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## European Technical Assessment

**ETA 18/1165**  
of 28/04/2020

General Part

### Technical Assessment Body issuing the European Technical Assessment

Technický a zkušební ústav stavební Praha, s.p.

<b>Trade name of the construction product</b>	Three-dimensional nailing plates KM, KL, WB, WBZ, PSR, PPSR, PSRP, PPS, PR, PSK, SDPSK
<b>Product family to which the construction product belongs</b>	Product area: 13 Three-Dimensional Nailing Plates
<b>Manufacturer</b>	DOMAX Sp. z o.o. Aleja Parku Krajobrazowego 109 Łężyce PL-84-207 Koleczkowo Republic of Poland
<b>Manufacturing plant</b>	DOMAX Sp. z o.o. Aleja Parku Krajobrazowego 109 84-207 Koleczkowo Łężyce Republic of Poland
<b>This European Technical Assessment contains</b>	50 pages including 6 Annexes, which form an integral part of this European Technical Assessment
<b>This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of</b>	ETAG 015 used as European Assessment Document (EAD)
<b>This version replaces</b>	ETA 18/1165, version 01, issued on 02/09/2019

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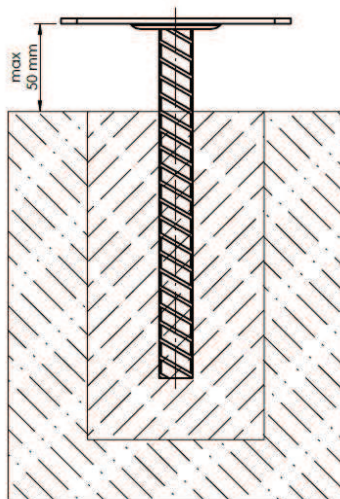
## 1 Technical description of the product

The three-dimensional nailing plates for timber connections are one-piece, welded or non-welded elements, made of the cold-formed steel sheet grade DX51D according to EN 10346 (KM, KL, WB, WBZ, PSK, SDPSK) with the zinc coating mass of 275 g/m<sup>2</sup> or multiple-piece welded or bolted parts (PSR, PSRP, PPS, PR, PPSR) from construction steel S235 according to EN 10025-2 with zinc coating against corrosion from Fe/ZN 12.














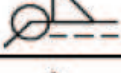

Designation of Domax connector	Made of	Kind of corrosion protection	Type of connector	Intended use
KM 16	DX51D	Z275	Angle	Used to connect two piece of timber, side-grain to side-grain
KM 16 (3mm)	DX51D	Z275		
KM 8 (2.5 mm)	DX51D	Z275		
KM 19 (3mm)	DX51D	Z275		
KM 3 (2.5 mm)	DX51D	Z275		
KL 0	DX51D	Z275		
KL 5 (3mm)	DX51D	Z275		
WB 39	DX51D	Z275	Beam-hanger	Used to connect two piece of timber, end-grain to side-grain
WB 40	DX51D	Z275		
WB 41	DX51D	Z275		
WB 42	DX51D	Z275		
WB 43	DX51D	Z275		
WB 44	DX51D	Z275		
WB 45	DX51D	Z275		
WB 46	DX51D	Z275		
WB 47	DX51D	Z275		
WB 48	DX51D	Z275		
WB 49	DX51D	Z275		
WB 50	DX51D	Z275		
WB 51	DX51D	Z275		
WB 52	DX51D	Z275		
WB 53	DX51D	Z275		
WB 54	DX51D	Z275		
WB 55	DX51D	Z275		
WB 56	DX51D	Z275		
WB 57	DX51D	Z275		
WB 58	DX51D	Z275		
WB 59	DX51D	Z275		
WB 60	DX51D	Z275		
WB 61	DX51D	Z275		

Type of Domax connector	Made of	Kind of corrosion protection	Type of connector	Intended use
WB 62	DX51D	Z275	Beam-hanger	Used to connect two piece of timber, end-grain to side-grain
WB 63	DX51D	Z275		
WBZ 38	DX51D	Z275		
WBZ 49	DX51D	Z275		
WBZ 52	DX51D	Z275		
WBZ 54	DX51D	Z275		
PSR 80 M24	S235JR	Fe/Zn 12	Post base	Used to connect timber beam with concrete ground, end-grain to steel plate
PSR 100 M24	S235JR	Fe/Zn 12		
PSR 130 M24	S235JR	Fe/Zn 12		
PSR 80 M20	S235JR	Fe/Zn 12		
PSR 100 M20	S235JR	Fe/Zn 12		
PSR 130 M20	S235JR	Fe/Zn 12		
PSRP 80 M20	S235JR	Fe/Zn 12		
PSRP 100 M20	S235JR	Fe/Zn 12		
PSRP 130 M20	S235JR	Fe/Zn 12		
PPSR 80	S235JR	Fe/Zn 12		
PPSR 100	S235JR	Fe/Zn 12		
PPSR 130	S235JR	Fe/Zn 12		
PPS 80	S235JR	Fe/Zn 12		
PPS 100	S235JR	Fe/Zn 12		
PPS 130	S235JR	Fe/Zn 12		
PR 100 100-150	S235JR	Fe/Zn 12		
PR 100 130-150	S235JR	Fe/Zn 12		
PR 130 130-150	S235JR	Fe/Zn 12		
PSK 70	DX51D	Z275		
SDPSK 70	DX51D	Z275/Powder coating 60 um		

For post bases with concrete bars (PPS 80, PPS 100, PPS 130) have to be fulfilled the maximal free length 50 mm. Reinforcing bars are made from steel designation B500SP.



For welded three dimensional nailing plates the information about weld is mentioned in table below.

Name	Weld size [mm]	Symbol	Weld lenght [mm]	Qty.
PPS 80	a 3,5		64,3	1
PPS 100	a 3,5		64,3	1
PPS 130	a 3,5		64,3	1
PR 100/130-150	a 2,8		57,23	1
PR 100/100-150	a 2,8		57,23	1
PR 130/130-150	a 2,8		57,23	1
PSR 80 M20	a 2,8		57,23	1
PSR 100 M20	a 2,8		57,23	1
PSR 130 M20	a 2,8		57,23	1
PSR 80 M24	a 2,8		69,1	1
PSR 100 M24	a 2,8		69,1	1
PSR 130 M24	a 2,8		69,1	1
PSRP 80 M20	a 2,8		57,23	1
PSRP 100 M20	a 2,8		57,23	1
PSRP 130 M20	a 2,8		57,23	1

Yield strength for used steel DX51D is 297 MPa (thickness 2 mm).  
 Yield strength for used steel DX51D is 287 MPa (thickness 2.5 mm).  
 Yield strength for used steel DX51D is 278 MPa (thickness 3 mm).

Threaded rods are made of steel S235, class 4.8.

## 1.1 Identification

The identification parameters and reference to product specifications for identifying the materials and components are given in Annex 1.

## 2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The three-dimensional nailing plates are intended to be used in timber to timber connections as well as connections between a timber joist and a concrete structure or a steel member. For connecting the mutually perpendicular, load-bearing, solid timber elements, in side-grain to side-grain configurations, in joints for which requirements for mechanical resistance and stability in the sense of the basic work requirement 1 of Regulation (EU) No 305/2011 shall be fulfilled.

Ring shank nails according to EN 14592+A1 with the diameter 4 mm and characteristic tensile capacity  $F_{ax,Rk}$  not less than 1.80 kN shall be used for connections made with the three-dimensional nailing plates.

In respect of the requirements concerning corrosion resistance, three-dimensional nailing plates are for use in timber structures subjected to the internal conditions defined by service classes 1 and 2 according to EN 1995-1-1 (Eurocode 5), in corrosion aggressiveness categories C1 and C2 according to EN ISO 12944-2, without action of acid gases or vapours.

The provisions made in this European Technical Approval are based on an assumed working life of the product of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer or approval body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

The assessment of the fitness of the three-dimensional nailing plates for the intended use has been made in compliance with the ETAG 015 “*Three-dimensional nailing plates*” used as European Assessment Document (EAD).

The fitness for use of the three-dimensional nailing plates can only be assumed if the following conditions of installation are met:

- installation is carried out by appropriately qualified personnel under the supervision of the person qualified for this work,
- the original three-dimensional nailing plates only are used, supplied by the manufacturer together with the appropriate ring shank nails defined in clause 2,
- three-dimensional nailing plates installation is in accordance with the manufacturer's installation guide,
- before placing the three-dimensional nailing plates, the characteristics of timber members (type, class and moisture content) in which the nailing plates are to be placed are checked to ensure that they are identical or better than the characteristics of timber members used in testing and for which the characteristic load-carrying capacities were determined,
- timber member placed in three-dimensional nailing plate does not contain the waness and the gap between the connected elements does not exceed 3 mm.

### 3 Performance of the product and references to the methods used for its assessment

The assessment of the fitness for use of the three dimensional nailing plates according to the basic work requirements (BWR) were carried out in compliance with ETAG 015.

The European Technical Assessment is issued for the three dimensional nailing plates on the basis of agreed data and information, deposited at Technický a zkušební ústav stavební Praha, s.p., which identifies three dimensional nailing plates that has been assessed and judged. Changes to the plates or production process which could result in this deposited data and information being incorrect should be notified to Technický a zkušební ústav stavební Praha, s.p. before the changes are introduced. Technický a zkušební ústav stavební Praha, s.p. will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alternations to the ETA shall be necessary.

**Table 1** Essential characteristics of the product

	Essential characteristic	Performance
3.1 BWR 1: Mechanical resistance and stability		
3.1.1	Joint strength	See Annex 3
3.1.2	Joint stiffness	NPA
3.1.3	Joint ductility in cyclic testing	NPA
3.2 BWR 2: Safety in case of fire		
3.2.1	Reaction to fire	The steel elements are classified as class A1 of reaction to fire (non-combustible products) in accordance with EN 13501-1+A1 and to European Commission Decision 96/603/EC amended by European Commission Decision 2000/605/EC.
3.2.2	Resistance to fire	NPA
3.3 BWR 3: Hygiene, health and the environment		
3.3.1	Content, emission and/or release of dangerous substances	See 3.3.1
BWR 4: Safety and accessibility in use		
Not relevant		
BWR 5: Protection against noise		
Not relevant		
BWR 6: Energy economy and heat retention		
Not relevant		
BWR 7: Sustainable use of natural resources		
Not relevant		

#### 3.1 Mechanical resistance and stability (BWR 1)

##### 3.1.1 Joint strength

The characteristic load-carrying capacities of joints loaded according to static diagrams (shown in Annex 2), determined by tests or calculations carried out according to ETAG 015, are given in Annex 3.

Following the requirements of ETAG 015 the applicant provided to the TAB test results, configuration of the connections and static schemes (direction of force actions).



The modifications of standard procedures applied come from the requirements of ETAG 015. The procedure is modified as required in EOTA TR 016 *Method of testing Three-Dimensional Nailing Plates* with examples, namely the procedure corresponding to the case “*Test specimens fulfil EN ISO 8970*”, which, as stated above, were relevant in all cases.

The conditions were as follows:

The timber members used – sawn timber blanks of European whitewood, grade C24, free from major defects in the area of the connector. Selection of timber members within a test group referring to densities comply with the requirements of EN ISO 8970.

### **3.1.2 Joint stiffness**

No performance assessed.

### **3.1.3 Joint ductility in cyclic testing**

No performance assessed.

## **3.2 Safety in case of fire (BWR 2)**

### **3.2.1 Reaction to fire**

The steel elements are classified as class A1 of reaction to fire (non-combustible products) in accordance with EN 13501-1+A1 and to European Commission Decision 96/603/EC amended by European Commission Decision 2000/605/EC.

### **3.2.2 Resistance to fire**

Performance in relation to fire resistance would be determined for the complete structural element with any associated finishes, therefore there is no performance assessed option used to this Basic Work Requirement.

## **3.3 Hygiene, health and the environment (BWR 3)**

### **3.3.1 Content, emission and/or release of dangerous substances**

The manufacturer submit a written declaration whether or not and in which concentration the three dimensional nailing plates contain substances which are classified as dangerous according to Directive 67/548/EEC and European Commission Regulation No 1272/2008.

In addition to the specific clauses relating to dangerous substances, there may be other requirements applicable to the products falling within their scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

### **3.4 Safety and accessibility in use (BWR 4)**

Not relevant.

### **3.5 Protection against noise (BWR 5)**

Not relevant.

### **3.6 Energy economy and heat retention (BWR 6)**

Not relevant.

### 3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was assessed for this product.

### 3.8 Aspects of durability, serviceability and identification

#### 3.8.1 Durability and serviceability

The three-dimensional nailing plates have been assessed as having adequate durability and serviceability when used in conditions defined by service classes 1 and 2 according to EN 1995-1-1 (Eurocode 5).

#### 3.8.2 Identification

Each three-dimensional nailing plate is to be marked with the symbol and the product type designation according to the Annex 1.

## 4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the decision 1997/638/EC<sup>1</sup>, of the European Commission the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011 and Commission delegated Regulation (EU) No 568/2014) given in the following table applies:

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Shear plates, toothed-plate connectors, punched nail plates, nailing plates	For structural timber products		2+

<sup>1</sup> Official Journal of the European Communities L 268/36 of 19.9.1997



## **5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD**

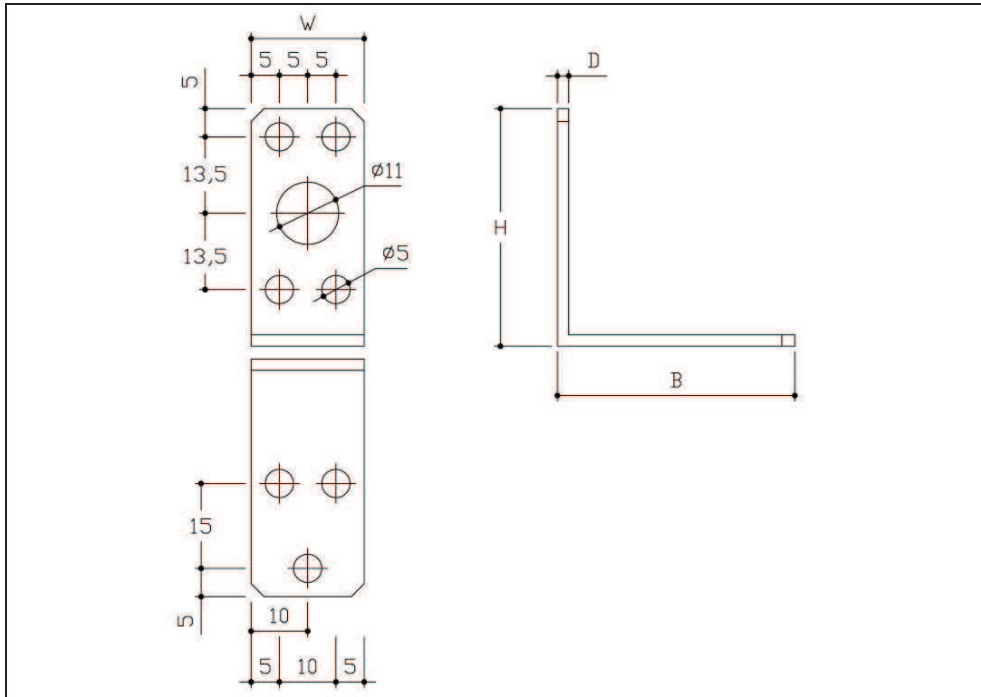
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Technický a zkušební ústav stavební Praha, s.p.

