aspekte in Bezug auf die Leistung des Produkts / <i>General aspects related to the performance of the product</i>	Nutzungsklassen 1 und 2 bei Holzkonstruktionen unter Verwendung von Holzarten gem. Eurocode 5 <i>Usage classes 1 and 2 for timber constructions using wood species acc. Eurocode 5</i>	ETA11/0297 P.3.8
Identifizierung / <i>Identification</i>	Tab 1	ETA11/0297 P.3.8

Art.-Nr	Winkel Art <i>Bracket type</i>	ETA Art.-Nr.	Dicke <i>Thickness</i>	Stahl Spezifikation <i>Steel specification</i>	Beschichtung <i>Coating</i>
HV2600 / HVG2600	50x50x35	4764000	2,5	S250GD / Z275	Z275
HV2610 / HVG2610	70x70x55	4765020	2,0	S250GD / Z275	Z275
HV2645	70x70x55 with rib	4765100	2,5	S250GD / Z275	Z275
HV2700 / HVG2700	40x40x60	4771000	2,5	S250GD / Z275	Z275
HV2710 / HVG2710	60x60x40	4772000	2,5	S250GD / Z275	Z275
HV2720 / HVG2720	60x60x50	4773000	2,5	S250GD / Z275	Z275
HV2730 / HVG2730	60x60x60	4774000	2,5	S250GD / Z275	Z275
HV2775	100x60x60	4776000	2,5	S250GD / Z275	Z275
HV3100	200x40x38	4791000	2,0	S250GD / Z275	Z275
HV3110	300x40x38	4792000	2,0	S250GD / Z275	Z275
HV3120	400x40x38	4793000	2,0	S250GD / Z275	Z275
HV3130	500x40x38	4794000	2,0	S250GD / Z275	Z275
HV3135	302x40x40	4792400	4,0	S250GD / Z275	Z275
HV3140	402x40x40	4793400	4,0	S250GD / Z275	Z275
HVG2620	90x90x40	4766000	3,0	S250GD / Z275	Z275
HVG2630	90x90x65	4767000	2,0	S350GD / Z275	Z275
HVG2650	90x90x65 With rib	4769000	2,0	S350GD / Z275	Z275
HVG2655	100x100x90	4768000	3,0	S250GD / Z275	Z275

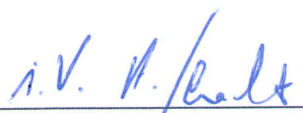
Die Leistung des vorstehenden Produkts entspricht der erklärten Leistung/ den erklärten Leistungen. Für die Erstellung der Leistungserklärung im Einklang mit der Verordnung (EU) Nr. 305/2011 ist allein der obengenannte Hersteller verantwortlich.

Unterzeichnet für den Hersteller und im Namen des Herstellers von:

The performance of the above product is the declared performance. The above manufacturer is solely responsible for drawing up the declaration of performance in accordance with Regulation (EU) No 305/2011.

Signed for the manufacturer and on behalf of the manufacturer of:

Conmetall Meister GmbH
Celle, 22.10.2019


i. V. Andreas Schacht
Leitung Einkauf Eisenwaren /
Head of purchasing ironmongery


i. A. Christian Ehle
Leitung Qualitätsmanagement Celle /
Head of quality management Celle



Annex B

Angle brackets Characteristic load-carrying capacities

Table 1: Force F_1 Column, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_V	Nail number n_H	$F_{1,Rk}$ [kN] (column)	
				Timber	Steel
40x40x60	4771000	-	-	-	-
50x50x35	4764000	-	-	-	-
60x40x60	4783000	-	-	-	-
60x60x40	4772000	-	-	-	-
60x60x50	4773000	-	-	-	-
60x60x60	4774000	-	-	-	-
60x60x80	4775000	-	-	-	-
60x60x100	4776000	-	-	-	-
70x70x55	4765020	1,2,3	11,12,13,14,16,18,19,20	3,51	1,33
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	2,34	2,65
70x70x55	4765000	1,2,3	9,10,11,12,14,15,16	2,34	2,34
70x70x55 with rib	4765100	1,2,3	9,10,11,12,14,15,16	2,34	7,44
80x60x60	4784000	1,2,3	13,14,15,17,18,19	2,57	4,60
80x80x100	4779000	1,2,3,4,5	19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36	5,06	5,00
90x48x48	4759000	1,2,4	10,11,13,14	1,98	2,85
90x48x76	4759100	1,2,3,6	16,17,21,22,23	2,30	7,07
90x48x116	4759200	1,2,3,4,5	22,23,25,26,29,30,31	3,96	7,20
90x90x40	4766000	1,2	11,12,14,15,19,20	2,40	1,88
90x90x65	4767150	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	3,75	1,31
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	4,17	5,12
90x90x65	4767000	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	3,75	2,60
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	4,17	6,14
90x90x65	4767000-A	1,2	12,13,16,17,21,22	2,41	2,46
90x90x65 with rib	4769000-A	1,2	12,13,16,17,21,22	2,41	6,90
100x100x60	4780000	1,2,3,4,5	15,16,17,18,19,20,21,22,23,24,25,26,27,28	2,64	3,13
100x100x80	4781000	1,2,3,4,5,6,7	18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34	3,96	4,06
100x100x90	4768000	1,2,3,4,5,6,8,9	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	2,62	6,92
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	5,25	20,9



100x100x100	4782000	1,2,3,4,5,6,7,8,9	23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44	5,28	5,00
105x105x90	4768020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	5,16	3,27
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	8,12	8,68
105x105x90	4768300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	5,16	5,25
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	8,12	11,7
140x40x40	4784200	1,2,6,7,9,10	16,17,19,20	2,34	4,22

Table 2: Force F₁ Column, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n _V	Nail number n _H	F _{1,Rk} [kN] (column)	
				Timber	Steel
40x40x60	4771000	-	-	-	-
50x50x35	4764000	-	-	-	-
60x40x60	4783000	-	-	-	-
60x60x40	4772000	-	-	-	-
60x60x50	4773000	-	-	-	-
60x60x60	4774000	-	-	-	-
60x60x80	4775000	-	-	-	-
60x60x100	4776000	-	-	-	-
70x70x55	4765020	1,2,3	11,12,13,14,16,18,19,20	1,75	0,67
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	1,17	1,32
70x70x55	4765000	1,2,3	9,10,11,12,14,15,16	1,17	1,17
70x70x55 with rib	4765100	1,2,3	9,10,11,12,14,15,16	1,17	3,72
80x60x60	4784000	1,2,3	13,14,15,17,18,19	1,28	2,30
80x80x100	4779000	1,2,3,4,5	19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36	2,53	2,50
90x48x48	4759000	1,2,4	10,11,13,14	0,99	1,43
90x48x76	4759100	1,2,3,6	16,17,21,22,23	1,15	3,54
90x48x116	4759200	1,2,3,4,5	22,23,25,26,29,30,31	1,98	3,60
90x90x40	4766000	1,2	11,12,14,15,19,20	1,20	0,94
90x90x65	4767150	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	1,88	0,66
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	2,08	2,56
90x90x65	4767000	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	1,88	1,30
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	2,08	3,07
90x90x65	4767000-A	1,2	12,13,16,17,21,22	1,21	1,23
90x90x65 with rib	4769000-A	1,2	12,13,16,17,21,22	1,21	3,45
100x100x60	4780000	1,2,3,4,5	15,16,17,18,19,20,21,22,	1,32	1,56



