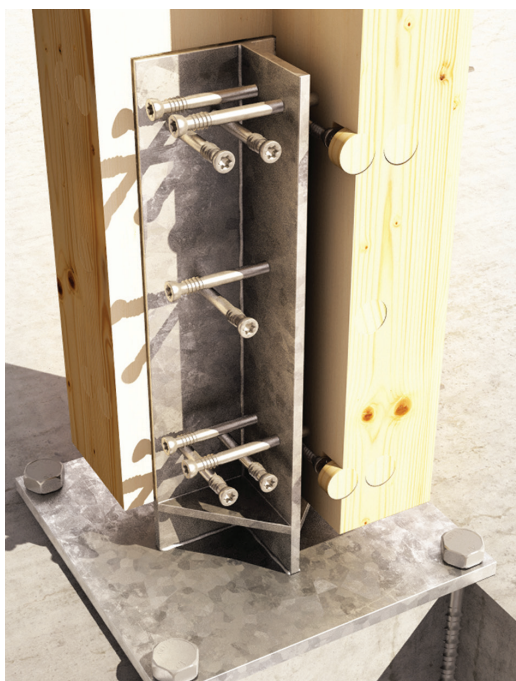


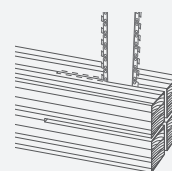
TYP X S10

CROSS-SHAPED POST BASE

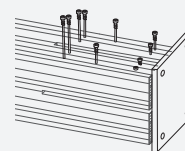
MATERIAL	carbon steel
COATING	hot-dip galvanised (service class 3)
TYPE	XS120 XS160
STRENGTH	compression more than $R_k = 300$ kN
FASTENINGS	SKR, STA, KOS, WS, XEPOX



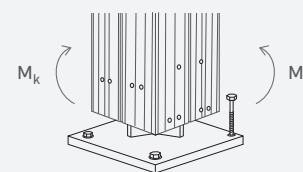
ASSEMBLY TYP X S10



01



02



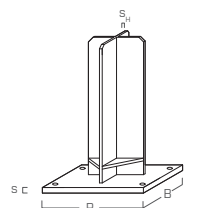
03

CODES AND DIMENSIONS

CODES	B x P x s [mm]	n _H x Ø [mm]	H [mm]	s _H [mm]	R _{1,k timber} ⁽¹⁾ [kN]	pcs.
TYPXS101212	220 x 220 x 10	4 x 13,0	300	6	127,0	1
TYPXS101616	260 x 260 x 12	4 x 17,0	300	8	315,0	1



VIDEO



B x P x s Base plate dimensions
H Height
n_H x Ø Number and diameter of holes on the base plate
s_H Wing thickness

⁽¹⁾ **R_{1,k timber}** Characteristic value of resistance to compression wood side. The design values are obtained as follows

$$R_d = \frac{R_{k \text{ timber}} \cdot k_{mod}}{\gamma_m}$$

TYP X

Cross-shaped post base

Hot dip galvanized carbon steel



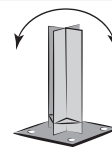
FIELD OF USE

Moment resisting joints for outdoor use. Suitable for Service class 1, 2 and 3.

- XLAM (Cross Laminated Timber)
- LVL (Laminated Veneer Lumber)
- solid timber
- glulam (Glued Laminated Timber)

