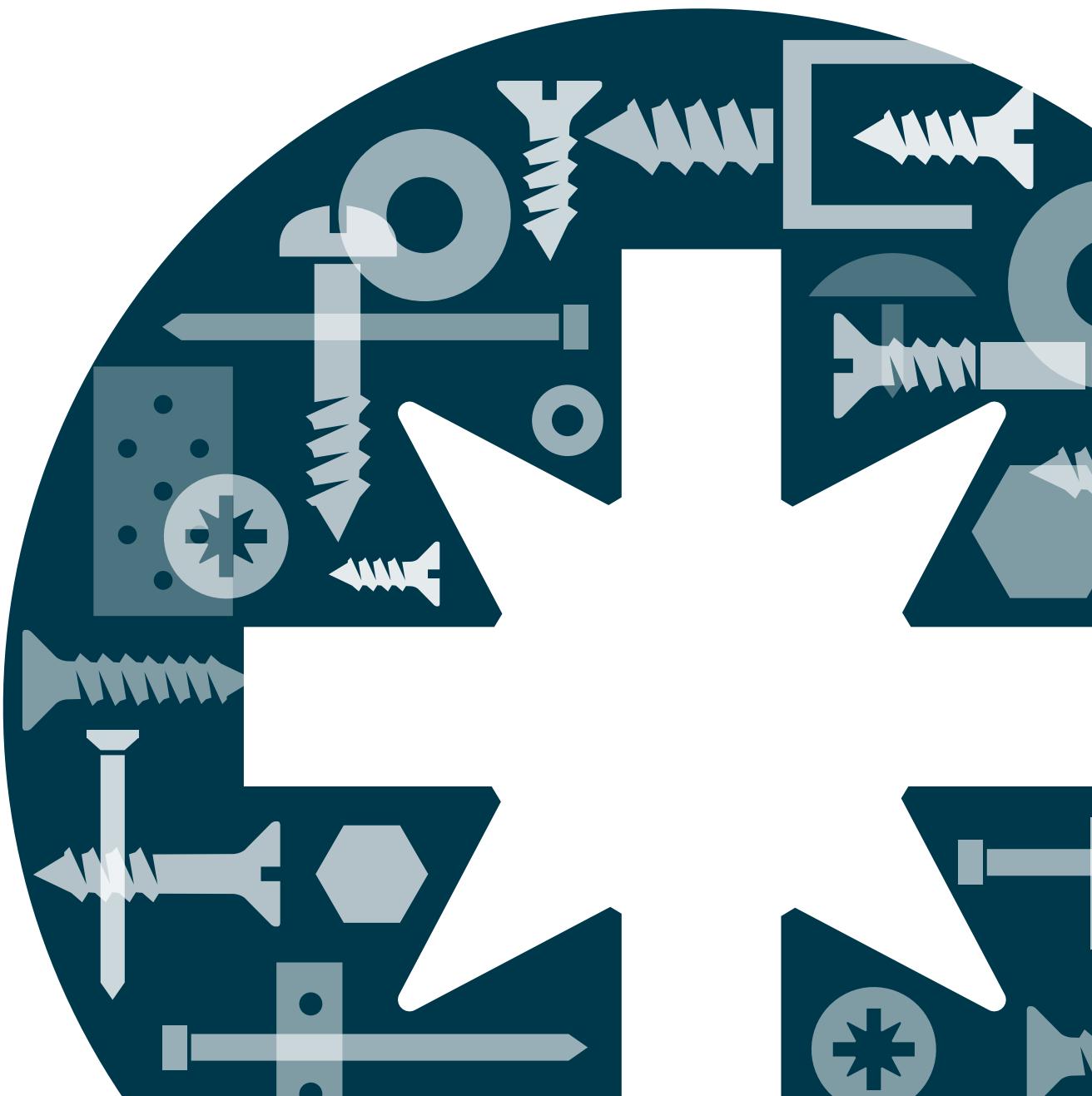




PRODUCT CATALOG

# SCREWS AND FASTENERS FOR WOODEN STRUCTURES

CONSTRUCTION  
COMPANY  
OF THE  
YEAR 2019



# We know how to connect



Counter head  
chipboard screw,  
partially threaded  
HUS



Post  
support  
PS





Flat head chipboard screw, partially threaded HUP



Counter head chipboard screw, partially threaded US



Post support with regulation PSRT



# CONTENT

01	GENERAL INFORMATION .....	07
02	WOOD JOINTS DESIGN .....	13
03	CONSTRUCTION SCREWS .....	39
04	TERRACE SCREWS .....	61
05	CARPENTRY CONNECTORS .....	65
06	ROOF COVERING SCREWS .....	77
07	WOOD TO STEEL SCREWS .....	85
08	DOUBLE THREADED RODS .....	89
09	NAILS .....	93





You can find  
all products from this catalog  
and thousands of others at:

**e-marcopol.eu**



01

## GENERAL INFORMATION





## GENERAL INFORMATION

PN-EN 338:2011

## STRUCTURAL TIMBER - STRENGTH CLASSES.

	Coniferous												Deciduous								
	C14	C16	C18	C20	C22	C24	C27	C30	C35	C40	C45	C50	D18	D24	D30	D35	D40	D50	D60	D70	
<b>Strength properties (in N/mm<sup>2</sup>)</b>																					
Bending	$f_{m,k}$	14	16	18	20	22	24	27	30	35	40	45	50	18	24	30	35	40	50	60	70
Stretching along the grain	$f_{t,0,k}$	8	10	11	12	13	14	16	18	21	24	27	30	11	14	18	21	24	30	36	42
Stretching crosswise the grain	$f_{t,90,k}$	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Compression along the grain	$f_{c,0,k}$	16	17	18	19	20	21	22	23	25	26	27	29	18	21	23	25	26	29	32	34
Compression crosswise the grain	$f_{c,90,k}$	2.0	2.2	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.1	3.2	7.5	7.8	8.0	8.1	8.3	9.3	10.5	13.5
Shearing	$f_{v,k}$	3.0	3.2	3.4	3.6	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.4	4.0	4.0	4.0	4.0	4.0	4.5	5.0
<b>Elastic properties (in kN/mm<sup>2</sup>)</b>																					
Average flexural modulus along the grain	$E_{0,mean}$	7	8	9	9.5	10	11	11.5	12	13	14	15	16	9.5	10	11	12	13	14	17	20
5% quantile of the flexural modulus along the grain	$E_{0,05}$	4.7	5.4	6.0	6.4	6.7	7.4	7.7	8.0	8.7	9.4	10.0	10.7	8	8.5	9.2	10.1	10.9	11.8	14.3	16.8
Average flexural modulus crosswise the grain	$E_{90,mean}$	0.23	0.27	0.30	0.32	0.33	0.37	0.38	0.40	0.43	0.47	0.50	0.53	0.63	0.67	0.73	0.80	0.86	0.93	1.13	1.33
Average modulus of the shape deformation	$G_{mean}$	0.44	0.5	0.56	0.59	0.63	0.69	0.72	0.75	0.81	0.88	0.94	1.00	0.59	0.62	0.69	0.75	0.81	0.88	1.06	1.25
<b>Density (w kg/m<sup>3</sup>)</b>																					
Characteristic density	$\rho_k$	290	310	320	330	340	350	370	380	400	420	440	460	475	485	530	540	550	620	700	900
Average density	$\rho_{mean}$	350	370	380	390	410	420	450	460	480	500	520	550	570	580	640	650	660	750	840	1080
<b>NOTES:</b>																					
1.	Values of tensile strength, compressive strength, shear strength, 5 % quantile of flexural modulus, average flexural modulus and average deformation modulus as provided above were calculated on the grounds of the formulas stipulated in the Annex A.																				
2.	Values in the table are determined for the wood moisture corresponding to the temperature equal 20 °C and the air humidity 65 %.																				
3.	It is possible that availability of the wood grades C45 and C50 is limited.																				
4.	The shear strength values refer to the wood without cracks according to EN 408. Impact of the cracks must be embedded in the design rules.																				

PN-EN 4080:2013

## WOOD STRUCTURES: CROSS-LAMINATED TIMBER AND SOLID LAMINATED TIMBER - REQUIREMENTS.

Characteristic values of strength and flexibility in N/mm<sup>2</sup> and density in kg/m<sup>3</sup> (for homogeneous glued laminated timber).

		Coniferous						
		GL 20h	GL 22h	GL 24h	GL 26h	GL 28h	GL 30h	GL 32h
Bending strength	$f_{m,g,k}$	20	22	24	26	28	30	32
Tensile strength	$f_{t,0,g,k}$	16	17.6	19.2	20.8	22.3	24	25.6
	$f_{t,90,g,k}$				0.5			
Compression strength	$f_{c,0,g,k}$	20	22	24	26	28	30	32
	$f_{c,90,g}$				2.5			
Shear strength	$f_{v,g,k}$				3.5			
	$E_{0,g,mean}$	8,400	10,500	11,500	12,100	12,600	13,600	14,200
Flexural modulus	$E_{0,g,05}$	7,000	8,800	9,600	10,100	10,500	11,300	11,800
	$E_{90,g,mean}$				300			
	$E_{90,g,05}$				250			
Modulus of the shape deformation	$G_{g,mean}$				650			
	$G_{g,05}$				540			
Density	$\rho_{g,k}$	340	370	385	405	425	430	440
	$\rho_{g,mean}$	370	410	420	445	460	480	490



## GRAPHICAL SYMBOLS USED

### A2 stainless steel - AISI 304



### Acid resistant steel A4 - AISI 316



A2 and A4 stainless steel - a group of steel alloys with reduced carbon content, characterized by high resistance to the corrosion under the influence of atmospheric conditions, low-concentration acids, salts and oxides. Resistance to the corrosion results from appropriate alloying additives to the steel: mainly chromium (minimum content is 11%), molybdenum, nickel and copper. Chromium contained in the steel reacts with the oxygen, resulting in a very thin, strong and corrosion resistant chromium oxide layer. The resulting layer can self-regenerate if damaged by external factors. Additionally, the chromium oxide layer is passive, i.e. it does not react with other substances. Stainless steels are additionally marked with classes, e.g. A2-50, A2-70 depending on the nominal tensile strength.

### Mechanical properties

Steel	Yield strength $R_{e_{min}}$ [MPa]	Tensile strength $R_m$ [MPa]	Elongation at break A [%]	Hardness $HB_{max}$ [HB]
A2	230	500 ÷ 750	45	215
A4	240	550 ÷ 700	40	215

### Bi-Metal



Bimetallic products are combination of the corrosion resistant steel with the carbon steel that can be hot set. This combination of two materials with different properties ensures possibility of drilling through structural steels, while providing high and long-term corrosion resistance of a fastener. Bimetal products are mainly intended for use in environments with increased corrosivity (C4, C5), in accordance with the requirements of Eurocodes.

### Iso-Fit



Hot-dip galvanized products require a special design due to the thickness of the coating itself. There are two types of design: so-called oversize and undersize. ISO-FIT version is a pre-machining of bolts and nuts resulting in the undersize (design). Such a design enables obtaining the final dimensions of the elements in accordance with the standard tolerances after the application of a protective coating.



## GENERAL INFORMATION

---

### COATINGS

#### Electrolytic zinc coating



Commonly used protective coating. Anti-corrosion properties of this coating depend on its thickness. Electrolytic zinc coating is applied on the element on the basis of a potential difference in the electrolysis processes. Electrolytic zinc coatings are cost-effective and give an aesthetic finish. Galvanizing is the most commonly used surface finish for fasteners.

#### Hot dip galvanizing HDG



Hot dip galvanizing HDG is a coating with high corrosion resistance. The protective coating resulting from the hot dip galvanizing enables an effective and long-term exposure in highly corrosive environments (C4, C5). Hot dip galvanizing is applied by dipping or pre-galvanizing. Thickness of hot dip galvanized coatings varies between 18-50 µm.

#### Ceramic coating Silver Ruspert



Silver Ruspert is a high quality coating with excellent anti-corrosion performance due to three coatings: a metallic zinc coating, a special chemical coating and a sealant coating. These coatings are combined with each other by means of a chemical reaction, resulting in a rigid connection of the coatings. Products coated with this method are used wherever high corrosion resistance and strength are required.

#### Zinc impregnated coating



Zinc impregnated coating (thermodiffusion) is produced by means of the thermodiffusion (thermophoresis) galvanizing - a process that is based on the reaction of a mixture of special zinc powder with the iron. The zinc particles diffuse into the surface layer of the steel, forming a protective anti-corrosion coating on it. The zinc penetrates to a thickness of about 1/3 of the entire layer, which provides extremely high resistance to the corrosion - several times higher than in the case of the galvanizing or the hot-dip galvanizing.

#### Wax coating



Thanks to the special wax coating, the screwing torque is significantly reduced. This makes the assembly (process) faster and easier. It also extends the operating time of battery-powered tools.



## COMPARISON OF COATING / STEEL STRENGTH

Type of coating / steel	Protective coating definition parameter / Corrosion rate category acc. to EN ISO 12944-2				
Galvanizing	$\geq 5\mu\text{m}$ C1	$\geq 8\mu\text{m}$ C1	$\geq 12\mu\text{m}$ C1, C2	$\geq 20\mu\text{m}$ C1, C2, C3	
Hot dip galvanizing	$\geq 15\mu\text{m}$ C2, C3	$\geq 20\mu\text{m}$ C3, C4	$\geq 40\mu\text{m}$ C4	$\geq 50\mu\text{m}$ C4, C5	
Thermophoresis hardening		$\geq 10\mu\text{m}$ C3, C4	$\geq 20\mu\text{m}$ C4	$\geq 35\mu\text{m}$ C4, C5	
Ceramic coating Silver Ruspert		$\geq 500\text{h}$ C3, C4	$\geq 750\text{h}$ C4, C5	$\geq 1500\text{h}$ C5	
Stainless steel AISI 304			C3	C4	
Stainless steel AISI 314			C3	C4	C5

## MECHANICAL PROPERTY CLASS

Performance of bolted products made of the carbon steel is determined by the mechanical property class. Mechanical property classes define the nominal tensile strength ( $R_m$ ) and the nominal yield strength ( $R_e$ ) for joints made of heat-treated carbon steels. The class designation consists of two digits separated by a dot. The first digit indicates the nominal tensile strength value and the second digit - the nominal yield strength value, according to the following relations.

CLASS 4.8

CLASS 5.8

CLASS 8.8

CLASS 10.9

### Example - class 4.8

The first number means 1/100 of the nominal tensile strength, i.e.:

$$R_m = 4 * 100 = 400 \text{ [N/mm}^2\text{] or [MPa]}$$

The second number defines the yield strength factor. To calculate the value of the nominal yield strength, it is necessary to multiply the nominal tensile strength by the second number - in this case 0.8:

$$R_e = 400 \text{ N/mm}^2 * 0.8 = 320 \text{ [N/mm}^2\text{] or [MPa]}$$

## CORROSION/CORROSIVITY CATEGORIES ACCORDING TO EN ISO 12944-2

Corrosion is the process that gradually destroys a structure of a material and eventually it causes its decomposition. This process takes place wherever there is a layer of moisture on the metal surface. The moisture layer can be so thin that it is invisible to an unaided eye.

Rate of the corrosion is increased by the following factors:

- Increase in the relative air humidity,
- occurrence of condensation (when the temperature is equal to or lower than the dew point temperature),
- increased amount of impurities in the atmosphere (corrosive impurities may react with the steel and form deposits on the surface).

The most frequently the corrosion occurs when the relative humidity exceeds 80% and the temperature is above 0°C - but if impurities and/or hygroscopic salts are present, corrosion takes place at much lower humidity levels.

According to EN ISO 12944-2 there are five corrosion categories, depending on the location and conditions of use:



## GENERAL INFORMATION

## COMPARISON OF COATING / STEEL STRENGTH

Corrosivity category	Examples of environments typical for temperate climates according to EN ISO 12944-2	
	Outdoor	Indoor
C1 - very low 	Not applicable	Heated buildings with clean atmosphere e.g. offices, stores, schools, hotels
C2 - low 	Atmospheres with low pollution, mainly rural areas	Unheated buildings where condensation may occur, e.g. warehouses, sports halls
C3 - average 	Urban and industrial atmospheres, medium sulphur oxide pollution, coastal areas with low salinity [rate]	Production rooms with high humidity and some air pollution, e.g. food plants, laundries, breweries, dairies
C4 - high 	Industrial areas and coastal areas with medium salinity	Chemical plants, swimming pools, ship and boat repair yards
C5 - very high 	Industrial areas with high humidity and an aggressive atmosphere	Buildings or areas with almost continuous condensation and high pollution

## Notes:

1. The table does not specify the CX category, which defines an extreme industrial corrosive environment.
2. Particular attention must be paid to proper storage and warehousing conditions. The conditions under which the product is stored must correspond to an environment with a corrosivity class lower than that specified in the product's intended use.

## RESISTANCE TO SEISMIC LOADS



## Seismic load resistance categories:

- C1 - resistance to cyclic loads in a crack up to 0.5 mm.
- C2 - resistance to cyclic loads in a variable crack up to 0.8 mm, with a defined maximum displacement.

## INSTALLATION PARAMETERS



Tightening torque



Recommended screwdriver speed during screwing

# 02

## WOOD JOINTS DESIGN





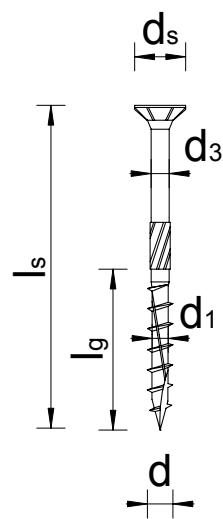
## USE OF SCREWS WITH PARTIAL THREAD IN CONSTRUCTION JOINTS

### 1. General data, application

Marcopol HUS screw is a screw with a countersunk head and a partial thread. Range of diameters available from 5 to 10 mm. Marcopol HUS screw is suitable for use in conditions of 1st and 2nd class of use of a structure, for connections in solid wood, glued laminated wood, LVL and wood based panels. The thread used in HUS screws prevents the wood from splitting and the drilling tip enables easy and light screwing without pre-drilling of the hole. HUS screws can, if necessary, be used with a PHUS washer where a full recess in the wood is not necessary. A HUS screw with a PHUS washer has a much higher head pull-through capacity.

The most common areas of application are the following joints:

- timber-to-wood overlapping e.g. rafter-to-truss connection, connection of the bottom flange of a roof truss,
- rafter with a floor beam or a masonry plate,
- floor beam to a structural wall,
- multi-branched posts,
- beam-to-beam butt joint,
- many others for which use of a screw with the partial thread is optimal.



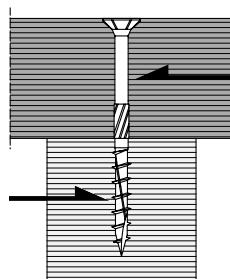
### 2. Mechanical properties of the materials

Diameter of the HUS screw		5	6	8	10
Nominal diameter	d [mm]	5	6	8	10
Head diameter	d <sub>s</sub> [mm]	10	12	15	18.40
Thread inside diameter	d <sub>1</sub> [mm]	3.7	4	5.45	6.50
Diameter of smooth part of the stem	d <sub>3</sub> [mm]	3.7	4.30	5.9	7.10
Material characteristic yield moment	M <sub>y,Rk</sub> [Nm]	7533	14152	33244	50969
Characteristic parameter for pullout resistance	f <sub>ax,k</sub> [N/mm <sup>2</sup> ]	19.00	18.67	15.12	14.16
Characteristic parameter for the resistance to head pull-out	f <sub>head,k</sub> [N/mm <sup>2</sup> ]	23.09	21.12	24.34	20.46
Characteristic tensile strength	f <sub>tens,k</sub> [kN]	8.66	14.58	23.31	31.48

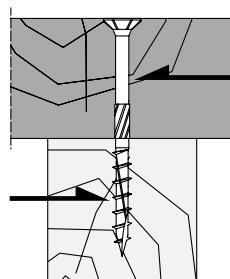


### 3. Minimum spacings and distances for transversely loaded screws

Minimum spacings and distances for transversely loaded screws



angle between force and fibre direction  $\alpha = 0^\circ$



angle between force and fibre direction  $\alpha = 90^\circ$

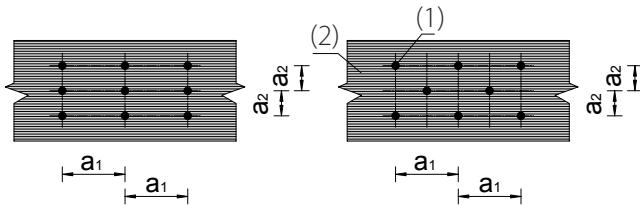
Screws placed with pre-drilled holes

	5	6	8	10	5	6	8	10
$a_1$ [mm]	25	30	40	50	20	24	32	40
$a_2$ [mm]	15	18	24	30	20	24	32	40
$a_{3,t}$ [mm]	60	72	96	120	35	42	56	70
$a_{3,c}$ [mm]	35	42	56	70	35	42	56	70
$a_{4,t}$ [mm]	15	18	24	30	35	42	56	70
$a_{4,c}$ [mm]	15	18	24	30	15	18	24	30

Screws placed without a pre-drilled hole

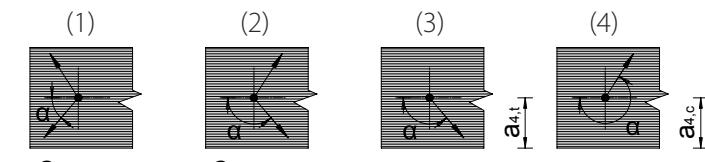
	5	6	8	10	5	6	8	10
$a_1$ [mm]	60	72	96	120	25	30	40	50
$a_2$ [mm]	25	30	40	50	25	30	40	50
$a_{3,t}$ [mm]	75	90	120	150	50	60	80	100
$a_{3,c}$ [mm]	50	60	80	100	50	60	80	100
$a_{4,t}$ [mm]	25	30	40	50	50	60	80	100
$a_{4,c}$ [mm]	25	30	40	50	25	30	40	50

spacing along and across fibres



Explanations  
(1) Connector  
(2) Fibre direction

Distances from the end and the side



Explanations  
(1) End loaded  
(2) End not loaded  
(3) Side loaded  
(4) Side not loaded

$-90^\circ \leq \alpha \leq 90^\circ$     $90^\circ \leq \alpha \leq 270^\circ$     $0^\circ \leq \alpha \leq 180^\circ$     $180^\circ \leq \alpha \leq 360^\circ$

Fig.1 Spacing and distances

#### Notes:

1. Minimum spacings and distances for transversely loaded screws in accordance with PN-EN 1995:2008.
2. Values based on a characteristic wood density of  $\rho_k = 350 \text{ kg/m}^3$ .
3. The minimum spacings in all wood-panel joints are to be multiplied by a factor of 0.85. Minimum end and side distances remain unchanged except as noted in 8.3.1.3 of the standard PN-EN 1995:2008.
4. The minimum spacing in steel-to-wood joints must be multiplied by a factor of 0.7. Minimum end and side distances remain unchanged.