			23,24,25,26,27,28		
100x100x80	4781000	1,2,3,4,5,6,7	18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34	1,98	2,03
100x100x90	4768000	1,2,3,4,5,6,8,9	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	1,31	3,46
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	2,62	10,43
100x100x100	4782000	1,2,3,4,5,6,7,8,9	23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44	2,64	2,50
105x105x90	4768020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	2,58	1,63
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	4,06	4,34
105x105x90	4768300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	2,58	2,63
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	4,06	5,83
140x40x40	4784200	1,2,6,7,9,10	16,17,19,20	1,17	2,11

Table 3: Force F_t Column, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	max. number of nails*	Bolt number n_H	$F_{t,Rk}$ [kN] (column)		Bolt factor $k_{t,II}$
					Timber	Steel	
70x70x55	4765020	20,19,18	3	9,4	9,73	2,06	0,7
70x70x55 with rib	4765120	16,15,14	3	4	9,73	0,54	2,0
90x90x65	4767150	23,22,20,19,18	5	11,10	16,3	1,69	0,6
90x90x65 with rib	4769150	20,19,17,16,15	5	10,9	16,3	4,68	0,6
90x90x65	4767000	23,22,20,19,18	5	11,10	16,1	3,36	0,6
90x90x65 with rib	4769000	20,19,17,16,15	5	10,9	16,1	7,03	0,6
105x105x90	4768020	40,39,38,37,35,34,33,32	8	19,18	25,9	4,98	0,6
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	8	19,18	25,9	11,4	0,6
105x105x90	4768300	40,39,38,37,35,34,33,32	8	19,18	25,5	8,00	0,6
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	8	19,18	25,5	18,4	0,6
PKR 95 x 85	4756000	1,2,3,4,5,6	6	11	18,9	17,2	0,73
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11,12	11	17	37,7	17,2	0,73
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31	28	36	88,0	17,2	0,73
PKR 95 x 85 with slotted hole	4756100	1,2,3,4,5,6	6	11	18,9	9,00	0,93
PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11,12	11	17	37,7	9,00	0,93
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,	28	36	88,0	9,00	0,93



		22,23,24,26,27,28,29,30,31				
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*A smaller number of nails may be used. $F_{1,Rk}$ for timber failure has to be reduced accordingly.

Table 4: Force F_1 Column, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail number n_v	max. number of nails*	Bolt number n_H	$F_{1,Rk}$ [kN] (column)		Bolt factor $k_{t,H}$
					Timber	Steel	
70x70x55	4765020	20,19,18	3	9,4	4,86	1,03	1,3
70x70x55 with rib	4765120	16,15,14	3	4	4,86	0,27	4,1
90x90x65	4767150	23,22,20,19,18	5	11,10	8,17	0,85	1,3
90x90x65 with rib	4769150	20,19,17,16,15	5	10,9	8,17	2,34	1,3
90x90x65	4767000	23,22,20,19,18	5	11,10	8,04	1,68	1,3
90x90x65 with rib	4769000	20,19,17,16,15	5	10,9	8,04	3,51	1,3
105x105x90	4768020	40,39,38,37,35,34,33,32	8	19,18	13,0	2,49	1,2
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	8	19,18	13,0	5,71	1,2
105x105x90	4768300	40,39,38,37,35,34,33,32	8	19,18	12,8	4,00	1,2
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	8	19,18	12,8	9,18	1,2
PKR 95 x 85	4756000	1,2,3,4,5,6	6	11	9,43	8,58	1,45
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11,12	11	17	18,9	8,58	1,45
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31	28	36	44,0	8,58	1,45
PKR 95 x 85 with slotted hole	4756100	1,2,3,4,5,6	6	11	9,43	4,50	1,86
PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11,12	11	17	18,9	4,50	1,86
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31	28	36	44,0	4,50	1,86

*A smaller number of nails may be used. $F_{1,Rk}$ for timber failure has to be reduced accordingly.

Table 5: Force F_1 Purlin, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{1,Rk}$ [kN] (purlin)	
				Timber	Steel
40x40x60	4771000	1,2	6,7,8,9,10	1,95	3,13
50x50x35	4764000	1,2	6,7,9,10	1,99	1,26
60x40x60	4783000	1,2,3	9,10,12,13	1,65	2,20
60x60x40	4772000	1,2,3	6,7,8,9,10	1,17	2,19
60x60x50	4773000	3,4	9,10,15,16	2,35	2,50
60x60x60	4774000	1,2,3,4,5	9,10,11,12,13,14,15,16	2,35	3,13
60x60x80	4775000	1,2,3,4,5,6,7	11,12,13,14,15,16,17,18,19,20	3,52	4,06
60x60x100	4776000	1,2,3,4,5,6,7,8,9	14,15,16,17,18,19,20	5,87	4,69



			21,22,23,24,25,26,27		
70x70x55	4765020	1,2,3,5,6,7	11,12,13,14,16,18,19,20	3,51	1,33
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	2,34	2,65
70x70x55	4765000	1,2,3,5,6	9,10,11,12,14,15,16	2,34	2,34
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	2,34	7,44
80x60x60	4784000	1,2,3,7,8	13,14,15,17,18,19	2,57	4,60
80x80x100	4779000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36	5,06	5,00
90x48x48	4759000	1,2,4,5,6,7	10,11,13,14	1,98	2,85
90x48x76	4759100	1,2,3,6,7,8,9,10, 11,12	16,17,21,22,23	2,30	7,07
90x48x116	4759200	1,2,3,4,5,8,9,10,11, 12,13,15,16,17,18	22,23,25,26,29,30,31	3,96	7,20
90x90x40	4766000	1,2,6,7	11,12,14,15,19,20	2,40	1,88
90x90x65	4767150	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22, 23	3,75	1,31
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	4,17	5,12
90x90x65	4767000	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22, 23	3,75	2,60
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	4,17	6,14
90x90x65	4767000-A	1,2,6,7,8,9	12,13,16,17,21,22	2,41	2,46
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	2,41	6,90
100x100x60	4780000	1,2,3,4,5,6,7, 8,9,10,11	15,16,17,18,19,20,21,22, 23,24,25,26,27,28	2,64	3,13
100x100x80	4781000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	18,19,20,21,22,23,24,25, 26,27,28,29,30,31, 32,33,34	3,96	4,06
100x100x90	4768000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27, 28,29,30,31,33,34, 35,36,37,38	2,62	6,92
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27, 28,29,30,31,33,34,35, 36,37,38	5,25	20,86
100x100x100	4782000	1,2,3,4,5,6,8,9,10, 11,12,13,14,15, 16,17,18	23,24,25,26,27,28,29,30, 31,32,33,34,35,36,37,38, 39,40,41,42,43,44	5,28	5,00
105x105x90	4768020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,32,33,34,35,37,38, 39,40	5,16	3,27
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,32,33,34,35,37,38, 39,40	8,12	8,68
105x105x90	4768300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,32,33,34,35,37,38, 39,40	5,16	5,25
105x105x90	4770300	1,2,3,4,6,7,8,9,10,11,	20,21,22,23,24,25,26,27,28,	8,12	11,7



with rib		12,13,14,15,16,17	29,30,31,32,33,34,35,37,38,39,40		
140x40x40	4784200	1,2,6,7,9,10,11,12	16,17,19,20	2,34	4,22