Issued in Prague on 28.04.2020

By  
Mária Schaan  
Head of the TAB

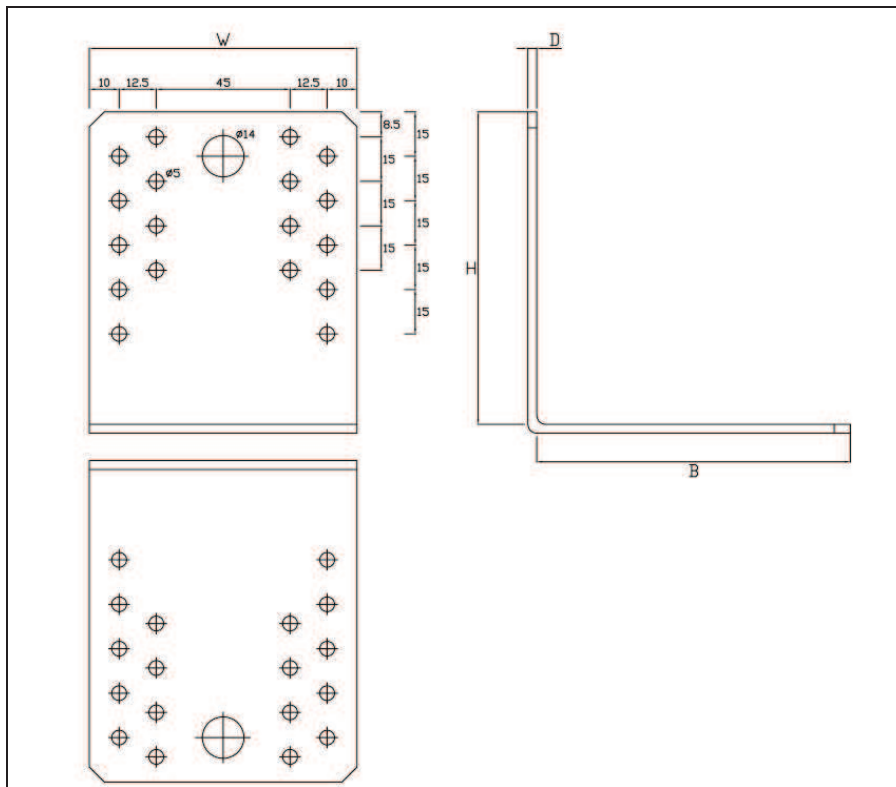
### Annexes:

- |         |   |
|---------|---|
| Annex 1 | Product details and definitions                           |
| Annex 2 | Loading according to static diagrams                      |
| Annex 3 | The characteristic load carrying capacities of connectors |
| Annex 4 | Nailing patterns  |
| Annex 5 | Specification of connection elements                      |
| Annex 6 | Reference documents                                       |



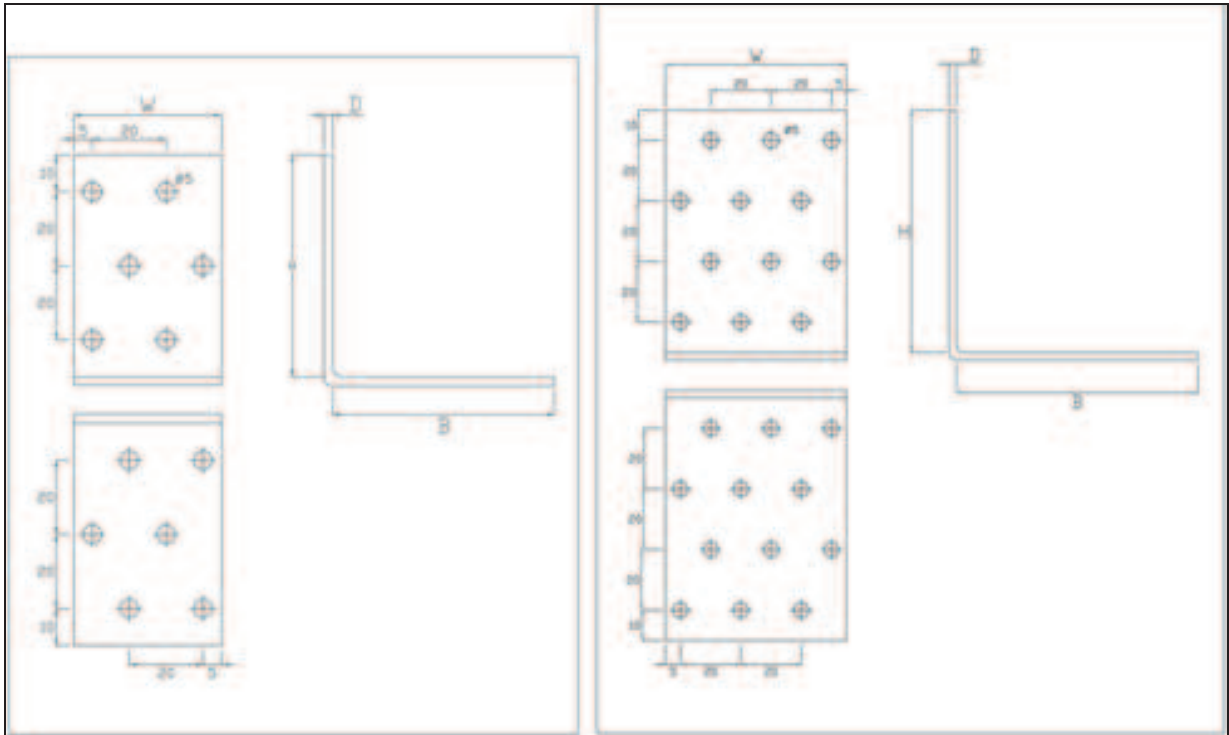
**KL 0**

Symbol	Dimensions [mm]				Quantity of openings	
	W	H	B	D	Ø5	Ø11
KL 0	20	40	40	2	7	1



**KL 5**

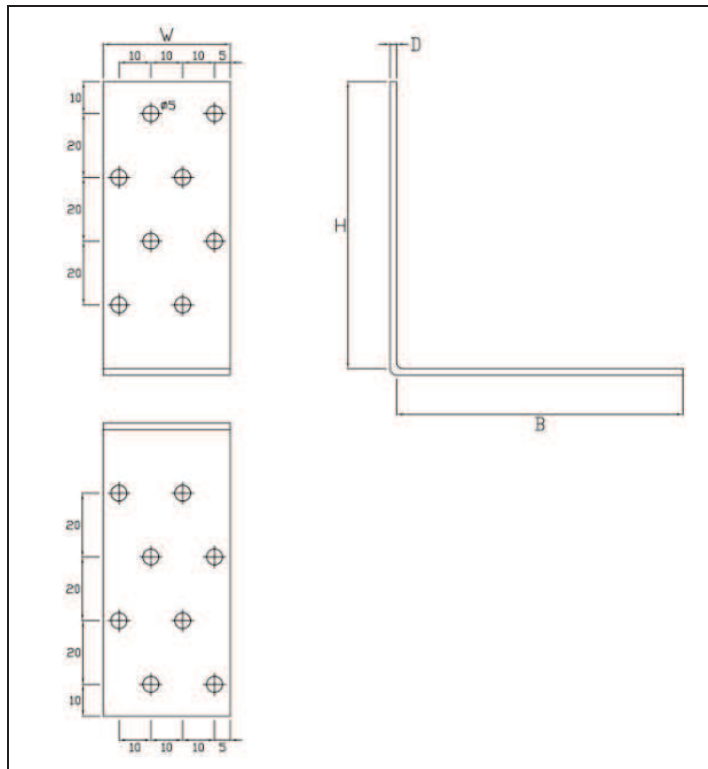
Symbol	Dimensions [mm]				Quantity of openings	
	W	H	B	D	Ø5	Ø14
KL 5	90	105	105	3	36	2



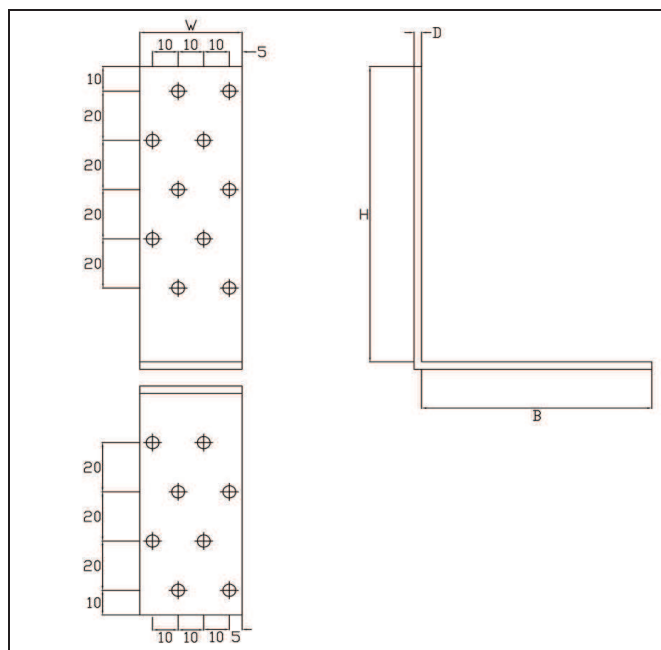
**KM 3**

**KM 8**

Symbol	Dimensions [mm]				Quantity of openings
	W	H	B	D	
KM 3	40	60	60	2,5	12
KM 8	60	80	80	2,5	24

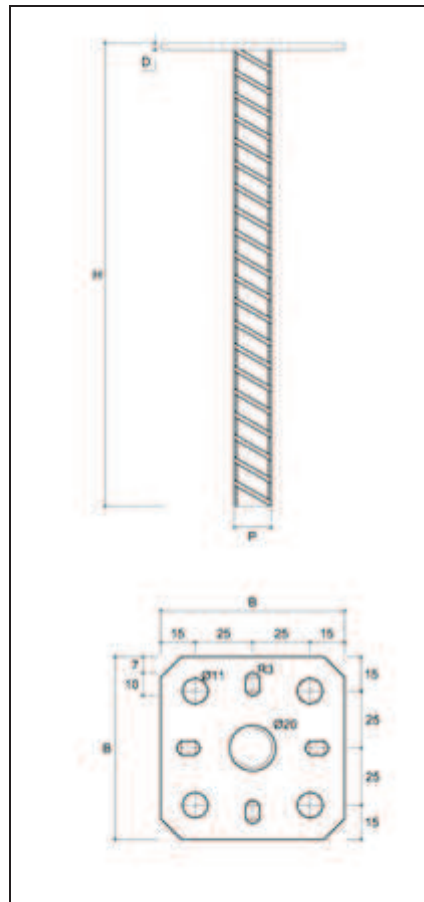


**KM 16 and KM 16 (3 mm)**



**KM 19**

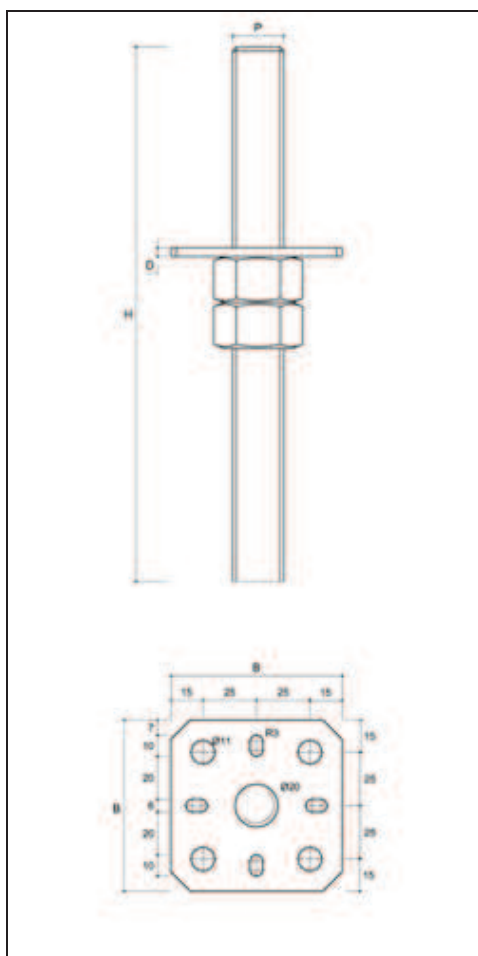
Symbol	Dimensions [mm]				Quantity of openings
	W	H	B	D	Ø5
KM 16	40	90	90	2	16
KM 16	40	90	90	3	16
KM 19	40	120	90	3	18



**PPS 80**

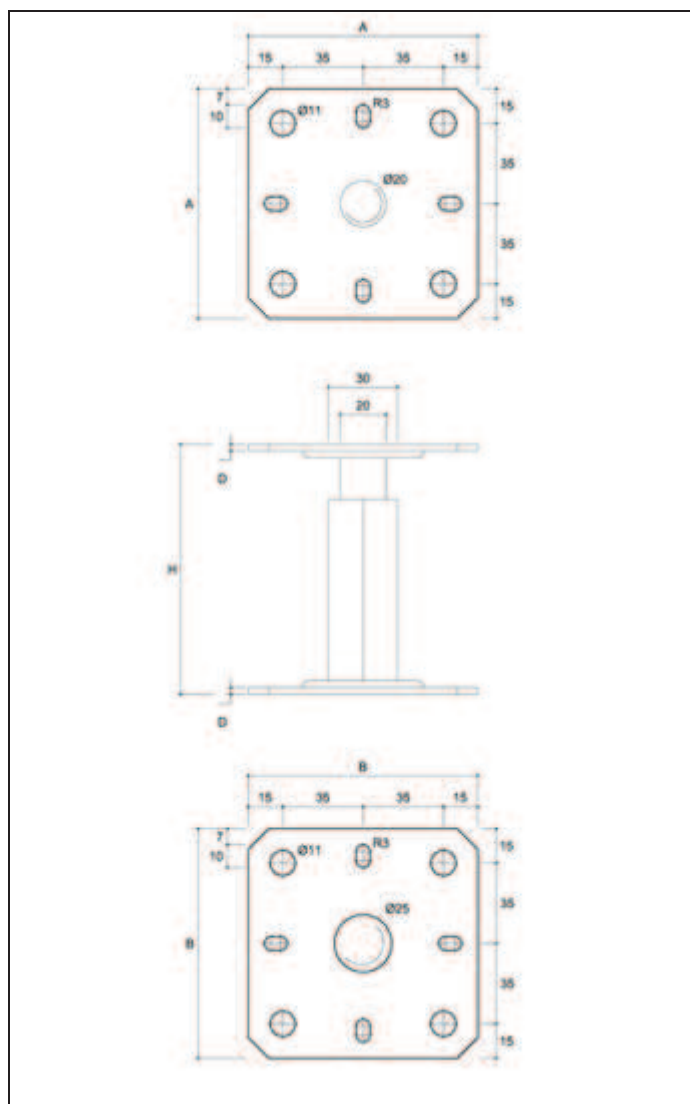
Symbol	Dimensions [mm]				Quantity of openings	
	H	B	D	P	Ø11	Ø20
PPS 80	202	80	3	Ø18	4	1
PPS 100	205	100	3	Ø18	4	1
PPS 130	205	130	3	Ø18	4	1





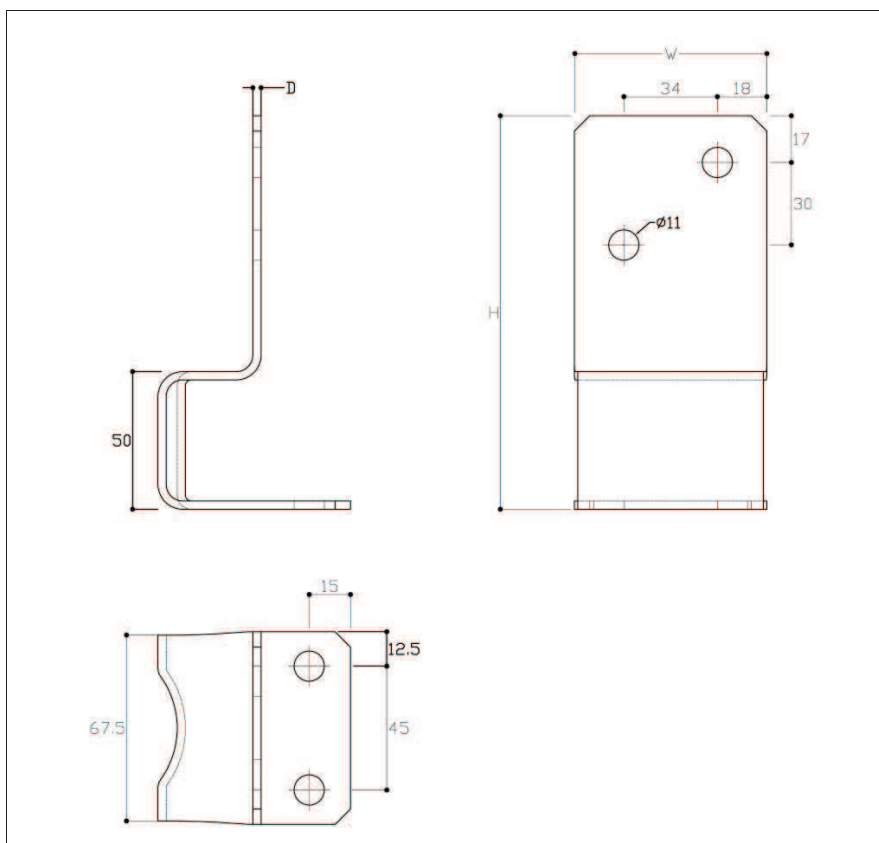
**PPSR 80**

Symbol	Dimensions [mm]				Quantity of openings	
	H	B	D	P	Ø11	Ø20
PPSR 80	330	80	3	M20	8	2
PPSR 100	330	100	3	M20	8	2
PPSR 130	330	130	3	M20	8	2