#### 4. Minimum spacings and distances for transversely loaded screws

Minimum spacing and distance of axially loaded screws				
	5	6	8	10
a1 [mm]	35	42	56	70
a1,c [mm]	50	60	80	100
a2,c [mm]	20	24	32	40
a2 [mm]	25	30	40	50

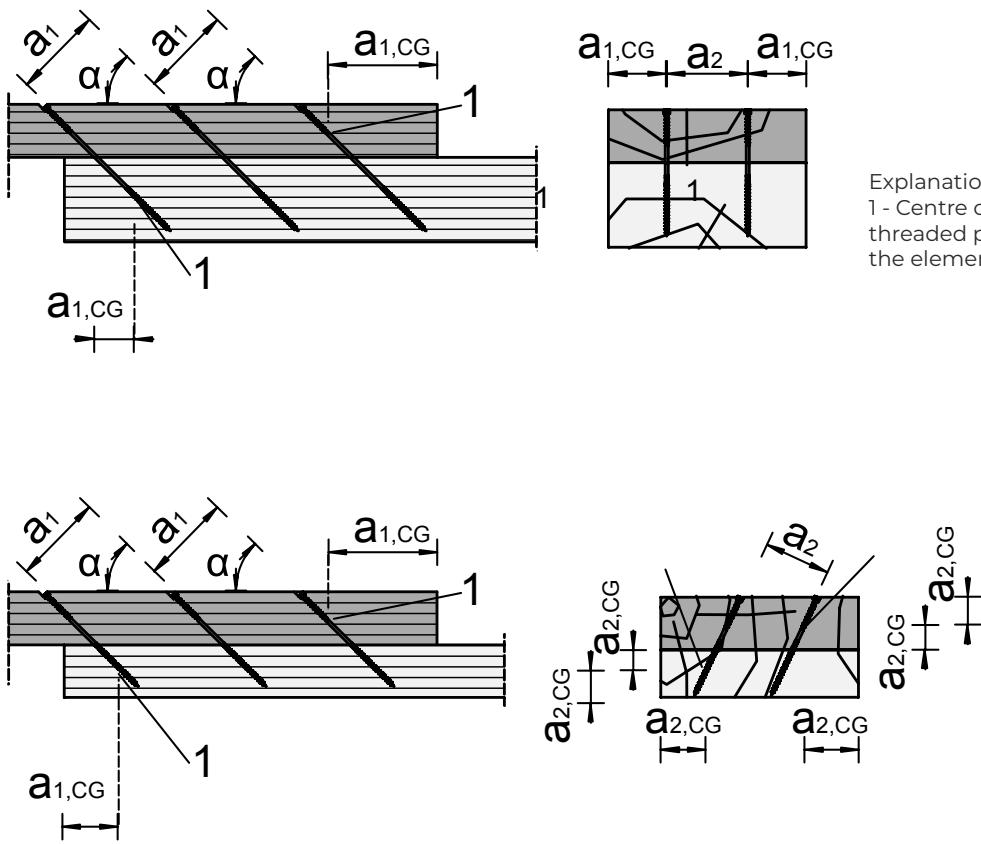


Fig. 2 Spacing and distances

Explanations:  
1 - Centre of gravity of the threaded part of the screw in the element

## 5. Characteristic resistance for transversely and axially loaded screws

Marcopol HUS screw - Geometry				Characteristic load ratings for transversely loaded screws				Characteristic load capacity of screws loaded axially				
				Wood - wood	Wood - wood with washer	Plate - wood	Steel - wood plate thin	Steel - wood board thick	Pulling out the thread	Pulling the head	Pulling the head with the washer	
d [mm]	ls [mm]	t <sub>1</sub> [mm]	t <sub>2</sub> [mm]	F <sub>v,Rk</sub> [kN]	F <sub>v,Rk</sub> [kN]	F <sub>v,Rk</sub> [kN]	F <sub>v,Rk</sub> [kN]	F <sub>v,Rk</sub> [kN]	F <sub>ax,Rk1</sub> [kN]	F <sub>ax,Rk2</sub> [kN]	F <sub>ax,Rkphus</sub> [kN]	
5	50	20	30	1.40	[ - ]	tWB1 = 12 [mm]	1.52	1.46	2.37	2.85	2.31	[ - ]
	60	20	40	1.46	[ - ]		1.52	1.76	2.70	3.80	2.31	[ - ]
	70	30	40	1.63	[ - ]		1.52	1.94	2.64	3.80	2.31	[ - ]
	80	30	50	1.63	[ - ]		1.52	2.22	2.88	4.75	2.31	[ - ]
	90	40	50	1.81	[ - ]		1.48	2.51	2.88	4.75	2.31	[ - ]
	100	40	60	1.81	[ - ]		1.48	2.80	3.12	5.70	2.31	[ - ]
	120	60	60	1.81	[ - ]		1.48	2.82	3.12	5.70	2.31	[ - ]
6	60	24	36	1.67	1.67	tWB1 = 22 [mm]	1.90	1.85	2.80	2.52	3.04	8.03
	70	30	40	1.95	2.03		2.30	2.17	3.29	3.36	3.04	8.03
	80	30	50	2.05	2.34		2.51	2.45	3.49	4.20	3.04	8.03
	90	40	50	2.24	2.53		2.51	2.77	3.49	4.20	3.04	8.03
	100	50	50	2.44	2.73		2.50	2.93	3.49	4.20	3.04	8.03
	120	45	75	2.35	3.16		2.70	3.54	4.02	6.30	3.04	8.03
	140	65	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
	160	85	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
	180	105	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
	200	125	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
	220	145	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
	240	165	75	2.50	3.32		2.69	3.54	4.02	6.30	3.04	8.03
8	80	28	52	2.82	2.82	t1 ≤ 4 [mm]	[ - ]	3.06	5.20	6.29	5.48	14.61
	100	48	52	3.46	3.66		[ - ]	3.82	5.75	6.29	5.48	14.61
	120	40	80	3.55	4.02		[ - ]	4.61	6.60	9.68	5.48	14.61
	140	60	80	4.03	5.08		[ - ]	5.41	6.60	9.68	5.48	14.61
	160	80	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	180	100	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	200	120	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	220	140	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	240	160	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	260	180	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	280	200	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	300	220	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	320	240	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	340	260	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	360	280	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	380	300	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
	400	320	80	4.34	5.39		[ - ]	5.74	6.60	9.68	5.48	14.61
10	120	40	80	4.46	4.55	t1 ≤ 5 [mm]	[ - ]	5.23	8.37	11.33	6.93	18.41
	140	60	80	4.94	6.04		[ - ]	6.11	8.36	11.33	6.93	18.41
	160	80	80	5.50	6.60		[ - ]	7.02	8.36	11.33	6.93	18.41
	180	100	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	200	120	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	220	140	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	240	160	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	260	180	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	280	200	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	300	220	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	320	240	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	340	260	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	360	280	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	380	300	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41
	400	320	80	5.55	6.65		[ - ]	7.16	8.36	11.33	6.93	18.41

### Notes:

- The characteristic load capacities are in accordance with EN 1995:2008 standard.
- To determine the design load capacity, the characteristic load capacity has to be multiplied by the  $k_{mod}$  factor depending on the use class and load duration class (Table 3.1 of EN 1995:2008) and divided by the respective safety factor  $\gamma_M$  (for solid wood  $\gamma_M=1.3$ ).
- Values based on characteristic wood density  $\rho_k=350 \text{ kg/m}^3$ .



4. It is assumed that the threaded part is completely embedded in the wooden element.
5. The calculations apply exclusively to the load capacity of the screws. The load capacity of wooden, wood-based or steel plate elements has to be checked separately.
6. The characteristic values in the table relate to a single screw. When checking a group of fasteners, the effective number of screws in the connection must be taken into account (acc. PN-EN 1995:2008).
7. The characteristic load capacities of transversely loaded screws refer to connections without pre-drilled holes.
8. The board-wood load capacity has been determined for OSB-3 board with thickness  $t_{WB1}$  stipulated in the Table 5. The steel-to-wood resistance has been determined for thin boards (board thickness not exceeding  $0.5d$ ) and for thick boards (the thickness of the board is greater than  $d$ ).
9. The resistance involving intermediate boards shall be determined by linear interpolation in accordance with 8.2.3 of the standard PN-EN 1995:2008.
10. The bearing capacity for the wood-to-wood screws with diameter  $> 6$  mm has been calculated for an inclination angle of  $\alpha=0^\circ$ . For screws with diameter  $\leq 6$  mm the pressure resistance is independent of the fibre angle.

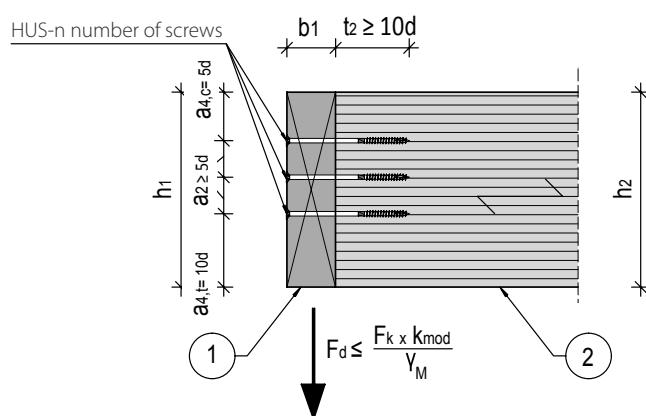
## 6. Right angle beam end connection

Table of characteristic shear resistances for Marcopol HUS screws includes the shear connection ① of a beam fixed to the head of the main beam ② at right angles. The number of screws, the load capacity and the required thickness of the connection components enable adjusting the design case to the design situation encountered in practice.

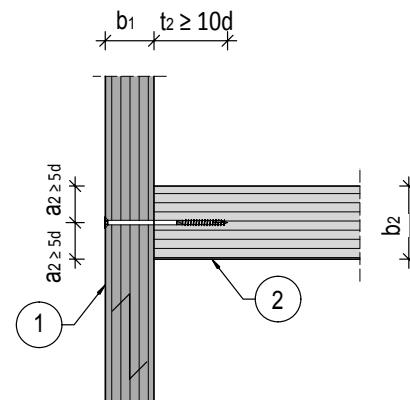
Example application:

- face connection of the floor beam closing the ceiling panel from the front side,
- end-to-end joints closing balcony floor beams,
- eaves board connection,
- many other cases where there is little vertical force and the fixed beam is protected against horizontal forces, e.g. by using wood-based board sheathing.

Side view



Front view



**Table I.6. Right angle beam end connection**

HUS Screw type	Number of screws n	Geometrical features			Minimum spacing and distance			Shear performance
		b1 - min. [mm]	h1 - min. h2 ≥ h1 [mm]	b2 - min. [mm]	a2 [mm]	a4,t [mm]	a4,c [mm]	
5x100	3	45	145	50	35	50	25	1.81
	4	45	170	50	32	50	25	2.41
	5	45	195	50	30	50	25	3.02
	6	45	220	50	29	50	25	3.62
5x120	3	60	140	50	33	50	25	1.81
	4	60	160	50	28	50	25	2.41
	5	60	180	50	26	50	25	3.02
	6	60	220	50	29	50	25	3.62
6x120	3	45	170	60	40	60	30	2.35
	4	45	195	60	35	60	30	3.13
	5	45	220	60	33	60	30	3.92
	6	45	240	60	30	60	30	4.70
6x140	3	60	160	60	35	60	30	2.50
	4	60	180	60	30	60	30	3.33
	5	60	220	60	33	60	30	4.17
	6	60	240	60	30	60	30	5.00
6x160	3	80	160	60	35	60	30	2.50
	4	80	180	60	30	60	30	3.33
	5	80	220	60	33	60	30	4.17
	6	80	240	60	30	60	30	5.00
8x160	3	80	200	80	40	80	40	3.69
	4	80	240	80	40	80	40	4.92
	5	80	280	80	40	80	40	6.15
	6	80	320	80	40	80	40	7.38
8x200	3	100	200	80	40	80	40	3.85
	4	100	240	80	40	80	40	5.13
	5	100	280	80	40	80	40	6.42
	6	100	320	80	40	80	40	7.70
10x220	3	100	260	100	55	100	50	4.97
	4	100	300	100	50	100	50	6.63
	5	100	360	100	53	100	50	8.28
10x240	3	120	260	100	55	100	50	4.97
	4	120	300	100	50	100	50	6.63
	5	120	360	100	53	100	50	8.28

**Notes:**

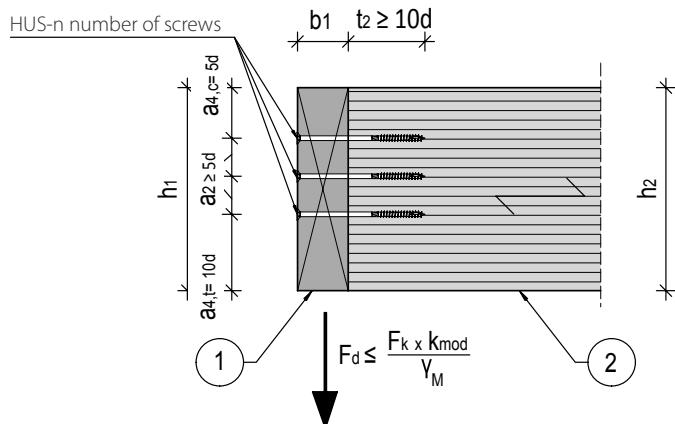
1. The characteristic load capacities are in accordance with EN 1995:2008.
2. To determine the design resistance, the characteristic resistance has to be multiplied by the  $k_{mod}$  factor depending on the use class and load duration class (Table 3.1 of EN 1995:2008) and divided by the adequate safety factor  $\gamma_M$  (for solid wood  $\gamma_M=1.3$ ).
3. Values determined on the basis of characteristic wood density  $\rho_k=350 \text{ kg/m}^3$ .
4. It is assumed that the threaded part is completely embedded in the wooden element.
5. The calculations apply exclusively to the load capacity of the screws. The verification of the load capacity of the wooden elements has to be carried out separately.
6. The characteristic load capacities of transversely loaded screws refer to connections without pre-drilled holes.
7. According to EN 1995:2008, the joints are not permitted in climatic conditions corresponding to the use class 3.



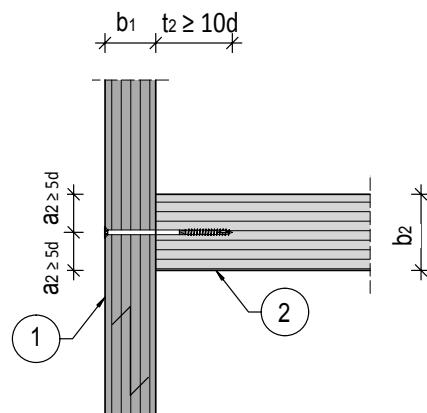
## CALCULATION EXAMPLE REGARDING I.6.

### Calculate the load capacity of the connection of the balcony edge beam

Side view



Front view



#### Data

Dimensions of element 1 (values from Table I.6):	Dimensions of element 2 (values from Table I.6):
Wood C24 (density $\rho_k = 350 \text{ kg/m}^3$ ) Beam height $h_1 = 180 \text{ mm}$ Beam width $b_1 = 60 \text{ mm}$ Design force on the beam $P_d = 1.8$ Use class 2 Load duration class: medium	Wood C24 (density $\rho_k = 350 \text{ kg/m}^3$ ) Beam height $h_1 = 200 \text{ mm}$ Beam width $b_1 = 60 \text{ mm}$

#### Design procedure

##### 1. Verification of dimensions of beams working in a joint and proper selection of the case from Table I.6.

Check whether the minimum spacing of screws, the distance from the edge and the thickness of the element enabling fixing screws without pre-drilling the hole are compliant in accordance with the requirements of the PN-EN 1995-1-1 standard. There are two variants available in Table I.6:

- 5 pcs of screws Marcopol HUS 5x120
- 4 pcs of screws Marcopol HUS 6x140

In this example, two variants are tested. In practice, if the load-bearing capacity requirements are met, usually there are selected screws available in the supplier's range, aiming for as little variation as possible.

##### 2. Determination of the $k_{mod}$ factor and the partial material factor $\gamma_M$ .

Factor  $k_{mod} = 0.80$  (table 3.1 PN-EN 1995-1-1),

Factor  $\gamma_M = 1.3$  (table 2.3 PN-EN 1995-1-1),

##### 3. Determination of the calculated load capacity of the joint from the table 6.

The design bearing capacity of 5 Marcopol HUS 5x120 screws equals:

$$F_d = \frac{F_k * k_{mod}}{\gamma_M} = \frac{3.02 * 0.80}{1.3} = 1.86[\text{kN}]$$



The design bearing capacity of 4 Marcopol HUS 6x140 screws equals:

$$F_d = \frac{F_d * k_{mod}}{\gamma_M} = \frac{3.33 * 0.80}{1.3} = 2.05[kN]$$

#### 4. Verification of the load-bearing capacity condition.

The load capacity condition for 5 Marcopol HUS 5x120 screws equals:

$$\frac{P_d}{F_d} = \frac{1.80}{1.86} = 0.97 \leq 1,$$

The load capacity condition for 4 Marcopol HUS 6x140 screws equals:

$$\frac{P_d}{F_d} = \frac{1.80}{2.05} = 0.88 \leq 1,$$

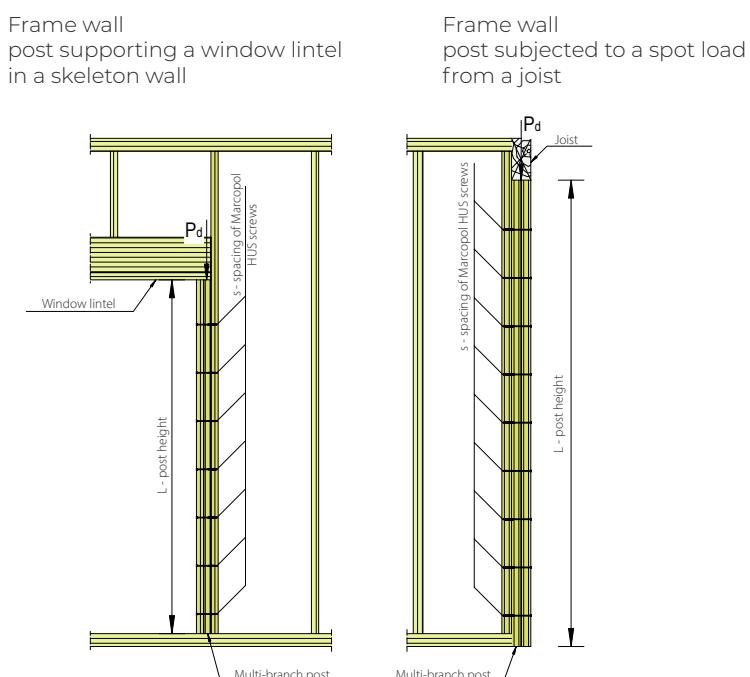
Both 5 Marcopol HUS 5x120 screws and 4 Marcopol HUS 6x140 screws can be used as a combination.

#### 7. Multi-branch post connection.

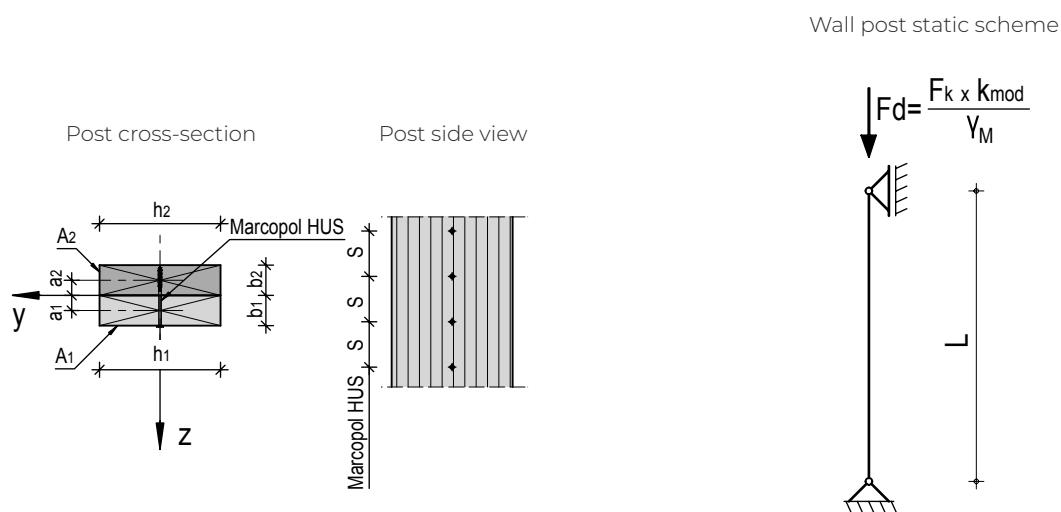
Table of characteristic load capacities for multi-branch posts includes different variants of height, section, dimension and spacing of the Marcopol HUS screws. The number of variants of counted posts enables a user to match the design case to the design situation encountered in practice by selecting the required section, optimum spacing and dimension of Marcopol HUS screws.

Example application of screws:

- post supporting a window lintel in a frame wall,
- multilayer post in a frame wall subjected to spot loads from a joist or a roof truss,



- Free-standing post (unprotected against buckling in the y and z directions),
- Built-up roof truss chord in compression.

**Table I.7.1 Two-branch post connection for branch thickness b<sub>1,2</sub> = 45 mm****Two-branch post of height L= 2.20 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 45x95	2x 45x120	2x 45x145	2x 45x170	2x 45x195	2x 45x220
5x80	60 (min)	30.70	36.51	41.93	47.24	50.36	53.70
	150	22.47	26.00	29.34	32.96	36.27	40.12
	200	20.15	23.56	27.15	30.84	33.88	38.13
	240 (max)	19.15	22.66	26.14	30.05	32.95	36.59
6x80	72 (min)	30.70	36.29	41.93	47.55	51.13	54.54
	150	24.92	28.34	31.69	35.22	39.01	42.36
	200	22.07	25.45	28.74	34.40	35.70	39.35
	288 (max)	19.46	22.97	26.58	30.49	33.46	37.17

**Two-branch post of height L= 2.50 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 45x95	2x 45x120	2x 45x145	2x 45x170	2x 45x195	2x 45x220
5x80	60 (min)	25.86	29.77	31.50	33.36	35.13	37.02
	150	15.29	17.43	19.55	21.61	23.64	27.75
	200	13.52	15.57	17.71	19.70	21.95	23.93
	240 (max)	12.57	14.54	16.77	18.72	21.03	23.45
6x80	72 (min)	25.86	30.25	31.96	33.88	35.70	37.58
	150	17.32	19.22	21.21	23.23	25.60	27.69
	200	14.82	16.85	18.93	21.26	23.34	25.25
	288 (max)	12.76	14.72	17.01	19.01	21.37	23.80

**Two-branch post of height L= 2.75 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 45x95	2x 45x120	2x 45x145	2x 45x170	2x 45x195	2x 45x220
5x80	60 (min)	22.80	23.81	24.81	25.89	27.21	28.43
	150	11.74	13.06	14.39	16.04	17.35	18.78
	200	10.08	11.51	13.02	14.30	15.94	17.40
	240 (max)	9.27	10.68	12.11	13.62	14.93	16.64
6x80	72 (min)	22.80	24.17	25.15	26.27	27.65	28.91
	150	13.26	14.67	15.99	17.38	18.87	20.29
	200	11.27	12.56	14.02	15.42	16.90	18.41
	288 (max)	9.43	10.84	12.27	13.82	15.17	16.93



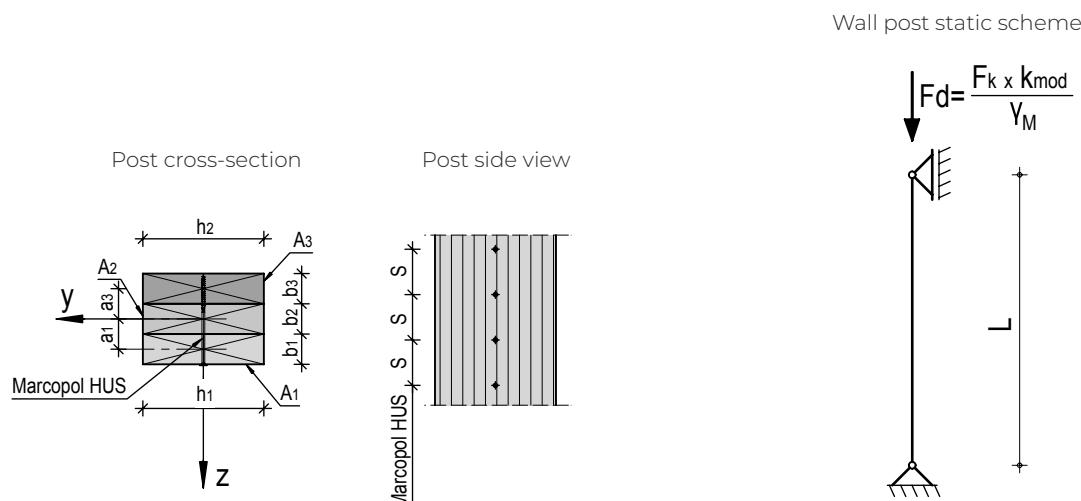
## Two-branch post of height L= 2.90 m

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 45x95	2x 45x120	2x 45x145	2x 45x170	2x 45x195	2x 45x220
Characteristic resistance of the post loaded with Fk [kN]							
5x80	60 (min.)	20.59	21.08	21.80	22.81	23.63	24.56
	150	10.19	11.20	12.37	13.34	14.57	15.74
	200	8.60	9.72	10.92	12.14	13.20	14.24
	240 (max.)	7.90	9.10	10.28	11.38	12.57	13.78
6x80	72 (min.)	20.95	21.41	22.17	23.11	23.97	24.95
	150	11.61	12.56	13.75	14.79	15.96	17.15
	200	9.65	10.79	11.88	13.17	14.20	15.54
	288 (max.)	8.05	9.25	10.42	11.56	12.75	14.00

## Two-branch post of height L= 3.10 m

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 45x95	2x 45x120	2x 45x145	2x 45x170	2x 45x195	2x 45x220
Characteristic resistance of the post loaded with Fk [kN]							
5x80	60 (min)	17.95	18.26	18.66	19.34	19.90	20.77
	150	8.50	9.32	10.06	10.93	11.82	12.74
	200	7.19	7.93	8.76	9.81	10.59	11.43
	240 (max)	6.51	7.33	8.14	9.08	10.03	11.07
6x80	72 (min)	18.21	18.51	18.94	19.62	20.21	21.07
	150	9.79	10.51	11.30	12.15	13.16	13.88
	200	8.05	8.94	9.79	10.61	11.53	12.40
	288 (max)	6.60	7.46	8.26	9.24	10.19	11.22

Table I.7.2 Two-branch post connection for branch thickness b1,2 = 60 mm



## Two-branch post of height L= 2.20 m

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 60x100	2x 60x120	2x 60x140	2x 60x160	2x 60x200	2x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x100	72 (min)	67.79	78.02	88.20	98.38	118.94	138.50
	150	58.97	68.95	79.03	88.70	108.86	128.82
	200	56.70	66.53	76.56	86.69	106.34	126.40
	288 (max)	54.68	64.41	74.44	84.27	104.33	123.98
8x120	96 (min)	67.79	78.02	88.20	98.38	118.94	138.50
	200	58.97	68.95	79.03	88.70	108.86	128.82
	300	55.94	65.92	75.85	85.88	105.34	125.19
	384 (max)	54.68	64.41	74.44	84.27	104.33	123.98

**Two-branch post of height L= 2.50 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 60x100	2x 60x120	2x 60x140	2x 60x160	2x 60x200	2x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x100	72 [min]	56.70	65.32	73.38	81.45	97.78	111.42
	150	48.38	54.91	60.59	66.40	77.00	89.70
	200	44.05	49.78	54.91	60.91	71.55	84.00
	288 [max]	38.88	44.64	51.00	56.50	68.25	80.43
8x120	96 [min]	56.70	65.32	73.38	81.45	97.78	113.10
	200	48.38	56.25	64.21	71.77	87.70	103.42
	300	45.36	53.22	61.03	68.95	84.67	99.79
	384 [max]	44.10	51.71	59.62	67.33	82.66	98.58