Table 6: Force F_1 Purlin, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{1,Rk}$ [kN] (purlin)	
				Timber	Steel
40x40x60	4771000	1,2	6,7,8,9,10	0,98	1,56
50x50x35	4764000	1,2	6,7,9,10	1,00	0,63
60x40x60	4783000	1,2,3	9,10,12,13	0,83	1,10
60x60x40	4772000	1,2,3	6,7,8,9,10	0,59	1,09
60x60x50	4773000	3,4	9,10,15,16	1,17	1,25
60x60x60	4774000	1,2,3,4,5	9,10,11,12,13,14,15,16	1,17	1,56
60x60x80	4775000	1,2,3,4,5,6,7	11,12,13,14,15,16,17,18,19,20	1,76	2,03
60x60x100	4776000	1,2,3,4,5,6,7,8,9	14,15,16,17,18,19,20,21,22,23,24,25,26,27	2,93	2,34
70x70x55	4765020	1,2,3,5,6,7	11,12,13,14,16,18,19,20	1,75	0,67
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	1,17	1,32
70x70x55	4765000	1,2,3,5,6	9,10,11,12,14,15,16	1,17	1,17
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	1,17	3,72
80x60x60	4784000	1,2,3,7,8	13,14,15,17,18,19	1,28	2,30
80x80x100	4779000	1,2,3,4,5,6,7,8,9,10,11,12,13,14	19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36	2,53	2,50
90x48x48	4759000	1,2,4,5,6,7	10,11,13,14	0,99	1,43
90x48x76	4759100	1,2,3,6,7,8,9,10,11,12	16,17,21,22,23	1,15	3,54
90x48x116	4759200	1,2,3,4,5,8,9,10,11,12,13,15,16,17,18	22,23,25,26,29,30,31	1,98	3,60
90x90x40	4766000	1,2,6,7	11,12,14,15,19,20	1,20	0,94
90x90x65	4767150	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	1,88	0,66
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	2,08	2,56
90x90x65	4767000	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	1,88	1,30
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	2,08	3,07
90x90x65	4767000-A	1,2,6,7,8,9	12,13,16,17,21,22	1,21	1,23
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	1,21	3,45
100x100x60	4780000	1,2,3,4,5,6,7,8,9,10,11	15,16,17,18,19,20,21,22,23,24,25,26,27,28	1,32	1,56
100x100x80	4781000	1,2,3,4,5,6,7,8,9	18,19,20,21,22,23,24	1,98	2,03



		10,11,12,13,14	25,26,27,28,29,30,31,32,33,34		
100x100x90	4768000	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	1,31	3,46
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,33,34,35,36,37,38	2,62	10,43
100x100x100	4782000	1,2,3,4,5,6,8,9,10,11,12,13,14,15,16,17,18	23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44	2,64	2,50
105x105x90	4768020	1,2,3,4,6,7,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	2,58	1,63
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	4,06	4,34
105x105x90	4768300	1,2,3,4,6,7,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	2,58	2,63
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10,11,12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,38,39,40	4,06	5,83
140x40x40	4784200	1,2,6,7,9,10,11,12	16,17,19,20	1,17	2,11

Table 7: Force F₁ Purlin, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail/Screw number n _v	max. number of nails/screws*	Bolt number n _H	F _{1,Rk} [kN] (purlin)		Bolt factor k _{t,H}
					Timber	Steel	
70x70x55	4765020	20,19,18,16,15,14	6	9,4	19,5	2,06	0,7
70x70x55 with rib	4765120	16,15,14,12,11	5	4	16,2	0,54	2,0
90x90x65	4767150	23,22,20,19,18,17,16,15	8	11,10	26,1	1,69	0,6
90x90x65 with rib	4769150	20,19,17,16,15,14,13	7	10,9	22,9	4,68	0,6
90x90x65	4767000	23,22,20,19,18,17,16,15	8	11,10	25,7	3,36	0,6
90x90x65 with rib	4769000	20,19,17,16,15,14,13	7	10,9	22,5	7,03	0,6
105x105x90	4768020	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	51,9	4,98	0,6
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	51,9	11,4	0,6
105x105x90	4768300	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	51,1	8,00	0,6
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	51,1	18,4	0,6
60x60x60	4757060	1,2,4,5	4	8,9	7,71	2,85	0,7
80x60x60	4757080	1,2,5,6,8,9	6	12,13	11,6	2,85	0,7
100x60x60	4757100	2,3,6,7,10,11,13,14	8	17,18	15,4	2,85	0,7
120x60x60	4757120	1,2,4,5,8,9,12,13,16,17,19,20	12	23,24	23,1	2,85	0,7



140x60x60	4757140	1,2,5,6,8,9,12,13,16,17,20,21	12	23,24	23,1	2,85	0,7
160x60x60	4757160	2,3,6,7,10,11,13,14,17,18,21	11	22,23	21,2	2,85	0,7
180x60x60	4757180	1,2,4,5,8,9,12,13,16,17,19,20	12	23,24	23,1	2,85	0,7
200x60x60	4757200	1,2,5,6,8,9,12,13,16,17,20,21	12	23,24	23,1	2,85	0,7
220x60x60	4757220	2,3,6,7,10,11,13,14,17,18,21,22	12	24,25	23,1	2,85	0,7
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	9	11	28,3	17,2	0,73
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11,12,13,14,15	14	17	47,1	17,2	0,73
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	31	36	97,4	17,2	0,73
PKR 95 x 85 with slotted hole	4756100	1,2,3,4,5,6,7,8,9	9	11	28,3	9,00	0,93
PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11,12,13,14,15	14	17	47,1	9,00	0,93
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	31	36	97,4	9,00	0,93

*A smaller number of nails may be used. $F_{1,Rk}$ for timber failure has to be reduced accordingly.