FIXED-END

Moment-resisting joint for fixed-end constraints



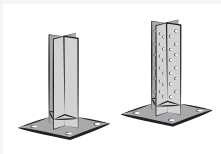
INNOVATIVE

Patent application filed



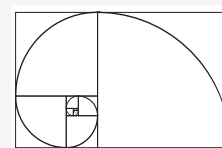
TWO VERSIONS

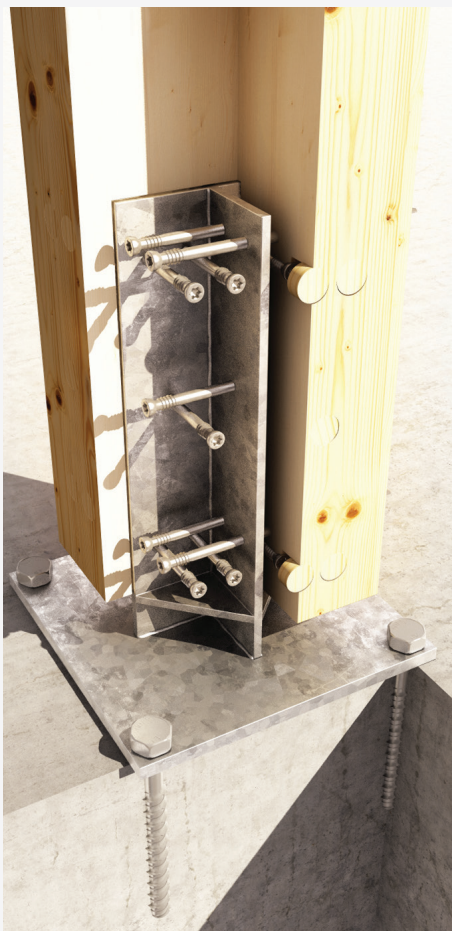
Without holes for use with self drilling dowels, smooth dowels or bolts; with holes, for use with epoxy resin



VERSATILE

Different strength levels depending on the fixing configuration selected





MOMENT RESISTING JOINT

The cross shaped configuration and the fastener disposition are designed to guarantee a moment-resisting capacity, creating a semi-rigid constraint at the base



FREE STRUCTURES

The base constraint can absorb horizontal loads allowing to realize pergolas or gazebos which do not require bracings and are open on all sides

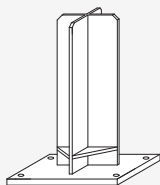


INVISIBLE AND DURABLE

The internal knife plates, the upper small plate and the base plate allow a hidden joint and an adequate distance from the ground, ensuring more durability. Designed to accommodate posts of all dimensions

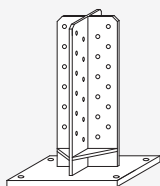
CODES AND DIMENSIONS

TYP XS10



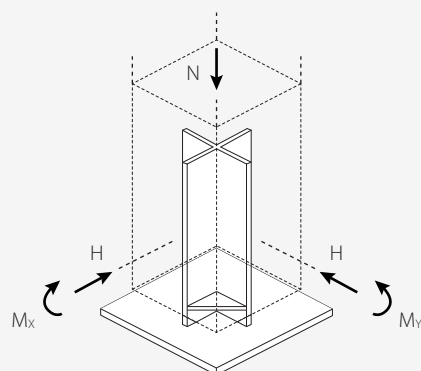
code	type	bottom plate [mm]	bottom holes [n. x mm]	height [mm]	s blades [mm]	cross shaped	pcs/box
TYPXS101212	XS10_1	220 x 220 x 10	4 x Ø13	300	6	smooth	1

TYP XR10



code	type	bottom plate [mm]	bottom holes [n. x mm]	height [mm]	s lame [mm]	cross shaped	pcs/box
TYPXR101212	XR10_1	220 x 220 x 10	4 x Ø13	300	6	holes Ø8	1

EXTERNAL LOADS



MATERIAL AND DURABILITY

TYP X: Bright zinc plated S235 carbon steel (thickness $\geq 40 \mu\text{m}$).
To be used in Service class 1, 2 e 3 (EN 1995:2008).

