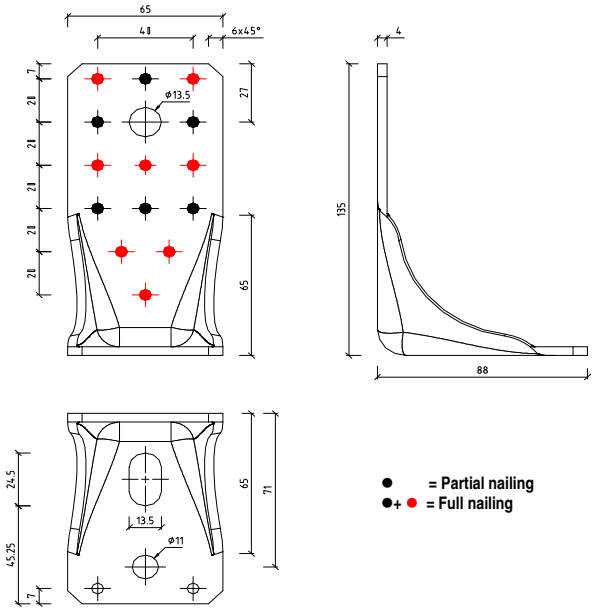
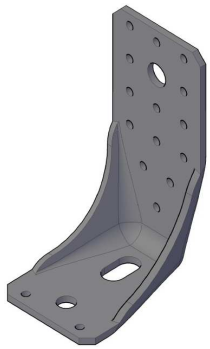
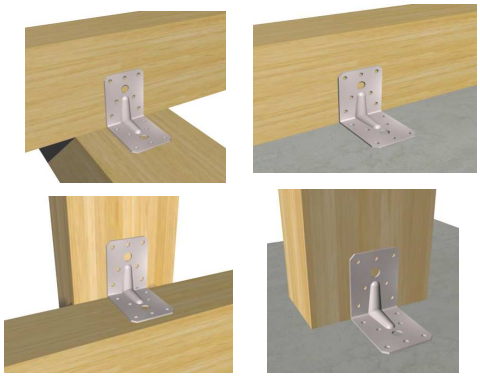
ANGLE BRACKET 135

Typ WKR135 PF101185

ETAG 015
ETA-09/0324
Typ 110135L4







General principles of calculation:

The principles of calculation refer to the current ETA: the values of calculation are based on EC5 and the design values have to be calculated as:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_m}$$

Materials:

o steel quality: S 250GD+Z275 (Thickness of galvanization ca. 20 µm)

o minimum Timber class resistance: Solid Wood C 24 and Glued-Laminated Timber GL24c; minimum density 350 kg/m

Connector systems:

o Anker nails: 4,0x… with class of resistance III and according to EN14592

o Screws 5.0x… according to certificate Z-9.1-375 and to EN14592

o Screw-down anchor or chemical anchors

Typology of connections with full or partial nailing:

o Wood/Wood

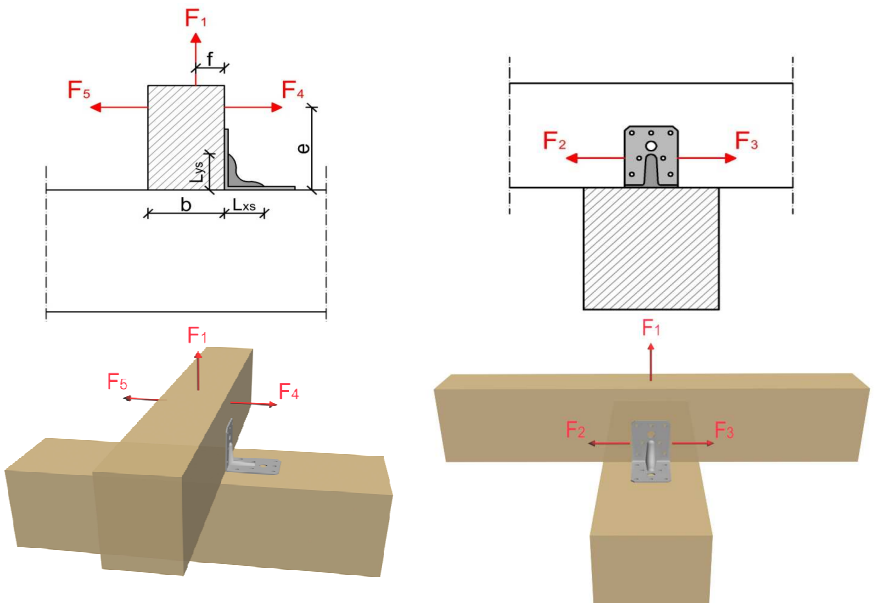
o Wood/Wood with intermediate layers (es.: OSB)

o Wood/Concrete*/Masonry*/Steel*

* in case of connections with screw-down anchors or chemical anchors, the connection has to be verified separately on the basis of what exposed from the producer of subsoil.