**Two-branch post of height L= 2.75 m**

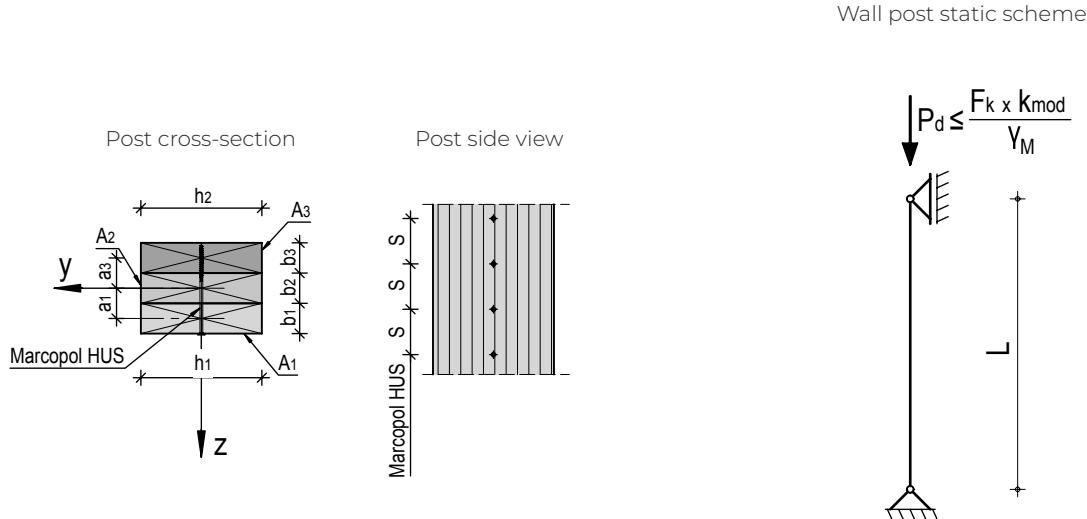
Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 60x100	2x 60x120	2x 60x140	2x 60x160	2x 60x200	2x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x100	72 [min]	49.90	57.15	64.21	69.77	76.76	84.40
	150	37.47	41.10	45.12	48.47	56.10	64.16
	200	32.83	36.37	40.69	43.84	51.82	59.69
	288 [max]	28.55	32.43	36.48	40.44	48.53	54.88
8x120	96 [min]	49.90	57.15	64.21	70.96	84.67	97.98
	200	41.83	48.38	55.04	61.69	72.67	83.09
	300	39.06	45.36	50.53	55.40	65.90	76.29
	384 [max]	36.94	41.96	47.27	52.35	62.92	71.13

**Two-branch post of height L= 2.90 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 60x100	2x 60x120	2x 60x140	2x 60x160	2x 60x200	2x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x100	72 [min]	46.62	53.22	57.99	60.42	66.27	71.64
	150	32.25	35.27	38.37	41.20	47.15	53.76
	200	27.96	30.90	33.80	37.19	43.46	49.59
	288 [max]	24.12	27.08	30.20	33.68	40.21	46.63
8x120	96 [min]	46.62	53.22	59.62	65.72	78.12	90.12
	200	38.56	44.76	49.75	53.36	61.16	69.69
	300	34.35	38.18	42.20	46.43	54.61	61.98
	384 [max]	31.17	35.12	39.14	43.57	52.06	60.40

**Two-branch post of height L= 3.10 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		2x 60x100	2x 60x120	2x 60x140	2x 60x160	2x 60x200	2x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x100	72 [min]	42.84	47.43	49.06	51.12	55.22	59.58
	150	26.88	29.21	31.45	33.57	38.13	43.11
	200	22.98	25.20	27.55	29.85	34.89	39.66
	288 [max]	19.59	21.80	24.24	26.51	31.60	36.42
8x120	96 [min]	42.84	48.69	54.33	60.08	71.06	77.20
	200	34.79	37.79	40.71	43.53	49.46	55.79
	300	28.13	30.96	33.91	37.20	43.48	50.00
	384 [max]	25.34	28.22	31.39	34.36	40.94	47.26

**Table I.7.3 Triple-branch post connection for branch thickness b<sub>1,2,3</sub> = 45 mm****Triple-branch post of height L= 2.20 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 45x95	3x 45x120	3x 45x145	3x 45x170	3x 45x195	3x 45x220
Characteristic resistance of the post loaded with F <sub>k</sub> [kN]							
5x120	60 (min)	58.80	80.63	89.61	98.80	107.80	116.63
	150	33.53	54.50	65.77	73.74	82.37	89.81
	200	30.05	49.20	61.25	69.40	77.40	85.45
	240 (max)	28.17	46.93	58.78	66.51	75.18	82.95
6x140	72 (min)	52.04	79.85	89.61	98.80	107.80	116.63
	150	34.07	54.50	69.06	77.59	85.69	93.56
	200	30.05	48.82	64.13	72.29	80.16	88.57
	288 (max)	26.29	43.52	58.78	66.51	75.18	82.95

**Triple-branch post of height L= 2.50 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 45x95	3x 45x120	3x 45x145	3x 45x170	3x 45x195	3x 45x220
Characteristic resistance of the post loaded with F <sub>k</sub> [kN]							
5x120	60 (min)	41.39	65.57	78.93	86.27	93.43	100.42
	150	23.50	39.28	55.50	61.69	68.55	74.84
	200	20.69	35.16	50.90	57.35	63.57	69.85
	240 (max)	19.19	32.63	47.64	54.94	61.36	67.36
6x140	72 (min)	38.59	60.82	78.93	86.27	93.43	100.42
	150	24.14	39.91	56.60	65.55	71.87	78.59
	200	20.91	34.84	50.49	59.76	66.34	72.97
	288 (max)	17.89	30.41	44.38	54.94	61.36	67.36

**Triple-branch post of height L= 2.75 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 45x95	3x 45x120	3x 45x145	3x 45x170	3x 45x195	3x 45x220
Characteristic resistance of the post loaded with F <sub>k</sub> [kN]							
5x120	60 (min)	33.20	53.25	71.94	78.08	84.58	90.44
	150	18.14	30.58	46.56	54.42	60.26	65.49
	200	15.79	27.03	40.21	50.12	55.28	60.50
	240 (max)	14.51	24.85	37.31	47.71	53.07	58.00
6x140	72 (min)	30.84	49.42	69.56	78.08	84.58	90.44
	150	18.69	31.13	45.65	57.83	63.57	69.23
	200	15.97	27.03	39.85	52.67	58.05	63.62
	288 (max)	13.43	23.21	34.78	46.58	53.07	58.00

**Triple-branch post of height L= 2.90 m**

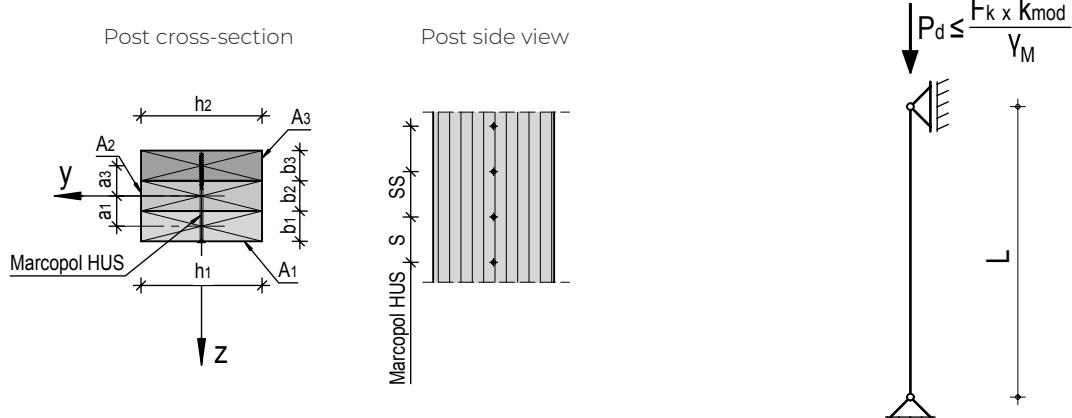
Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 45x95	3x 45x120	3x 45x145	3x 45x170	3x 45x195	3x 45x220
Characteristic resistance of the post loaded with Fk [kN]							
5x120	60 [min]	29.42	47.19	66.97	74.22	80.16	85.45
	150	15.87	26.47	39.37	51.09	55.84	61.12
	200	13.55	23.22	34.66	46.75	51.41	56.13
	240 [max]	12.40	21.47	32.31	44.08	49.20	53.64
6x140	72 [min]	27.43	43.95	62.59	74.22	80.16	85.45
	150	16.36	27.22	40.05	53.14	59.71	64.24
	200	13.88	23.47	34.66	46.97	54.18	58.63
	288 [max]	11.57	19.98	30.29	41.20	49.20	53.64

**Triple-branch post of height L= 3.10 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 45x95	3x 45x120	3x 45x145	3x 45x170	3x 45x195	3x 45x220
Characteristic resistance of the post loaded with Fk [kN]							
5x120	60 [min]	25.28	40.54	58.52	69.40	74.63	79.83
	150	13.15	20.49	33.22	44.94	51.41	55.51
	200	11.25	19.16	28.96	39.99	46.99	51.14
	240 [max]	10.23	17.60	26.82	37.32	44.78	48.65
6x140	72 [min]	23.52	37.87	54.25	69.40	74.63	79.83
	150	13.88	22.94	34.14	45.70	54.73	59.25
	200	11.54	19.60	29.56	39.99	49.75	54.26
	288 [max]	9.50	16.26	24.99	34.66	44.13	48.65

**Table I.7.4 Triple-branch post connection for branch thickness b1,2,3 = 60 mm**

Wall post static scheme

**Triple-branch post of height L= 2.20 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 60x100	3x 60x120	3x 60x140	3x 60x160	3x 60x200	3x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x160	72 [min]	105.06	147.97	177.28	194.14	226.04	255.83
	150	73.34	107.10	140.27	157.25	187.49	217.73
	200	65.77	97.64	128.65	148.18	178.42	208.66
	288 [max]	59.37	88.93	117.48	139.71	169.34	199.58
8x180	96 [min]	106.22	149.86	177.28	194.14	226.04	255.83
	200	74.21	108.23	141.61	157.25	187.49	217.73
	300	64.31	94.23	125.97	145.15	174.64	204.12
	384 [max]	60.24	89.69	118.82	139.71	169.34	199.58

**Triple-branch post of height L= 2.50 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 60x100	3x 60x120	3x 60x140	3x 60x160	3x 60x200	3x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x160	72 (min)	77.15	110.87	145.85	168.74	194.29	219.54
	150	51.43	76.34	140.27	130.07	156.49	179.63
	200	45.53	68.74	128.65	117.96	146.66	170.55
	288 (max)	39.64	61.14	85.24	108.09	137.59	160.57
8x180	96 (min)	78.09	112.14	147.41	168.74	194.29	219.54
	200	52.14	77.29	104.79	131.41	156.49	179.63
	300	43.88	65.89	90.72	116.16	143.64	166.92
	384 (max)	40.11	61.77	86.41	109.43	137.59	160.57

**Triple-branch post of height L= 2.75 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 60x100	3x 60x120	3x 60x140	3x 60x160	3x 60x200	3x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x160	72 (min)	61.22	89.02	119.20	149.06	174.64	195.96
	150	39.28	59.25	81.89	103.73	136.84	156.95
	200	34.30	52.15	73.25	93.52	127.76	146.97
	288 (max)	29.71	45.87	65.30	85.35	118.69	138.80
8x180	96 (min)	61.81	90.11	120.58	150.69	174.64	195.96
	200	39.68	59.80	82.92	104.95	136.84	156.95
	300	32.90	50.79	71.17	91.89	123.98	143.34
	384 (max)	30.11	46.42	65.99	86.17	118.69	138.80

**Triple-branch post of height L= 2.90 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 60x100	3x 60x120	3x 60x140	3x 60x160	3x 60x200	3x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x160	72 (min)	53.89	78.41	106.16	133.75	164.81	185.07
	150	34.11	51.19	71.31	91.59	127.76	146.06
	200	29.57	44.70	62.67	82.40	117.94	136.08
	288 (max)	25.22	39.20	55.32	73.58	108.86	127.01
8x180	96 (min)	54.43	79.40	107.12	135.28	164.81	185.07
	200	34.47	51.69	71.95	92.74	127.76	146.06
	300	28.30	43.20	61.07	79.71	114.91	133.36
	384 (max)	25.58	39.45	55.96	74.73	108.86	127.01

**Triple-branch post of height L= 3.10 m**

Marcopol HUS screw type	Screw spacing s [mm]	Cross-sectional dimension of the post					
		3x 60x100	3x 60x120	3x 60x140	3x 60x160	3x 60x200	3x 60x240
Characteristic resistance of the post loaded with Fk [kN]							
6x160	72 (min)	45.90	67.05	91.02	116.90	153.47	171.46
	150	28.40	42.77	59.62	78.52	113.93	133.36
	200	24.39	37.20	52.42	69.01	103.53	123.38
	288 (max)	20.70	32.08	45.80	60.91	92.23	114.31
8x180	96 (min)	46.38	67.72	92.17	117.95	153.47	171.46
	200	28.73	43.21	60.49	79.22	115.28	133.36
	300	23.27	35.64	50.40	67.25	99.91	119.75
	384 (max)	20.86	32.30	46.37	61.62	93.58	114.31

**Remarks regarding 7.1, 7.2, 7.3, 7.4:**

1. The characteristic load capacities are in accordance with EN 1995:2008.
2. To determine the design resistance, the characteristic resistance has to be multiplied by the  $k_{mod}$  factor depending on the use class and load duration class (Table 3.1 of PN-EN 1995:2008) and divided by the adequate safety factor  $\gamma M$  (for solid wood  $\gamma M=1.3$ ).



3. Values determined on the basis of characteristic wood density  $\rho_k = 350 \text{ kg/m}^3$ .

4. The calculations consider the overall resistance of the posts and include:

- compression with buckling into the y-direction,
- compression with buckling into the z direction,
- shear resistance of the screws.

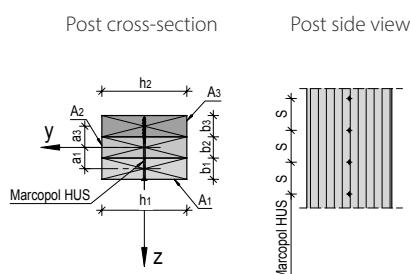
Tabular value of the characteristic resistance is the minimum value of the above three resistances.

5. All other conditions in the calculation of the structure must be checked separately according to EN 1995:2008, for example: bearing resistance of the post to the ground beam (if the post rests on the ground beam).
6. The characteristic load capacities of transversely loaded screws refer to connections without pre-drilled holes.
7. When determining the load capacity, assumptions were adopted in accordance with the Annex C of PN-EN 1995:2008.

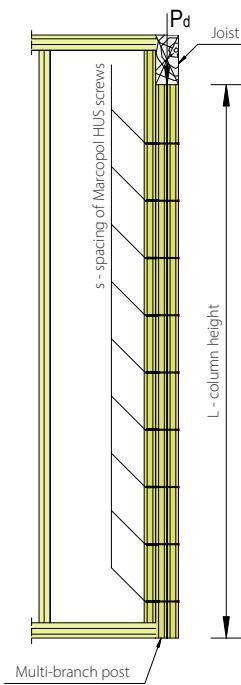
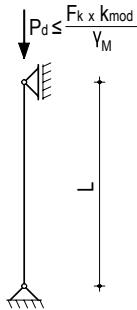
## CALCULATION EXAMPLE REGARDING I.7.

### Calculate post of the frame wall loaded by the vertical force

Triple-branched post (values from Table I.7.4):
Wood C24 (density $\rho_k = 350 \text{ kg/m}^3$ )
Beam height $h_{1,2,3} = 160 \text{ mm}$ ( $h_1 = h_2 = h_3$ )
Beam width $b_{1,2,3} = 60 \text{ mm}$ ( $b_1 = b_2 = b_3$ )
Post to the joist height $L = 2,75 \text{ m}$
Design force having an impact on the beam: - for regular combination $P_{d,st} = 38 \text{ kN}$ - for medium strength combination $P_{d,śr} = 51 \text{ kN}$ Use class: 2



Wall column static scheme



### Design procedure

#### 1. Verification of cross-section dimensions and proper selection of a case from Table I.7.4

First, find the case in the table that corresponds to your design situation. In the example in question we have a triple-branch post with a branch thickness of 60 mm and 160 mm high, post height  $L=2.75 \text{ m}$ . For this example, we can use Marcopol HUS 6x160 or Marcopol HUS 8x180 screws.

#### 2. Determination of the $k_{mod}$ factor and the partial material factor $y_M$

Factor for permanent loads  $k_{mod} = 0.60$ , for medium-term loads  $k_{mod} = 0.80$  (table 3.1 PN-EN 1995-1-1), factor  $y_M = 1.3$  (table 2.3 PN-EN 1995-1-1).

#### 3. Determination of the calculated load capacity of the post from the table 7.4

If we care about the minimum number of screws and we have Marcopol HUS 8x180 screw in our assortment, we choose the maximum spacing for this diameter equal 384 mm.



Design load capacity for permanent loads of 3x60x160 of a post with 8x180 screws spaced s= 384 mm

$$F_{d,st} = \frac{F_k * k_{mod}}{\gamma_M} = \frac{86.17 * 0.60}{1.3} = 39.77[kN]$$

Design load capacity for medium-term loads for the 3x60x160 post with 8x180 screws spaced

s= 384 mm

$$F_{d,sr} = \frac{F_k * k_{mod}}{\gamma_M} = \frac{86.17 * 0.80}{1.3} = 53.03[kN]$$

#### 4. Verification of the load condition

Load condition for regular loads

$$\frac{P_{d,st}}{F_{d,st}} = \frac{38}{39.77} = 0.96 \leq 1$$

Load condition for medium strength loads

$$\frac{P_{d,sr}}{F_{d,sr}} = \frac{51}{53.03} = 0.96 \leq 1$$

It is possible to design a 3x60x160 post and connect it with Marcopol HUS 8x180 screws, keeping the spacing every 38.4 cm (L/s= 8 pcs/post)

#### General note to the clause 7.

Note that a multi-branched post in a frame wall must be connected with fasteners to ensure cooperation between the individual branches. Use of wood-based panel sheathing does not ensure cooperation between post branches unless proper calculations have been completed. The attitude presented above avoids many mistakes in the area of the frame wall design. Marcopol HUS screws do not have to be used for fixing the wall sheathing to each branch of the post. Note that the characteristic resistances have been obtained for the post unprotected from buckling into the y and z directions. It happens that the decisive resistance condition in low posts with dense screw spacing is the compression resistance with buckling into the z-direction, so if we provide protection against buckling we will obtain a better result. However, for clarity and ease of use of the resistance table, this simplification was decided in favour of the safety.



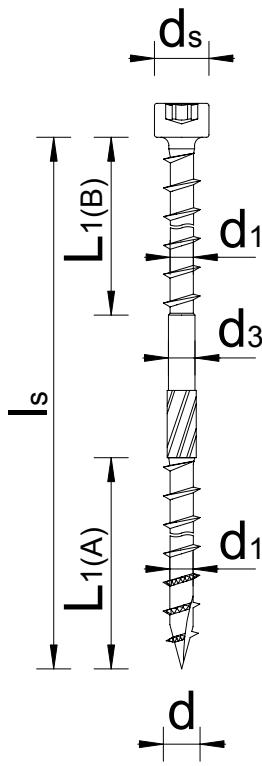
## USE OF DOUBLE-THREADED SCREWS ON THE STEM IN CONSTRUCTIONAL CONNECTIONS

### 1. General data, application

Marcopol IUC screw is a screw with a cylindrical head and a double thread on the shank. Available in 8 mm diameter range. Marcopol IUC screw is suitable for use in conditions of 1st and 2nd class of use of a structure, for connections in solid wood, glued laminated wood, LVL and wood based panels.

The most common areas of application are the following joints:

- structural connection of counter-battens in roof insulation over-rafter systems,
- shear joints with crossed connectors,
- many other connections for which it is optimal to use a screw with double thread on the shank.



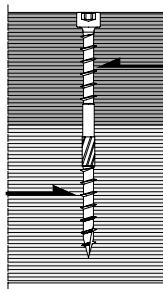


## 2. Mechanical properties of the materials

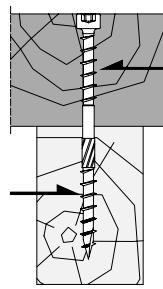
Diameter of the IUC screw		8
Nominal diameter	d [mm]	8
Head diameter	ds [mm]	11
Thread inside diameter	d1 [mm]	5.2
Diameter of smooth part of the stem	d3 [mm]	5.8
Material characteristic yield moment	M <sub>y,Rk</sub> [Nm]	28850
Characteristic parameter for pullout resistance	f <sub>ax,k</sub> [N/mm <sup>2</sup> ]	14.05
Characteristic parameter for the resistance to head pull-out	f <sub>head,k</sub> [N/mm <sup>2</sup> ]	25.12
Characteristic tensile strength	f <sub>tens,k</sub> [kN]	27.03

## 3. Minimum spacings and distances for transversely loaded screws

Minimum spacings and distances for transversely loaded screws



angle between force and fibre  
direction  $\alpha = 0^\circ$



angle between force and fibre  
direction  $\alpha = 90^\circ$

Screws placed in pre-drilled holes

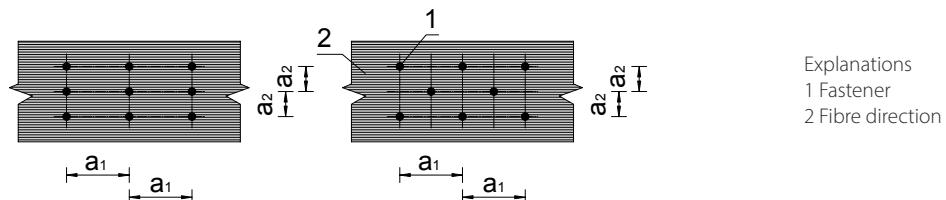
	8	8
a1 [mm]	40	32
a2 [mm]	24	32
a3,t [mm]	96	56
a3,c [mm]	56	56
a4,t [mm]	24	56
a4,c [mm]	24	24

Screws placed without a pre-drilled hole

a1 [mm]	96	40
a2 [mm]	40	40
a3,t [mm]	120	80
a3,c [mm]	80	80
a4,t [mm]	40	80
a4,c [mm]	40	40



spacing along and across fibres



Distances from end and side

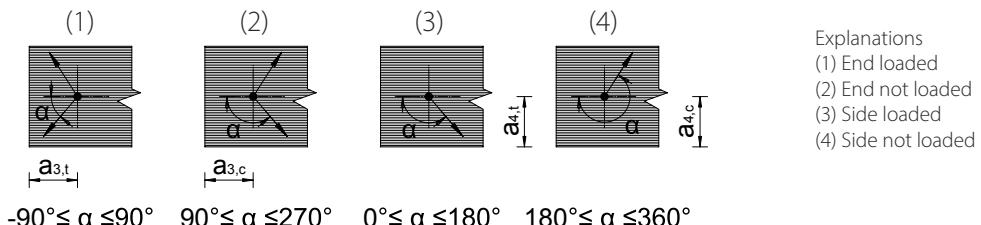


Fig.3 Spacing and distances

**Notes:**

1. Minimum spacings and distances for transversely loaded screws in accordance with PN-EN 1995:2008.
2. Values based on characteristic wood density  $\rho_k = 350 \text{ kg/m}^3$ .

**4. Minimum spacings and distances for transversely loaded screws**

Minimum spacing and distance of axially loaded screws	
	8
$a_1$ [mm]	56
$a_{1,c}$ [mm]	80
$a_{2,c}$ [mm]	32
$a_2$ [mm]	40

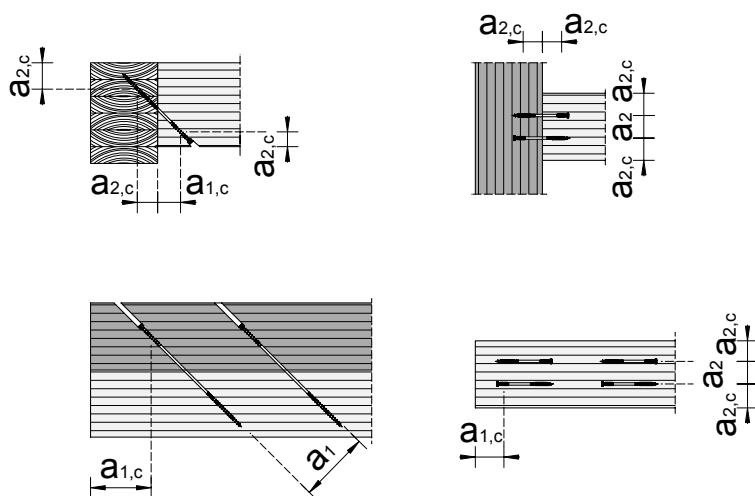


Fig. 4 Spacing and distances



## 5. Characteristic resistance for transversely and axially loaded screws

Marcopol IUC screw - Geometry								Shearing - Displacement		Tension	
d [mm]	l <sub>s</sub> [mm]	l <sub>t1(A)</sub> [mm]	l <sub>t1(B)</sub> [mm]	t <sub>1</sub> [mm]	t <sub>2</sub> [mm]	l <sub>A</sub> [mm]	l <sub>B</sub> [mm]	Wood - wood		Wood - wood	
								F <sub>v,Rk</sub> [kN]	F <sub>ax,45,k</sub> [kN]	F <sub>ax,Rk1</sub> [kN]	F <sub>ax,Rk2</sub> [kN]
8	165	80	60	83	82	60	60	4.12	6.13	6.74	27.03
	195	80	60	98	97	70	70	4.14	6.13	6.74	27.03
	225	100	60	113	112	80	80	4.14	6.13	6.74	27.03
	235	100	60	118	117	90	90	4.14	6.13	6.74	27.03
	255	100	60	128	127	90	90	4.14	6.13	6.74	27.03
	275	100	60	138	137	100	100	4.14	6.13	6.74	27.03
	302	100	60	151	151	110	110	4.14	6.13	6.74	27.03
	335	100	60	168	167	120	120	4.14	6.13	6.74	27.03
	365	100	60	183	182	130	130	4.14	6.13	6.74	27.03
	400	100	60	200	200	150	150	4.14	6.13	6.74	27.03
	435	100	60	218	217	160	160	4.14	6.13	6.74	27.03
	472	100	60	236	236	170	170	4.14	6.13	6.74	27.03
	535	100	60	268	267	190	190	4.14	6.13	6.74	27.03

### Notes:

1. The characteristic load capacities are in accordance with EN 1995:2008.
2. To determine the design resistance, the characteristic resistance has to be multiplied by the  $k_{mod}$  factor depending on the use class and load duration class (Table 3.1 of PN-EN 1995:2008) and divided by the adequate safety factor  $\gamma M$  (for solid wood  $\gamma M=1.3$ ).
3. The values of the tensile resistance of steel are characteristic values and must therefore be divided by an appropriate safety factor according to Eurocode 3 ( $\gamma M_2=1.25$ ).
4. Values determined on the basis of characteristic wood density  $\rho_k=350 \text{ kg/m}^3$ .
5. The calculations apply exclusively to the load capacity of the screws. Verification of the load capacity of the wooden elements has to be carried out separately.