FIELD OF USE

Fixed-end constraint for timber posts

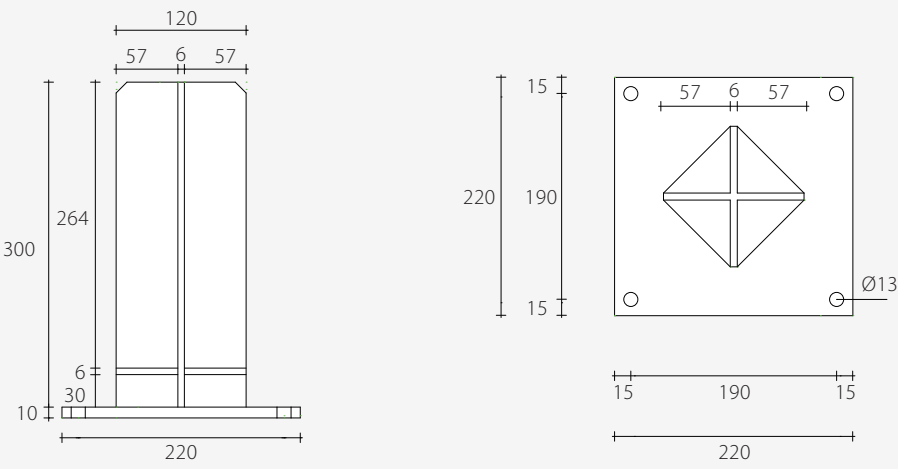


ADDITIONAL PRODUCTS - FASTENERS

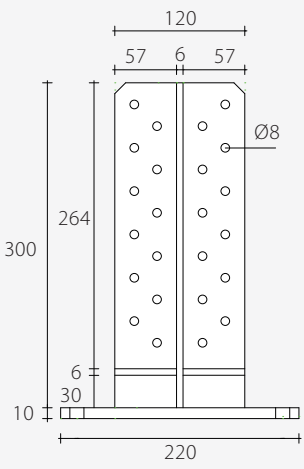
type	description		d [mm]	support	p.
WS	self drilling dowel		7		368
STA	smooth dowel		12		50
KOS	bolt		M12		54
XEPOX 226.4 / 26 / 235.4	epoxy adhesive		-		116
SKR	screw anchor		12		328
AB1	A4 metal anchor		12		334
VINYLPPO	chemical anchor		M12		346
EPOPLUS	chemical anchor		M12		354

GEOMETRY

TYP XS10

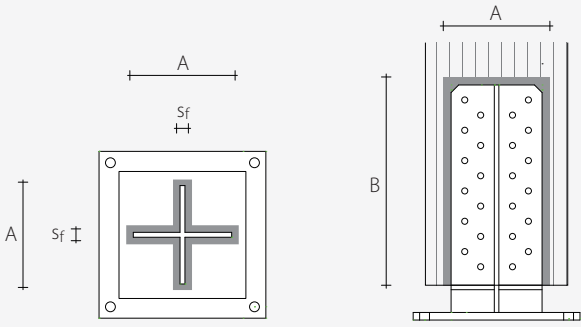


TYP XR10



INSTALLATION AND ASSEMBLING

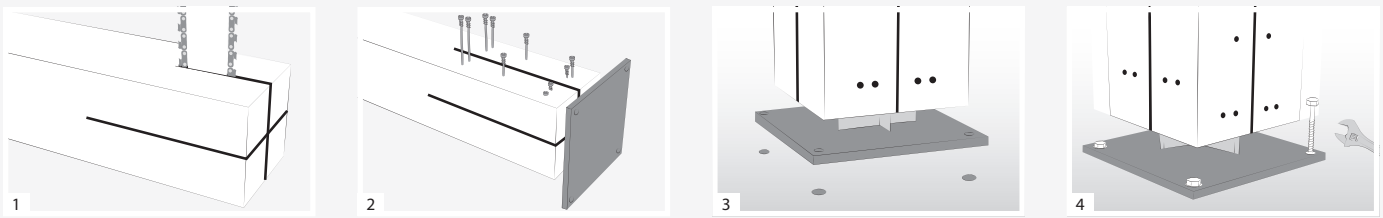
ESTIMATE OF THE REQUIRED AMOUNT OF XEPOX RESIN - TYP XR10