Table 8: Force F_1 Purlin, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail/Screw number n_v	max. number of nails/screws*	Bolt number n_H	$F_{1,Rk}$ [kN] (purlin)		Bolt factor $k_{t,H}$
					Timber	Steel	
70x70x55	4765020	20,19,18,16,15,14	6	9,4	9,73	1,03	1,3
70x70x55 with rib	4765120	16,15,14,12,11	5	4	8,11	0,27	4,1
90x90x65	4767150	23,22,20,19,18,17,16,15	8	11,10	13,1	0,85	1,3
90x90x65 with rib	4769150	20,19,17,16,15,14,13	7	10,9	11,4	2,34	1,3
90x90x65	4767000	23,22,20,19,18,17,16,15	8	11,10	12,9	1,68	1,3
90x90x65 with rib	4769000	20,19,17,16,15,14,13	7	10,9	11,3	3,51	1,3
105x105x90	4768020	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	25,9	2,49	1,2
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	25,9	5,71	1,2
105x105x90	4768300	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	25,5	4,00	1,2
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	16	19,18	25,5	9,18	1,2
60x60x60	4757060	1,2,4,5	4	8,9	3,85	1,43	1,5
80x60x60	4757080	1,2,5,6,8,9	6	12,13	5,78	1,43	1,5
100x60x60	4757100	2,3,6,7,10,11,13,14	8	17,18	7,71	1,43	1,5
120x60x60	4757120	1,2,4,5,8,9,12,13,16,17,19,20	12	23,24	11,6	1,43	1,5



140x60x60	4757140	1,2,5,6,8,9,12,13,16,17,20,21	12	23,24	11,6	1,43	1,5
160x60x60	4757160	2,3,6,7,10,11,13,14,17,18,21	11	22,23	10,6	1,43	1,5
180x60x60	4757180	1,2,4,5,8,9,12,13,16,17,19,20	12	23,24	11,6	1,43	1,5
200x60x60	4757200	1,2,5,6,8,9,12,13,16,17,20,21	12	23,24	11,6	1,43	1,5
220x60x60	4757220	2,3,6,7,10,11,13,14,17,18,21,22	12	24,25	11,6	1,43	1,5
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	9	11	14,1	8,58	1,45
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11,12,13,14,15	14	17	23,6	8,58	1,45
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	31	36	48,7	8,58	1,45
PKR 95 x 85 with slotted hole	4756100	1,2,3,4,5,6,7,8,9	9	11	14,1	4,50	1,86
PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11,12,13,14,15	14	17	23,6	4,50	1,86
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	31	36	48,7	4,50	1,86

*A smaller number of nails may be used. $F_{t,Rk}$ for timber failure has to be reduced accordingly.

Table 9: Force F_t Purlin, 2 angle brackets / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	screw number n_v	Bolt number n_H	$F_{t,Rk}$ [kN] (purlin)		Bolt factor $k_{t,H}$
				Timber	Steel	
60x60x60	4757060	1,2,4,5	8,9	7,71	2,85	0,7
80x60x60	4757080	1,2,5,6	12,13	7,71	2,85	0,7
100x60x60	4757100	2,3,6,7,10,11	17,18	11,6	2,85	0,7
120x60x60	4757120	1,2,4,5,8,9	23,24	11,6	2,85	0,7
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	15,4	2,85	0,7
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	15,4	2,85	0,7
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	15,4	2,85	0,7
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	15,4	2,85	0,7
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	15,4	2,85	0,7

Table 10: Force F_t Purlin, 1 angle bracket / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	screw number n_v	Bolt number n_H	$F_{t,Rk}$ [kN] (purlin)		Bolt factor $k_{t,H}$
				Timber	Steel	
60x60x60	4757060	1,2,4,5	8,9	3,85	1,43	1,5
80x60x60	4757080	1,2,5,6	12,13	3,85	1,43	1,5
100x60x60	4757100	2,3,6,7,10,11	17,18	5,78	1,43	1,5



120x60x60	4757120	1,2,4,5,8,9	23,24	5,78	1,43	1,5
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	7,71	1,43	1,5
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	7,71	1,43	1,5
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	7,71	1,43	1,5
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	7,71	1,43	1,5
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	7,71	1,43	1,5

Table 11: Compressive force $F_{1,c}$ Purlin, 2 angle brackets / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	screw number n_v	Bolt number n_H	$F_{1,c,Rk}$ [kN] (purlin)	
				Timber	Steel ¹⁾
60x60x60	4757060	1,2,4,5	8,9	7,71	53,9
80x60x60	4757080	1,2,5,6	12,13	7,71	43,3
100x60x60	4757100	2,3,6,7,10,11	17,18	11,6	38,3
120x60x60	4757120	1,2,4,5,8,9	23,24	11,6	23,4
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	15,4	20,8
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	15,4	16,8
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	15,4	11,4
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	15,4	9,69
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	15,4	8,29

¹⁾ Partial factor γ_{M1} according to EN 1993 has to be taken into account

Table 12: Compressive force $F_{1,c}$ Purlin, 1 angle bracket / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	screw number n_v	Bolt number n_H	$F_{1,c,Rk}$ [kN] (purlin)	
				Timber	Steel ¹⁾
60x60x60	4757060	1,2,4,5	8,9	3,85	26,9
80x60x60	4757080	1,2,5,6	12,13	3,85	21,6
100x60x60	4757100	2,3,6,7,10,11	17,18	5,78	19,1
120x60x60	4757120	1,2,4,5,8,9	23,24	5,78	11,7
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	7,71	10,4
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	7,71	8,40
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	7,71	5,73
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	7,71	4,84
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	7,71	4,14

¹⁾ Partial factor γ_{M1} according to EN 1993 has to be taken into account

Table 13: Forces $F_{2/3}$ Column, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{2/3,Rk}$ [kN] (column)
				Timber

70x70x55	4765020	1,2,3	11,12,13,14,16,18,19,20	4,47
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	4,36
90x90x65	4767150	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	7,22
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	7,03
90x90x65	4767000	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	7,14
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	6,95
105x105x90	4768020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	12,5
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	12,5
105x105x90	4768300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	12,4
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	12,4

Table 14: Forces F_{23} Column, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n_V	Nail number n_H	$F_{2/3,Rk}$ [kN] (column)
				Timber
70x70x55	4765020	1,2,3	11,12,13,14,16,18,19,20	2,24
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	2,18
90x90x65	4767150	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	3,61
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	3,51
90x90x65	4767000	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	3,57
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	3,48
105x105x90	4768020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,27
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,27
105x105x90	4768300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,20
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,20

Table 15: Forces F_{23} Purlin, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_V	Nail number n_H	$F_{2/3,Rk}$ [kN] (purlin)
				Timber
40x40x60	4771000	1,2	6,7,8,9,10	5,23
50x50x35	4764000	1,2	6,7,9,10	2,86
60x40x60	4783000	1,2,3	9,10,12,13	3,82
60x60x40	4772000	1,2,3	6,7,8,9,10	2,82