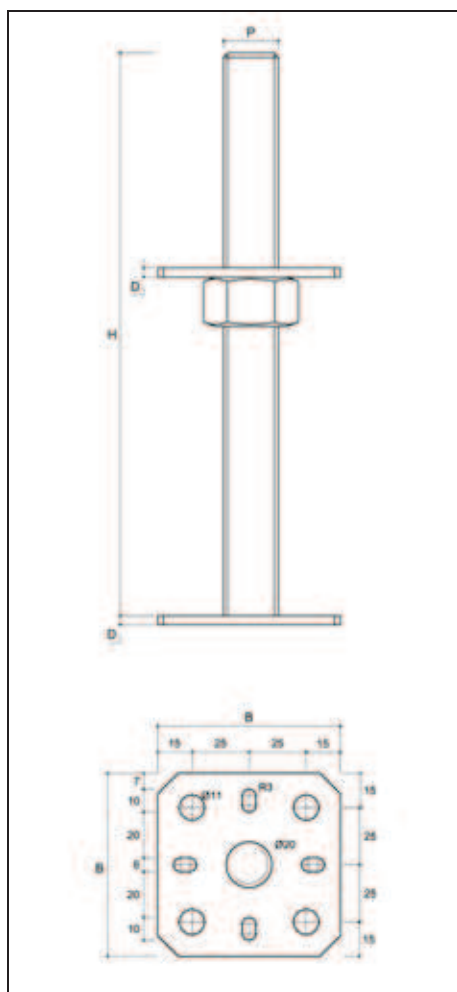
**PR 100 100-150**

Symbol	Dimensions [mm]				Quantity of openings		
	H	A	B	D	Ø11	Ø20	Ø25
PR 100 100-150	100-150	100	100	3	8	1	1
PR 100 130-150	100-150	100	130	3	8	1	1
PR 130 130-150	100-150	130	130	3	8	1	1



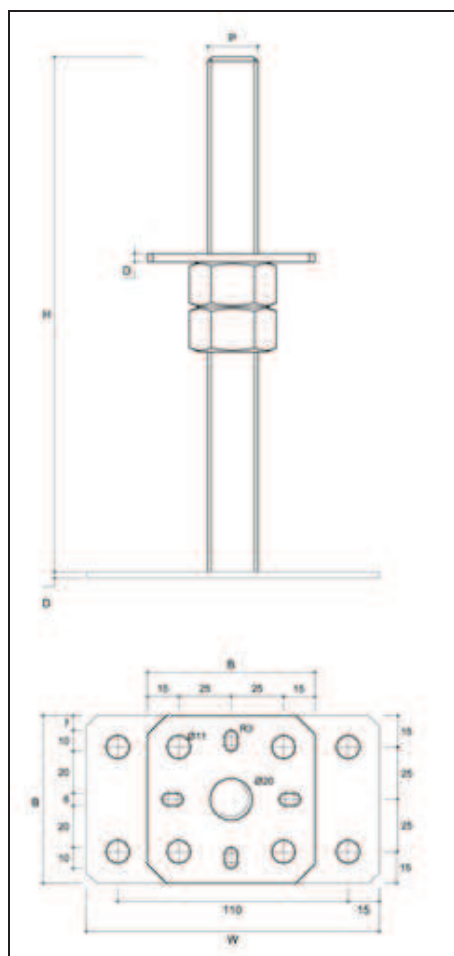
**PSK 70**

Symbol	Dimensions [mm]			Quantity of openings
	H	B	D	Ø11
PSK 70	143	70	3	4
SDPSK 70	165	70	3	4



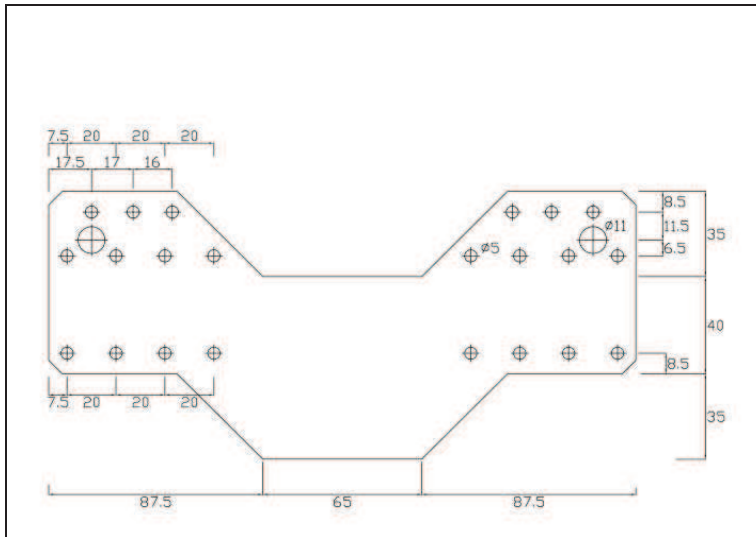
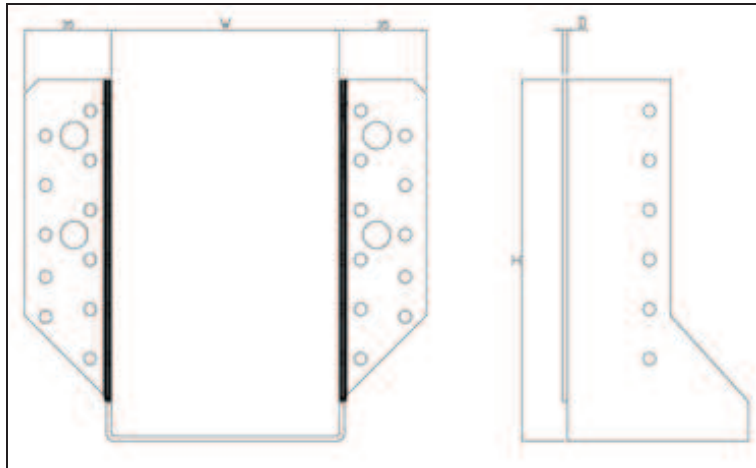
**PSR 80 M20**

Symbol	Dimensions [mm]				Quantity of openings		
	H	B	D	P	Ø11	Ø20	Ø24
PSR 80 M20	240	80	3	M20	8	2	-
PSR 100 M20	252	100	3	M20	8	2	-
PSR 130 M20	252	130	3	M20	8	2	-
PSR 80 M24	250	80	4	M24	8	-	2
PSR 100 M24	250	100	4	M24	8	-	2
PSR 130 M24	250	130	4	M24	8	-	2



**PSRP 80 M20**

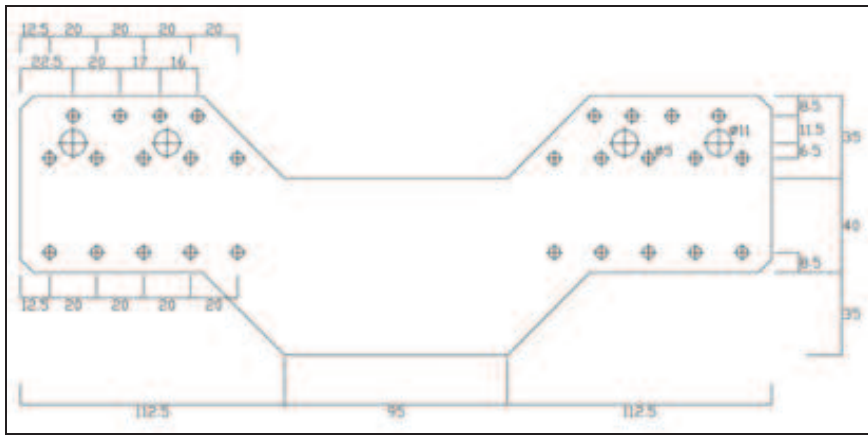
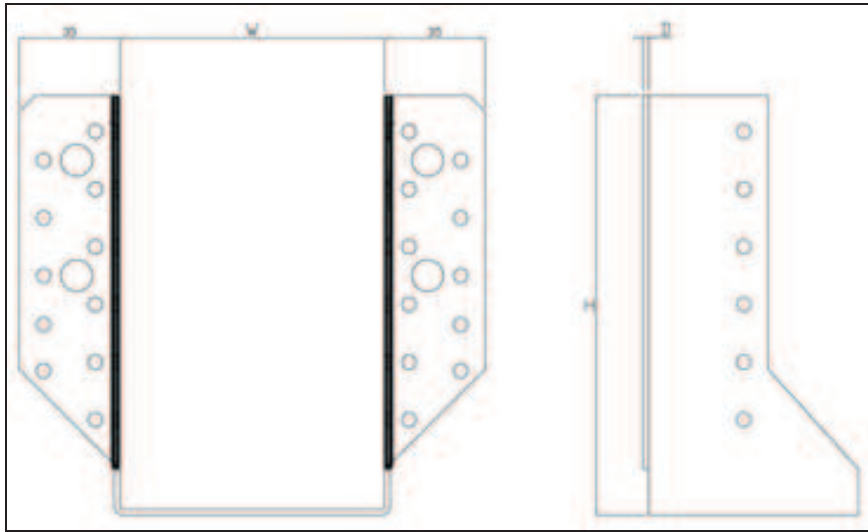
Symbol	Dimensions [mm]					Quantity of openings	
	H	W	B	D	P	Ø11	Ø20
PSRP 80 M20	250	140	80	3	M20	8	2
PSRP 100 M20	250	160	100	3	M20	8	2
PSRP 130 M20	250	200	130	3	M20	8	2



**WB, type A**

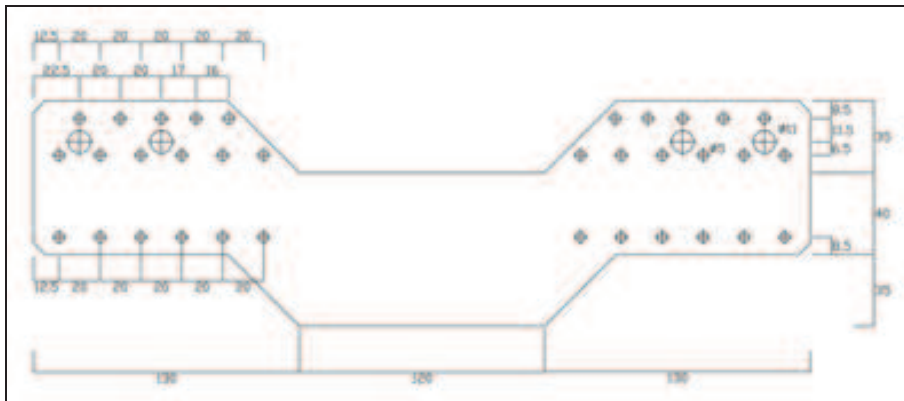
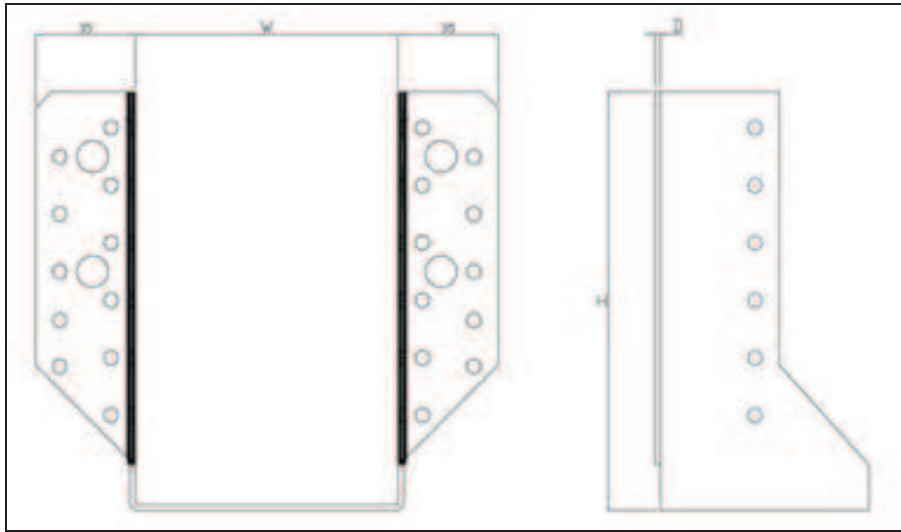
Symbol	Dimensions [mm]			Quantity of openings		Type
	W	H	D	Ø5	Ø11	
WB 40	25	109	2	22	2	A
WB 43	32	106	2	22	2	A
WB 44	32	116	2	22	2	A
WB 47	38	103	2	22	2	A
WB 48	41	101	2	22	2	A
WB 49	45	99	2	22	2	A
WB 52	48	98	2	22	2	A
WB 53	48	108	2	22	2	A
WB 57	51	96	2	22	2	A





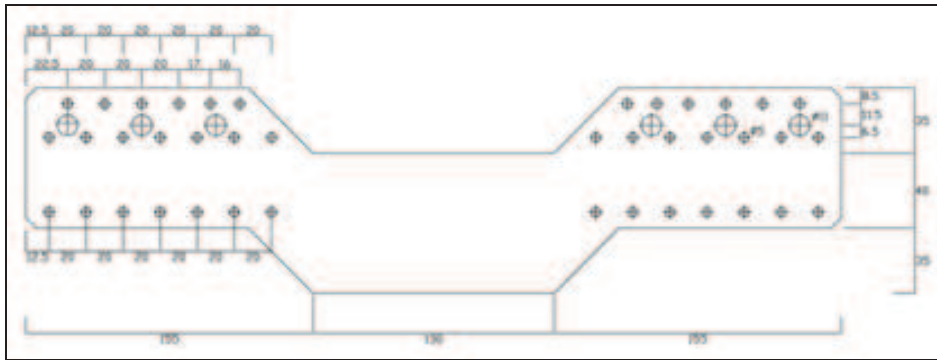
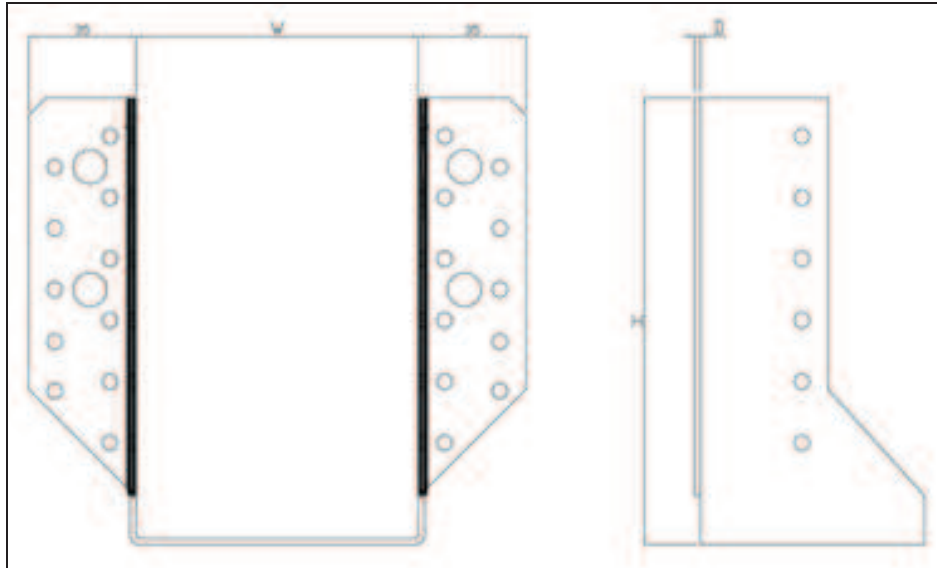
**WB, type B**