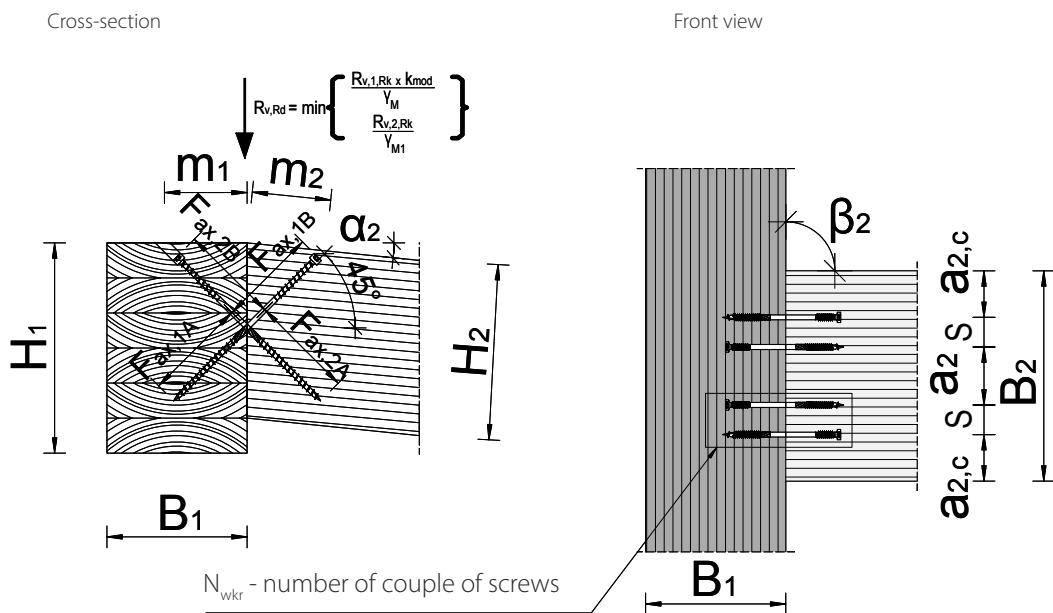


## 6. Joining of beams with crossed fasteners

Table of characteristic load capacities of Marcopol IUC screws includes connection of beams with crossed fasteners. The connection includes the load bearing capacity on the beam face fixed to the main beam at the  $\alpha$  angle relative to the cross-section of the connected beams and the  $\beta$  angle relative to the top view. The crossed screws are fixed as pairs (2 pcs) in a joint, so the design case must be adjusted to the design situation in terms of the dimensions of the timber members as well as the required resistances.

Example application:

- face connection of the floor beam closing the ceiling panel from the front side,
- rafter to ridge connection, eaves board connection,
- joining the rafters with a corner or a valley beam.



**Table II.6.1 Crossed screw connection for  $\alpha=0^\circ$** 

Marcopol IUC		Geometrical data of the junction							Characteristic resistance of the connection with crossed fasteners [kN]							
									Inclination angle of the secondary beam in vertical arrangement $\alpha = 0^\circ$							
screw diameter d [mm]	length of the screw ls [mm]	width of the primary beam B1 [mm]	height of the primary beam H1 [mm]	width of the secondary beam B2 [mm]	height of the secondary beam H2 [mm]	screw distance m1 [mm]	screw distance m2 [mm]	number of couple (pairs) of screws	The angle of inclination of the secondary beam in horizontal arrangement $\beta$							
									$\beta = 90^\circ$		$\beta = 60^\circ$		$\beta = 45^\circ$		$\beta = 30^\circ$	
8	165	80	140	80	140	68	68	1	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>
		80	140	130	140	68	68	2	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		80	140	180	140	68	68	3	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
8	185	90	160	80	160	79	79	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		90	160	130	160	79	79	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		90	160	180	160	79	79	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	225	100	180	80	180	90	90	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		100	180	130	180	90	90	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		100	180	180	180	90	90	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	235	110	180	80	180	93	93	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		110	180	130	180	93	93	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		110	180	180	180	93	93	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	255	110	200	80	200	100	100	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		110	200	130	200	100	100	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		110	200	180	200	100	100	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	275	120	210	80	210	107	107	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		120	210	130	210	107	107	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		120	210	180	210	107	107	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	302	130	230	80	230	117	117	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		130	230	130	230	117	117	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		130	230	180	230	117	117	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	335	140	260	80	260	128	128	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		140	260	130	260	128	128	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		140	260	180	260	128	128	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	365	150	280	80	280	139	139	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		150	280	130	280	139	139	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		150	280	180	280	139	139	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	400	170	300	80	300	151	151	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		170	300	130	300	151	151	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		170	300	180	300	151	151	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	435	180	330	80	330	164	164	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		180	330	130	330	164	164	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		180	330	180	330	164	164	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	472	190	350	80	350	177	177	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		190	350	130	350	177	177	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		190	350	180	350	177	177	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12
8	535	210	400	80	400	199	199	1	9.10	16.22	8.87	16.22	8.67	16.22	8.48	15.67
		210	400	130	400	199	199	2	16.98	30.27	16.56	30.27	16.18	30.27	15.82	29.24
		210	400	180	400	199	199	3	24.46	43.60	23.85	43.60	23.30	43.60	22.79	42.12

**Table II.6.2 Crossed screw connection for  $\alpha=15^\circ$** 

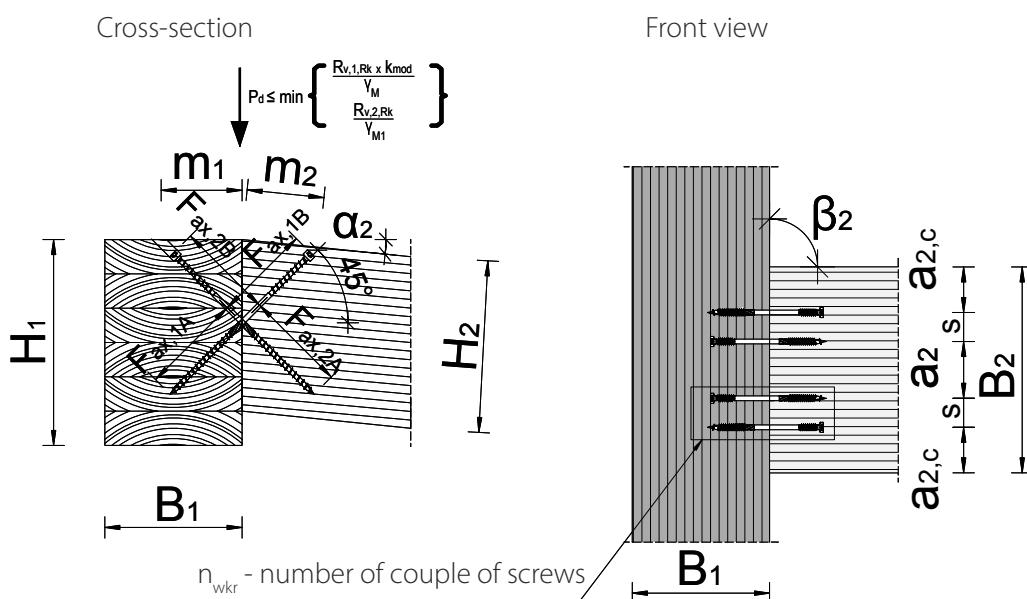
Marcopol IUC		Geometrical data of the junction							Characteristic resistance of the connection with crossed fasteners [kN]							
									Inclination angle of the secondary beam in vertical arrangement $\alpha = 15^\circ$							
screw diameter d [mm]	length of the screw ls [mm]	width of the primary beam B1 [mm]	height of the primary beam H1 [mm]	width of the secondary beam B2 [mm]	height of the secondary beam H2 [mm]	screw distance m1 [mm]	screw distance m2 [mm]	number of couple of screws	The angle of inclination of the secondary beam in horizontal arrangement $\beta$							
									$\beta = 90^\circ$		$\beta = 60^\circ$		$\beta = 45^\circ$		$\beta = 30^\circ$	
8	165	100	150	80	150	90	71	1	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>	F <sub>v,1,Rk</sub>	F <sub>v,2,Rk</sub>
		100	150	130	150	90	71	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		100	150	180	150	90	71	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	195	120	180	80	180	104	82	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		120	180	130	180	104	82	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		120	180	180	180	104	82	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	225	130	200	80	200	118	93	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		130	200	130	200	118	93	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		130	200	180	200	118	93	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	235	140	210	80	210	122	96	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		140	210	130	210	122	96	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		140	210	180	210	122	96	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	255	150	230	80	230	132	104	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		150	230	130	230	132	104	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		150	230	180	230	132	104	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	275	160	240	80	240	141	111	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		160	240	130	240	141	111	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		160	240	180	240	141	111	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	302	170	260	80	260	153	121	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		170	260	130	260	153	121	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		170	260	180	260	153	121	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	335	180	290	80	280	169	133	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		180	290	130	280	169	133	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		180	290	180	280	169	133	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	365	200	320	80	300	183	144	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		200	320	130	300	183	144	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		200	320	180	300	183	144	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	400	210	340	80	320	199	157	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		210	340	130	320	199	157	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		210	340	180	320	199	157	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	435	230	370	80	350	216	170	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		230	370	130	350	216	170	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		230	370	180	350	216	170	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	472	250	400	80	370	232	183	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		250	400	130	370	232	183	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		250	400	180	370	232	183	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12
8	535	280	450	80	450	261	206	1	8.91	15.67	8.68	15.67	8.48	15.67	8.29	15.67
		280	450	130	450	261	206	2	16.62	29.24	16.21	29.24	15.82	29.24	15.46	29.24
		280	450	180	450	261	206	3	23.95	42.12	23.34	42.12	22.79	42.12	22.27	42.12

**Notes:**

1. The characteristic load capacities are in accordance with EN 1995:2008.
2. The resistances in the table are the characteristic values of the tension resistance ( $F_{v,1,Rk}$ ) and the buckling resistance ( $F_{v,2,Rk}$ ). The design resistance of the connection is the minimum value between the design tension and the buckling resistance. The characteristic tension resistance must be multiplied by the  $k_{mod}$  factor depending on the use class and load duration class (Table 3.1 of EN 1995:2008) and divided by the relevant safety factor  $\gamma_M$  (for solid wood  $\gamma_M=1.3$ ). The characteristic buckling resistance has to be divided by the relevant safety factor according to Eurocode 3 ( $\gamma_{M1}=1.1$ ). The whole takes the mathematical form:

$$R_{v,Rd} = \min \left\{ \frac{\frac{R_{v,1,Rk} * k_{mod}}{\gamma_M}}{\frac{R_{v,2,Rk}}{\gamma_{M1}}} \right\}$$

3. Values based on characteristic wood density  $\rho_k = 380 \text{ kg/m}^3$ . The quoted density corresponds to the solid wood of strength class GL24h; it can also be used for higher strength classes for the benefit of the safety.
4. It is assumed that the screw is positioned at an  $45^\circ$  angle to the shear plane. The centre of gravity of the fasteners must be in line with the shear plane.
5. The calculations apply exclusively to the load capacity of the screws. Verification of the load capacity of the wooden (or wood-based) elements has to be carried out separately.

**CALCULATION EXAMPLE REGARDING II.6.****Calculate the resistance of the rafter to roof ridge beam**



## Data

Roof ridge beam dimensions	Rafter dimensions
Wood GL24h (density $\rho_k = 380 \text{ kg/m}^3$ ) Beam height $H_1 = 240 \text{ mm}$ Beam width $B_1 = 160 \text{ mm}$ Beam angle $\alpha = 15^\circ$ Beam angle $\beta = 45^\circ$ Design force on the beam $P_d = 4.10 \text{ kN}$ Use class 2 Load duration class: medium	Wood GL24h (density $\rho_k = 380 \text{ kg/m}^3$ ) Beam height $H_2 = 240 \text{ mm}$ Beam width $B_2 = 80 \text{ mm}$

## Design procedure

### 1. Verification of the dimensions of the beams working in the joint and proper selection of the case from Table II.6.2

The design case must be controlled and adjusted to the tabular value. In the table II.6, we can use only one pair of screws due to the small width of the rafters (80 mm).

### 2. Determination of $k_{mod}$ factor and the partial material factor $\gamma_M$

Factor  $k_{mod} = 0.80$  (table 3.1 PN-EN 1995-1-1), factor  $\gamma_M = 1.3$  (table 2.3 PN-EN 1995-1-1).

### 3. Determination of the calculated load capacity of the joint from the table II.6.2

Design resistance for one pair of screws IUS 8x275 for  $\alpha = 15^\circ$  and  $\beta = 45^\circ$

$$R_{v,Rd} = \min \left\{ \begin{array}{l} \frac{R_{v,1,Rk} * k_{mod}}{\gamma_M} = \frac{8.48 * 0.8}{1.3} = 5.22 \text{ kN} \\ \frac{R_{v,2,Rk}}{\gamma_{M1}} = \frac{15.67}{1.1} = 14.25 \text{ kN} \end{array} \right.$$

$$R_{v,Rd} = 5.22 \text{ kN}$$

### 4. Verification of the load condition

The load capacity condition for 5 Marcopol IUS 8x275 screws equals:

$$\frac{P_d}{R_{v,Rd}} = \frac{4.10}{5.22} = 0.79 \leq 1$$

The connection has been designed with a load-bearing capacity reserve of 21%.



# 03 CONSTRUCTION SCREWS

CONSTRUCTION SCREWS



## HUS Counter head screw, partially threaded

3110

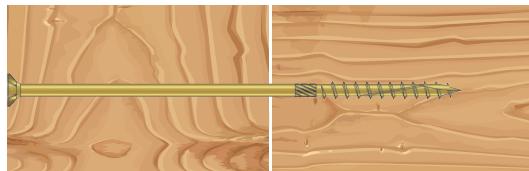
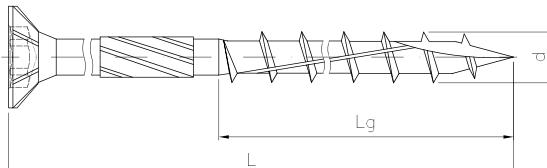


Fig.1. Perpendicular screw-in connection



Fig. 2. Cross connection between the rafter and the beam

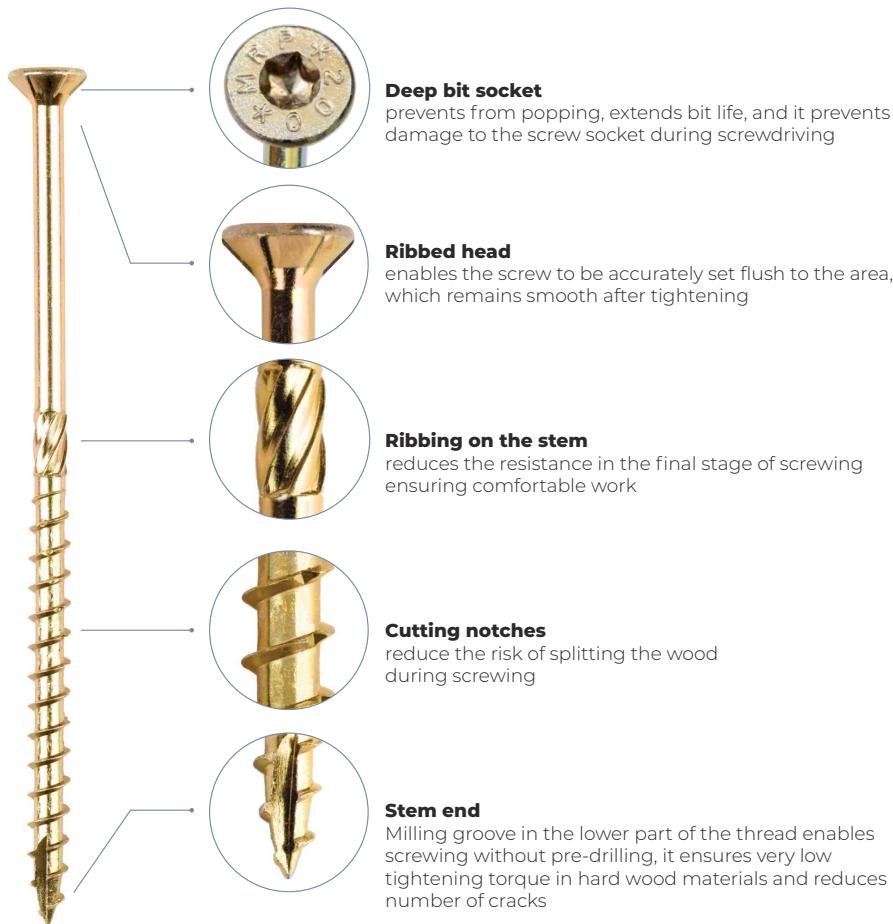


SOLD BY PACK						
SIZE [mm]			TX	pcs		Index
d	L	Lg				
5.0	50	30	TX 25	250	1000 (4)	637323 634187
	60	40	TX 25	250	1000 (4)	637324 634188
	70	40	TX 25	250	1500 (6)	642826 634189
	80	40	TX 25	250	1000 (4)	637326 634190
	90	40	TX 25	250	1000 (4)	637327 634191
	100	40	TX 25	250	1000 (4)	637328 634192
	120	60	TX 25	250	1000 (4)	637329 634193
6.0	50*	30	TX 30	100	800 (8)	640434 640344
	60	40	TX 30	100	800 (8)	637322 634194
	70	40	TX 30	100	400 (4)	637305 634195
	80	40	TX 30	100	400 (4)	637306 634196
	90	40	TX 30	100	400 (4)	637307 634197
	100	40	TX 30	100	400 (4)	637308 634198
	120	70	TX 30	100	400 (4)	637309 634199
	140	70	TX 30	100	400 (4)	637310 634200
	160	70	TX 30	100	400 (4)	637311 634201
	180	70	TX 30	100	400 (4)	637312 634202
	200	70	TX 30	100	300 (3)	637299 634203
	220	70	TX 30	100	300 (3)	637300 634204
	240	70	TX 30	100	300 (3)	637301 634205
8.0	80	40	TX 40	50	400 (8)	637298 634206
	100	40	TX 40	50	200 (4)	637276 634207
	120	80	TX 40	50	200 (4)	637277 634208
	140	80	TX 40	50	200 (4)	637278 634209
	160	80	TX 40	50	200 (4)	637279 634210
	180	80	TX 40	50	200 (4)	637280 634211
	200	80	TX 40	50	200 (4)	637281 634212
	220	80	TX 40	50	200 (4)	637282 634213
	240	80	TX 40	50	200 (4)	637283 634214
	260	80	TX 40	50	150 (3)	637257 634215
	280	80	TX 40	50	150 (3)	637258 634216
	300	80	TX 40	50	150 (3)	637259 634217
	320	80	TX 40	50	150 (3)	637260 634218
	340	80	TX 40	50	150 (3)	637261 634219
	360	80	TX 40	50	150 (3)	640038 36350
10.0	120	80	TX 40	50	200 (4)	637284 634221
	140	80	TX 40	50	200 (4)	637285 634222
	160	80	TX 40	50	200 (4)	637286 634223
	180	80	TX 40	50	200 (4)	637287 634224
	200	80	TX 40	50	200 (4)	637288 634225
	220	80	TX 40	50	200 (4)	637289 634226
	240	80	TX 40	50	200 (4)	637290 634227
	260	80	TX 40	50	150 (3)	637263 634228
	280	80	TX 40	50	150 (3)	637264 634229
	300	80	TX 40	50	150 (3)	637265 634230

\* Product without the CE mark

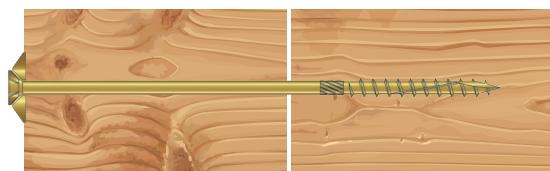
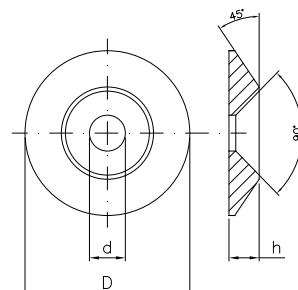
\*\* Chapter 2 "Wood joints design" has been developed on the basis of the parameters of the Premium product line.

HUS screw is suitable for use in conditions of 1st and 2nd class of use of a structure, for connections in solid wood, glued laminated wood, LVL and wood based panels. The thread used in HUS screws prevents the wood from splitting and the drilling tip enables easy and light screwing without pre-drilling of the hole. HUS screws can, if necessary, be used with a PHUS washer where a full recess in the wood is not necessary. A HUS screw with a PHUS washer has a much higher head pull-through capacity.



## PHUS Chipboard screws washer

1431



SOLD BY PACK					
SIZE [mm]			pcs	800 (16)	632428
$\frac{\leftarrow}{\rightarrow}$	$\frac{\leftarrow}{\rightarrow}$	$\frac{\leftarrow}{\rightarrow}$			
d	d	h			
7.5	19.5	4.6	50	800 (16)	632428
8.5	24.5	5.4	50	800 (16)	632429
10.5	30.0	6.6	50	400 (8)	632430

Fig.1. Perpendicular screw-in connection

Used for countersunk carpentry screws to improve the screw pressure.

**HUP Flat head chipboard screw, partially threaded**

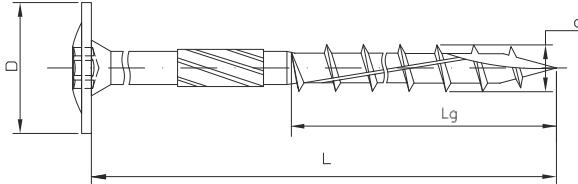
3111



Fig.1. Perpendicular screw-in connection



Fig. 2. Pole and beam connection

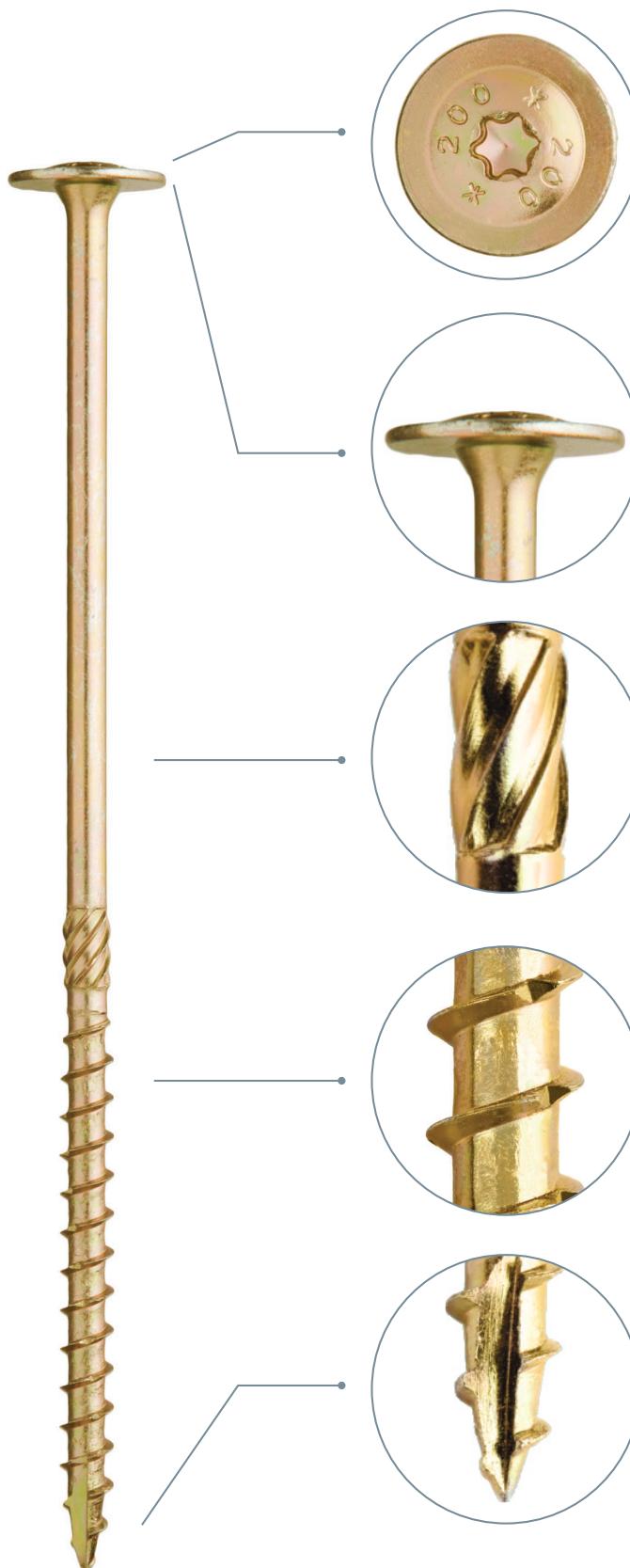


SOLD BY PACK						Index	
SIZE [mm]			TX	pcs		STANDARD LINE	PREMIUM LINE
d	L	Lg					
6.0	80	40	TX 30	100	400 (4)	637313	634231
	100	40	TX 30	100	400 (4)	637314	634232
	120	70	TX 30	100	400 (4)	637315	634233
	140	70	TX 30	100	400 (4)	637316	634234
	160	70	TX 30	100	400 (4)	637317	634235
	180	70	TX 30	100	400 (4)	637318	634236
	200	70	TX 30	100	400 (4)	637319	634237
	220	70	TX 30	100	400 (4)	637320	634238
	240	70	TX 30	100	400 (4)	637321	634239
	260	70	TX 30	100	300 (3)	637302	634240
8.0	280	70	TX 30	100	300 (3)	637303	634241
	300	70	TX 30	100	300 (3)	637304	634242
	60*	50	TX 40	50	200 (4)	-	43265
	80	40	TX 40	50	200 (4)	637291	634243
	100	40	TX 40	50	200 (4)	637292	634244
	120	80	TX 40	50	200 (4)	637293	634245
	140	80	TX 40	50	200 (4)	637294	634246
	160	80	TX 40	50	200 (4)	637295	634247
	180	80	TX 40	50	150 (3)	637266	634248
	200	80	TX 40	50	150 (3)	637267	634249
10.0	220	80	TX 40	50	150 (3)	637268	634250
	240	80	TX 40	50	150 (3)	637269	634251
	260	80	TX 40	50	150 (3)	637270	634252
	280	80	TX 40	50	150 (3)	637271	634253
	300	80	TX 40	50	150 (3)	637272	634254
	320	80	TX 40	50	150 (3)	637273	634255
	340	80	TX 40	50	150 (3)	637274	647941
	360	80	TX 40	50	-	640086	647942
	380	80	TX 40	50	-	640531	647943
	400	80	TX 40	50	-	640532	36415
	120	80	TX 40	50	200 (4)	637296	634260
	140	80	TX 40	50	200 (4)	637297	634261
	160	80	TX 40	25	100 (4)	637251	634262
	180	80	TX 40	25	100 (4)	637252	634263
	200	80	TX 40	25	100 (4)	637253	634264
	220	80	TX 40	25	100 (4)	637254	634265
	240	80	TX 40	25	100 (4)	637242	634266
	260	80	TX 40	25	75 (3)	637243	634267
	280	80	TX 40	25	75 (3)	637244	634268
	300	80	TX 40	25	75 (3)	637245	634269

\* Product without the CE mark

\*\* Chapter 2 "Wood joints design" has been developed on the basis of the parameters of the Premium product line.