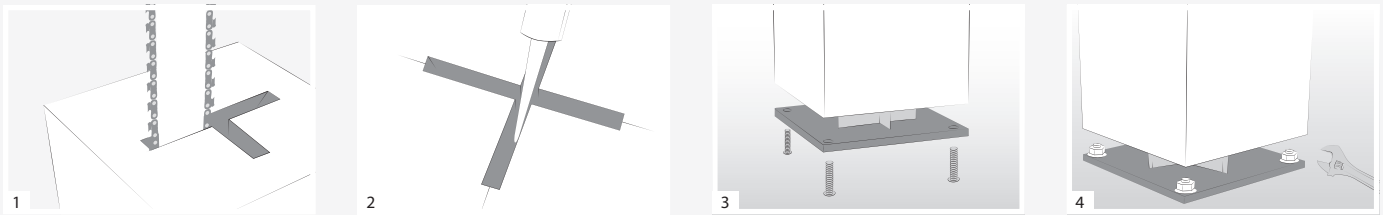
EXAMPLES OF DIMENSIONS OF THE GROOVING	grooving thickness s_f	[mm]	10	12
	A horizontal grooving	[mm]	140	140
	B horizontal grooving	[mm]	280	280
	V grooving	[mm ³]	784000	940800
	V plate holes	[mm ³]	9651	
	V plate	[mm ³]	370509	
	ΔV	[mm ³]	423142	579942
waste coefficient			1,4	
amount of resin required		[mm ³]	592399	811919
		[litri]	0,60	0,85

The evaluation of the right amount of resin is an approximate estimate for the installer. Verify the variability of the data shown in the table depending on the effective grooving thickness realized.

ASSEMBLING - XS10

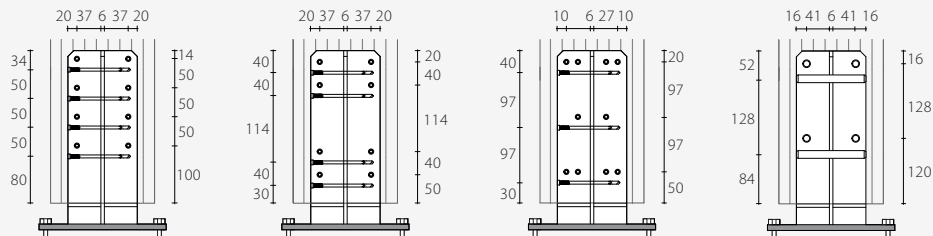
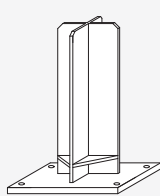


ASSEMBLING - XR10



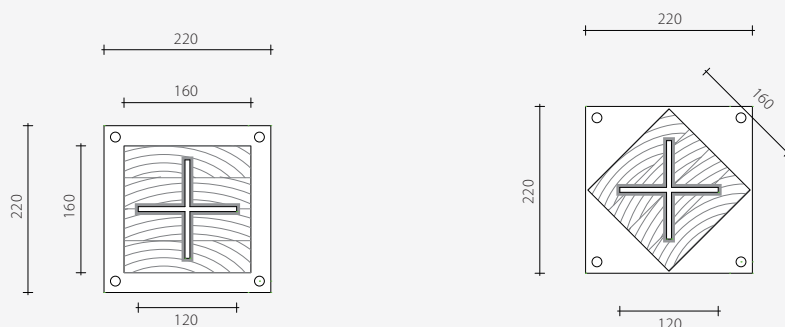
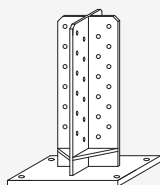
STATIC VALUES

TYP XS10 CONFIGURATION SCHEMES



configuration			S1	S2	S3	S4
min post size	B _{s,min}	[mm]	120 x 120	160 x 160	160 x 160	160 x 160
screw anchors	SKR Ø12 x 120	[pcs]	4	4	4	4
self drilling anchors	WS Ø7 x 113	[pcs]	16	16	20	-
smooth dowels	STA Ø12 x 120	[pcs]	-	-	-	8