Symbol	Dimensions [mm]			Quantity of openings		Type
	W	H	D	Ø5	Ø11	
WB 41	28	148	2	28	4	B
WB 45	32	146	2	28	4	B
WB 54	48	138	2	28	4	B
WB 59	73	125	2	28	4	B



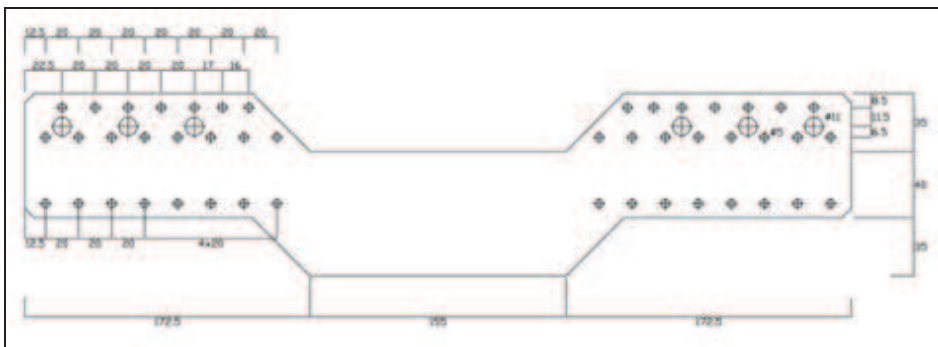
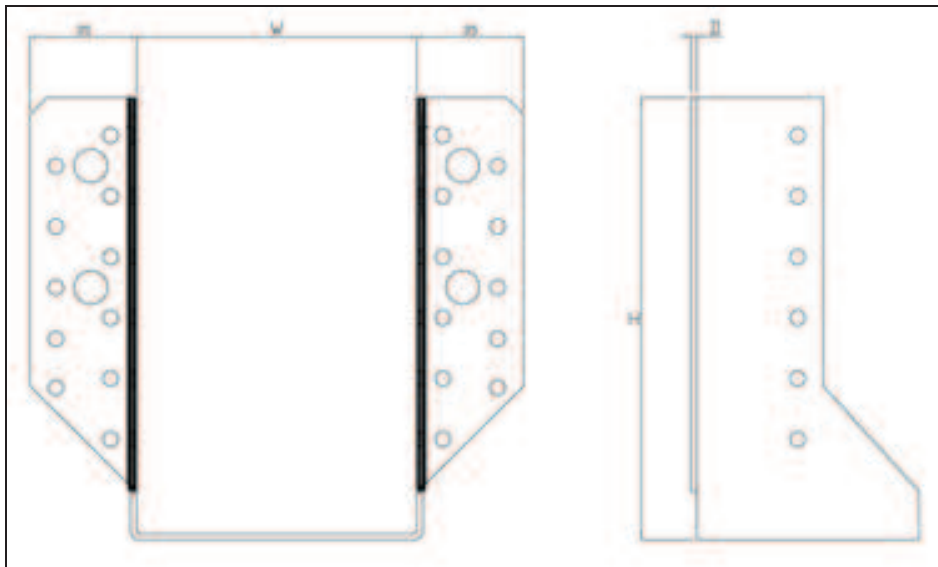
**WB, type C**

Symbol	Dimensions [mm]			Quantity of openings		Type
	W	H	D	Ø5	Ø11	
WB 39	92	146	2	34	4	C
WB 42	28	178	2	34	4	C
WB 46	32	176	2	34	4	C
WB 50	45	169	2	34	4	C
WB 55	48	168	2	34	4	C
WB 60	73	155	2	34	4	C
WB 63	98	143	2	34	4	C



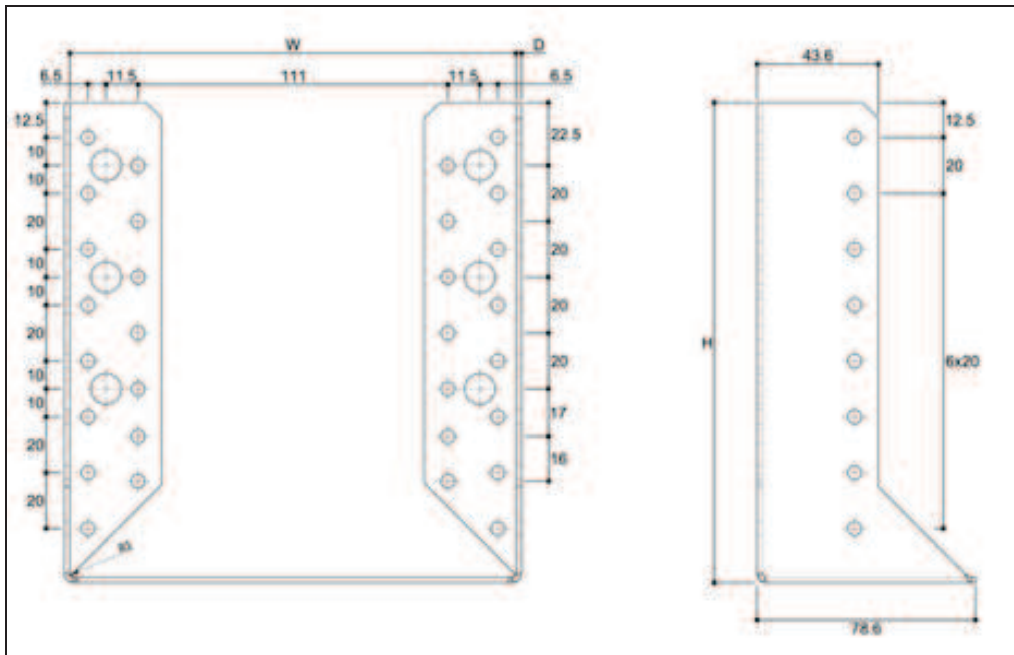
**WB, type D**

Symbol	Dimensions [mm]			Quantity of openings		Type
	W	H	D	Ø5	Ø11	
WB 51	45	199	2	40	6	D
WB 61	73	185	2	40	6	D



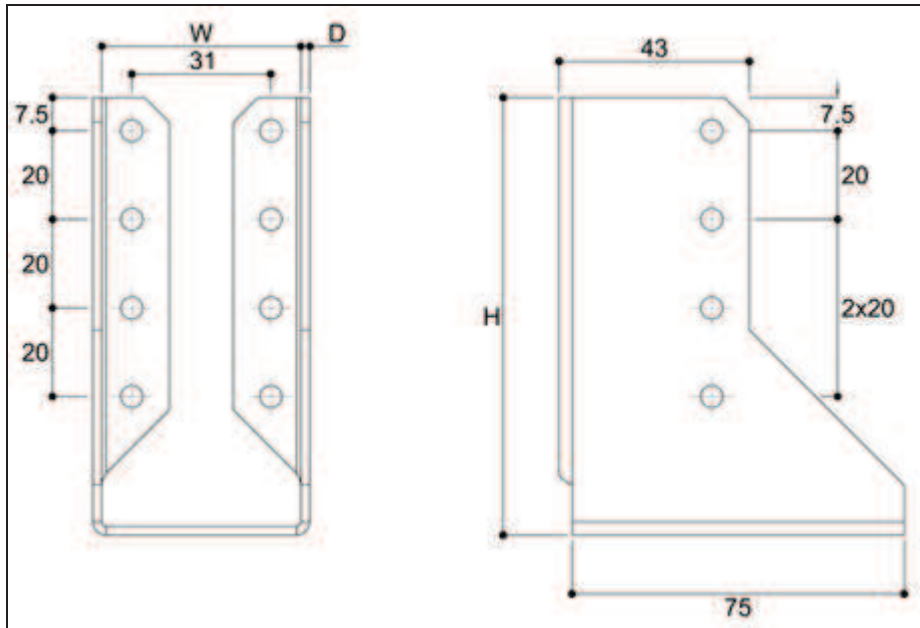
**WB, type E**

Symbol	Dimensions [mm]			Quantity of openings		Type
	W	H	D	Ø5	Ø11	
WB 56	48	228	2	46	6	E
WB 58	66	219	2	46	6	E
WB 62	90	207	2	46	6	E

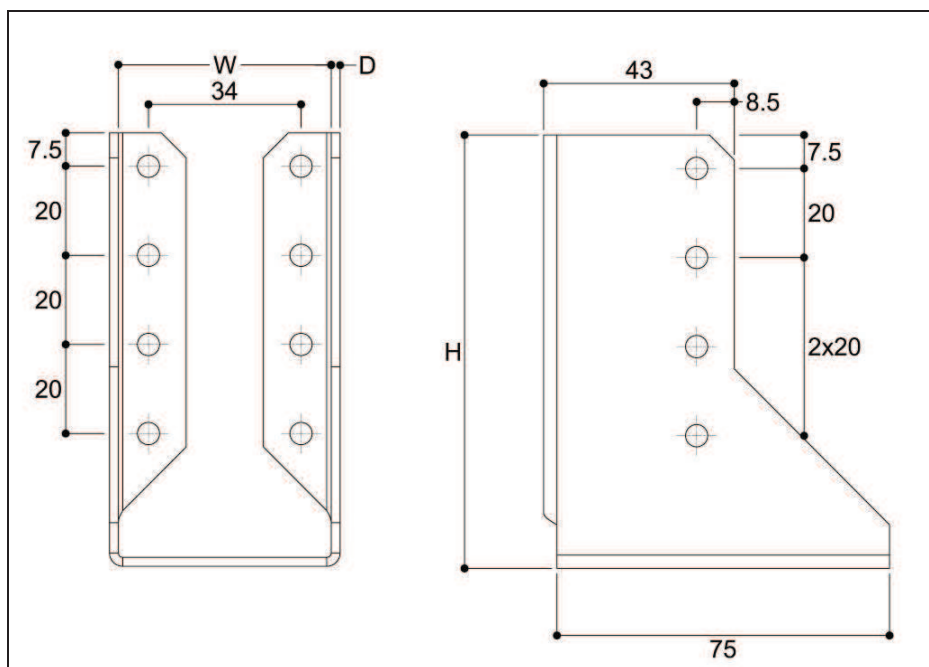


**WBZ 38**

Symbol	Dimensions [mm]			Quantity of openings	
	W	H	D	Ø5	Ø11
WBZ 38	160,5	172	2	46	6



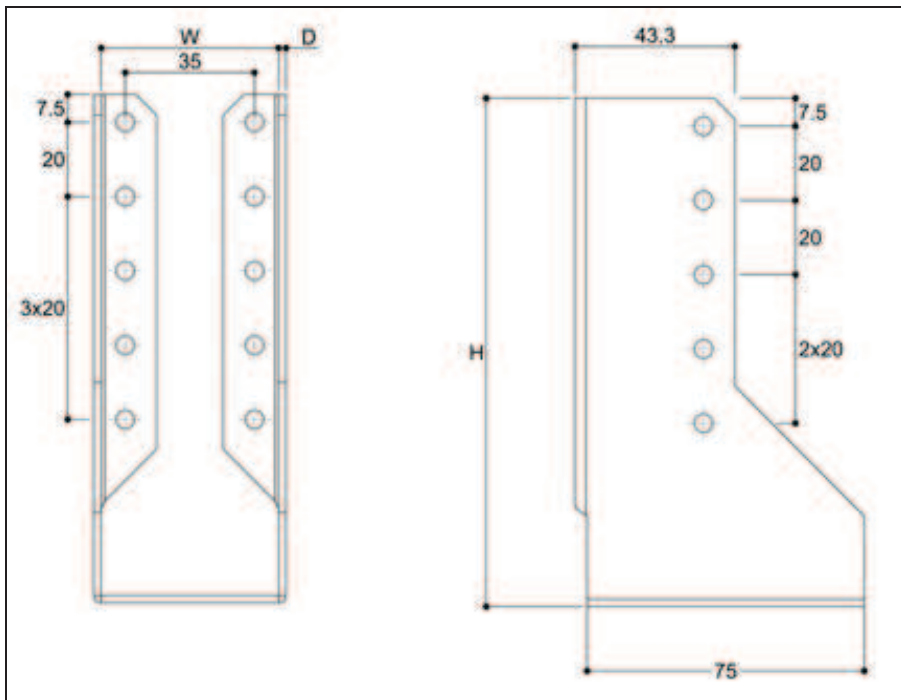
**WBZ 49**



**WBZ 52**

Symbol	Dimensions [mm]			Quantity of openings
	W	H	D	Ø5
WBZ 49	45	99	2	16
WBZ 52	48	98	2	16





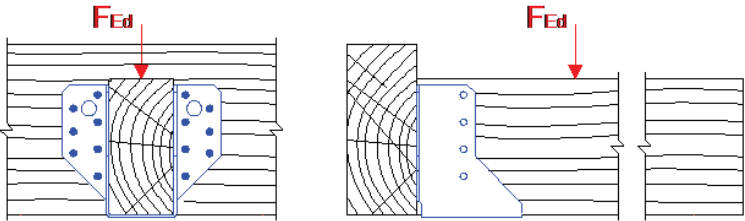
**WBZ 54**

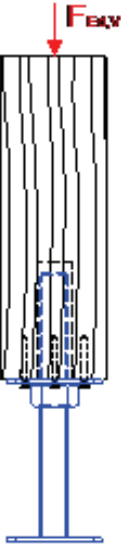
Symbol	Dimensions [mm]			Quantity of openings
	W	H	D	
WBZ 54	48	138	2	20


<b>Three dimensional nailing plates</b>	<b>Annex 2</b> ETA 18/1165
<b>LOADING ACCORDING TO STATIC DIAGRAMS</b>	

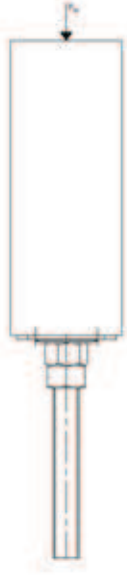
No.	Scheme	Connector types
1		<p style="text-align: center;">           KM 16            KM 16 (3 mm)            KM 8 (2.5 mm)            KM 19            KM 3 (2.5 mm)            KL 0            KL 5 (3 mm)         </p>


No.	Scheme	Connector types
2		<p style="text-align: center;">           WBZ 38            WBZ 49            WBZ 52            WBZ 54         </p>


No.	Scheme	Connector types
3		WB 39 WB 40 WB 41 WB 42 WB 43 WB 44 WB 45 WB 46 WB 47 WB 48 WB 49 WB 50 WB 51 WB 52 WB 53 WB 54 WB 55 WB 56 WB 57 WB 58 WB 59 WB 60 WB 61 WB 62 WB 63

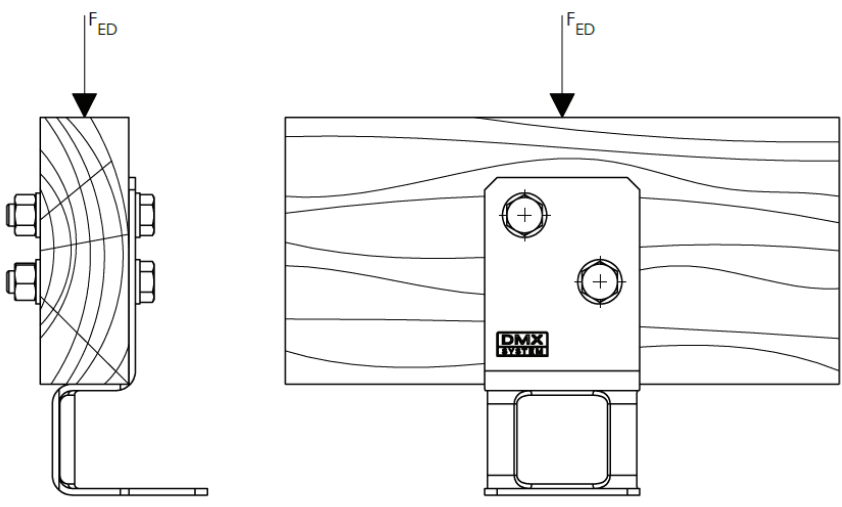
No.	Scheme	Connector types
4		PSR 80 M24 PSR 100 M24 PSR 130 M24  PSR 80 M20 PSR 100 M20 PSR 130 M20