Special wax coating applied during the manufacturing process significantly reduces the torque required to drive a screw. This makes assembly faster and easier and significantly reduces power consumption, which is especially important in case of battery-powered tools. The flat head with the torx socket increases the contact area for high pull-out strength and it locks the connection. The TORX socket ensures optimum torque transmission and the expansion bit reduces the torque required for screwdriving by widening the hole. A special blade with a notch at the beginning of the thread makes it easier to start screwing and it prevents wood from cracking. Moreover, special cutting notches on the thread cut through the fibres of the wood structure when screwing.

**Deep bit socket**

prevents from popping, extends bit life, and it prevents damage to the screw socket during screwdriving

**Flat head**

improved clamping of the workpieces; firmly adhering disc head ensures a higher clamping force which saves time and material

**Ribbing on the stem**

reduces the resistance in the final stage of screwdriving ensuring comfortable work

**Cutting notches**

reduce the risk of wood splitting during screwing

**Stem end**

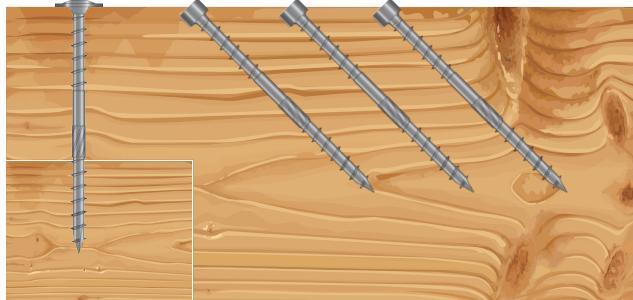
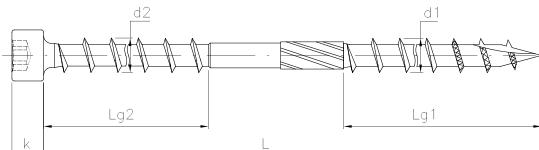
Milling groove in the lower part of the thread enables screwing without pre-drilling, it ensures very low tightening torque in hard wood materials and reduces number of cracks



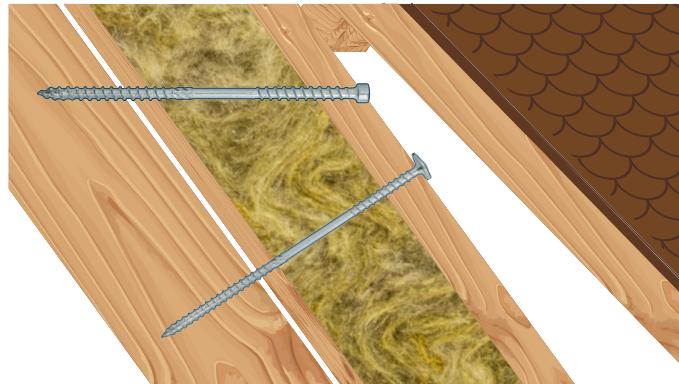
IUC

**Roofing construction screw with a cylindrical head**

3117

**Fig. 1.** Reinforcement of a beam section for shear stress

SOLD BY PACK				
SIZE [mm]		TX	pcs	Index
d	L			
8.0	165	TX40	50	48671
	195	TX40	50	48672
	225	TX40	50	48673
	235	TX40	50	48674
	255	TX40	50	48675
	275	TX40	50	48676
	302	TX40	50	48677
	335	TX40	50	48678
	365	TX40	50	48679
	400	TX40	50	48680
	435	TX40	50	48681
	472	TX40	50	48682
	535	TX40	50	48683

**Fig. 2.** Installation of counter-battens in the rafter overhang system with an insulation layer

IUC screw is a screw with a cylindrical head and a double thread on the stem. The screw is suitable for use in conditions of 1st and 2nd class of use of a structure, for connections in solid wood, glued laminated wood, LVL and wood based panels.

The most common areas of application are:

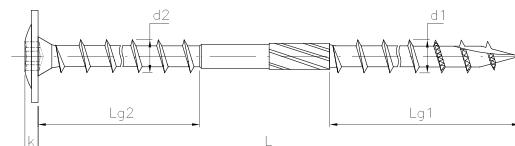
- reinforcement of the beam cross-section at supports,
- structural connections of counter-battens in over-rafter systems with a thermal insulation material spacer.

Product advantages:

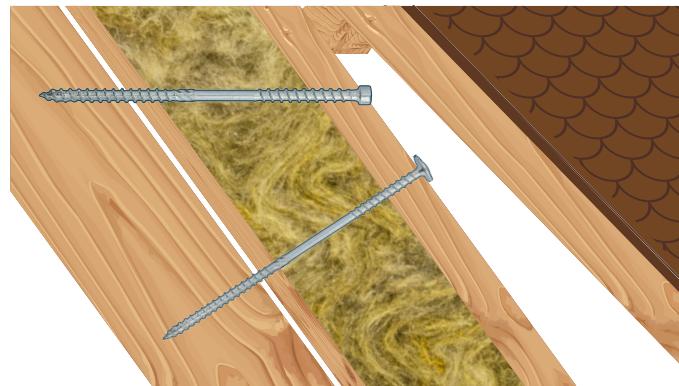
- pre-drilling of the base is not required - special cutting blade cuts the structure of the wood making it easier to install,
- lower thread at the stem - ensures perfect fastening in the rafter,
- upper thread on the stem - keeps a counter-batten at the right distance from the rafter,
- spiral cutters on the stem - reduce the tightening torque,
- countersunk cylindrical head - ensures optimum penetration into the wood structure,
- special wax coating - reduces friction during screwing
- TX recess - provides excellent and safe guidance for the screw.

**IUP Roofing construction screw with a flat head**

3116



SOLD BY PACK				
SIZE [mm]				
		TX	pcs	Index
d	L			
8.0	165	TX40	50	48684
	195	TX40	50	48685
	225	TX40	50	48686
	235	TX40	50	48688
	255	TX40	50	48689
	275	TX40	50	48690
	302	TX40	50	48691
	335	TX40	50	48692
	365	TX40	50	48693
	400	TX40	50	48694
	435	TX40	50	48695
	472	TX40	50	48696
	535	TX40	50	48697

**Fig. 1.** Installation of counter-battens in the rafter overhang system with an insulation layer

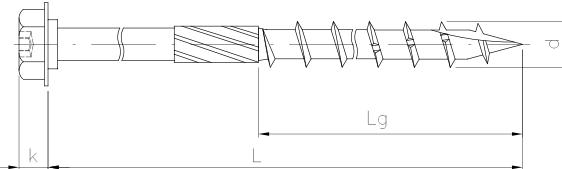
For structural connections of counter-battens in roof insulation over-rafter systems. The screws have a flat head ensuring large clamping surface of fastened counter-battens and double thread on the stem. The lower thread provides perfect fastening in the structural elements (rafters), the upper thread keeps the roofing sub-structure at the right distance from the rafters. This protects the insulation material against crushing caused by the weight of the roofing and external loads. The spiral ribbing in the middle part of the stem significantly reduces the tightening torque, while ensuring optimal grip of the over-rafter counter-battens. The screws with a flat head are mainly recommended for perpendicular installation of counter-battens.

Product advantages:

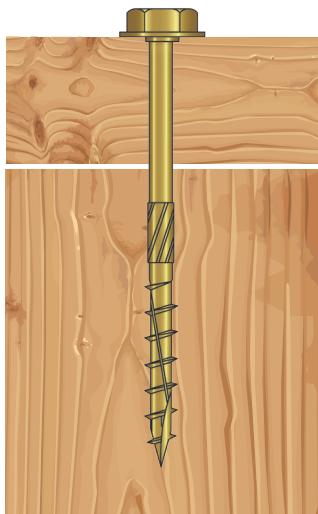
- pre-drilling of the base is not required - special cutting blade cuts the structure of the wood making it easier to install,
- lower thread at the stem - ensures perfect fastening in the rafter,
- upper thread on the stem - keeps a counter-batten at the right distance from the rafter,
- spiral cutters on the stem - reduce the tightening torque,
- wide flat head - provides a large contact area preventing indentation of the counter batten,
- special wax coating - reduces friction during screwing
- TX recess - excellent and safe guidance for the screw.

**HUK Hex head wood construction screw with a washer and TX recess**

3213



SIZE [mm]				SOLD BY PACK		Index
			Spanner icon			
d	L	Lg				
8.0	140	80	12	50	150 (3)	634313
	160	80	12	50	150 (3)	634314
	220	80	12	50	150 (3)	634317
	280	80	12	50	100 (2)	634320
10.0	160	80	15	25	100 (4)	634322
	180	80	15	25	100 (4)	634323
	200	80	15	25	100 (4)	634324
	220	80	15	25	100 (4)	634325
	240	80	15	25	100 (4)	634326
	260	80	15	25	100 (4)	634327
	280	80	15	25	100 (4)	634328
	300	80	15	25	75 (3)	634329
	320	80	15	25	75 (3)	634330
	340	80	15	25	75 (3)	634331
	360	80	15	25	75 (3)	634332
	380	80	15	25	75 (3)	634333

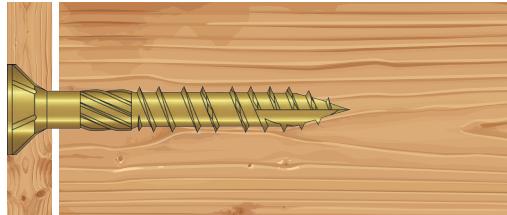
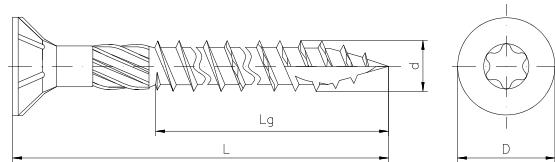
**Fig. 1.** Connection of the load-bearing beam to the post

**UHS****Counter head screw with a grooved stem**

3114



WAX COATING

**Fig. 1.** Perpendicular screw-in connection

SIZE [mm]			SOLD BY PACK		
d	L	Lg			Index
3.5*	25	18	TX 15	250	2000 (8)
	30	18	TX 15	250	2000 (8)
	35	24	TX 15	250	2000 (8)
	40	24	TX 15	250	2000 (8)
	45	24	TX 15	250	2000 (8)
	50	30	TX 15	250	2000 (8)
4.0	30	18	TX 20	250	2000 (8)
	35	24	TX 20	250	2000 (8)
	40	24	TX 20	250	2000 (8)
	45	30	TX 20	250	2000 (8)
	50	30	TX 20	250	2000 (8)
	55	36	TX 20	250	1000 (4)
	60	36	TX 20	250	1000 (4)
	70	42	TX 20	250	1000 (4)
4.5	40	24	TX 20	250	2000 (8)
	50	30	TX 20	250	1000 (4)
	60	36	TX 20	250	1000 (4)
	70	42	TX 20	250	1000 (4)
	80	50	TX 20	250	1000 (4)
	30	18	TX 25	250	2000 (8)
5.0	40	24	TX 25	250	2000 (8)
	45	30	TX 25	250	1000 (4)
	50	30	TX 25	250	1000 (4)
	60	36	TX 25	250	1000 (4)
	70	42	TX 25	250	1500 (6)
	80	50	TX 25	250	1000 (4)
	90	60	TX 25	250	1000 (4)
	100	60	TX 25	250	1000 (4)
	120	60	TX 25	250	1000 (4)
	40	24	TX 30	250	1000 (4)
6.0	50	30	TX 30	250	1000 (4)
	60	36	TX 30	100	400 (4)
	70	42	TX 30	100	400 (4)
	80	50	TX 30	100	400 (4)
	90	60	TX 30	100	400 (4)
	100	60	TX 30	100	400 (4)
	40	24	TX 30	250	1000 (4)
	50	30	TX 30	250	1000 (4)

\* Product without the CE mark

SIZE [mm]			SOLD BY WEIGHT		
					kg
d	L	Lg			Index
3.0*	30		TX 10	1020	5
	35	24	TX 15	800	5
	40	24	TX 15	700	5
	45	30	TX 15	630	5
	50	18	TX 20	510	5
	30	24	TX 20	590	5
4.0	35	36	TX 20	550	5
	40	18	TX 20	465	5
	45	24	TX 20	420	5
	50	30	TX 20	384	5
	60	36	TX 20	321	5
	70	42	TX 20	270	5
4.5	30	50	TX 20	465	5
	35	24	TX 20	400	5
	40	30	TX 20	362	5
	50	30	TX 20	295	5
	60	36	TX 20	250	5
	70	50	TX 20	217	5
5.0	80	60	TX 20	200	5
	40	60	TX 25	284	5
	45	60	TX 25	260	5
	50	30	TX 25	240	5
	60	42	TX 25	205	5
	70	50	TX 25	178	5
6.0	80	60	TX 25	155	5
	90	60	TX 25	138	5
	100	60	TX 30	120	5
	120	60	TX 30	100	5
	50	60	TX 30	157	5
	40	24	TX 30	157	5

\* Product without the CE mark

EXTRA screws are specialized hardened screws for hardwood and other wooden joints. Unique features of the product include ribbed head (it enables you to precisely set the screw evenly with the area, which remains smooth after tightening); Stem end (milling groove in the lower part of the thread enables a user to screw without pre-drilling, as well as a very low torque in hard wood materials, it reduces no. of cracks); deep TORX bit seat (prevents bit from jumping out, extends bit life and prevents damage to bit seat during screwdriving); cutting notches (reduce risk of wood splitting during screwdriving).



US

## Counter head screw, fully threaded

3103

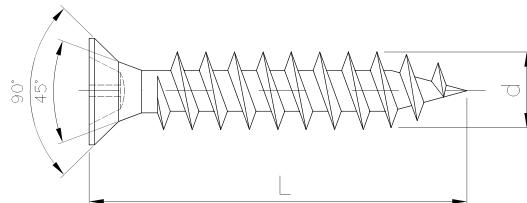


Fig. 1. Perpendicular screw-in connection

The screws we offer are ideal for connecting all kinds of wooden elements such as chipboard, plywood, as well as wood-based materials. Used by professionals, they are perfect for work in home gardens, garages and during small repairs. Thanks to their properties, they are extremely strong and resistant.

SOLD BY PACK							
SIZE [mm]		PZ	pcs	Index	Zn coating 5 µm	Zn coating 5 µm	
d	L						
2.5	10*	PZ 1	2000	32000 (16)	636888	636889	
	12*	PZ 1	2000	32000 (16)	636890	636891	
	16*	PZ 1	2000	16000 (8)	645432	645433	
	20*	PZ 1	2000	16000 (8)	645434	645435	
3.0	10*	PZ 1	2000	16000 (8)	645436	636897	
	12*	PZ 1	2000	16000 (8)	**	636898	
	13*	PZ 1	2000	16000 (8)	636899	636901	
	16*	PZ 1	2000	16000 (8)	636903	636905	
	20*	PZ 1	2000	8000 (4)	636907	636909	
	25*	PZ 1	2000	8000 (4)	636911	636913	
	30*	PZ 1	2000	12000 (6)	641638	646687	
3.5	35*	PZ 1	2000	4000 (2)	636919	636920	
	10*	PZ 2	2000	16000 (8)	**	636926	
	13*	PZ 2	2000	16000 (8)	636927	636929	
	16*	PZ 2	1000	8000 (8)	636931	636933	
	20*	PZ 2	1000	8000 (8)	636937	636939	
	25	PZ 2	250	4000 (16)	642864	642865	
	30	PZ 2	1000	8000 (8)	642866	636947	
	35	PZ 2	1000	4000 (16)	642867	636951	
	40	PZ 2	1000	4000 (4)	636955	636957	
	45	PZ 2	1000	4000 (8)	636963	**	
4.0	50	PZ 2	1000	4000 (4)	636969	**	
	12*	PZ 2	2000	8000 (4)	636975	**	
	13*	PZ 2	2000	8000 (4)	636976	636978	
	16*	PZ 2	1000	8000 (8)	642868	642869	
	20*	PZ 2	1000	8000 (8)	636985	636987	
	25	PZ 2	1000	4000 (4)	642870	642871	
	30	PZ 2	1000	4000 (4)	642872	636998	
	35	PZ 2	1000	6000 (6)	642873	642874	
	40	PZ 2	1000	4000 (4)	642875	642876	
	45	PZ 2	500	2000 (4)	637017	637019	
	50	PZ 2	500	2000 (4)	637025	637027	
	60	PZ 2	500	2000 (4)	637037	637039	
4.5	16*	PZ 2	1000	8000 (8)	637047	637048	
	20*	PZ 2	1000	4000 (4)	637049	637050	
	25	PZ 2	1000	4000 (4)	637051	637052	
	30	PZ 2	500	2000 (4)	637053	637055	
	35	PZ 2	500	4000 (8)	637057	637059	
	40	PZ 2	500	2000 (4)	637061	637063	
	50	PZ 2	500	2000 (4)	**	637073	
	55	PZ 2	500	2000 (4)	**	637075	
5.0	60	PZ 2	1000	8	637078	637080	
	16*	PZ 2	1000	4000 (4)	**	637086	
	20*	PZ 2	1000	4000 (4)	637087	637088	
	25	PZ 2	00	4000 (4)	642877	642878	
	30	PZ 2	00	6000 (4)	642896	644843	
	35	PZ 2	500	2000 (4)	637093	637095	
	40	PZ 2	500	2000 (4)	637097	637099	
	45	PZ 2	500	2000 (4)	637101	637103	
	50	PZ 2	500	3000 (6)	644078	644079	
	60	PZ 2	500	2000 (4)	637121	637123	
6.0	70	PZ 2	500	1000 (2)	646754	637131	
	25*	PZ 3	500	2000 (4)	**	637149	
	30	PZ 3	500	2000 (4)	637151	637253	
	40	PZ 3	500	2000 (4)	637155	637157	

\*Product without the CE mark

\*\* On request

SOLD BY WEIGHT							
SIZE [mm]		PZ	~ PCS IN KG	kg	Index		
d	L				Zn coating 5 µm	Zn coating 5 µm	
3.0	13*	PZ 1	2430	5	637473	637474	
	16*	PZ 1	1920	5	637475	637476	
	20*	PZ 1	1580	5	637477	637478	
	25*	PZ 1	1290	5	637479	637480	
3.5	30*	PZ 1	1140	5	637481	637482	
	16*	PZ 2	1440	5	637483	637484	
	20*	PZ 2	1190	5	637485	637486	
	25*	PZ 2	940	5	637487	637488	
	30*	PZ 2	820	5	637489	637490	
	35*	PZ 2	720	5	637491	637492	
	40*	PZ 2	640	5	637493	**	
4.0	16*	PZ 2	1020	5	637494	637495	
	20*	PZ 2	860	5	637496	637497	
	25	PZ 2	720	5	637498	637499	
	30	PZ 2	630	5	637500	637501	
	35	PZ 2	550	5	637502	637503	
4.5	40	PZ 2	490	5	637504	637505	
	50	PZ 2	390	5	637506	637507	
	30	PZ 2	500	5	637508	**	
	35	PZ 2	380	5	637509	**	
5.0	40	PZ 2	330	5	637510	**	
	45	PZ 2	300	5	637511	**	
	50	PZ 2	270	5	637512	**	
	55	PZ 2	240	5	637513	644788	
6.0	40	PZ 3	200	5	637514	644785	
	25*	PZ 3	500	5	637149		

\* Product without the CE mark

\*\* On request





US

## Counter head screw, partially threaded

3104

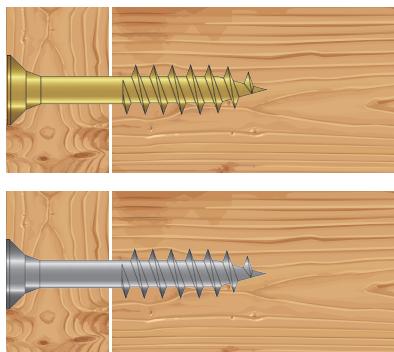
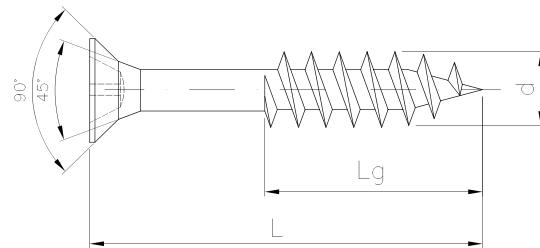


Fig. 1. Perpendicular screw-in connection

The screws we offer are ideal for connecting all kinds of wooden elements such as chipboard, plywood, as well as wood-based materials. Used by professionals, they are perfect for work in home gardens, garages and small repairs. Thanks to their properties, they are extremely strong and resistant.