60x60x50	4773000	3,4	9,10,15,16	2,24
60x60x60	4774000	1,2,3,4,5	9,10,11,12,13,14,15,16	7,56
60x60x80	4775000	1,2,3,4,5,6,7	11,12,13,14,15, 16,17,18,19,20	9,39
60x60x100	4776000	1,2,3,4,5,6,7,8,9	14,15,16,17,18,19,20, 21,22,23,24,25,26,27	15,52
70x70x55	4765020	1,2,3,5,6,7	11,12,13,14,16,18,19,20	7,81
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	6,50
70x70x55	4765000	1,2,3,5,6	9,10,11,12,14,15,16	5,71
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	5,67
80x60x60	4784000	1,2,3,7,8	13,14,15,17,18,19	5,92
80x80x100	4779000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36	18,76
90x48x48	4759000	1,2,4,5,6,7	10,11,13,14	5,08
90x48x76	4759100	1,2,3,6,7,8,9,10, 11,12	16,17,21,22,23	6,60
90x48x116	4759200	1,2,3,4,5,8,9,10,11, 12,13,15,16,17,18	22,23,25,26,29,30,31	13,53
90x90x40	4766000	1,2,6,7	11,12,14,15,19,20	4,37
90x90x65	4767150	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	9,96
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	9,07
90x90x65	4767000	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	9,83
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	8,95
90x90x65	4767000- A	1,2,6,7,8,9	12,13,16,17,21,22	6,02
90x90x65 with rib	4769000- A	1,2,6,7,8,9	12,13,16,17,21,22	6,99
100x100x60	4780000	1,2,3,4,5,6,7, 8,9,10,11	15,16,17,18,19,20,21,22, 23,24,25,26,27,28	11,11
100x100x80	4781000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	18,19,20,21,22,23,24,25,26, 27,28,29,30,31,32,33,34	14,31
100x100x90	4768000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	17,49
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	17,49
100x100x 100	4782000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17,18	23,24,25,26,27,28,29,30,31,32, 33,34,35,36,37,38,39,40,41,42, 43,44	25,59
105x105x90	4768020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	20,9
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	20,9
105x105x90	4768300	1,2,3,4,6,7,8,9,10,11,	20,21,22,23,24,25,26,27,28,29,	20,6



		12,13,14,15,16,17	30,31,32,33,34,35,37,38,39,40	
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	20,6
140x40x40	4784200	1,2,6,7,9,10,11,12	16,17,19,20	6,16

Table 16: Forces F_{23} Purlin, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_{II}	$F_{23,RK}$ [kN] (purlin)
				Timber
40x40x60	4771000	1,2	6,7,8,9,10	2,61
50x50x35	4764000	1,2	6,7,9,10	1,43
60x40x60	4783000	1,2,3	9,10,12,13	1,91
60x60x40	4772000	1,2,3	6,7,8,9,10	1,41
60x60x50	4773000	3,4	9,10,15,16	1,12
60x60x60	4774000	1,2,3,4,5	9,10,11,12,13,14,15,16	3,78
60x60x80	4775000	1,2,3,4,5,6,7	11,12,13,14,15, 16,17,18,19,20	4,70
60x60x100	4776000	1,2,3,4,5,6,7,8,9	14,15,16,17,18,19,20, 21,22,23,24,25,26,27	7,76
70x70x55	4765020	1,2,3,5,6,7	11,12,13,14,16,18,19,20	3,90
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	3,25
70x70x55	4765000	1,2,3,5,6	9,10,11,12,14,15,16	2,85
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	2,84
80x60x60	4784000	1,2,3,7,8	13,14,15,17,18,19	2,96
80x80x100	4779000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36	9,38
90x48x48	4759000	1,2,4,5,6,7	10,11,13,14	2,54
90x48x76	4759100	1,2,3,6,7,8,9,10, 11,12	16,17,21,22,23	3,30
90x48x116	4759200	1,2,3,4,5,8,9,10,11, 12,13,15,16,17,18	22,23,25,26,29,30,31	6,76
90x90x40	4766000	1,2,6,7	11,12,14,15,19,20	2,18
90x90x65	4767150	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	4,98
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	4,53
90x90x65	4767000	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	4,91
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	4,47
90x90x65	4767000-A	1,2,6,7,8,9	12,13,16,17,21,22	3,01
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	3,49
100x100x60	4780000	1,2,3,4,5,6,7, 8,9,10,11	15,16,17,18,19,20,21,22, 23,24,25,26,27,28	5,56
100x100x80	4781000	1,2,3,4,5,6,7,8,9	18,19,20,21,22,23,24,25,26	7,15



		10,11,12,13,14	27,28,29,30,31,32,33,34	
100x100x90	4768000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	8,75
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	8,75
100x100x100	4782000	1,2,3,4,5,6,8,9, 10,11,12,13,14, 15,16,17,18	23,24,25,26,27,28,29,30,31, 32,33,34,35,36,37,38,39, 40,41,42,43,44	12,80
105x105x90	4768020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	10,4
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	10,4
105x105x90	4768300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	10,3
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	10,3
140x40x40	4784200	1,2,6,7,9,10,11,12	16,17,19,20	3,08

Table 17: Forces F_{23} Column, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{2/3,Rk}$ [kN] (column)	Bolt factor
				Timber	$k_{L,L}$
70x70x55	4765020	20,19,18	9,4	2,03	0,7
70x70x55 with rib	4765120	16,15,14	4	1,06	0,5
90x90x65	4767150	23,22,20,19,18	11,10	4,38	0,3
90x90x65 with rib	4769150	20,19,17,16,15	10,9	4,38	0,3
90x90x65	4767000	23,22,20,19,18	11,10	4,31	0,3
90x90x65 with rib	4769000	20,19,17,16,15	10,9	4,31	0,3
105x105x90	4768020	40,39,38,37,35,34,33,32	19,18	6,75	0,3
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	19,18	6,75	0,3
105x105x90	4768300	40,39,38,37,35,34,33,32	19,18	6,64	0,3
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	19,18	6,64	0,3

Table 18: Forces F_{23} Column, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{2/3,Rk}$ [kN] (column)	Bolt factor
				Timber	$k_{L,L}$
70x70x55	4765020	20,19,18	9,4	1,01	1,4
70x70x55 with rib	4765120	16,15,14	4	0,53	1,0
90x90x65	4767150	23,22,20,19,18	11,10	2,19	0,7
90x90x65 with rib	4769150	20,19,17,16,15	10,9	2,19	0,7



90x90x65	4767000	23,22,20,19,18	11,10	2,15	0,7
90x90x65 with rib	4769000	20,19,17,16,15	10,9	2,15	0,7
105x105x90	4768020	40,39,38,37,35,34,33,32	19,18	3,37	0,6
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	19,18	3,37	0,6
105x105x90	4768300	40,39,38,37,35,34,33,32	19,18	3,32	0,6
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	19,18	3,32	0,6