No.	Scheme	Connector types
5		PSRP 80 M20 PSRP 100 M20 PSRP 130 M20

No.	Scheme	Connector types
6		PPSR 80 PPSR 100 PPSR 130

No.	Scheme	Connector types
7		<p>PPS 80 PPS 100 PPS 130</p>

No.	Scheme	Connector types
8		<p>PR 100 100-150 PR 100 130-150 PR 130 130-150</p>

No.	Scheme	Connector types
9		<p>PSK 70 SDPSK 70</p>

**Three dimensional nailing plates**
**THE CHARACTERISTIC LOAD-CARRYING CAPACITIES OF CONNECTORS**
**Annex 3**

ETA 18/1165

Connector	Type of Load	Timber Moisture	Density	$P_{max,mean}$	$P_{max,k}$	Connectors per connection	Method of determination	Note
			$p_{mean, 12\%}$	(350 kg*m <sup>3</sup> )	(350 kg*m <sup>3</sup> )			
			[%]	[kg*m <sup>3</sup> ]	[kN]			
KM 16	pressure	11.7	441	11.1	8.5	2	testing	2)
KM 16 (3mm)	pressure	-	C24	11.1	8.5	2	calculation	2)
KM 8 (2.5 mm)	pressure	-	C24	7.33	6.68	2	testing	2)
KM 19	pressure	11.9	429	20.5	15.4	2	testing	2)
KM 3 (2.5 mm)	pressure	-	C24	4.05	3.83	2	testing	2)
KL 0	pressure	12.7	438	8.6	7.4	2	testing	2)
KL 5 (3mm)	pressure	-	C24	24.3	21.9	2	testing	2)
WB 39	pressure	-	C24	-	13.2	1	calculation	1)
WB 40	pressure	-	C24	-	6.6	1	calculation	1)
WB 41	pressure	-	C24	-	7.4	1	calculation	1)
WB 42	pressure	-	C24	-	7.4	1	calculation	1)
WB 43	pressure	-	C24	-	8.4	1	calculation	1)
WB 44	pressure	-	C24	-	8.4	1	calculation	1)
WB 45	pressure	-	C24	-	8.4	1	calculation	1)
WB 46	pressure	-	C24	-	8.4	1	calculation	1)
WB 47	pressure	-	C24	-	9.7	1	calculation	1)
WB 48	pressure	-	C24	-	9.6	1	calculation	1)
WB 49	pressure	-	C24	-	9.4	1	calculation	1)
WB 50	pressure	-	C24	-	11.8	1	calculation	1)
WB 51	pressure	-	C24	-	11.8	1	calculation	1)
WB 52	pressure	-	C24	-	9.3	1	calculation	1)
WB 53	pressure	-	C24	-	9.3	1	calculation	1)
WB 54	pressure	-	C24	-	12.4	1	calculation	1)
WB 55	pressure	-	C24	-	12.6	1	calculation	1)
WB 56	pressure	-	C24	-	12.6	1	calculation	1)
WB 57	pressure	-	C24	-	9.1	1	calculation	1)
WB 58	pressure	-	C24	-	17.3	1	calculation	1)
WB 59	pressure	-	C24	-	11.2	1	calculation	1)
WB 60	pressure	-	C24	-	14.2	1	calculation	1)
WB 61	pressure	-	C24	-	18.4	1	calculation	1)
WB 62	pressure	-	C24	-	22.9	1	calculation	1)
WB 63	pressure	-	C24	-	12.9	1	calculation	1)
WBZ 38	pressure	-	C24	-	16.2	1	calculation	1)
WBZ 49	pressure	-	C24	-	4.8	1	calculation	1)
WBZ 52	pressure	-	C24	-	4.8	1	calculation	1)
WBZ 54	pressure	-	C24	-	5.8	1	calculation	1)

Connector	Type of Load	Timber Moisture [%]	Density	$P_{max,mean}$	$P_{max,k}$	Connectors per connection	Method of determination	Note
			$\rho_{mean, 12\%}$	(350 kg*m <sup>3</sup> )	(350 kg*m <sup>3</sup> )			
			[kg*m <sup>3</sup> ]	[kN]	[kN]			
PSR 80 M24	pressure	-	C24	-	49.3	1	calculation	1)
PSR 100 M24	pressure	-	C24	-	49.3	1	calculation	1)
PSR 130 M24	pressure	-	C24	-	49.3	1	calculation	1)
PSR 80 M20	pressure	-	C24	-	40.8	1	calculation	1)
PSR 100 M20	pressure	-	C24	-	40.8	1	calculation	1)
PSR 130 M20	pressure	-	C24	-	40.8	1	calculation	1)
PSRP 80 M20	pressure	-	C24	-	40.8	1	calculation	1)
PSRP 100 M20	pressure	-	C24	-	40.8	1	calculation	1)
PSRP 130 M20	pressure	-	C24	-	40.8	1	calculation	1)
PPSR 80	pressure	-	C24	-	52.6	1	calculation	1)
PPSR 100	pressure	-	C24	-	52.6	1	calculation	1)
PPSR 130	pressure	-	C24	-	52.6	1	calculation	1)
PPS 80	pressure	-	C24	-	57.3	1	calculation	1)
PPS 100	pressure	-	C24	-	57.3	1	calculation	1)
PPS 130	pressure	-	C24	-	57.3	1	calculation	1)
PR 100 100-150	pressure	-	C24	-	40.8	1	calculation	1)
PR 100 130-150	pressure	-	C24	-	40.8	1	calculation	1)
PR 130 130-150	pressure	-	C24	-	40.8	1	calculation	1)
PSK 70	pressure	-	C25	-	4.9	1	calculation	1)
SDPSK 70	pressure	-	C26	-	4.9	1	calculation	1)

<sup>1)</sup> The forces are given for the complete connection consisting of one connector.

<sup>2)</sup> The forces are given for the complete connection consisting of two connectors, hence force per one connector (one angle bracket) is half of the given value.

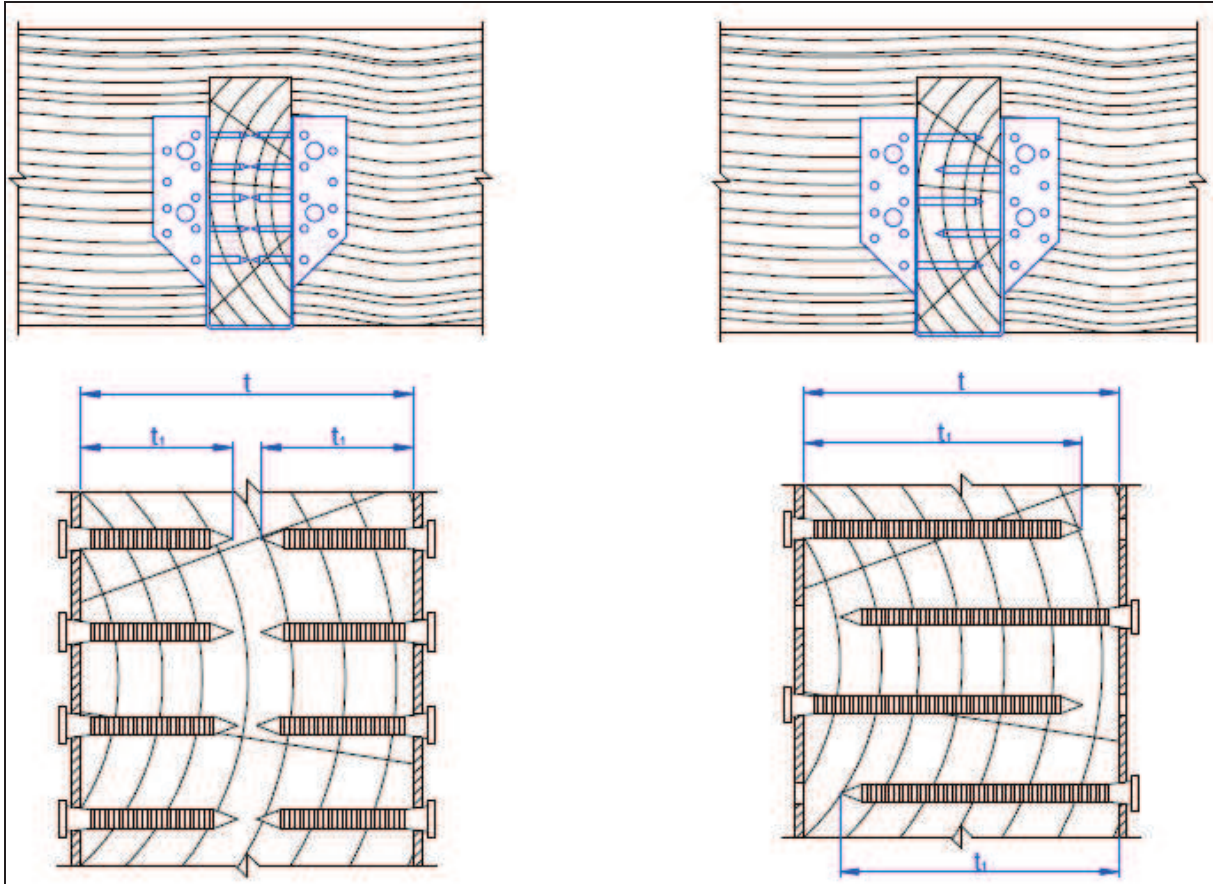


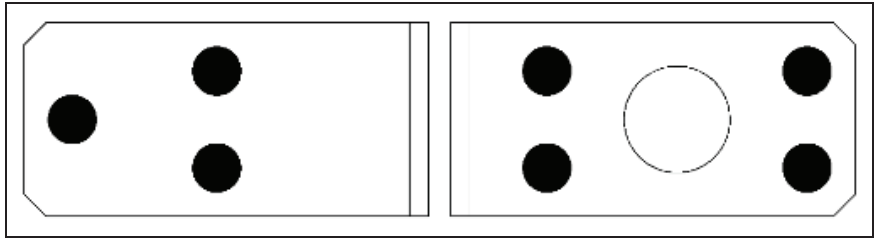
NAILING PATTERNS

It is always necessary to put nails in the black marked holes. This is the only one proper pattern because too many or too long nails can weaken the wood, if it's quite close to edge (rule for placement nails is stated below).

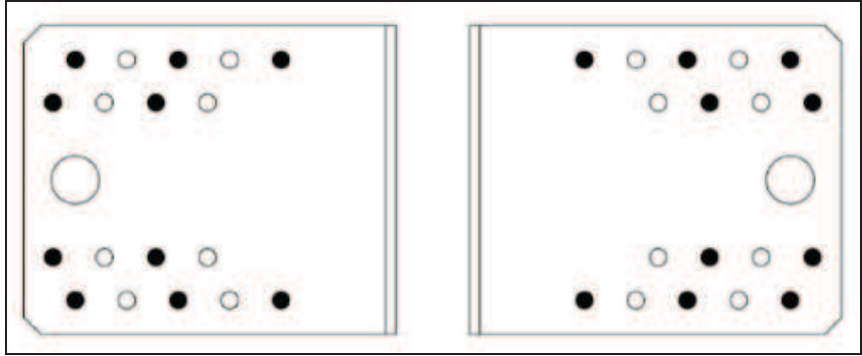
If  $t > 60$  [mm]  
Then  $0.5 \cdot t \geq t_1 \geq 0.35 \cdot t$