TYP XR10 CONFIGURATIONS SCHEMES



configuration			R1	R2
min post size	B _{s,min}	[mm]	160 x 160	160 x 160
screw anchors	SKR Ø12 x 120	[pcs]	4	4
min. thickness grooving	S _f	[pcs]	10	10

GENERAL PRINCIPLES

- Characteristic values according to EN 1995:2008.
- Design values can be obtained from characteristic values as follows:

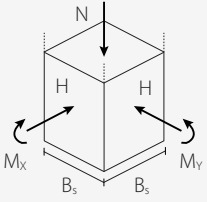
$$R_d = \frac{R_{k \text{ timber}} \cdot k_{mod}}{\gamma_m}$$

Coefficients k_{mod} and γ_m must be taken according to the current Standard adopted for the design.

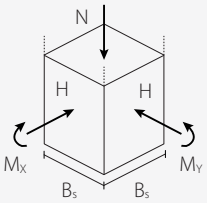
The verification of the fastener-to-concrete connection must be carried out separately.

- Admissible values are obtained according to DIN 1052:1988.
- For calculations, a timber density $\rho_k = 350 \text{ kg/m}^3$ has been considered
- Dimensioning and verification of timber elements must be carried out separately.
- The provided strength values are evaluated singularly; in case of combined loading the verification must be carried out separately.

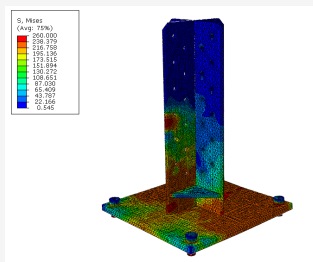
CHARACTERISTIC VALUES

external loads	type	configuration	post $B_{s,min}$ [mm]	COMPRESSION	SHEAR	MOMENT X	MOMENT Y
				N_k [kN]	H_k [kN]	$M_{x,k}$ [kNm]	$M_{y,k}$ [kNm]
	TYP XS10	S1	120	127,00	10,10	2,28	2,28
		S2	160	127,00	13,80	4,39	4,39
		S3	160	127,00	13,80	5,53	5,53
		S4	160	127,00	13,80	2,94	2,94
	TYP XR10	R1	160	105,00	11,70	4,19	4,19
		R2	160	105,00	11,70	4,19	4,19

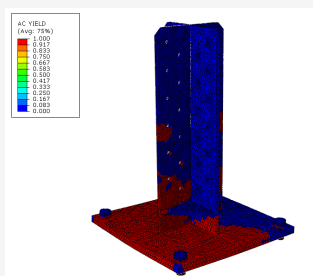
ADMISSIBLE VALUES

external loads	type	configuration	post $B_{s,min}$ [mm]	COMPRESSION	SHEAR	MOMENT X	MOMENT Y
				N_{adm} [kg]	H_{adm} [kg]	$M_{x,adm}$ [kgm]	$M_{y,adm}$ [kgm]
	TYP XS10	S1	120	5140	360	123	123
		S2	160	5140	500	178	178
		S3	160	5140	500	224	224
		S4	160	5140	500	160	160
	TYP XR10	R1	160	4250	420	166	166
		R2	160	4250	420	166	166

TYP XR10 NUMERICAL MODELING



Mises stress in the plate and the dowels



Yield stress in the plate and in the dowels

Investigation on the load bearing capacity and plastic deformation history of TYP XR10 post base via finite element analysis.

JOINT LOAD BEARING CAPACITY - STEEL SIDE

vertical load	N	[kN]	50	25	0
horizontal load ⁽¹⁾	$F_{H,max}$	[kN]	40,77	49,49	50,64
bending capacity	M_{max}	[kNm]	6,12	7,42	7,60

⁽¹⁾ Load application point located at mid height of the post base