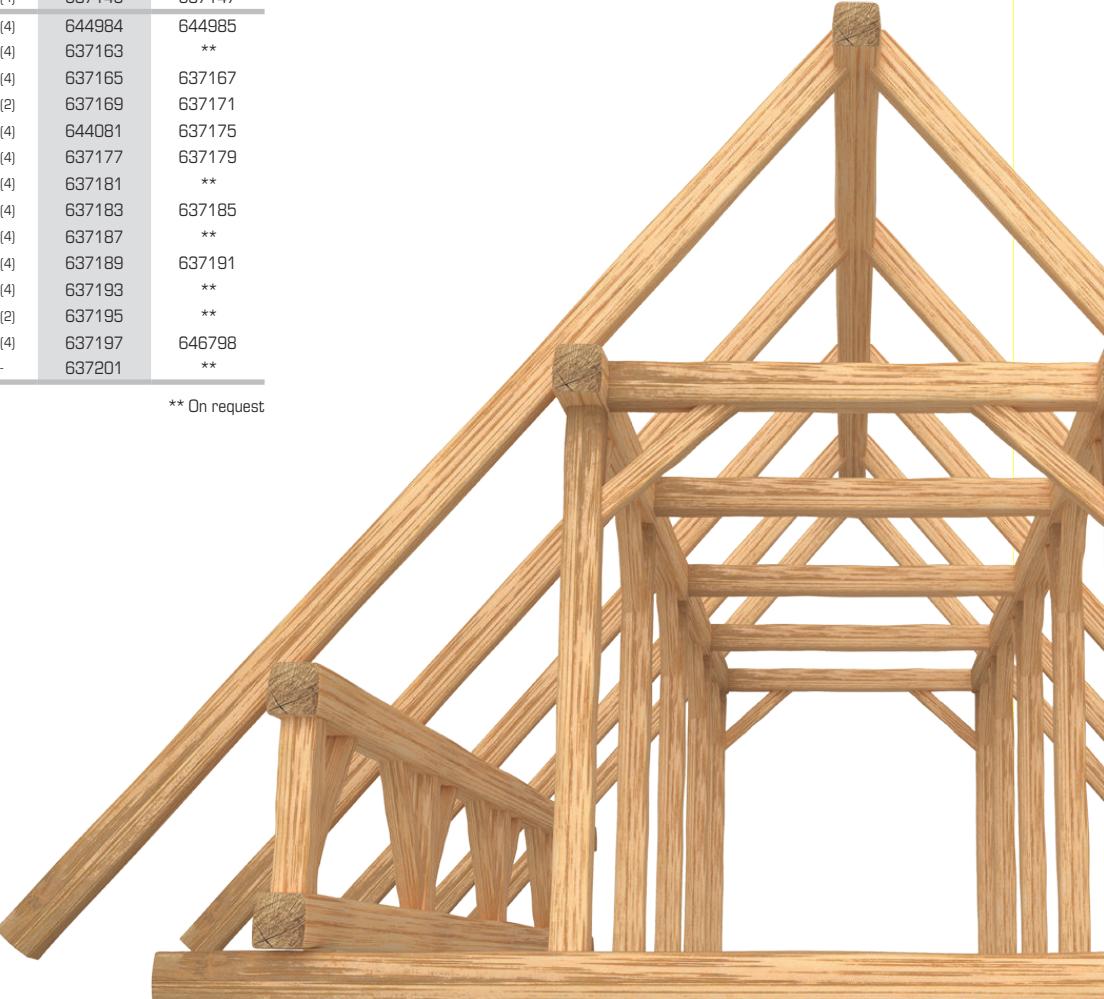
SOLD BY PACK							Index	
SIZE [mm]			PZ	pcs	3D		Zn Coating 5 µm	Zn Coating 5 µm
d	L	Lg						
3.0	40*	30	PZ1	2000	4000 (2)	636921	636923	
	45*	30	PZ1	2000	4000 (2)	636924	636925	
3.5	40	30	PZ 2	1000	4000 (4)	636953	**	
	45	30	PZ 2	1000	4000 (4)	636959	636961	
	50	30	PZ 2	1000	4000 (4)	636965	636967	
	60	35	PZ 2	1000	2000 (2)	636971	636973	
4.0	30*	20	PZ 2	1000	4000 (4)	636995	**	
	35*	20	PZ 2	1000	6000 (6)	646709	**	
	40	25	PZ 2	1000	4000 (4)	637005	637007	
	45	30	PZ 2	500	2000 (4)	637013	637015	
	50	30	PZ 2	500	2000 (4)	637021	637023	
	55	35	PZ 2	500	2000 (4)	637029	637031	
	60	35	PZ 2	500	2000 (4)	637033	637035	
	70	40	PZ 2	500	2000 (4)	637041	637043	
	80	50	PZ 2	500	2000 (4)	637044	637046	
4.5	45	30	PZ 2	500	3000 (6)	645438	645439	
	50	30	PZ 2	500	2000 (4)	637069	637071	
	60	35	PZ 2	500	1000 (2)	637076	637077	
	70	40	PZ 2	500	1000 (2)	637081	637083	
	80	50	PZ 2	500	2000 (4)	637084	**	
5.0	50	40	PZ 2	500	3000 (6)	646751	646752	
	55	35	PZ 2	500	2000 (4)	637113	637115	
	60	40	PZ 2	500	2000 (4)	637117	637119	
	70	40	PZ 2	500	1000 (2)	637125	637127	
	80	45	PZ 2	250	1000 (4)	637133	637135	
	90	45	PZ 2	250	1000 (4)	637137	637139	
	100	45	PZ 2	250	1000 (4)	637141	637143	
	120	50	PZ 2	250	1000 (4)	637145	637147	
	50	30	PZ 3	500	2000 (4)	644984	644985	
6.0	60	35	PZ 3	250	1000 (4)	637163	**	
	70	40	PZ 3	250	1000 (4)	637165	637167	
	80	45	PZ 3	250	500 (2)	637169	637171	
	90	50	PZ 3	250	1000 (4)	644081	637175	
	100	50	PZ 3	100	400 (4)	637177	637179	
	110	70	PZ 3	100	400 (4)	637181	**	
	120	70	PZ 3	100	400 (4)	637183	637185	
	130	75	PZ 3	100	400 (4)	637187	**	
	140	75	PZ 3	100	400 (4)	637189	637191	
	150	75	PZ 3	100	400 (4)	637193	**	
	160	95	PZ 3	100	200 (2)	637195	**	
	180	95	PZ 3	100	400 (4)	637197	646798	
	200	75	PZ 3	100	100 -	637201	**	

\* Product without the CE mark

\*\* On request

SOLD BY WEIGHT							Index	
SIZE [mm]			PZ	~ PCS IN KG	kg		Zn Coating 5 µm	
d	L	Lg						
3.5	50*	30	PZ 2	500	5		637516	
4.0	50	30	PZ 2	390	5		637517	
	60	35	PZ 2	340	5		637518	
4.5	70	40	PZ 2	280	5		637519	
	80	50	PZ 2	250	5		637520	
5.0	50	30	PZ 2	300	5		637521	
	70	40	PZ 2	220	5		637522	
6.0	80	50	PZ 2	190	5		637523	
	50	30	PZ 2	240	5		637524	
7.0	60	35	PZ 2	210	5		637525	
	70	40	PZ 2	180	5		637526	
8.0	80	50	PZ 2	150	5		637527	
	50	30	PZ 3	160	5		637528	
9.0	60	40	PZ 3	140	5		637529	
	80	50	PZ 3	110	5		637530	
10.0	100	60	PZ 3	80	5		637531	
	120	70	PZ 3	70	5		637532	
12.0	140	75	PZ 3	60	5		637533	
	160	75	PZ 3	50	5		637534	
14.0	180	75	PZ 3	50	5		637535	
	200	75	PZ 3	30	5		637536	

\* Product without the CE mark

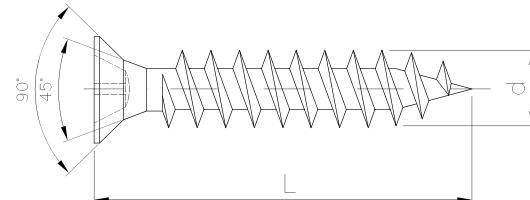


**US A2 Counter head screw, fully threaded**

I3103

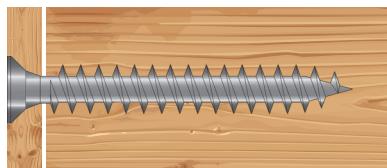


A2 STAINLESS STEEL



SOLD BY PACK				
SIZE [mm]		PZ	pcs	Index
$\frac{d}{\text{mm}}$	$L$			
3.0*	20	PZ 1	500	11983
	25	PZ 1	500	36146
	30	PZ 1	500	36148
3.5	16	PZ 2	500	36149
	25	PZ 2	500	36150
	30	PZ 2	500	36152
	35	PZ 2	500	41019
	40	PZ 2	200	34707
4.0*	20	PZ 2	500	70676
	30	PZ 2	500	70545
	40	PZ 2	500	70681
	60	PZ 2	200	11996
	70	PZ 2	200	82795
5.0*	35	PZ 2	500	70690
	40	PZ 2	200	70691

\*Product without the CE mark

**Fig. 1.** Perpendicular screw-in connection

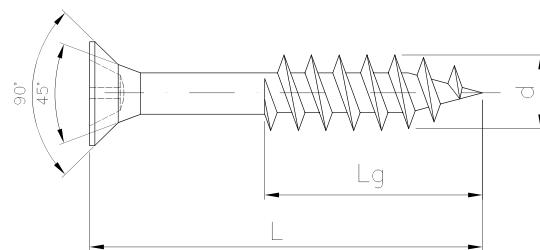
Stainless A2 steel wood screws are more and more popular due to the fact that they are characterized by high corrosion resistance even in high saline conditions. A2 steel is a high-alloy material with an increased chromium content, which results in higher resistance to the oxidation (corrosion). The perfectly balanced proportions of the chromium and the carbon bring the alloy specific properties that increase its resistance to the corrosion. The chromium, in combination with the oxygen, forms a fine coating which is responsible for prolonged life of the product. A2 steel is characterized by a great resistance to the oxidation process, so that even with direct contact with water the rusting process does not take place.


**US A2 Counter head screw, partially threaded**

I3104



A2 STAINLESS STEEL



SOLD BY PACK					
SIZE [mm]			PZ 2	200	Index
$\frac{\text{---}}{\text{*}}$	$\frac{\text{---}}{\text{---}}$	$\frac{\text{---}}{\text{---}}$			
d	L	Lg			
3.5	40	25	PZ 2	200	16870
4.0*	40	24	PZ 2	200	9609
	45	30	PZ 2	200	1344
	50	25	PZ 2	200	36155
	50	30	PZ 2	200	76185
	60	36	PZ 2	200	38490
5.0*	50	30	PZ 2	200	70693
	60	35	PZ 2	100	3008
	70	40	PZ 2	100	23631
	80	50	PZ 2	100	23632
	100	60	PZ 2	100	92684
6.0*	80	50	PZ 3	100	23634

\* Product without the CE mark

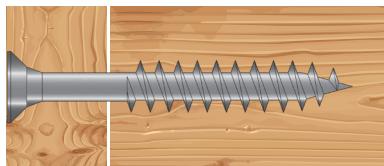


Fig. 1. Perpendicular screw-in connection

Stainless A2 steel wood screws are more and more popular due to the fact that they are characterized by high corrosion resistance even in high saline conditions. A2 steel is a high-alloy material with an increased chromium content, which results in higher resistance to the oxidation (corrosion). The perfectly balanced proportions of the chromium and the carbon bring the alloy specific properties that increase its resistance to the corrosion. The chromium, in combination with the oxygen, forms a fine coating which is responsible for prolonging the life of the product. A2 steel is characterized by a great resistance to the oxidation process, so that even with direct contact with water the rusting process does not take place.



UP

## Flat head chipboard screw, fully threaded

3101

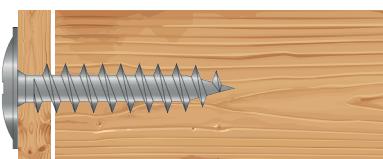
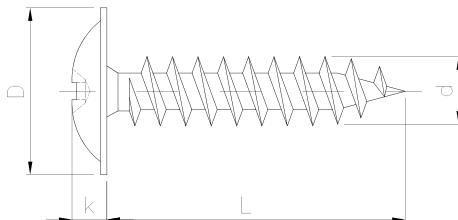


Fig. 1. Perpendicular screw-in connection



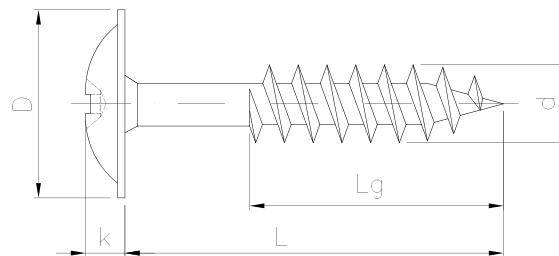
SOLD BY PACK					
SIZE [mm]		PZ	pcs		Index
d	L				
3.0	10	PZ 1	1000	16000 (16)	633647
	12	PZ 1	1000	8000 (8)	633649
	13	PZ 1	1000	8000 (8)	633651
	16	PZ 1	1000	8000 (8)	633654
	20	PZ 1	1000	8000 (8)	633656
	25	PZ 1	1000	8000 (8)	633658
	30	PZ 1	1000	4000 (4)	633660
3.5	10	PZ 2	1000	8000 (8)	633661
	13	PZ 2	1000	8000 (8)	633663
	16	PZ 2	1000	8000 (8)	633666
	16	PZ 2	1000	8000 (8)	641946
	20	PZ 2	1000	8000 (8)	633668
	25	PZ 2	1000	4000 (4)	633670
	27	PZ 2	1000	4000 (4)	641947
	30	PZ 2	1000	4000 (4)	633673
	40	PZ 2	1000	4000 (4)	633675
4.0	12	PZ 2	1000	8000 (8)	633676
	16	PZ 2	1000	8000 (8)	633679
	20	PZ 2	1000	4000 (4)	633682
	25	PZ 2	1000	4000 (4)	633685
	27	PZ 2	1000	4000 (4)	643257
	30	PZ 2	1000	4000 (4)	633688
	35	PZ 2	1000	4000 (4)	649882
	45	PZ 2	1000	4000 (4)	649881
4.5	16	PZ 2	1000	4000 (4)	649883
	25	PZ 2	1000	4000 (4)	633696
	30	PZ 2	1000	4000 (4)	633697
5.0	16	PZ 2	1000	4000 (4)	633698
	20	PZ 2	1000	4000 (4)	633700
	25	PZ 2	1000	4000 (4)	633701
	30	PZ 2	500	2000 (4)	633702
	35	PZ 2	500	2000 (4)	633704
	40	PZ 2	500	2000 (4)	633706
	45	PZ 2	500	2000 (4)	633708
	16	PZ 3	250	2000 (8)	633709
6.0	20	PZ 3	250	2000 (8)	633710
	25	PZ 3	250	2000 (8)	633711
	35	PZ 3	250	1000 (4)	633712
	30	PZ 3	250	1000 (4)	633713
	40	PZ 3	250	1000 (4)	633714
	50	PZ 3	250	1500 (6)	633715



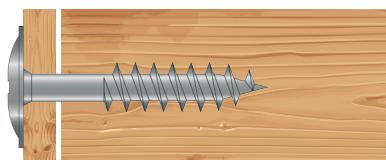
US

**Flat head chipboard screw, partially threaded**

3102



SOLD BY PACK						
SIZE [mm]			PZ	pcs	Index	
4	35	34	PZ 2	1000	4000 (4)	643259
	40	34	PZ 2	1000	4000 (4)	633716
	50	34	PZ 2	250	1000 (4)	633717
5	50	44	PZ 2	250	1000 (4)	633719
	60	55	PZ 2	250	1000 (4)	633720
	70	44	PZ 2	250	1000 (4)	633722
6	60	45	PZ 3	250	1000 (4)	633723
	70	45	PZ 3	250	500 (2)	649884
	80	45	PZ 3	100	400 (4)	633726

**Fig. 1.** Perpendicular screw-in connection

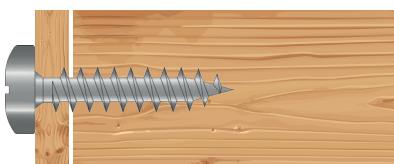
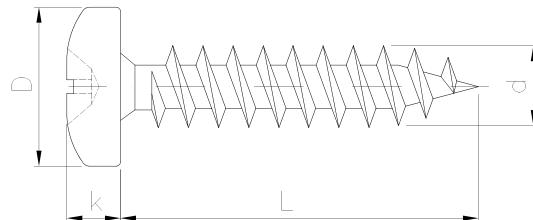
Flat head screws are most commonly used in the furniture industry to fasten fibreboard to the back of cabinets or racks. The flat, disc-shaped head saves space and increases the adhesion of an area to the fibreboard. The head does not go through the boards.



UW

**Pan head chipboard screw, fully threaded**

3107

**Fig. 1.** Perpendicular screw-in connection

SOLD BY PACK					
SIZE [mm]		PZ	pcs	Index	
d	L				
2.5	13	PZ1	2000	16000 (8)	643261
	10	PZ1	1000	16000 (16)	634124
	12	PZ1	1000	16000 (16)	647566
	13	PZ1	1000	8000 (8)	634126
	16	PZ1	2000	8000 (4)	634128
	20	PZ1	2000	8000 (4)	634129
	25	PZ1	1000	8000 (8)	643262
3.0	30	PZ1	1000	4000 (4)	634130
	10	PZ2	1000	8000 (8)	634132
	13	PZ2	1000	8000 (8)	634133
	16	PZ2	1000	8000 (8)	634136
	20	PZ2	1000	8000 (8)	634138
	25	PZ2	1000	4000 (4)	634140
	30	PZ2	1000	4000 (4)	643263
3.5	35	PZ2	1000	4000 (4)	634141
	10	PZ2	1000	8000 (8)	634142
	12	PZ2	1000	8000 (8)	634143
	13	PZ2	1000	8000 (8)	634145
	16	PZ2	1000	8000 (8)	634148
	20	PZ2	1000	4000 (4)	634151
	25	PZ2	1000	4000 (4)	634153
4.0	30	PZ2	1000	4000 (4)	634156
	35	PZ2	500	2000 (4)	634159
	16	PZ2	1000	4000 (4)	634161
	20	PZ2	1000	4000 (4)	643264
	25	PZ2	1000	4000 (4)	634163
	16	PZ2	1000	4000 (4)	634164
	20	PZ2	1000	4000 (4)	634165
5.0	25	PZ2	1000	4000 (4)	634167
	30	PZ2	1000	4000 (4)	647222
	35	PZ2	5000	-	634170
	40	PZ2	500	2000 (4)	634171
	30	PZ3	2000	-	634175
6.0	35	PZ4	2000	-	634177
	60	PZ5	1000	-	99159

Hardened screw with a cylinder head and PZ socket is designed for wood and wood-like elements connections. Cylindrical head provides adequate pressure to the fastened element.

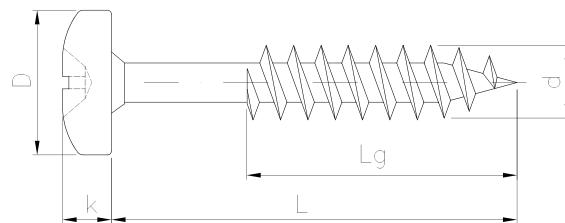
The PZ socket makes it easy to mount the elements quickly and securely. The sharp tip makes it easy to start the installation and the specially designed screw profile makes the installation fast and the connection strong.



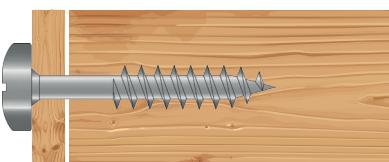
UW

**Pan head chipboard screw, partially threaded**

3108



SOLD BY PACK						
SIZE [mm]			PZ	pcs	Index	
d	L	Lg				
3.5	40	34	PZ 2	500	2000 (4)	634178
4.0	40	34	PZ 2	500	2000 (4)	634180
	50	34	PZ 2	500	2000 (4)	649876
5.0	50	44	PZ 2	250	1000 (4)	634182
	55	44	PZ 2	250	1000 (4)	634183
	60	44	PZ 2	250	1000 (4)	634184
	70	44	PZ 2	250	1000 (4)	634185
6.0	50	40	PZ 3	250	1000 (4)	634186

**Fig. 1.** Perpendicular screw-in connection

Hardened screw with a cylinder head and PZ socket is designed for wood and wood-like elements connections. Cylindrical head provides adequate pressure to the fastened element.

The PZ socket makes it easy to mount the elements quickly and securely. The sharp tip makes it easy to start the installation and the specially designed screw profile makes the installation fast and the connection strong.



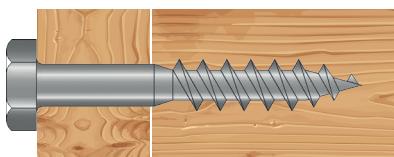
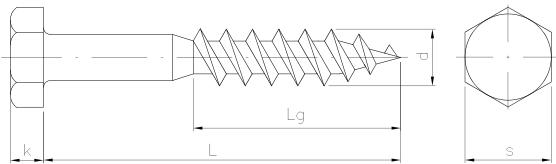
# CONSTRUCTION SCREWS

## H6K Hex head wood screw, partially threaded

3203



DIN 571

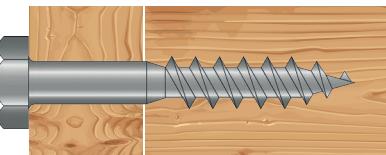
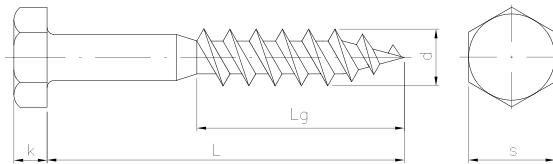


**Fig. 1.** Perpendicular screw-in connection

SOLD BY WEIGHT						
SIZE [mm]		WRENCH	~ PCS IN KG	kg	kg	Index
d	L					
6.0	40	10	128	5	20 (4)	637567
	50	10	108	5	20 (4)	637568
	60	10	94	5	20 (4)	637569
	70	10	81	5	10 (2)	640470
	80	10	72	5	10 (2)	637547
	90	10	57	5	10 (2)	637548
	100	10	56	5	10 (2)	637549
	120	10	44	5	10 (2)	637550
	140	10	36	5	10 (2)	637551
8.0	30	13	62	5	20 (4)	637570
	40	13	59	5	20 (4)	637571
	50	13	56	5	20 (4)	637572
	60	13	51	5	20 (4)	637573
	70	13	44	5	10 (2)	637552
	80	13	38	5	10 (2)	637553
	90	13	34	5	10 (2)	640474
	100	13	32	5	10 (2)	637554
	120	13	27	5	10 (2)	637555
	140	13	24	5	10 (2)	637556
	160	13	21	5	10 (2)	637557
	180	13	19	5	20 (4)	637574
	200	13	17	5	20 (4)	637575
	260	13	13	5	15 (3)	637563
10.0	60	17	27	5	10 (2)	637558
	80	17	23	5	10 (2)	637559
	100	17	21	5	10 (2)	637560
	120	17	17	5	10 (2)	637561
	140	17	15	5	10 (2)	637562
	160	17	12	5	-	637545
	180	17	11	5	-	637546
	200	17	10	5	20 (4)	637576
	220	17	9	5	20 (4)	637577
	240	17	9	5	20 (4)	637578
	260	17	8	5	15 (3)	637564
	300	17	7	5	15 (3)	640472
12.0	80	19	16	5	20 (4)	637579
	100	19	13	5	20 (4)	637580
	120	19	11	5	20 (4)	637581
	140	19	10	5	20 (4)	637582
	160	19	9	5	20 (4)	637583
	180	19	8	5	20 (4)	637584
	200	19	7	5	15 (3)	637565
	220	19	7	5	20 (4)	637585
	240	19	6	5	20 (4)	637586
	260	19	6	5	15 (3)	637566
	300	19	5	5	15 (3)	640473

**H6KA Hex head wood screw, partially threaded**

I3203

**A2 STAINLESS STEEL** DIN 571**Fig. 1.** Perpendicular screw-in connection

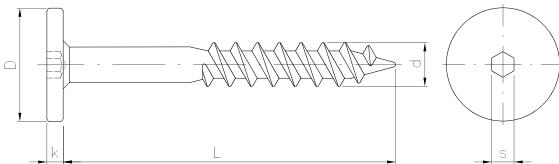
Stainless A2 steel wood screws are more and more popular due to the fact that they are characterized by high corrosion resistance even in high saline conditions. A2 steel is a high-alloy material with an increased chromium content, which results in higher resistance to the oxidation (corrosion). The perfectly balanced proportions of the chromium and the carbon bring the alloy specific properties that increase its resistance to the corrosion. The chromium, in combination with the oxygen, forms a fine coating which is responsible for prolonged life of the product. A2 steel is characterized by a great resistance to the oxidation process, so that even with direct contact with water the rusting process does not take place.



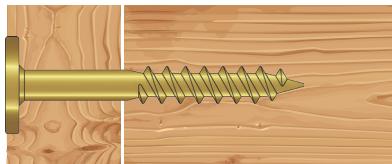
HWI

**Pan head hex wood screw with hex socket, partially threaded**

3210



SOLD BY PACK					
SIZE [mm]			IM	pcs	Index
d	L	Lg			
6.5	35	-	4.0	2000	6799
	40	35	4.0	2000	632157
	60	50	4.0	2000	632158
	70	50	4.0	1000	632160
	80	50	4.0	500	632161
	90	50	4.0	500	632162
	100	50	4.0	500	632163
	110	50	4.0	500	632164

**Fig. 1.** Perpendicular screw-in connection

HWI screws are designed for joining thin wood components where a large clamping area is required, while providing an aesthetically pleasing finish to the joint.



# 04 TERRACE SCREWS

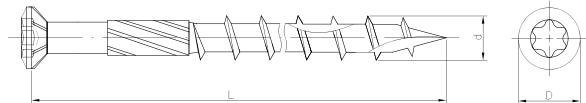


A large, white, semi-transparent circle is positioned on the left side of the page, partially overlapping a dark teal background area. It has a thick, dark teal outline and a dark teal shadow effect at the bottom right corner.

TERRACE SCREWS

**WTX** Terrace (decking) screw

I3221



SOLD BY PACK					
SIZE [mm]			TX	PCS	Index
d	L	d			
4.0	40	6.9	TX 20	200	1600 (8)
	50	6.9	TX 20	200	1600 (8)
	60	6.9	TX 20	200	800 (4)
4.5	40	7.4	TX 20	200	1600 (8)
	50	7.4	TX 20	200	1600 (8)
	60	7.4	TX 20	200	800 (4)
	70	7.4	TX 20	200	800 (4)
	80	7.9	TX 20	200	800 (4)
5.0	40	7.9	TX 25	200	1600 (8)
	50	7.9	TX 25	200	800 (4)
	60	7.9	TX 25	200	800 (4)
	70	7.9	TX 25	200	1200 (6)
	80	7.9	TX 25	200	1200 (6)

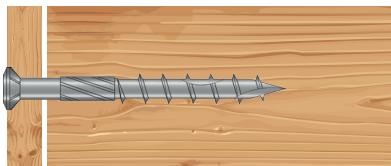


Fig. 1. Perpendicular screw-in connection



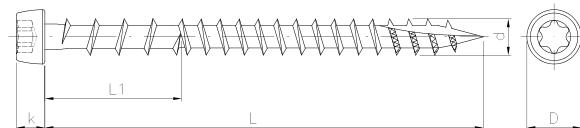
Terrace (decking) screws are mainly designed for installation of outdoor wooden decking and vertical façade cladding. Terrace screws are equipped with a serrated thread. The thread, in combination with a special cutting blade, ensure fast penetration into the base. Moreover, the spiral cutters located at the beginning of an unthreaded part drill a hole in a fastened element, which reduces the screwing torque. The conical shape (countersunk) of the head masks the fixing well in the base and improves the aesthetics of the connection. Head of the screw has milling ribs that enable recessing in the base. WTX terrace (decking) screws are made of steel with enhanced corrosion resistance. It provides an excellent and reliable anti-corrosion protection for screws exposed to external weather conditions. WTX terrace screws are recommended for fixing all kinds of timber used on terraces as well as for composite materials. In hardwoods, pre-drilling is recommended.

Product advantages:

- milling ribs make it easier to sink into the base,
- shape of the head perfectly masks and improves the aesthetics of the connection,
- special cutter blade facilitates the installation,
- spiral hole milling cutters reduce the tightening torque.

**WTR Terrace screw with HCP coat**

3220



SOLD BY PACK						
SIZE [mm]		TX	COLOUR	pcs	Index	
d	L					
5.0	40	TX 20	brown	200	1600 (8)	634335
	40	TX 20	grey	200	1600 (8)	634337
	50	TX 20	sand	200	1600 (8)	634341
	50	TX 20	grey	200	1600 (8)	634342
	50	TX 20	gold	200	1600 (8)	634344
	60	TX 20	brown	200	1600 (8)	634345
	60	TX 20	sand	200	1600 (8)	634346
	60	TX 20	grey	200	1600 (8)	634347
	60	TX 20	gold	200	1600 (8)	634349
	70	TX 20	brown	200	1200 (6)	648024
	70	TX 20	sand	200	1200 (6)	648025
	70	TX 20	grey	200	1200 (6)	648026

**Fig. 1.** Perpendicular screw-in connection

Terrace (decking) screws are mainly designed for installation of outdoor wooden decking and vertical façade cladding. These screws have a double thread. The lower thread enables fixing in the base. The upper thread has a reverse winding direction, which reduces the tightening torque required for fastening. Special conical shape (counterhsunk) of the screw head perfectly masks the fixing in the base. Special HCP coat protective layer based on the nanotechnology ensures very high corrosion resistance of over 1000h in a salt chamber. It provides an excellent and reliable anti-corrosion protection for screws exposed to external weather conditions. WTR decking screws are recommended for fixing: spruce, pine, Douglas fir, cedar, mahogany, oak, maple, American walnut, as well as composite materials.