If  $t \leq 60$  [mm]  
Then  $0.9 \cdot t \geq t_1 \geq 0.7 \cdot t$

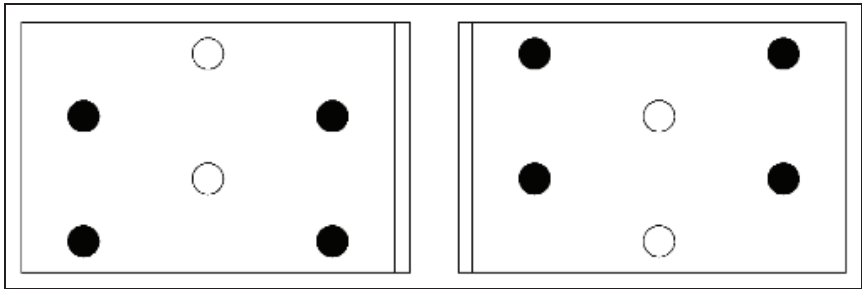




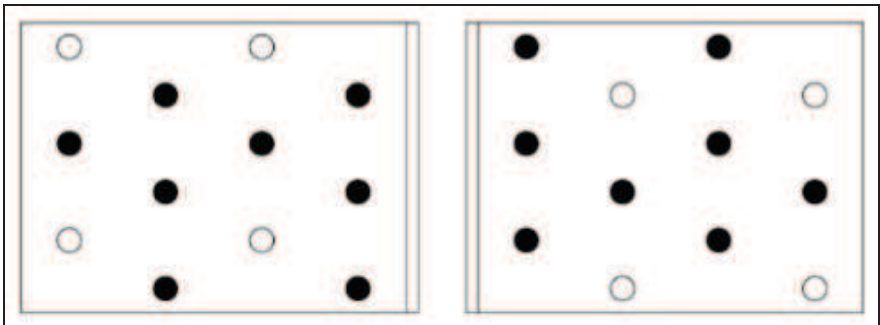
Type KL 0



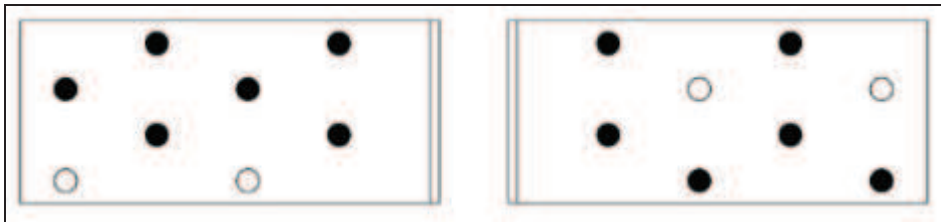
Type KL 5



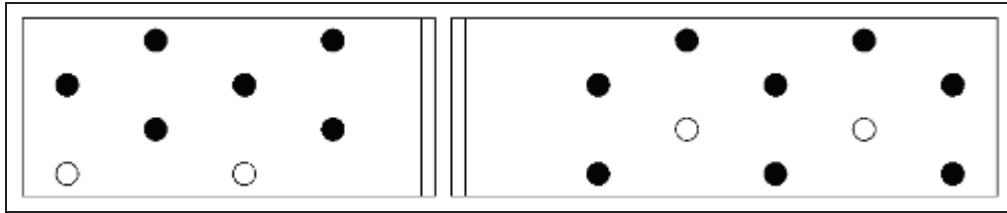
Type KM 3



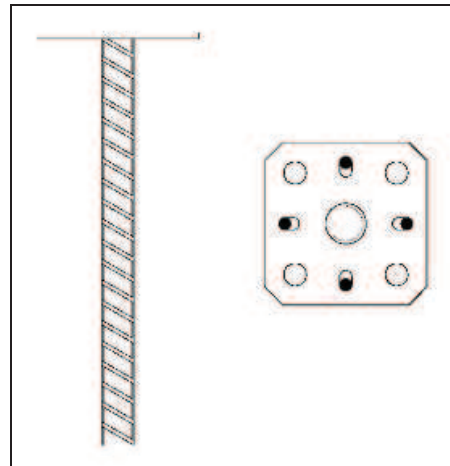
Type KM 8



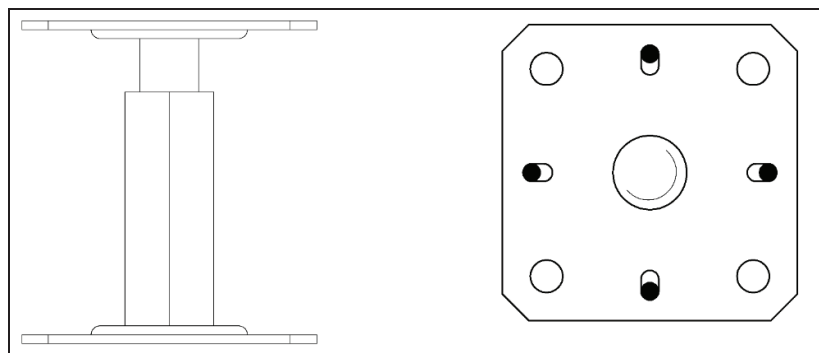
Type KM 16



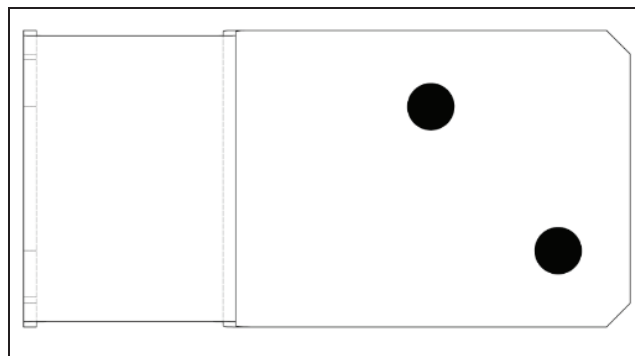
Type KM 19



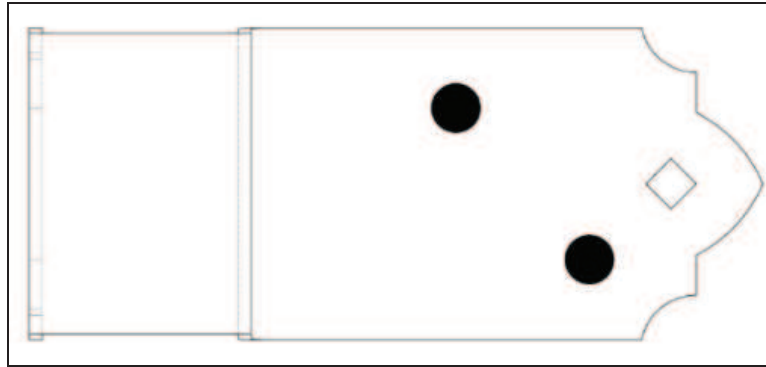
Type PPS



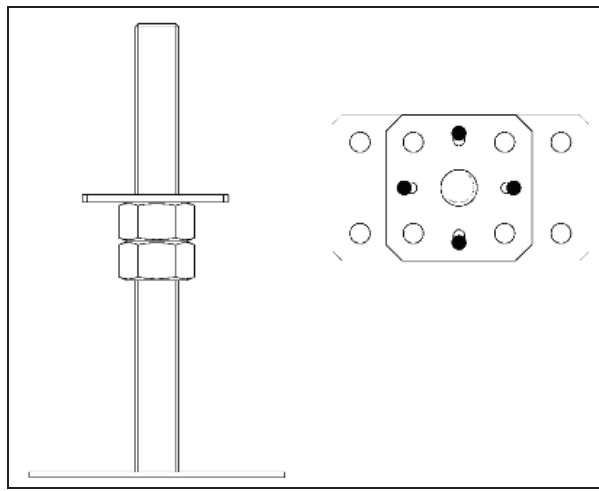
Type PR



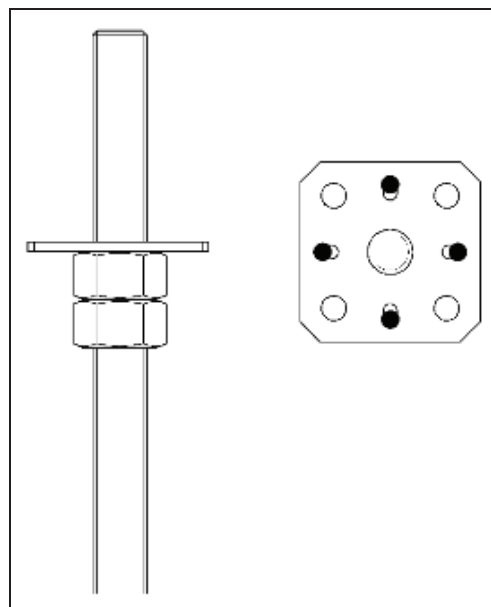
Type PSK



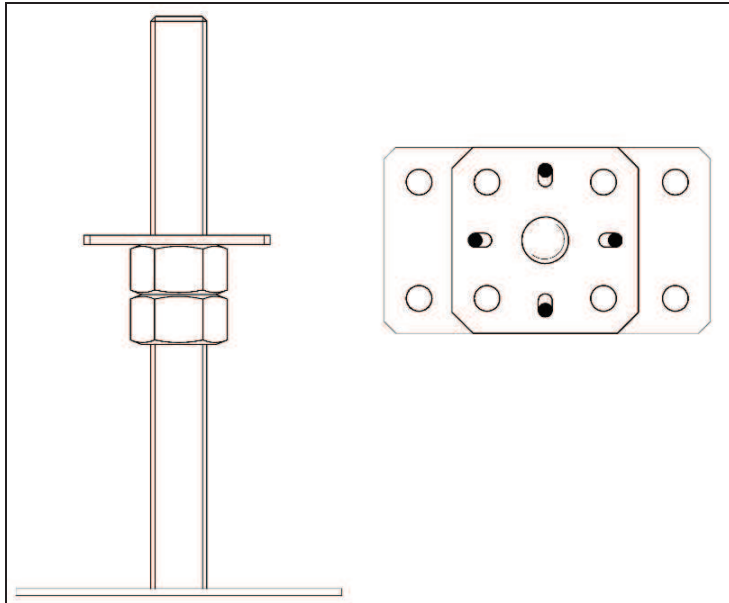
Type SDPSK



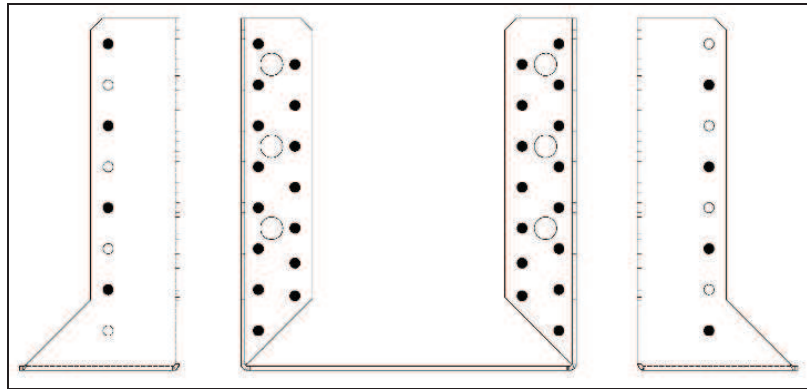
Type PSR



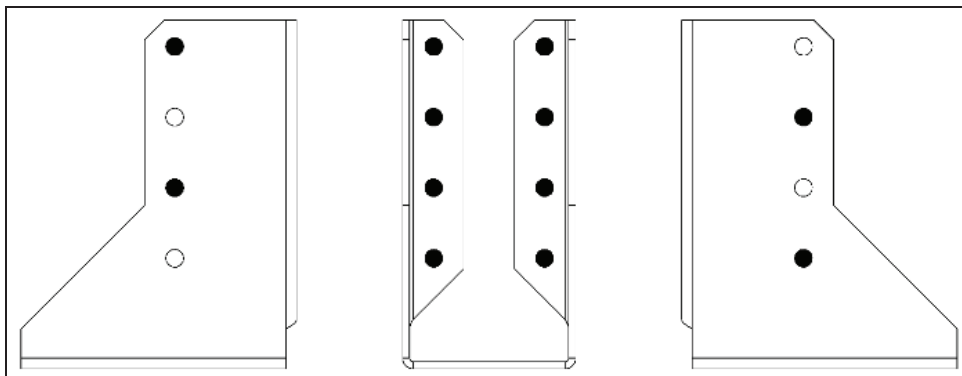
Type PPSR



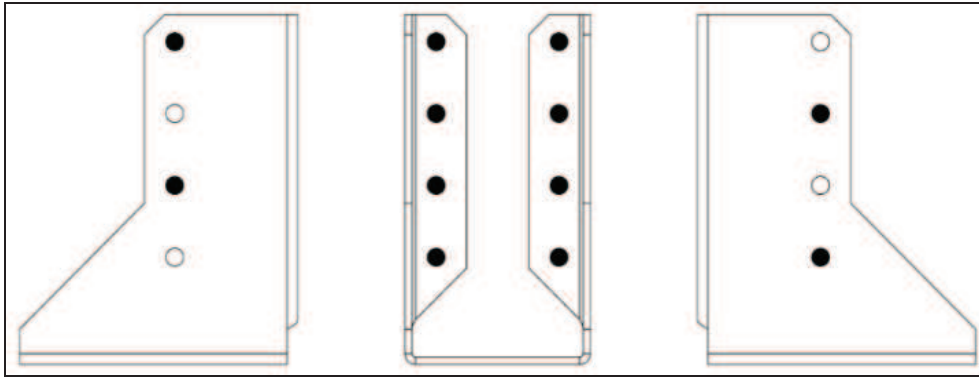
Type PSRP



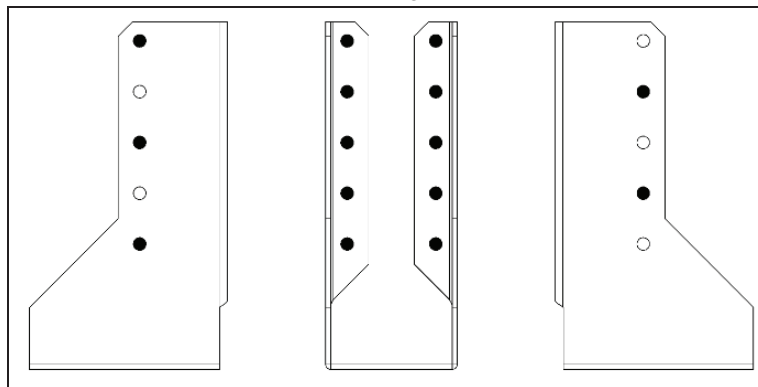
Type WBZ 38



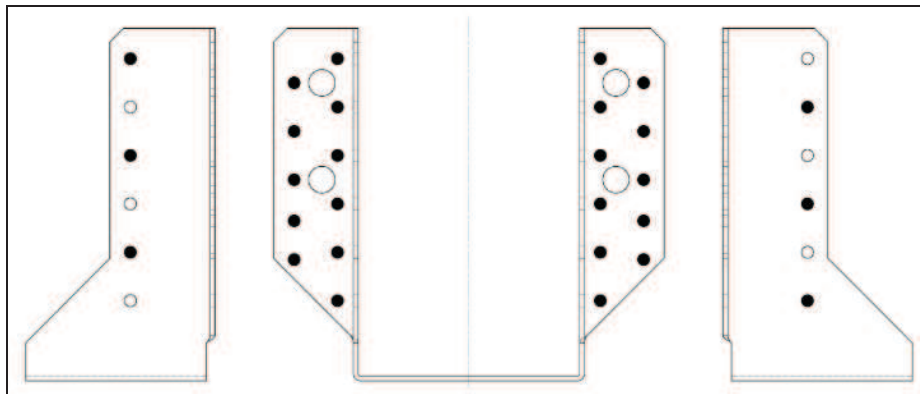
Type WBZ 49



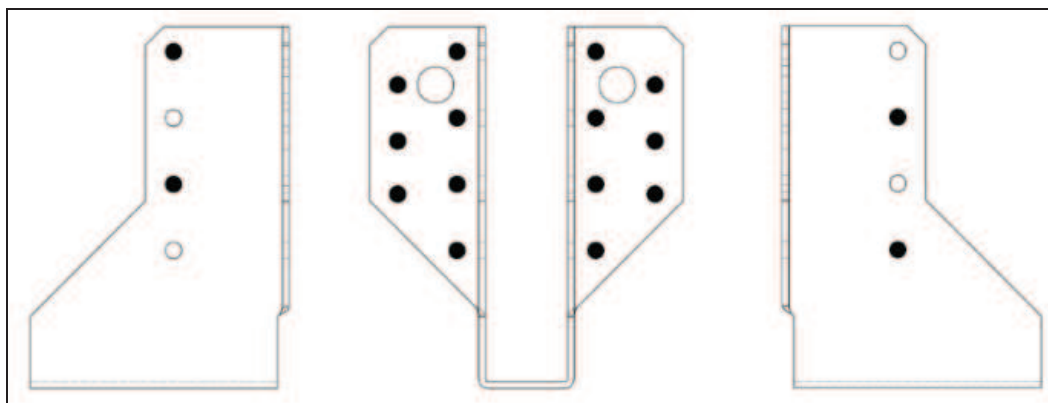
WBZ 52



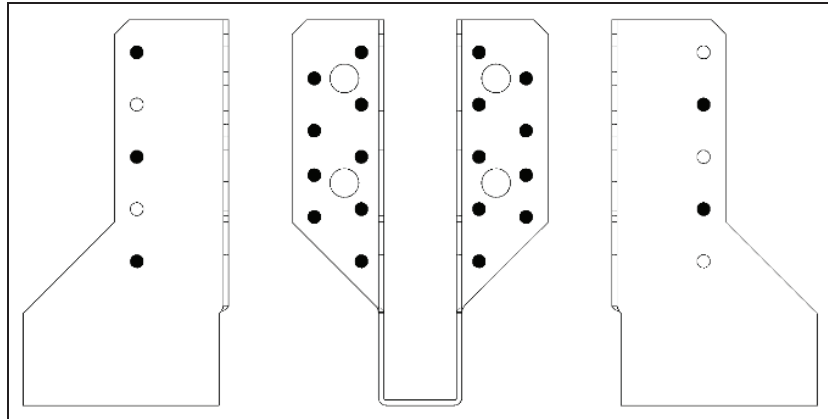
WBZ 54



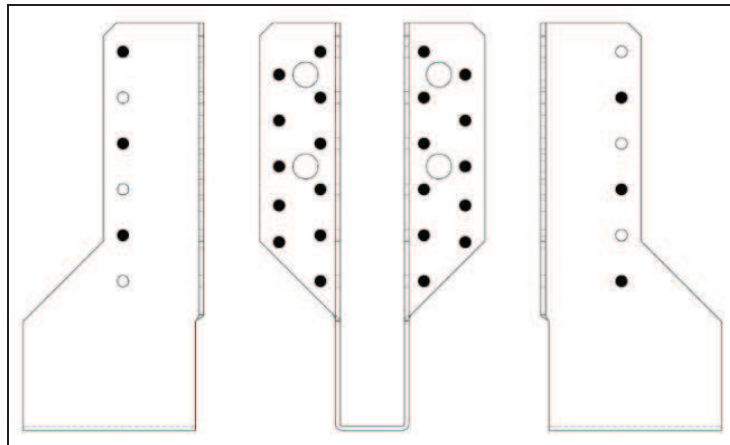
WB 39



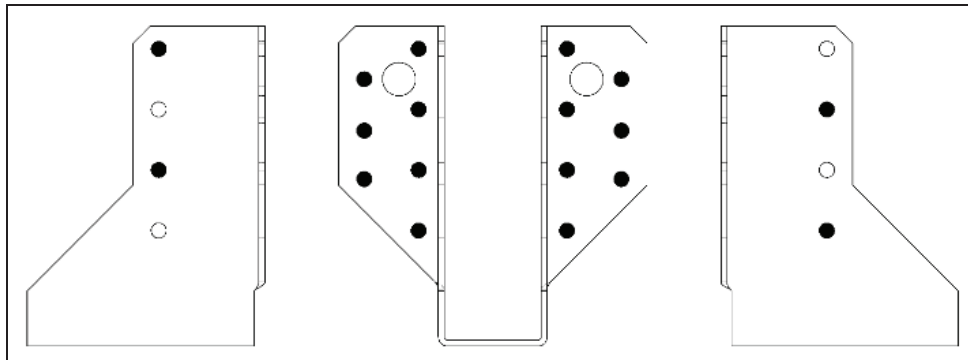
WB 40



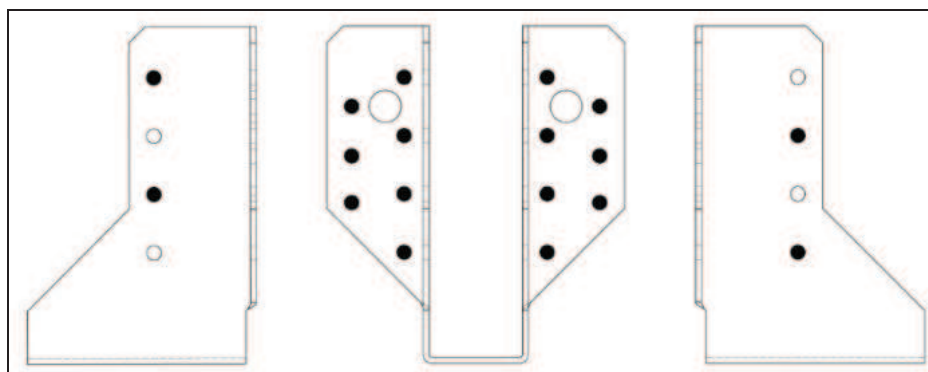
WB 41



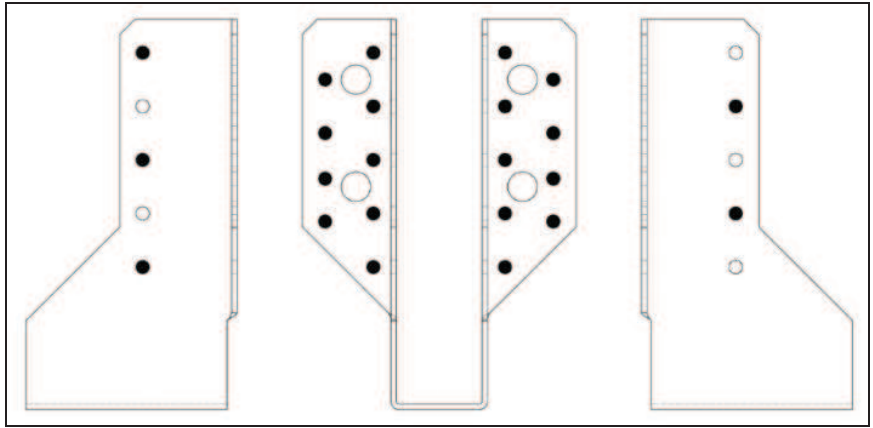
WB 42



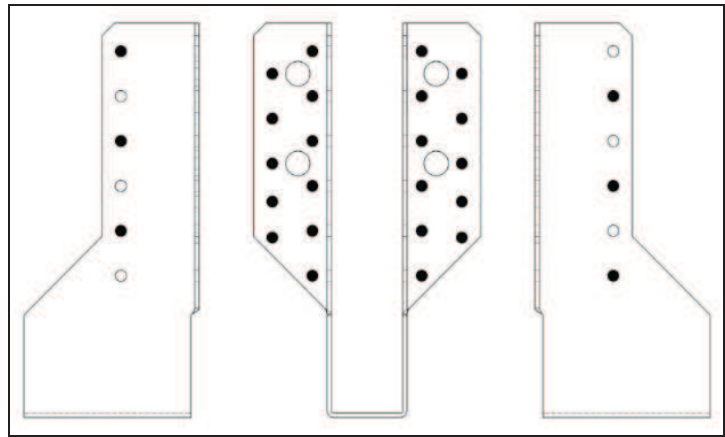
WB 43



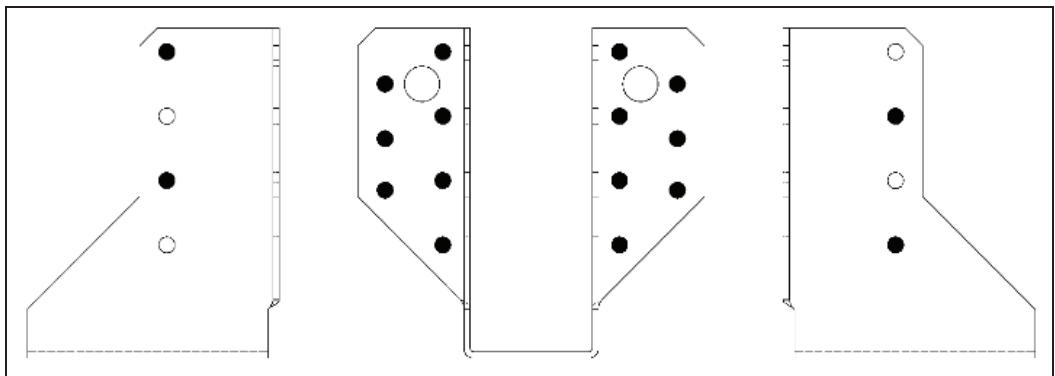
WB 44



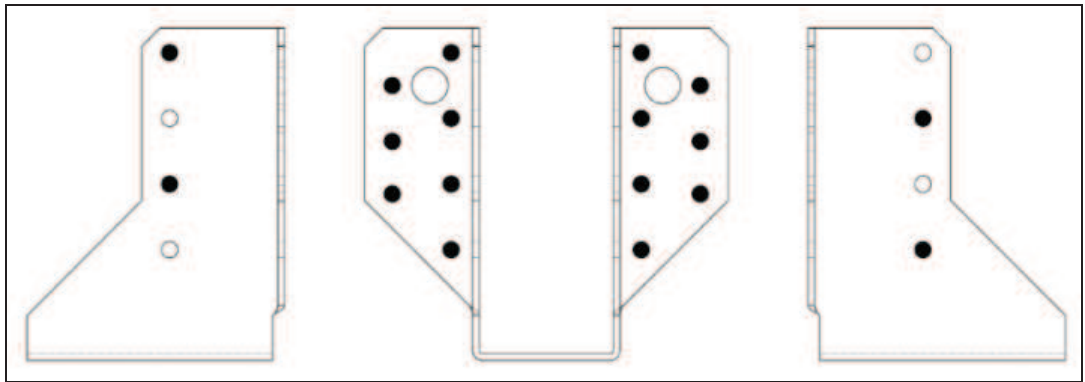
WB 45



WB 46

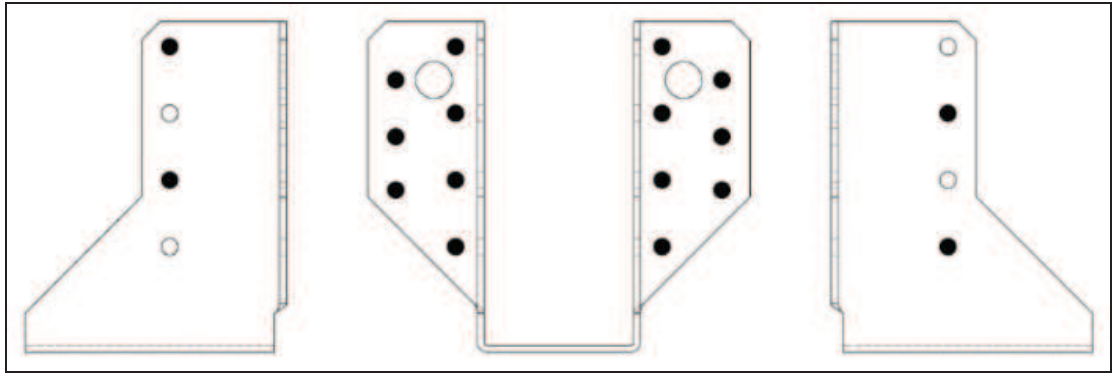


WB 47

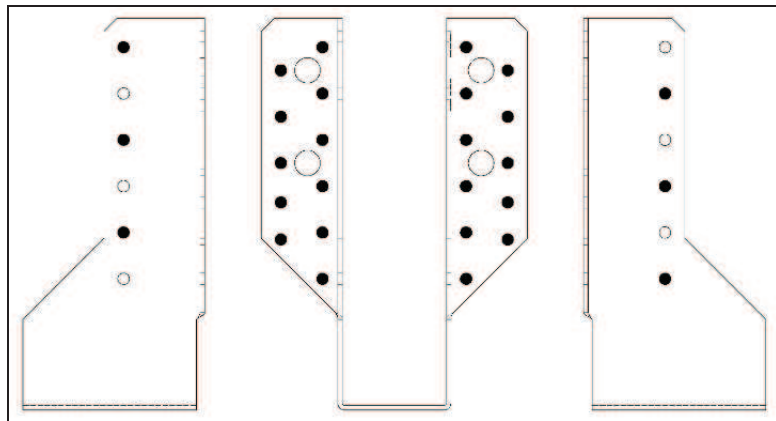


WB 48

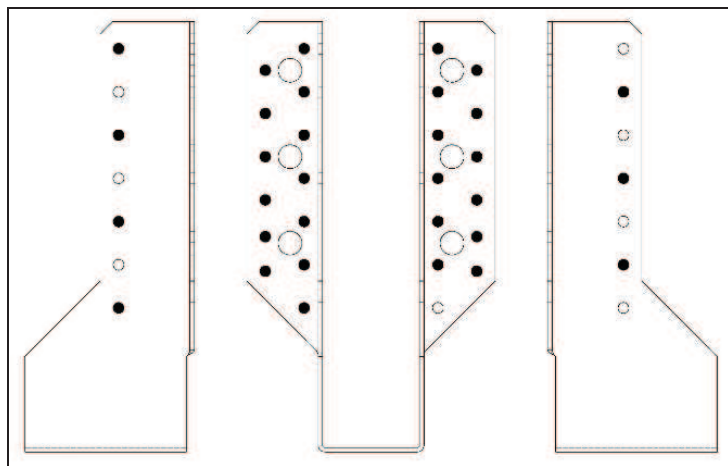




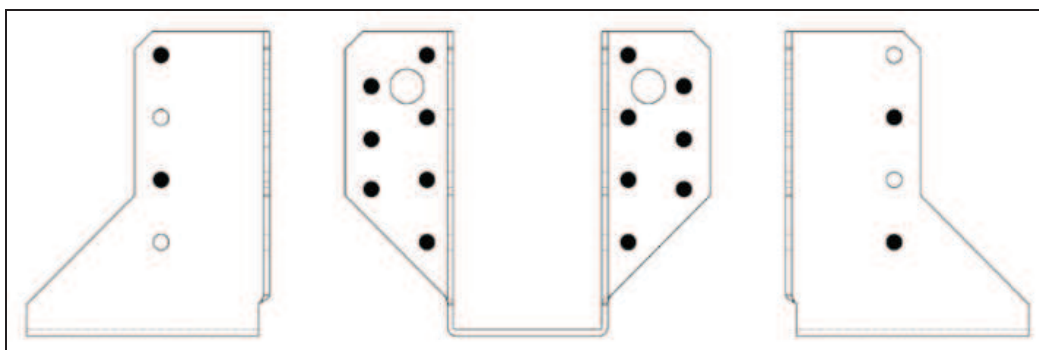
WB 49



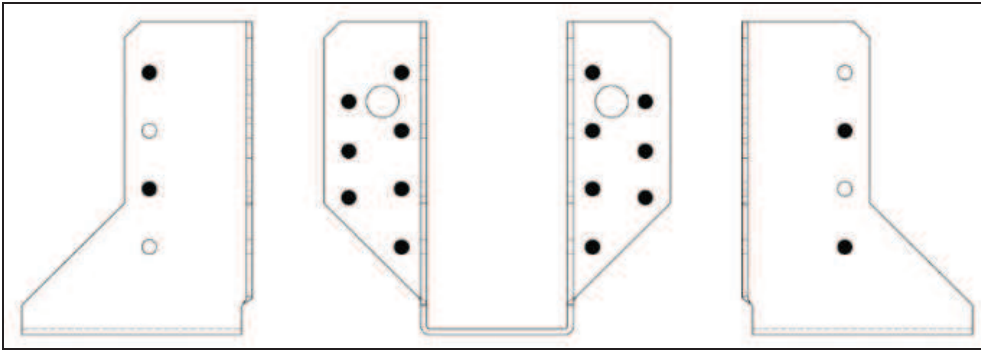
WB 50



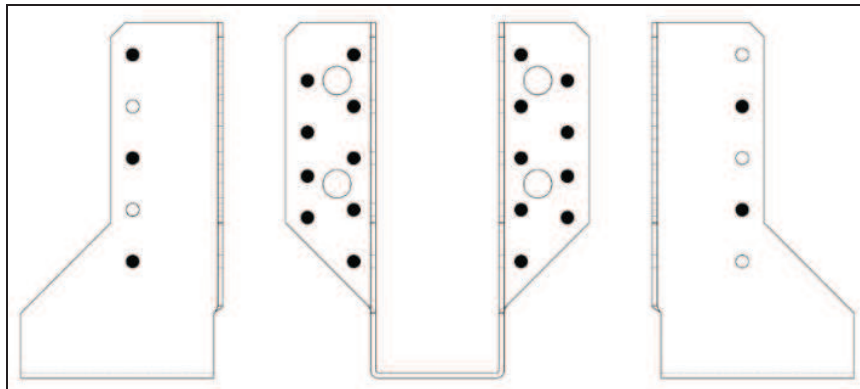
WB 51



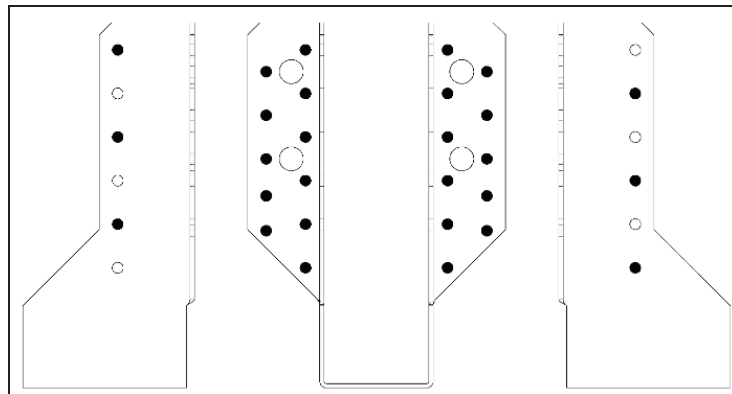
WB 52



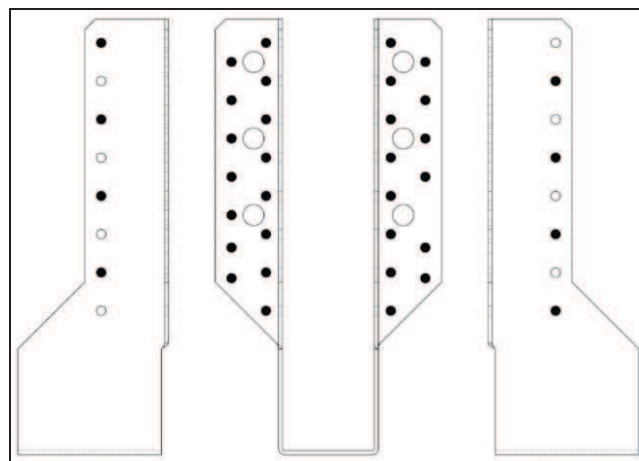
WB 53



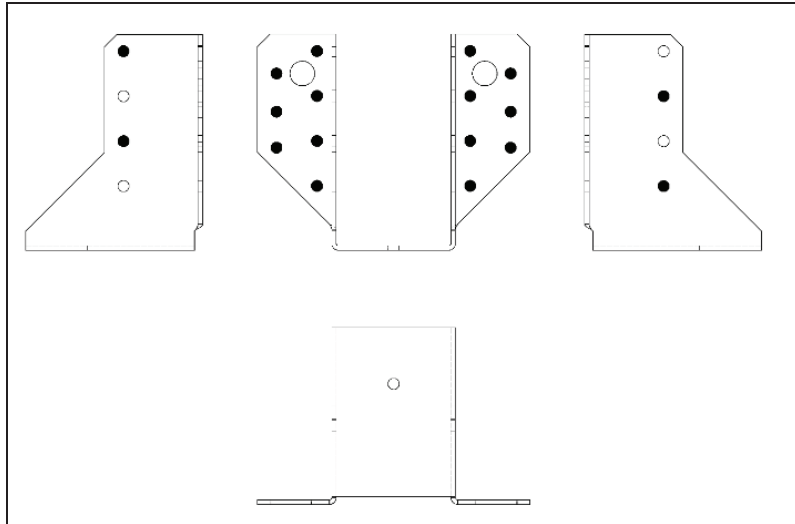
WB 54



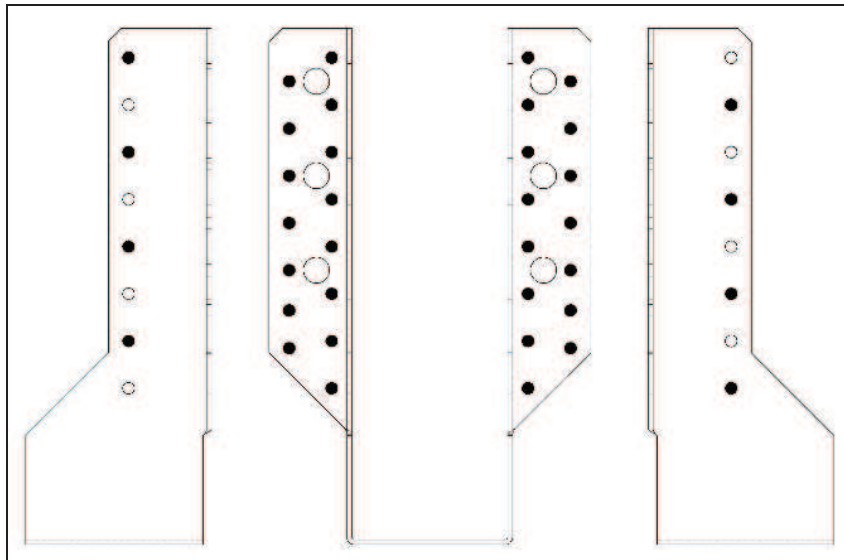
WB 55



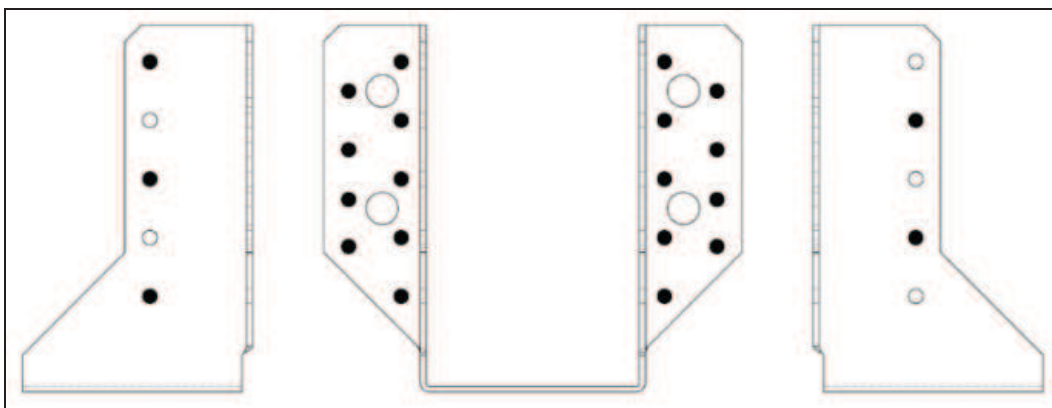
WB 56



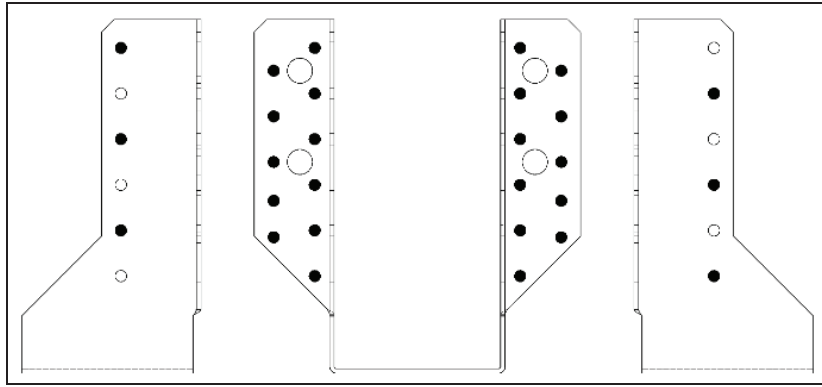
WB 57



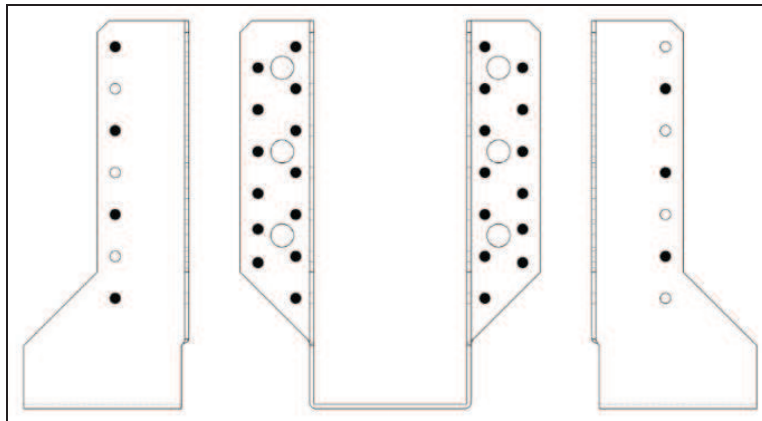
WB 58



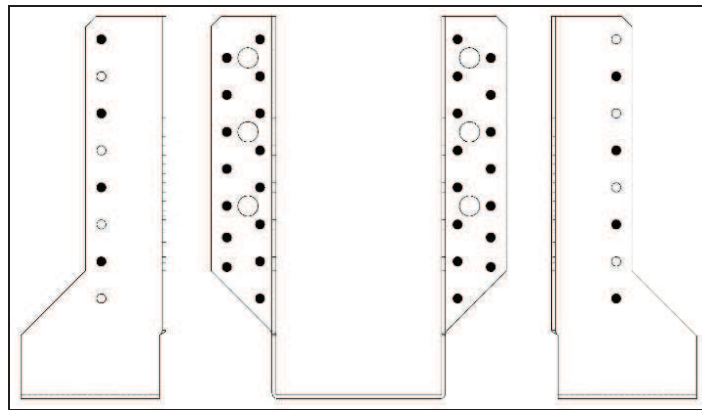
WB 59



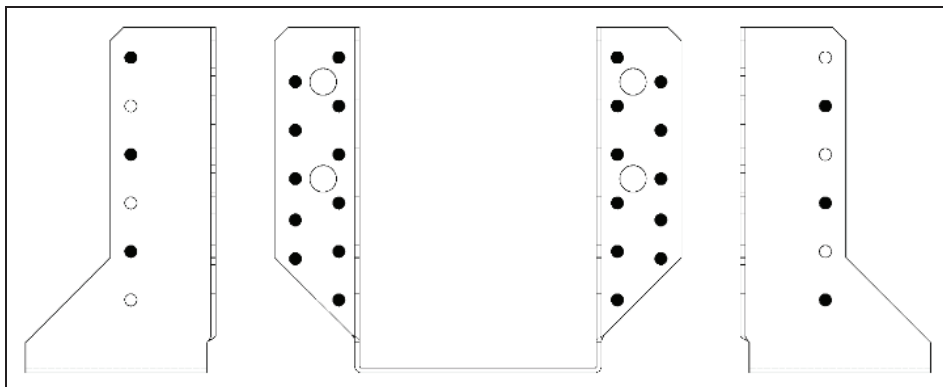
WB 60



WB 61



WB 62



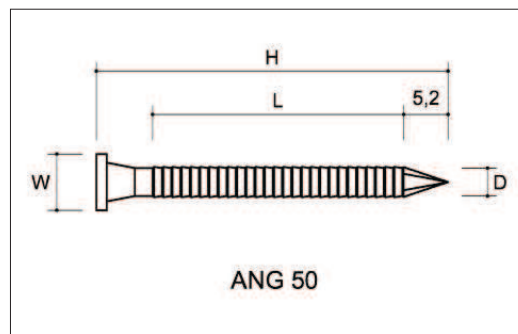
WB 63

## SPECIFICATION OF CONNECTION ELEMENTS

Connector	Dowel type fasteners	Fasteners per detail [pc.]	Fasteners per connection [pc.]