Table 19: Forces $F_{2/3}$ Purlin, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail/Screw number n_V	Bolt number n_H	$F_{2/3,Rk}$ [kN] (purlin)	Bolt factor
				Timber	$k_{t,L}$
70x70x55	4765020	20,19,18,16,15,14	9,4	5,95	0,7
70x70x55 with rib	4765120	16,15,14,12,11	4	2,20	0,5
90x90x65	4767150	23,22,20,19,18,17,16,15	11,10	7,68	0,3
90x90x65 with rib	4769150	20,19,17,16,15,14,13	10,9	7,14	0,3
90x90x65	4767000	23,22,20,19,18,17,16,15	11,10	7,56	0,3
90x90x65 with rib	4769000	20,19,17,16,15,14,13	10,9	7,03	0,3
105x105x90	4768020	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	17,0	0,3
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	17,0	0,3
105x105x90	4768300	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	16,7	0,3
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	16,7	0,3
60x60x60	4757060	1,2,4,5	8,9	3,13	0,4
80x60x60	4757080	1,2,5,6,8,9	12,13	3,99	0,4
100x60x60	4757100	2,3,6,7,10,11,13,14	17,18	4,72	0,4
120x60x60	4757120	1,2,4,5,8,9,12,13,16,17,19,20	23,24	6,13	0,4
140x60x60	4757140	1,2,5,6,8,9,12,13,16,17,20,21	23,24	5,34	0,4
160x60x60	4757160	2,3,6,7,10,11,13,14,17,18,21	22,23	3,69	0,4
180x60x60	4757180	1,2,4,5,8,9,12,13,16,17,19,20	23,24	3,85	0,4
200x60x60	4757200	1,2,5,6,8,9,12,13,16,17,20,21	23,24	3,52	0,4
220x60x60	4757220	2,3,6,7,10,11,13,14,17,18,21,22	24,25	3,24	0,4
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	11	3,56	0,5
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11, 12,13,14,15	17	6,04	0,5
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11, 12,13,15,16,17,18,19,20,21,22,2 3,24,26,27,28,29,30,31,32,33,34	36	11,2	0,5
PKR 95 x 85 with slotted	4756100	1,2,3,4,5,6,7,8,9	11	2,83	0,5



hole					
PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11,12,13,14,15	17	4,74	0,5
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10, 11, 12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	36	8,58	0,5

Table 20: Forces $F_{2/3}$ Purlin, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail/Screw number nv	Bolt number nH	$F_{2/3,Rk}$ [kN] (purlin)	Bolt factor
				Timber	$k_{t,L}$
70x70x55	4765020	20,19,18,16,15,14	9,4	2,98	1,4
70x70x55 with rib	4765120	16,15,14,12,11	4	1,10	1,0
90x90x65	4767150	23,22,20,19,18,17,16,15	11,10	3,84	0,7
90x90x65 with rib	4769150	20,19,17,16,15,14,13	10,9	3,57	0,7
90x90x65	4767000	23,22,20,19,18,17,16,15	11,10	3,78	0,7
90x90x65 with rib	4769000	20,19,17,16,15,14,13	10,9	3,52	0,7
105x105x90	4768020	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	8,48	0,6
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	8,48	0,6
105x105x90	4768300	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	8,35	0,6
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30, 29,28,27,26,25,24	19,18	8,35	0,6
60x60x60	4757060	1,2,4,5	8,9	1,56	0,7
80x60x60	4757080	1,2,5,6,8,9	12,13	1,99	0,7
100x60x60	4757100	2,3,6,7,10,11,13,14	17,18	2,36	0,7
120x60x60	4757120	1,2,4,5,8,9,12,13,16,17,19,20	23,24	3,07	0,7
140x60x60	4757140	1,2,5,6,8,9,12,13,16,17,20,21	23,24	2,67	0,7
160x60x60	4757160	2,3,6,7,10,11,13,14,17,18,21	22,23	1,85	0,7
180x60x60	4757180	1,2,4,5,8,9,12,13,16,17,19,20	23,24	1,92	0,7
200x60x60	4757200	1,2,5,6,8,9,12,13,16,17,20,21	23,24	1,76	0,7
220x60x60	4757220	2,3,6,7,10,11,13,14,17,18,21,22	24,25	1,62	0,7
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	11	1,78	1,0
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11, 12,13,14,15	17	3,02	1,0
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10, 11, 12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	36	5,60	1,0
PKR 95 x 85 with slotted hole	4756100	1,2,3,4,5,6,7,8,9	11	1,42	1,0



PKR 135 x 85 with slotted hole	4756110	1,2,3,4,5,7,8,9,10,11, 12,13,14,15	17	2,37	1,0
PKR 285 x 85 with slotted hole	4756120	1,2,4,5,6,7,8,9,10, 11, 12,13,15,16,17,18,19,20,21,22,2 3,24,26,27,28,29,30,31,32,33,34	36	4,29	1,0

Table 21: Forces $F_{2/3}$ Purlin, 2 angle brackets / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	Screw number n_v	Bolt number n_H	$F_{2/3,Rk}$ [kN] (purlin)	Bolt factor
				Timber	$k_{t,\perp}$
60x60x60	4757060	1,2,4,5	8,9	2,36	0,4
80x60x60	4757080	1,2,5,6	12,13	2,52	0,4
100x60x60	4757100	2,3,6,7,10,11	17,18	3,31	0,4
120x60x60	4757120	1,2,4,5,8,9	23,24	2,46	0,4
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	3,05	0,4
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	2,72	0,4
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	2,25	0,4
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	2,06	0,4
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	1,91	0,4

Table 22: Forces $F_{2/3}$ Purlin, 1 angle bracket / connection, connection timber to concrete/steel for fastened purlin at a distance to the ground

Type	Product number	Screw number n_v	Bolt number n_H	$F_{2/3,Rk}$ [kN] (purlin)	Bolt factor
				Timber	$k_{t,\perp}$
60x60x60	4757060	1,2,4,5	8,9	1,18	0,7
80x60x60	4757080	1,2,5,6	12,13	1,26	0,7
100x60x60	4757100	2,3,6,7,10,11	17,18	1,65	0,7
120x60x60	4757120	1,2,4,5,8,9	23,24	1,23	0,7
140x60x60	4757140	1,2,5,6,8,9,12,13	23,24	1,52	0,7
160x60x60	4757160	2,3,6,7,10,11,13,14	22,23	1,36	0,7
180x60x60	4757180	1,2,4,5,8,9,12,13	23,24	1,12	0,7
200x60x60	4757200	1,2,5,6,8,9,12,13	23,24	1,03	0,7
220x60x60	4757220	2,3,6,7,10,11,13,14	24,25	0,96	0,7

Table 23: Basic Forces $F_{4/5}$ Column, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{4/5,Rk}$ [kN] (column)	
				Timber	Steel
70x70x55	4765020	1,2,3	11,12,13,14,16,18,19,20	2,34	2,09
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	3,31	2,55
90x90x65	4767150	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	2,31	2,43



90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	4,52	4,01
90x90x65	4767000	1,2,4,5,6	12,13,14,15,17,18,19,20,22,23	3,46	3,27
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	5,07	4,70
105x105x90	4768020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	3,90	4,57
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,25	6,40
105x105x90	4768300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	5,33	5,63
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	7,37	7,35