Product advantages:

- inverted thread for reduced tightening torque,
- special shape of the head perfectly masks the connection,
- colour range adapted to wood shades,
- special cutter blade facilitates the installation.





# 05

## CARPENTRY FASTENERS



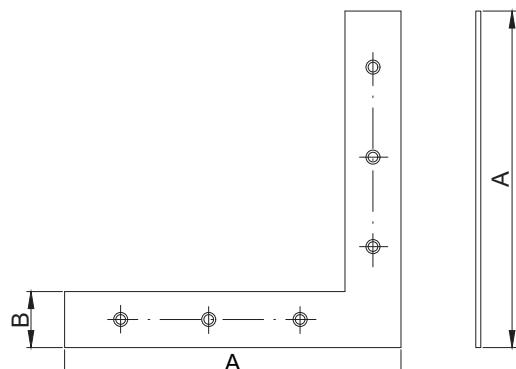
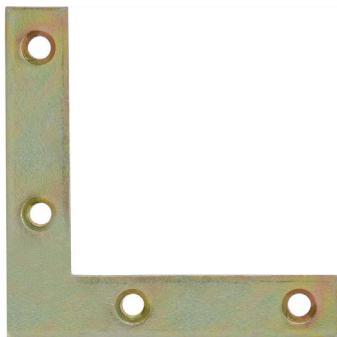
CARPENTRY FASTENERS

A large white circle is positioned on the left side of the page, partially overlapping a dark teal background. Inside the circle, there are several dark teal geometric shapes, including a large triangle and a rectangle, suggesting a nail or screw head.



## NA Corner

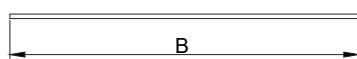
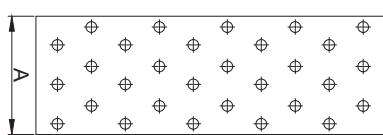
6202



TYPE OF THE PRODUCT	SIZE [mm]		SOLD BY PACK pcs	Index
	A	B		
NA1	150	25	10	38873
NA2	200	30	10	38875
NA3	250	30	10	31408
NA4	300	40	10	9876
NA5	50	10	50	52482
NA6	60	10	50	52483
NA7	75	12	50	85932
NA8	100	15	50	85957

## PP Perforated plate

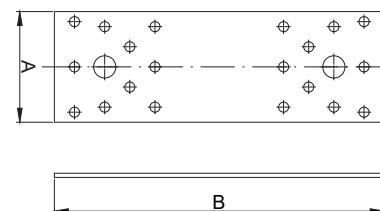
6203



TYPE OF THE PRODUCT	SIZE [mm]		SOLD BY PACK pcs	Index
	A	B		
PP1	40	80	20	35659
PP2	40	100	20	9877
PP3	40	120	20	37341
PP4	40	160	20	31269
PP5	60	140	20	31270
PP6	60	160	20	92079
PP7	60	200	20	9878
PP8	60	240	50	98865
PP9	80	200	25	97623
PP10	80	240	25	97624
PP11	80	300	25	98866
PP12	100	200	25	97625
PP13	100	240	25	97626
PP14	100	260	25	98907
PP15	100	300	25	44227
PP16	100	400	25	57284
PP17	100	500	25	89963
PP18	120	200	25	51680
PP19	120	240	25	98867
PP20	120	260	25	51682
PP21	120	300	25	97628
PP22	140	400	10	89964
PP23	160	400	10	89965
PP24	200	300	10	89966

**LP** Flat fastener

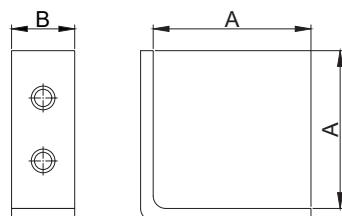
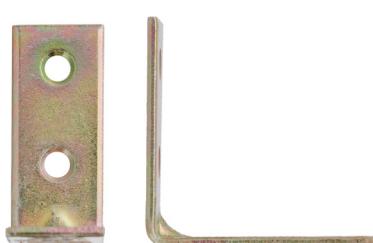
6204



SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]		pcs	Index
	A	B		
LP1	35	100	20	51663
LP2	55	140	20	99593
LP3	35	200	20	89957
LP4	55	280	20	85921
LP5	65	180	20	98874
LP6	90	210	20	89959

**KW** Narrow angle

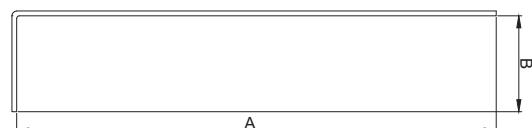
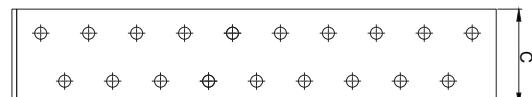
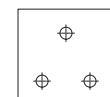
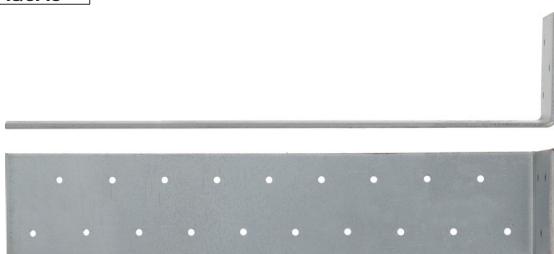
6205



SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]		pcs	Index
	A	B		
KW1	25	17	25	98711
KW1	25	17	50	18175
KW2A	30	15	100	49995
KW2	40	17	50	77712
KW2	40	17	100	93580
KW3	50	17	20	98713
KW4	75	17	20	98714
KW5	100	20	20	98715
KW6	125	20	20	98716
KW7	150	25	20	90224

**KK Rafter angle**

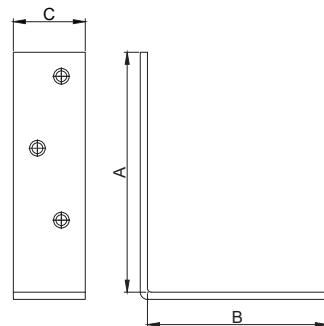
6207



SOLD BY PACK					
TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index
	A	B	C		
KK1	200	40	40	20	9880
KK2	300	40	40	25	1144

**KB Beam angle**

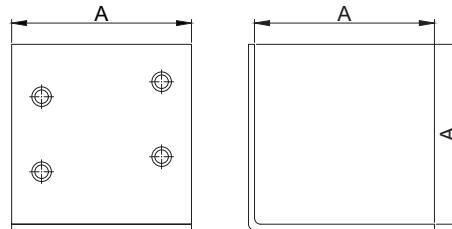
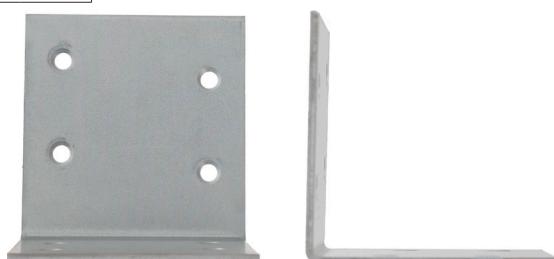
6206



SOLD BY PACK					
TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index
	A	B	C		
KB1	100	75	30	20	33736
KB2	120	80	35	50	89952
KB3	180	120	40	25	98700

**KS** Wide angle

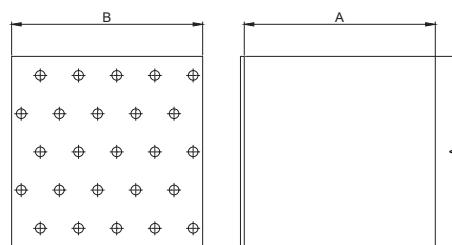
6208



SOLD BY PACK			
TYPE OF THE PRODUCT	SIZE [mm]		Index
	A	pcs	
KS1	30	50	98717
KS2	40	50	70000
KS3	60	50	98719

**KM** Installation angle

6209



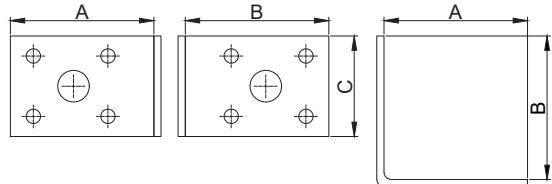
SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]			Index
	A	B	C	
KM1	40	40	40	18128
KM2	40	40	60	1865
KM3	60	60	40	1063
KM4	60	60	60	70001
KM5	60	60	80	1065
KM6	60	60	100	7293
KM7	80	80	40	38315
KM8	80	80	60	24424
KM9	80	80	80	74148
KM10	80	80	100	89955
KM11	100	100	60	97622
KM12	100	100	80	52444
KM13	100	100	100	52445
KM14	40	40	100	52446
KM15	40	40	200	52447



KL

**Connection angle**

6210

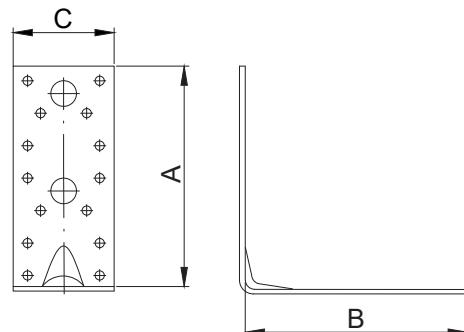


TYPE OF THE PRODUCT	SIZE [mm]			SOLD BY PACK pcs	Index
	A	B	C		
KL1	50	50	35	25	99413
KL2	70	70	55	20	639681
KL3	50	150	35	25	89953
KL4	90	90	65	50	51650
KL5	105	105	90	20	639680

KP

**Strengthening angle**

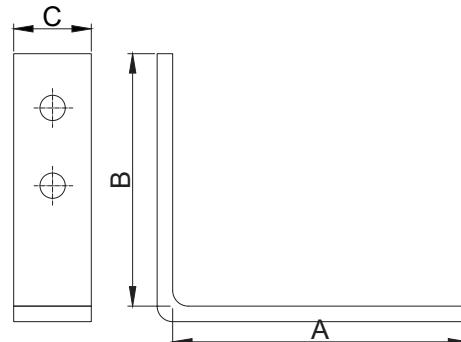
6212



TYPE OF THE PRODUCT	SIZE [mm]			SOLD BY PACK pcs	Index
	A	B	C		
KP1	90	90	65	25	51652
KP2	105	105	90	15	89956
KP3	90	50	55	20	31264
KP4	70	70	55	25	1061
KP8	150	150	65	25	21537

**KR Adjustable angle**

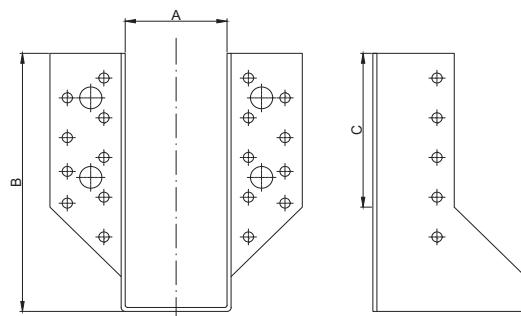
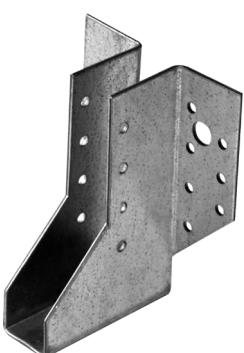
6211



SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]			Index
	A	B	C	
KR1	80	65	20	31263
KR2	60	40	60	90238

**WB Beam hanger**

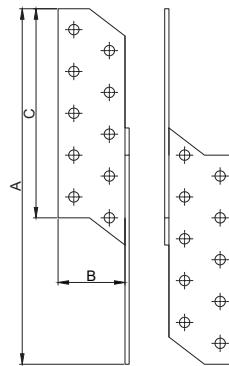
6214



SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]			Index
	A	B	pcs	
WB5	41	110	10	1051
WB9	45	138	10	70253
WB10	51	105	10	98876
WB11	51	135	10	1052
WB13	51	195	10	98710
WB14	60	100	10	98877
WB15	60	130	10	1056
WB16	60	160	10	51688
WB21	70	125	10	51690
WB26	80	120	10	98878
WB27	80	150	10	98879
WB28	80	180	10	52470
WB30	100	140	10	1058
WB31	100	170	10	1059

**LK****Rafter bracket**

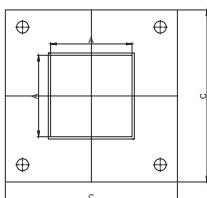
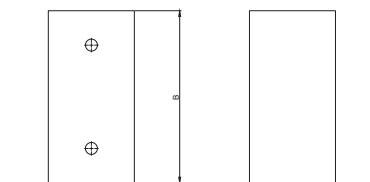
6225



TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index
	A	B	C		
LK1 L	170	32	100	20	24265
LK2 P	170	32	100	20	24264
LK3 L	210	32	140	20	94227
LK4 P	210	32	140	20	24263
LK5 L	250	32	180	20	1601
LK6 P	250	32	180	20	1605
LK7 L	290	32	220	20	1607
LK8 P	290	32	220	20	1610

**PSP****Rectangular base post support**

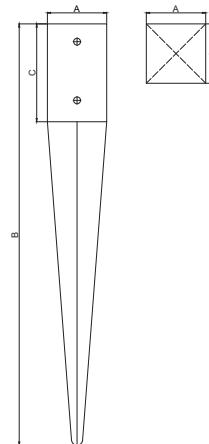
6240



TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index
	A	B	C		
PSP1	71	150	150	6	6347
PSP2	91	150	150	6	58134
PSP3	101	150	150	6	6348

**PSG** Drive in post support

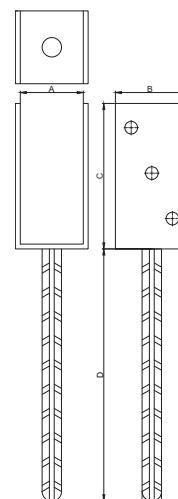
6233



TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index
	A	B	C		
PSG1	71	750	150	4	58130
PSG2	91	750	150	4	58131
PSG3	91	900	150	4	6346
PSG4	101	900	150	4	90919
PSG6	101	750	150	4	22002
PSG7	121	900	150	4	6352

**PS** Post support

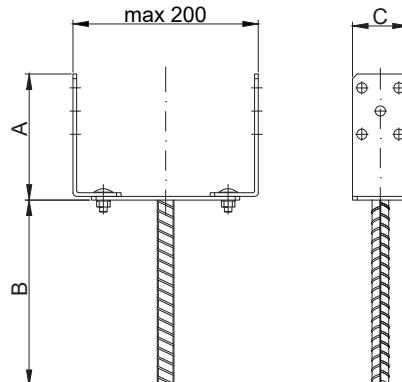
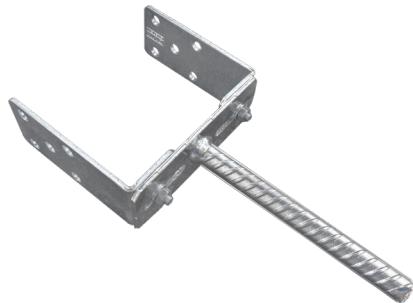
6231



TYPE OF THE PRODUCT	SIZE [mm]				pcs	Index
	A	B	C	$\varnothing d \times D$		
PS1	60	60	120	16 x 200	6	18127
PS2	70	60	120	16 x 200	6	99233
PS3	80	60	120	20 x 200	6	99234
PS4	90	60	120	20 x 200	6	99235
PS5	100	60	120	20 x 200	6	99236
PS6	120	60	120	20 x 200	6	99237
PS8	140	90	126	20 x 200	6	33169

**PSRU Post support with regulation, to be concreted**

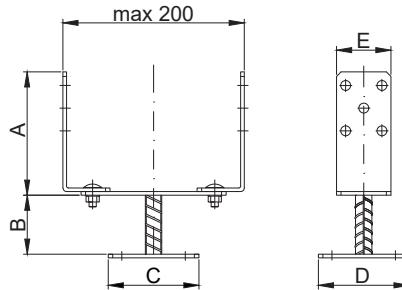
6242



SOLD BY PACK				
TYPE OF THE PRODUCT	SIZE [mm]			Index
	A	B	C	
PSRU	120	200	60	10 22694

**PSRU Post support with regulation, screw in**

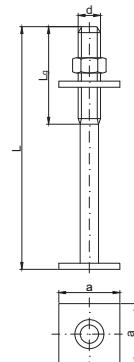
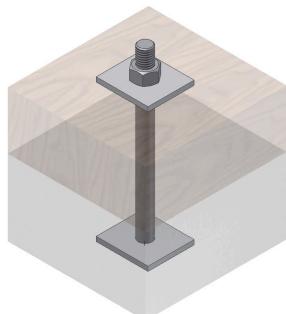
6243



SOLD BY PACK						Index	
TYPE OF THE PRODUCT	SIZE [mm]						
	A	B	C	d	E		
PSRU	136	200	100	100	60	4 24529	

**ML****Construction anchor (construction fastener)**

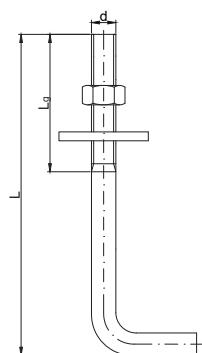
6227



SOLD BY PACK						
TYPE OF THE PRODUCT	SIZE [mm]				pcs	Index
	$\varnothing d$	L	$l_g$	a		
ML3 square	M12	350	70	47	10	2005
ML5 square	M12	400	70	47	10	2009
ML7 square	M12	500	70	47	10	2011

**ML****Construction anchor (construction fastener)**

6227



SOLD BY PACK						
TYPE OF THE PRODUCT	SIZE [mm]			pcs	Index	
	$\varnothing d$	L	$l_g$			
ML2 bent	M12	350	80	10	77236	
ML4 bent	M12	400	80	10	77237	
ML8 bent	M14	350	80	10	77243	
ML9 bent	M14	400	80	10	77244	
ML10 bent	M14	450	80	10	77247	
ML11 bent	M16	350	80	10	77249	
ML12 bent	M16	400	80	10	77250	
ML13 bent	M16	450	80	10	77258	





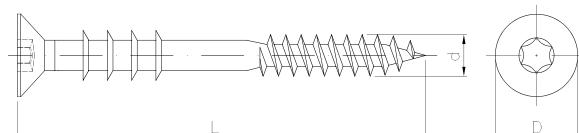
# 06 ROOF COVERING SCREWS



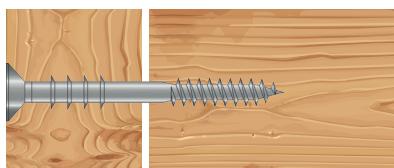
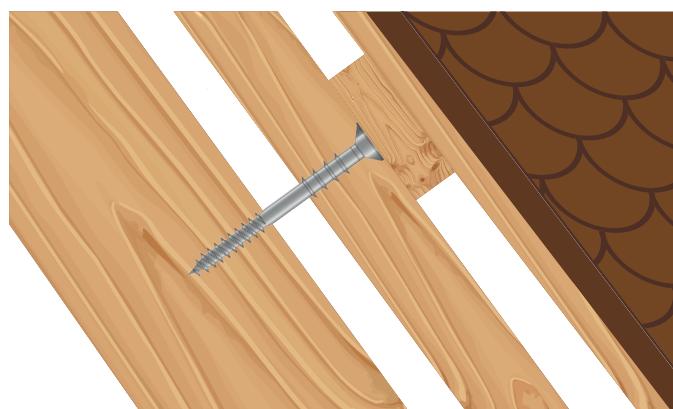
ROOF COVERING  
SCREWS

**DHS Distance screw with a countersunk screw**

3219



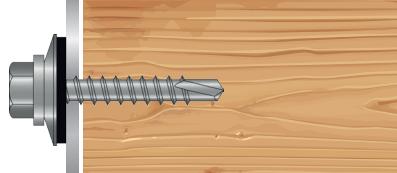
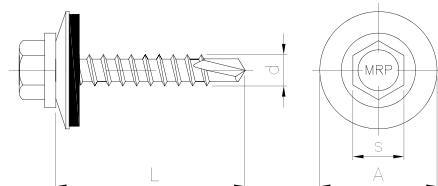
SOLD BY PACK					
SIZE [mm]		TX	pcs	3D	Index
d	L				
6.0	60	TX 25	50	400 (8)	632165
	70	TX 25	50	400 (8)	632166
	80	TX 25	50	400 (8)	632168
	90	TX 25	50	400 (8)	632169
	100	TX 25	50	400 (8)	632171
	110	TX 25	50	400 (8)	632173
	120	TX 25	500	- (1)	632175
	140	TX 25	500	- (1)	632176

**Fig. 1.** Fixing and levelling of roofing battens

Levelling screws provide a high strength connection for all types of wood and wood-like materials. They are designed e.g. for levelling of structural battens, installation of wooden windows and window supporting structures. Special levelling rings on the stem enable adjusting the distance between the fastened element and the base. The distance between the fastened areas can be changed at any time by simply changing the screwdriving direction. The TORX socket makes installation easier due to an optimal force application and also it eliminates risk of damaging the screwdriver bit or creating a socket in the head.


**WSPD Self-drilling farmer screw for roof coverings**

5201



**Fig. 1.** Fastening of roof works and profiled roof metal sheets to timber structures.

SOLD BY PACK					Index	
SIZE [mm]			COLOUR	pcs		
d	L	d	Spanner			
4.8	20	14	8	galvanized	250 1000 (4) 637578	
	20	14	8	7024	250 1000 (4) 645021	
	20	14	8	8017	250 1000 (4) 645022	
	20	14	8	9006	250 1000 (4) 645023	
	20	14	8	9010	250 1000 (4) 645024	
	20	14	8	3009	250 1000 (4) 647342	
	20	14	8	3011	250 1000 (4) 647346	
	20	14	8	7016	250 1000 (4) 647343	
	20	14	8	7035	250 1000 (4) 647347	
	20	14	8	8004	250 1000 (4) 647344	
	20	14	8	9002	250 1000 (4) 647345	
	20	14	8	9005	250 1000 (4) 645120	
	35	14	8	galvanized	250 1000 (4) 634590	
	35	14	8	3005	250 1000 (4) 645025	
	35	14	8	3009	250 1000 (4) 645026	
	35	14	8	3011	250 1000 (4) 645027	
	35	14	8	6005	250 1000 (4) 645028	
	35	14	8	6020	250 1000 (4) 645029	
	35	14	8	7024	250 1000 (4) 645031	
	35	14	8	8004	250 1000 (4) 645032	
	35	14	8	8017	250 1000 (4) 645033	
	35	14	8	8019	250 1000 (4) 645034	
	35	14	8	9005	250 1000 (4) 645035	
	35	14	8	9010	250 1000 (4) 645036	
	35	14	8	7035	250 1000 (4) 647348	
	35	14	8	9002	250 1000 (4) 647349	
	35	14	8	9006	250 1000 (4) 647350	
	35	14	8	9011	250 1000 (4) 645122	
	50	14	8	galvanized	250 1000 (4) 634591	





## ROOF COVERING SCREWS

**WFP**

### Self-drilling sheet metal screw with a pan head and a washer

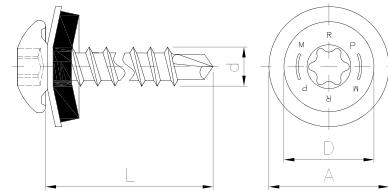
5221



CORROSION CLASS  
C3



**Fig. 1.** Fastening of roof works and profiled roof metal sheets to wooden structures.



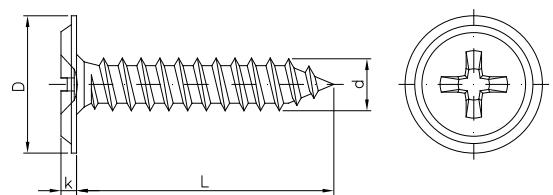
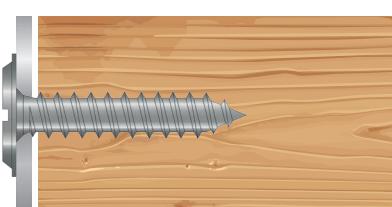
SOLD BY PACK						
	SIZE [mm]		TX	COLOUR	pcs	Index
	d	L	d			
4.8	20	14	TX 25	galva-nized	250	1000 (4)
		14	TX 25	3011	250	1000 (4)
		14	TX 25	7016	250	1000 (4)
		14	TX 25	7024	250	1000 (4)
		14	TX 25	8004	250	1000 (4)
		14	TX 25	8017	250	1000 (4)
		14	TX 25	9005	250	1000 (4)
		14	TX 25	9006	250	1000 (4)
		14	TX 25	9010	250	1000 (4)
		14	TX 25	8019	250	1000 (4)
4.8	35	14	TX 25	galva-nized	250	1000 (4)
		14	TX 25	3011	250	1000 (4)
		14	TX 25	7016	250	1000 (4)
		14	TX 25	7024	250	1000 (4)
		14	TX 25	8004	250	1000 (4)
		14	TX 25	8017	250	1000 (4)
		14	TX 25	9005	250	1000 (4)
		14	TX 25	9006	250	1000 (4)
		14	TX 25	9010	250	1000 (4)
		14	TX 25	8019	250	1000 (4)

### BPMNT Metal sheet metal screw with a flat head - installation

2315



ISO 2702



SOLD BY PACK						
	SIZE [mm]		PH	pcs	Index	
	d	L	d			
4.2	13	11.5	PH 2	1000	4000 (4)	635354
		16	PH 2	1000	4000 (4)	635355
		19	PH 2	1000	4000 (4)	635356
		25	PH 2	1000	4000 (4)	635357
		32	PH 2	500	2000 (4)	635358
		40	PH 2	500	2000 (4)	635359

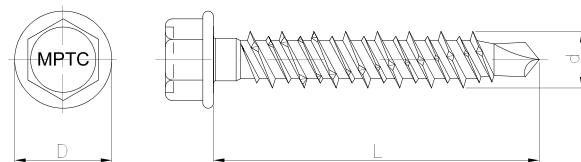
**Fig. 1.** Fastening of steel sheets to a wood base.