KM 16	ANCHOR Ø4x50	16	32
KM 16 (3mm)	ANCHOR Ø4x50	16	32
KM 8 (2.5 mm)	ANCHOR Ø4x50	16	32
KM 19 (3mm)	ANCHOR Ø4x50	14	28
KM 3 (2.5 mm)	ANCHOR Ø4x50	8	16
KL 0	ANCHOR Ø4x50	7	14
KL 5 (3mm)	ANCHOR Ø4x50	20	40
WB 39	ANCHOR Ø4x50/ANCHOR Ø4x50	22/8	22/8
WB 40	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 41	ANCHOR Ø4x50/ANCHOR Ø4x50	18/6	18/6
WB 42	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WB 43	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 44	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 45	ANCHOR Ø4x50/ANCHOR Ø4x50	18/6	18/6
WB 46	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WB 47	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 48	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 49	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 50	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WB 51	ANCHOR Ø4x50/ANCHOR Ø4x50	26/8	26/8
WB 52	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 53	ANCHOR Ø4x50/ANCHOR Ø4x50	14/4	14/4
WB 54	ANCHOR Ø4x50/ANCHOR Ø4x50	18/6	18/6
WB 55	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WB 56	ANCHOR Ø4x50/ANCHOR Ø4x50	30/8	30/8
WB 57	ANCHOR Ø4x50/ANCHOR Ø4x50	12/4	12/4
WB 58	ANCHOR Ø4x50/ANCHOR Ø4x50	30/8	30/8
WB 59	ANCHOR Ø4x50/ANCHOR Ø4x50	18/6	18/6
WB 60	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WB 61	ANCHOR Ø4x50/ANCHOR Ø4x50	26/8	26/8
WB 62	ANCHOR Ø4x50/ANCHOR Ø4x50	30/8	30/8
WB 63	ANCHOR Ø4x50/ANCHOR Ø4x50	22/6	22/6
WBZ 38	ANCHOR Ø4x50/ANCHOR Ø4x50	16/8	16/8
WBZ 49	ANCHOR Ø4x50/ANCHOR Ø4x50	8/4	8/4
WBZ 52	ANCHOR Ø4x50/ANCHOR Ø4x50	8/4	8/4
WBZ 54	ANCHOR Ø4x50/ANCHOR Ø4x50	10/6	10/6
PSR 80 M24	ANCHOR Ø4x50	4	4

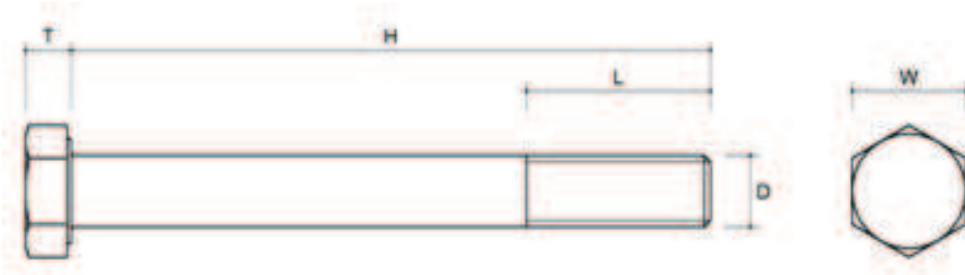
Connector	Dowel type fasteners	Fasteners per detail [pc.]	Fasteners per connection [pc.]
PSR 100 M24	ANCHOR Ø4x50	4	4
PSR 130 M24	ANCHOR Ø4x50	4	4
PSR 80 M20	ANCHOR Ø4x50	4	4
PSR 100 M20	ANCHOR Ø4x50	4	4
PSR 130 M20	ANCHOR Ø4x50	4	4
PSRP 80 M20	ANCHOR Ø4x50	4	4
PSRP 100 M20	ANCHOR Ø4x50	4	4
PSRP 130 M20	ANCHOR Ø4x50	4	4
PPSR 80	ANCHOR Ø4x50	4	4
PPSR 100	ANCHOR Ø4x50	4	4
PPSR 130	ANCHOR Ø4x50	4	4
PPS 80	ANCHOR Ø4x50	4	4
PPS 100	ANCHOR Ø4x50	4	4
PPS 130	ANCHOR Ø4x50	4	4
PR 100 100-150	ANCHOR Ø4x50	4	4
PR 100 130-150	ANCHOR Ø4x50	4	4
PR 130 130-150	ANCHOR Ø4x50	4	4
PSK 70	Bolt M 10x60 - 5.8 + washer M10	2	2