Table 24: Basic Forces $F_{4/5}$ Purlin, 2 angle brackets / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{4/5,Rk}$ [kN] (purlin)	
				Timber	Steel
40x40x60	4771000	1,2	6,7,8,9,10	7,17	3,60
50x50x35	4764000	1,2	6,7,9,10	7,58	2,01
60x40x60	4783000	1,2,3	9,10,12,13	7,19	3,91
60x60x40	4772000	1,2,3	6,7,8,9,10	4,01	2,39
60x60x50	4773000	3,4	9,10,15,16	5,64	2,71
60x60x60	4774000	1,2,3,4,5	9,10,11,12,13,14,15,16	6,51	3,65
60x60x80	4775000	1,2,3,4,5,6,7	11,12,13,14,15, 16,17,18,19,20	9,70	5,12
60x60x100	4776000	1,2,3,4,5,6,7,8,9	14,15,16,17,18,19,20, 21,22,23,24,25,26,27	12,41	6,22
70x70x55	4765020	1,2,3,5,6,7	11,12,13,14,16,18,19,20	5,58	2,36
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	7,01	2,91
70x70x55	4765000	1,2,3,5,6	9,10,11,12,14,15,16	5,52	3,60
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	5,87	4,43
80x60x60	4784000	1,2,3,7,8	13,14,15,17,18,19	5,33	3,70
80x80x100	4779000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	19,20,21,22,23,24,25,26,27, 28,29,30,31,32,33,34,35,36	13,08	6,62
90x48x48	4759000	1,2,4,5,6,7	10,11,13,14	3,54	4,76
90x48x76	4759100	1,2,3,6,7,8,9,10, 11,12	16,17,21,22,23	7,21	6,99
90x48x116	4759200	1,2,3,4,5,8,9,10,11, 12,13,15,16,17,18	22,23,25,26,29,30,31	10,18	11,03
90x90x40	4766000	1,2,6,7	11,12,14,15,19,20	5,23	3,25
90x90x65	4767150	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	4,87	2,59
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	8,94	4,47
90x90x65	4767000	1,2,4,5,6,7,8,9	12,13,14,15,17,18,19,20,22,23	7,65	3,61



90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	8,96	5,17
90x90x65	4767000-A	1,2,6,7,8,9	12,13,16,17,21,22	6,19	4,48
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	6,55	6,25
100x100x60	4780000	1,2,3,4,5,6,7, 8,9,10,11	15,16,17,18,19,20,21,22, 23,24,25,26,27,28	7,77	3,73
100x100x80	4781000	1,2,3,4,5,6,7,8,9, 10,11,12,13,14	18,19,20,21,22,23,24,25,26, 27,28,29,30,31,32,33,34	11,23	5,22
100x100x90	4768000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	11,94	7,53
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	13,37	11,71
100x100x 100	4782000	1,2,3,4,5,6,8,9,10, 11,12,13,14,15, 16,17,18	23,24,25,26,27,28,29,30,31, 32,33,34,35,36,37,38,39, 40,41,42,43,44	14,16	6,51
105x105x90	4768020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	7,67	5,22
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	13,4	7,89
105x105x90	4768300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	11,0	6,67
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10,11, 12,13,14,15,16,17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	15,2	9,24
140x40x40	4784200	1,2,6,7,9,10,11,12	16,17,19,20	4,97	3,04

Table 25: Basic Forces F₄ Column, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n _v	Nail number n _H	F _{4,Rk} [kN] (column)	
				Timber	Steel
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	3,07	2,36
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	4,06	3,61
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	4,41	4,09
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	5,82	5,96
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	6,68	6,67

Table 26: Basic Forces F₄ Purlin, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n _v	Nail number n _H	F _{4,Rk} [kN] (purlin)	
				Timber	Steel
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	6,33	2,32



70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	5,87	3,18
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	7,97	3,60
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	8,64	4,04
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	6,55	4,40
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9, 10,11,12,13,14, 15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	13,37	7,94
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10, 11,12,13,14,15,16, 17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	10,0	5,92
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10, 11,12,13,14,15,16, 17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	11,5	6,68

Table 27: Basic Forces F_s Column, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{s,Rk}$ [kN] (column)	
				Timber	Steel
70x70x55 with rib	4765120	1,2,3	9,10,11,12,14,15,16	1,76	0,39
90x90x65 with rib	4769150	1,2,4,5,6	11,12,13,14,15,16,17,19,20	1,69	0,59
90x90x65 with rib	4769000	1,2,4,5,6	11,12,13,14,15,16,17,19,20	1,83	0,84
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	1,94	0,92
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	2,30	1,25

Table 28: Basic Forces F_s Purlin, 1 angle bracket / connection, connection timber to timber

Type	Product number	Nail number n_v	Nail number n_H	$F_{s,Rk}$ [kN] (purlin)	
				Timber	Steel
70x70x55 with rib	4765120	1,2,3,5,6	9,10,11,12,14,15,16	1,43	0,88
70x70x55 with rib	4765100	1,2,3,5,6	9,10,11,12,14,15,16	1,66	1,23
90x90x65 with rib	4769150	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	1,73	0,97
90x90x65 with rib	4769000	1,2,4,5,6,7,8	11,12,13,14,15,16,17,19,20	1,96	1,37
90x90x65 with rib	4769000-A	1,2,6,7,8,9	12,13,16,17,21,22	1,88	1,90
100x100x90 with rib	4770000	1,2,3,4,5,6,8,9, 10,11,12,13,14, 15,16,17	20,21,22,23,24,25,26,27,28, 29,30,31,33,34,35,36,37,38	4,42	3,88
105x105x90 with rib	4770020	1,2,3,4,6,7,8,9,10, 11,12,13,14,15,16,	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	3,67	2,26



		17			
105x105x90 with rib	4770300	1,2,3,4,6,7,8,9,10, 11,12,13,14,15,16, 17	20,21,22,23,24,25,26,27,28,29, 30,31,32,33,34,35,37,38,39,40	4,21	3,19

Table 29: Basic Forces $F_{4/5}$ Column, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{4/5,Rk}$ [kN] (column)		Bolt factor	
				Timber	Steel	$k_{t,II}$	$k_{t,I}$
70x70x55	4765020	20,19,18	9,4	2,48	2,02	0,1	0,5
70x70x55 with rib	4765120	16,15,14	4	3,72	2,49	0,1	0,9
90x90x65	4767150	23,22,20,19,18	11,10	2,55	2,42	0,1	0,5
90x90x65 with rib	4769150	20,19,17,16,15	10,9	5,04	2,65	0,2	0,4
90x90x65	4767000	23,22,20,19,18	11,10	3,71	3,31	0,1	0,4
90x90x65 with rib	4769000	20,19,17,16,15	10,9	5,57	3,32	0,2	0,4
105x105x90	4768020	40,39,38,37,35,34,33,32	19,18	4,25	4,38	0,1	0,5
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	19,18	7,09	4,69	0,2	0,5
105x105x90	4768300	40,39,38,37,35,34,33,32	19,18	5,72	5,49	0,1	0,5
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	19,18	8,22	6,21	0,2	0,4