**MPTC****MPTC self-drilling screw (ceramic coating)**

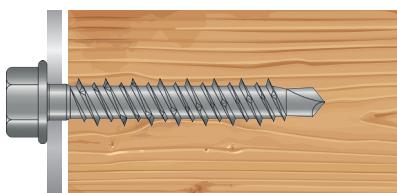
5270



SILVER RUSPERT



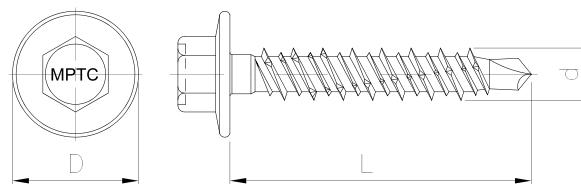
SIZE [mm]			SOLD BY PACK		Index
					Index
d	L	d	pcs	Index	
6.4 - 5.3	40	11	250	1000 (4)	633230
	50	11	250	1500 (6)	78858
	65	11	250	1000 (4)	637809

**Fig. 1.** Fastening of steel sheets to timber supporting structures.**MPTC IW Self-drilling screw with an integrated washer**

5271



SILVER RUSPERT



SIZE [mm]			SOLD BY PACK		Index
					Index
d	L	d	pcs	Index	
6.4 - 5.3	40	11	250	1000 (4)	78862
	50	11	250	1500 (6)	78866
	65	11	250	1000 (4)	78867

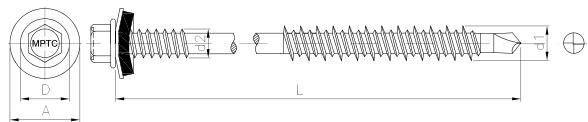
**Fig. 1.** Fastening of steel sheets to timber supporting structures.

**MPTCSP Self-drilling sandwich panel to timber screw**

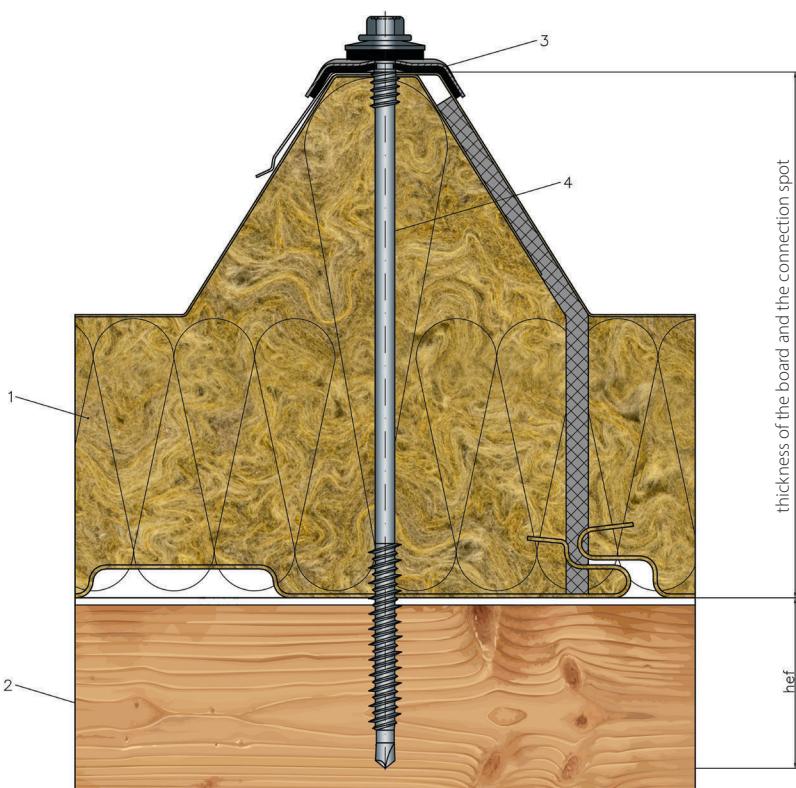
5222



SILVER RUSPERT



SOLD BY PACK						
SIZE [mm]					Pcs	Index
d1	d2	L	d	A		
6.4	7.0	125	13	19	50	300 (6) 638950
	7.0	145	13	19	50	300 (6) 638951
	7.0	165	13	19	50	200 (4) 638952
	7.0	195	13	19	50	200 (4) 638953
	7.0	225	13	19	50	200 (4) 638954
	7.0	245	13	19	50	200 (4) 638955



1. Sandwich panel  
2. Timber  
3. Calotte  
4. Sandwich panel screw MPTC SP / MPXC SP

hef = 40 mm (timber)

**Fig. 1.** Fastening of roof panels to supporting beams



GW-P

**Building paper nails**

6104

**S**  
RAW

SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	Index	
$\overleftarrow{\text{d}}$	$\overrightarrow{\text{L}}$				
3.0	20	775	5	20 (4)	641374
	25	610	5	20 (4)	632098
	30	568	5	20 (4)	632100
	35	426	5	20 (4)	632102
	40	400	5	20 (4)	632104

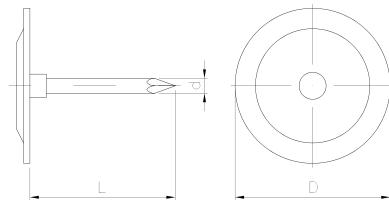


Fig. 1. Fastening of the roof paper to the timber

GW-P

**Roof paper nails with a washer**

6114

**Zn**  
ZINK COATING 5  $\mu\text{m}$ 

SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	Index	
$\overleftarrow{\text{d}}$	$\overrightarrow{\text{L}}$				
2.8	25	2.5	2.5	43235	
	28	2.5	2.5	43240	

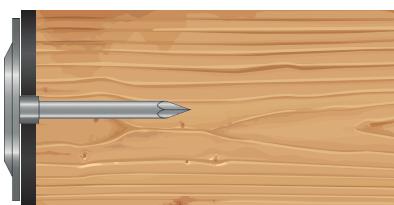


Fig. 1. Fastening of the roof paper to the timber





# 07 WOOD TO STEEL SCREWS



**BSZ Self-drilling screw for fixing wood to steel**

2319

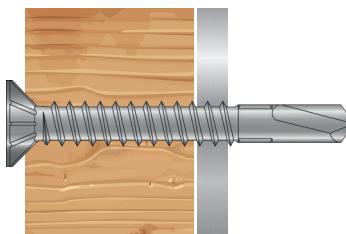
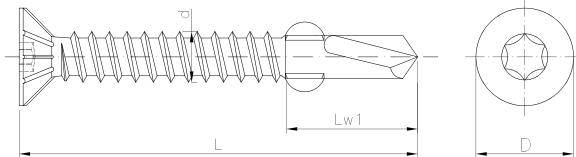


Fig. 1. Fastening wooden elements to steel profiles



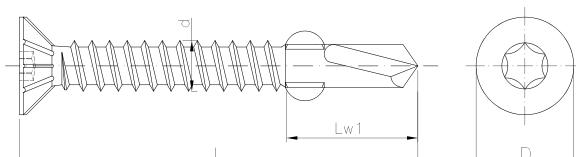
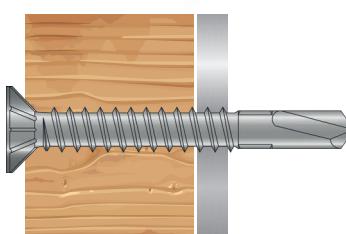
SIZE [mm]			SOLD BY PACK		
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	TX	pcs	Index
d	L	d			
5.5	45	10.8	TX 30	100	635365
	50	10.8	TX 30	100	635366

Self-drilling screw designed for fixing wooden elements to a steel base. It ensures quick and efficient installation while maintaining product strength due to the zinc coating.

Speed of installation is ensured by the self-drilling blade. The TX socket provides secure guidance of the screw during installation. Specially designed ribbing of the head removes drill bits and forms a hole for the countersunk head.

**BSX Self-drilling screw for fixing wood to steel**

I2319



SIZE [mm]			SOLD BY PACK		
$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	TX	pcs	Index
d	L	d			
5.5	45	10.8	TX 30	100	76108
	50	10.8	TX 30	100	76109
	60	10.8	TX 30	100	76110

Self-drilling bi-metal screw designed for fixing wooden elements to a steel base. Due to the aggressive nature of the environment the Ruspert Silver coating was applied since it offers corrosivity class C4. Bimetal production, i.e. the combination of a stainless steel with the hardness of the carbon steel ensures fast and effective installation while maintaining the strength of the product. Speed of installation is ensured by the self-drilling blade. The TX socket provides secure guidance of the screw during installation. Specially designed ribbing of the head removes drill bits and forms a hole for the countersunk head.

Fig. 1. Fastening wooden elements to steel profiles


**KSZ** Self-drilling screw

3134

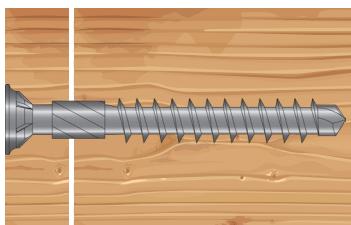
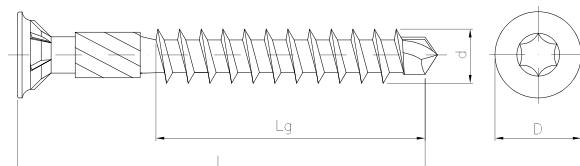


Fig. 1. Perpendicular screw-in connection



SOLD BY PACK						
SIZE [mm]				TX	pcs	Index
				TX 20	1000	4000 (4) 638690
4.0	50	8.0	29	TX 20	1000	4000 (4) 634311
				TX 20	1000	2000 (2) 641091
5.0	50	9.0	35			
	60	9.0	35			

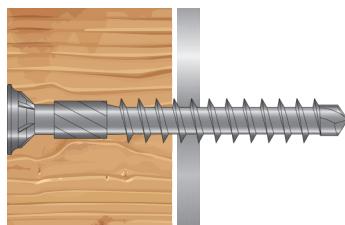


Fig. 1. Fastening wooden elements to steel profiles

**KSZ** Self-drilling screw

I3134

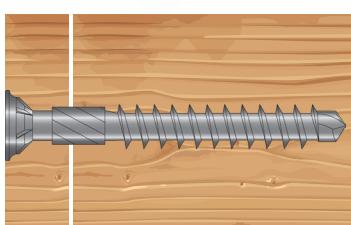
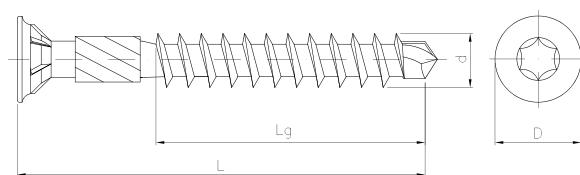


Fig. 1. Perpendicular screw-in connection



SOLD BY PACK						
SIZE [mm]				TX	pcs	Index
				10	500	649567
3.2	50	5.0	30	10	500	649568
	60	6.0	30	10	500	649569
4.0	50	6.0	30	15	200	649569

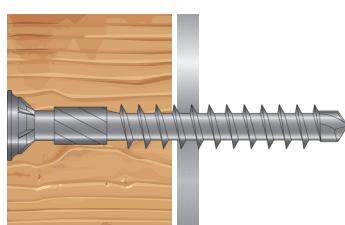


Fig. 1. Fastening wooden elements to steel profiles





# 08

## DOUBLE THREADED RODS



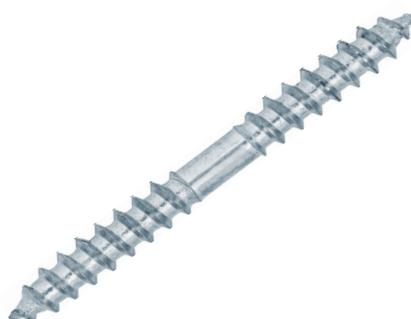
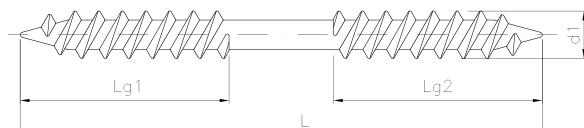


## DOUBLE THREADED RODS

SDDD

### Double side wood threaded rod

3803



SOLD BY PACK					CAT. NO.	
SIZE [mm]				pcs		
d1	L	Lg1	Lg2			
7	70	30	30	250 2000	1000 (4) - 633596 633597	

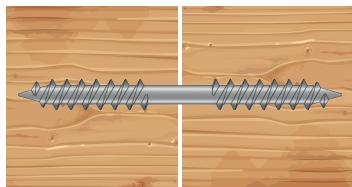
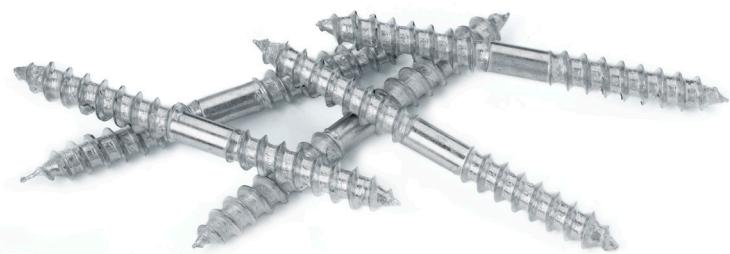
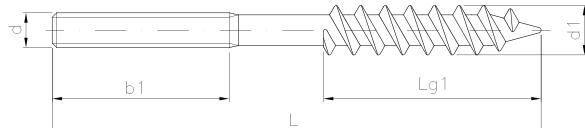


Fig. 1. Fastening of a threaded rod in a wooden element

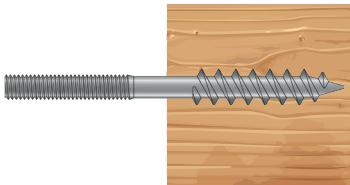


**SDMD****Double side wood and metric threaded rod**

3804



SOLD BY PACK						CAT. NO.	
SIZE [mm]					pcs		
d	d1	L	b1	Lg1			
M4	4.5	25	8.5	14	1000	4000 (4) 633598	
		40	8.5	28	100	3200 (32) 633599	
		40	8.5	28	1000	4000 (4) 633600	
M6	6.5	40	17	20	250	1000 (4) 633601	
		40	17	20	2000	4000 (2) 633602	
		50	24	25	100	800 (8) 633603	
		55	24	25	250	1000 (4) 633604	
		60	24	30	100	800 (8) 633605	
		60	24	30	1000	2000 (2) 633606	
		70	24	40	1000	- 633607	
M8	8.0	50	15	32	1000	- 633608	
		60	28	30	100	800 (8) 633609	
		60	28	30	1000	- 633610	
		70	25	39	250	1000 (4) 633611	
		70	25	39	1000	- 633612	
		80	25	49	250	1000 (4) 633613	
		90	25	59	250	1000 (4) 633614	
		100	30	59	250	1000 (4) 633615	
		60	17	39	500	- 633616	
M10	10.0	70	17	39	500	- 633617	
		80	26	49	100	400 (4) 633618	
		100	36	59	100	400 (4) 633619	
		120	46	59	100	400 (4) 633620	
		120	46	59	500	400 (4) 633621	

**Fig. 1.** Fastening of a threaded rod in a wooden element

Wood-metal rods (double-threaded rods) intended, among others, for construction joints. The double threaded screw can be used to create metal-concrete and wood-concrete connections, to screw together furniture such as garden benches, etc., to enable quick installation and disassembly of products. Moreover, double-threaded screws are used to install stairs.

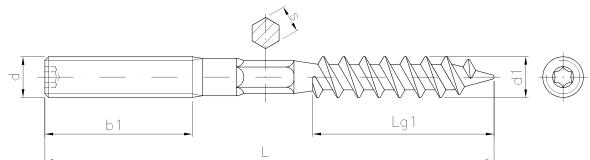


## DOUBLE THREADED RODS

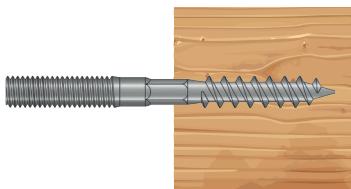
**SDMD**

**Double side wood and metric threaded rod with a hex rib**

3805



SOLD BY PACK							CAT. NO.	
d	d1	L	b1	Lg1	S	pc		
						cs		
M8	8	50	10	30	6	250	1000 (4)	633622
	8	60	10	30	6	250	1000 (4)	633623
	8	70	10	44	6	250	1000 (4)	633625
	8	80	25	39	6	250	1000 (4)	633627
	8	90	25	49	6	100	800 (8)	633629
	8	100	25	59	6	100	400 (4)	633630
	8	120	50	59	6	100	400 (4)	633632
	8	140	50	59	6	100	400 (4)	633634
	8	150	50	59	6	100	400 (4)	633635
	8	160	50	59	6	100	400 (4)	633636
	8	180	50	59	6	100	400 (4)	633637
	8	200	50	59	6	100	400 (4)	633638
M10	8	250	50	59	6	100	400 (4)	633639
	8	300	50	59	6	100	300 (3)	636068
	10	70	19	39	8	100	400 (4)	633641
	10	80	19	49	8	100	400 (4)	633642
	10	100	30	59	8	100	400 (4)	633643
	10	120	37	59	8	100	400 (4)	633645
	10	140	59	59	8	100	400 (4)	633646



**Fig. 1.** Fastening of a threaded rod in a wooden element





09 NAILS





NAILS

## GW-BUD Common nails

6101

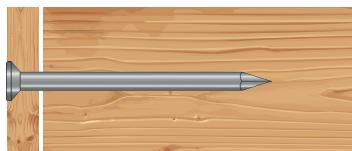


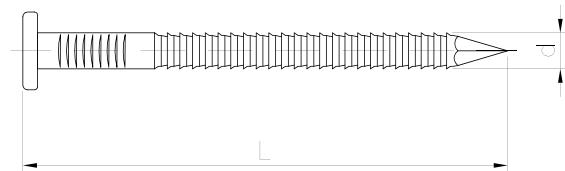
Fig. 1. Perpendicular joint



SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	Index	Index
d	L				
4.2	100	92	5	20 (4)	632038
	125	80	5	20 (4)	632039
4.6	125	64	5	20 (4)	632040
5.0	150	43	5	20 (4)	645424
6.0	175	25	5	20 (4)	632042
	250	11	5	20 (4)	645425
8.0	275	9	5	20 (4)	645426
	300	8	5	20 (4)	645427

## GW-PAL Ring-stem nails

6102



SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	Index	Index
d	L				
2.5	40	645	5	20 (4)	632050
	50	535	5	20 (4)	632051
	60	425	5	20 (4)	632052
	65	425	5	20 (4)	641370
3.0	40	530	5	20 (4)	632054
	50	400	5	20 (4)	632055
	70	250	5	20 (4)	632056
	80	225	5	20 (4)	632057
3.1	60	280	5	20 (4)	632059
3.4	80	200	5	20 (4)	632060
3.8	60	180	5	20 (4)	632061
	70	160	5	20 (4)	632062
	80	140	5	20 (4)	632064
	90	113	5	20 (4)	632066
	100	108	5	20 (4)	632068
4.0	100	100	5	20 (4)	632070
	125	85	5	20 (4)	632071
4.5	125	64	5	20 (4)	632073

Fig. 1. Ring connection

## GW-KWA Square twisted nails

6103

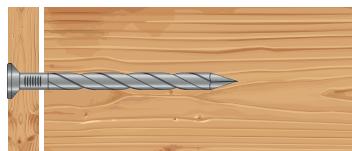
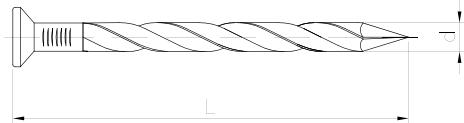


Fig. 1. Nailed twisted joint

SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg		Index
d	L				
3.0*	50	324	5	20 (4)	632074
	60	250	5	20 (4)	632075
	70	200	5	20 (4)	632077
	80	190	5	20 (4)	632079
3.8	70	150	5	20 (4)	632081
	80	170	5	20 (4)	632082
	90	132	5	20 (4)	632083
	100	126	5	20 (4)	632085
4.0	100	112	5	20 (4)	632087
	120	87	5	20 (4)	632089
4.5	125	64	5	20 (4)	632091
5.0	150	43	5	20 (4)	641371

\* Product without the CE mark

## GW-PAP Building paper nails

6104



SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg		Index
d	L				
3.0	20	775	5	20 (4)	641374
	25	610	5	20 (4)	632098
	30	568	5	20 (4)	632100
	35	426	5	20 (4)	632102
	40	400	5	20 (4)	632104



Fig. 1. Fastening of the roof paper to the timber





NAILS

**GW-ZW Metal nails**

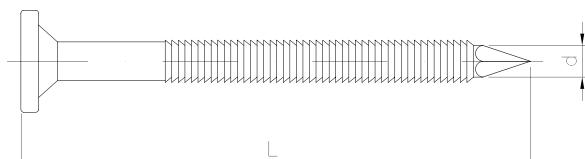
6106

**S**  
RAW**Fig. 1.** Perpendicular joint

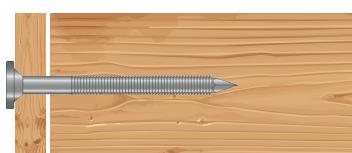
SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	kg	Index
d	L				
1.2	20	5600	5	20 (4)	632105
	20	4100	5	20 (4)	632107
1.4	25	3096	5	20 (4)	632109
2.0	40	1000	5	20 (4)	632115
2.2	50	667	5	20 (4)	641375
2.4	60	440	5	20 (4)	641376
2.7	65	320	5	20 (4)	641377
3.0	70	240	5	20 (4)	641378
	80	210	5	20 (4)	641379
3.4	90	187	5	20 (4)	641380

**GW-CIE Carpentry nails (anchor)**

6107

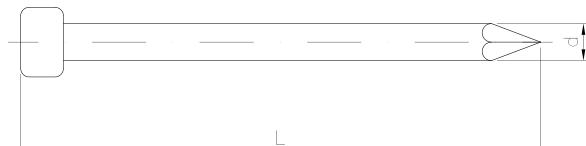


SOLD BY WEIGHT					
SIZE [mm]		kg	kg	kg	Index
d	L				
	40	5	20 (4)	632141	
	50	5	20 (4)	632142	
4.0	60	5	20 (4)	632143	
	70	5	20 (4)	632144	
	80	5	20 (4)	632145	

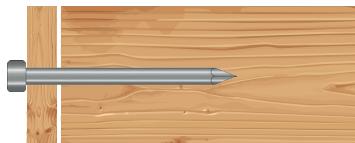
**Fig. 1.** Perpendicular joint

**GW-STO** Joinery nails

6115



SOLD BY WEIGHT					
SIZE [mm]		~ PCS IN KG	kg	Index	Index
d	L				
1.4	25	3330	5	20 (4)	632146
1.6	30	2080	5	20 (4)	632147
1.8	35	1430	5	20 (4)	632148

**Fig. 1.** Perpendicular joint

ON THE  
MARKET  
SINCE

# 1985

# 41

PRODUCT  
GROUPS

# 50 000

SATISFIED CUSTOMERS

# 20 000

PRODUCTS AT THE CATALOG

12

SALES OFFICES

MARCOPOL

2 PRODUCTION  
PLANTS



a brand that connects

**Head Office / Export Department**  
Главный офис / Отдел экспорта  
Hauptsitz / Exportabteilung  
Centrinė buveinė / Eksporto skyrius

**POLAND**  
**Marcopol Sp. z o.o.**

Chwaszczyno  
Oliwska 100 Street  
80-209 Chwaszczyno

Tel.: +48 58 55 40 410  
Fax: +48 58 55 40 419  
[export@marcopol.eu](mailto:export@marcopol.eu)  
[www.marcopol.eu](http://www.marcopol.eu)

**Foreign Branches**  
Иностранные офисы  
Ausländische Niederlassungen  
Užsienio skyriai

**LITHUANIA**  
**UAB Marcopol Baltija**

UAB „Marcopol Baltija“  
Pirklių g.5  
LT-02300 Vilnius, Lietuva  
Tel: +370 52 306 183  
Fax: +370 52 137 184  
[baltija@marcopol.lt](mailto:baltija@marcopol.lt)

Klaipėda  
Šilutės plentas 79  
LT-94101 Klaipėda, Lietuva  
Tel: +370 46 470 413  
Fax: +370 52 137 184  
[klaipeda@marcopolbaltija.lt](mailto:klaipeda@marcopolbaltija.lt)

Kaunas  
Draugystės 13A  
LT-51224 Kaunas, Lietuva  
Tel: +370 37 280 832  
Fax: +370 52 137 184  
[kaunas@marcopolbaltija.lt](mailto:kaunas@marcopolbaltija.lt)

Šiauliai  
Metalistų g. 6h  
LT-78107 Šiauliai, Lietuva  
Tel: +370 41 201 212  
Fax: +370 52 137 184  
[siauliai@marcopolbaltija.lt](mailto:siauliai@marcopolbaltija.lt)

**RUSSIA**  
**ООО Маркопол**  
**КЛД Трейдинг**

Россия  
г. Калининград  
Ул. Гагарина 239  
Тел.: +7 (4012) 51 50 35  
Моб. тел. +7 962 260 1940  
[kaliningrad@marcopol.ru](mailto:kaliningrad@marcopol.ru)

**ESTONIA**  
**Marcopol Estonia OÜ**

Sepa 15G  
50113 Tartu, Eesti  
Tel.: +372 7401 411  
Fax: +372 7401 411  
Mob: +372 5097 923  
[estonia@marcopol.ee](mailto:estonia@marcopol.ee)

[www.marcopol.eu](http://www.marcopol.eu)

## INTERNATIONAL SALES NETWORK