SDPSK 70	Bolt M 10x60 - 5.8 + washer M10	2	2

Anchor fastener type ANG 50 symbols and dimensions



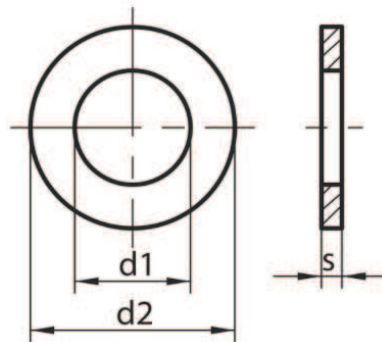
Symbol	Dimensions [mm]				DoP No.
	D	H	L	W	
ANG 50	4	50	36.8	8	DWU 30-20232 AN (issued on 02.01.2018)

Bolt type M 10x60 - 5.8 symbols and dimensions



Symbol	Dimensions [mm]					DoP No.
	D	H	L	W	T	
M10x60 - 5.8	10	60	26	16	6,5	NKJ/CPR/20170201 (issued on 01.02.2017)

Washer type M10 symbols and dimensions



Symbol	Dimensions [mm]			DoP No.
	d1	d2	s	
M10	10.5	20	2	NKJ/CPR/2015-09-01 rev.02 (issued on 15.01.2016)

<b>Three dimensional nailing plates</b>	<b>Annex 6</b>
<b>REFERENCE DOCUMENTS</b>	<b>ETA 18/1165</b>

- [1] Guideline for European Technical Approval of Three-dimensional nailing plates ETAG 015 (edition November 2012)
- [2] Declaration about dangerous substances issued by DOMAX sp. z o.o.
- [3] EN 26891:1991 Timber structures – Joints made with mechanical fasteners – General principles for the determination of strength and deformation characteristics
- [4] EN ISO 8970:2010 Timber structures – Testing of joints made with mechanical fasteners – Requirements for wood density
- [5] EN 384+A1:2019 Structural timber – Determination of characteristic values of mechanical properties and density
- [6] EN 13183-2:2002 Moisture content of a piece of sawn timber - Part 2: Estimation by electrical resistance method
- [7] EN 1309-1:1997 Round and sawn timber - Method of measurement of dimensions - Part 1: Sawn timber
- [8] EN 14358:2006 Timber structures – Calculation and verification of characteristic values
- [9] EOTA TR 016 *“Method of testing Three-Dimensional Nailing Plates with examples”*, version February 2002



## 5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Technický a zkušební ústav stavební Praha, s.p.

Issued in Prague on 28.04.2020



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Head of the TAB



### Annexes:

- |         |   |
|---------|---|
| Annex 1 | Product details and definitions                           |
| Annex 2 | Loading according to static diagrams                      |
| Annex 3 | The characteristic load carrying capacities of connectors |
| Annex 4 | Nailing patterns  |
| Annex 5 | Specification of connection elements                      |
| Annex 6 | Reference documents                                       |