Table 30: Basic Forces $F_{4/5}$ Purlin, 2 angle brackets / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{4/5,Rk}$ [kN] (purlin)		Bolt factor	
				Timber	Steel	$k_{t,II}$	$k_{t,I}$
70x70x55	4765020	20,19,18,16,15,14	9,4	6,08	2,21	0,1	0,4
70x70x55 with rib	4765120	16,15,14,12,11	4	5,67	2,96	0,2	0,7
90x90x65	4767150	23,22,20,19,18,17,16,15	11,10	5,50	2,53	0,1	0,4
90x90x65 with rib	4769150	20,19,17,16,15,14,13	10,9	7,99	2,99	0,3	0,4
90x90x65	4767000	23,22,20,19,18,17,16,15	11,10	8,47	3,63	0,2	0,4
90x90x65 with rib	4769000	20,19,17,16,15,14,13	10,9	8,18	3,72	0,2	0,4
105x105x90	4768020	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	8,83	4,95	0,1	0,4
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	13,3	5,97	0,3	0,4
105x105x90	4768300	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	12,0	6,41	0,2	0,4
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	13,6	7,73	0,3	0,4



PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	11	9,36	8,03	0,78	0,78
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11, 12,13,14,15	17	13,5	8,52	0,76	0,76
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10, 11, 12,13,15,16,17,18,19,20,21,22,23, 24,26,27,28,29,30,31,32,33,34	36	10,4	8,74	0,76	0,76

Table 31: Basic Force F_4 Column, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{4,Rk}$ [kN] (column)		Bolt factor	
				Timber	Steel	$k_{t,H}$	$k_{t,L}$
70x70x55 with rib	4765120	16,15,14	4	3,31	2,22	0,0	1,0
90x90x65 with rib	4769150	20,19,17,16,15	10,9	4,36	2,29	0,0	0,5
90x90x65 with rib	4769000	20,19,17,16,15	10,9	4,77	2,85	0,1	0,5
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	19,18	6,46	4,27	0,1	0,5
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	19,18	7,38	5,57	0,1	0,5

Table 32: Basic Force F_4 Purlin, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	$F_{4,Rk}$ [kN] (purlin)		Bolt factor	
				Timber	Steel	$k_{t,H}$	$k_{t,L}$
70x70x55 with rib	4765120	16,15,14,12,11	4	7,00	2,20	0,0	1,0
90x90x65 with rib	4769150	20,19,17,16,15,14,13	10,9	8,73	2,31	0,0	0,5
90x90x65 with rib	4769000	20,19,17,16,15,14,13	10,9	9,45	2,87	0,0	0,5
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	11,5	4,35	0,0	0,5
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30,29, 28,27,26,25,24	19,18	13,0	5,59	0,0	0,5
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	11	9,36	6,28	-	1,0
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11, 12,13,14,15	17	13,5	6,50	-	1,0
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10, 11, 12,13,15,16,17,18,19,20,21,22,23, 24,26,27,28,29,30,31,32,33,34	36	10,4	6,64	-	1,0

Table 33: Basic Force F_5 Column, 1 angle bracket / connection, connection timber to concrete/steel


Type	Product number	Nail number nv	Bolt number n_H	F _{5,Rk} [kN] (column)		Bolt factor	
				Timber	Steel	$k_{t,II}$	$k_{t,I}$
70x70x55 with rib	4765120	16,15,14	4	2,02	0,39	1,3	1,0
90x90x65 with rib	4769150	20,19,17,16,15	10,9	1,81	0,91	1,6	0,5
90x90x65 with rib	4769000	20,19,17,16,15	10,9	1,80	1,22	1,6	0,5
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32	19,18	1,97	0,92	1,9	0,5
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32	19,18	2,15	1,36	2,0	0,5

Table 34: Basic Force F₅ Purlin, 1 angle bracket / connection, connection timber to concrete/steel

Type	Product number	Nail number nv	Bolt number n_H	F _{5,Rk} [kN] (purlin)		Bolt factor	
				Timber	Steel	$k_{t,II}$	$k_{t,I}$
70x70x55 with rib	4765120	16,15,14,12,11	4	1,45	0,80	0,7	1,0
90x90x65 with rib	4769150	20,19,17,16,15,14,13	10,9	1,84	1,69	1,1	0,5
90x90x65 with rib	4769000	20,19,17,16,15,14,13	10,9	1,87	2,20	1,1	0,5
105x105x90 with rib	4770020	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	19,18	3,61	3,07	1,0	0,5
105x105x90 with rib	4770300	40,39,38,37,35,34,33,32,31,30,29,28,27,26,25,24	19,18	3,76	4,63	0,9	0,5
PKR 95 x 85	4756000	1,2,3,4,5,6,7,8,9	11	2,04	5,43	1,74	1,0
PKR 135 x 85	4756010	1,2,3,4,5,7,8,9,10,11,12,13,14,15	17	2,40	3,50	1,47	1,0
PKR 285 x 85	4756020	1,2,4,5,6,7,8,9,10,11,12,13,15,16,17,18,19,20,21,22,23,24,26,27,28,29,30,31,32,33,34	36	2,51	3,74	1,43	1,0

Hold-downs Characteristic load-carrying capacities

Table 35: Force F₁ Column and Purlin, 1 hold-down / connection, connection timber to concrete/steel

hold-down ¹⁾	capacity per nail in the vertical flange F _{VM,Rk} [kN]	concrete	Bolt	Steel		
			$k_{t,II}$	moment capacity F _{m,Rk} [kN]	shear capacity F _{v,Rk} [kN]	tensile capacity ²⁾ F _{t,Rk} [kN]
4791000	n · 1,62	see EN 1992	3,44	8,54	11,0	16,6
4791400	n · 1,57		3,44	10,9	23,1	35,6
4792000	n · 1,62		3,44	8,54	11,0	16,6
4792400	n · 1,57		3,44	10,9	23,1	35,6



4793000	$n \cdot 1,62$		3,44	8,54	11,0	16,6
4793400	$n \cdot 1,57$		3,44	10,9	23,1	35,6
4794000	$n \cdot 1,62$		3,44	8,54	11,0	16,6
4794400	$n \cdot 1,57$		3,44	10,9	23,1	35,6
4824000	$n \cdot 1,60$		3,09	8,86	17,3	26,7
4825000	$n \cdot 1,60$		3,09	8,86	17,3	26,7
4826000	$n \cdot 1,60$		3,09	8,86	17,3	26,7
4827000	$n \cdot 1,60$		3,09	8,86	17,3	26,7

¹⁾ Washer according to the engineering drawing 4790000 must be used

²⁾ Partial factor $\gamma_{M,2}$ has to be taken into account