All calculations and values are valid for angle brackets in possession of ETA-09/0322.

Model of calculation:



Legend of symbols used in formulas:

b (mm)	Width of the beam or column
e (mm)	Eccentricity between action line of the force F and the inner edge
f (mm)	Eccentricity between action line of the force F and the outer edge of the vertical joist
R_k (KN)	Characteristic resistance of the angle bracket
$L_{x,s}$ (mm)	Length of reinforcement
$L_{y,s}$ (mm)	Height of reinforcement

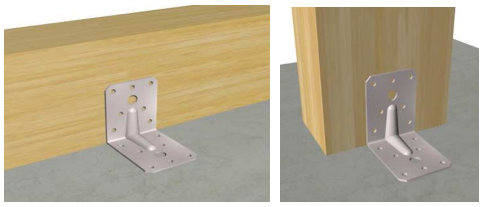
If the forces F1 and F2/F3 or F4/F5 act at the same time, the following inequality shall be fulfilled:

$$\left(\frac{F_{1,d}}{R_{1,d}}\right)^2 + \left(\frac{F_{2,d}}{R_{2,d}}\right)^2 + \left(\frac{F_{3,d}}{R_{3,d}}\right)^2 + \left(\frac{F_{4,d}}{R_{4,d}}\right)^2 + \left(\frac{F_{5,d}}{R_{5,d}}\right)^2 \leq 1$$

The forces F2 and F3 or F4 and F5 are forces with opposite direction; therefore only one force F2 or F3, respectively, and F4 or F5, respectively, is able to act simultaneously with F1, F6 or F7, while the other shall be set to 0.

CONNECTION WOOD TO CONCRETE

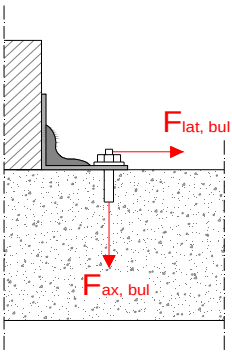
Fastening Concrete - Beam or Concrete - Column



FASTENERS ON WOOD:

ANKER NAILS
Ø 4,0 X 60

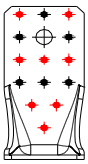
SPECIAL SCREWS
Ø 5,0 X 60

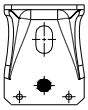


$F_{lat, bul}$ Shear force perpendicular to the anchorage

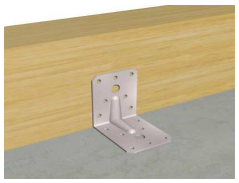
$F_{ax, bul}$ Axial force on anchorage

The connection between anchorage and concrete has to be verified separately on the basis of forces acting on the anchorage.





● = Partial nailing
●+ ● = Full nailing



WKR - *Fastening on beam*			Characteristic Resistance				Bolt holes pattern
			R_1 (tension)		$R_{2/3}$ (shear)		
TYP WKR	Fastening Holes Ø5 (fasteners)		$R_{k, WKR}$		$R_{k, WKR}$		
			n_{conn}	$R_{k, KR}$	n_{conn}	$R_{k, KR}$	
	Anker Nails	Spec. Screws	(pz.)	(kN)	(pz.)	(kN)	
135	Ø4,0x40	Ø5,0x40	14	14,1	14	3,8	Fastening on joist
	Ø4,0x60	Ø5,0x50					

The design resistances duplicate using 2 angle brackets TYP WKR for a single connection.

WKR - *Fastening on column*			Characteristic Resistance				Bolt holes pattern
			R_1 (tension)		$R_{2/3}$ (shear)		
TYP WKR	Fastening Holes Ø5 (fasteners)		$R_{k, WKR}$		$R_{k, WKR}$		
			n_{conn}	$R_{k, KR}$	n_{conn}	$R_{k, KR}$	
	Anker Nails	Spec. Screws	(pz.)	(kN)	(pz.)	(kN)	
135	Ø4,0x40	Ø5,0x40	6	11,6	-	-	Fastening on joist
	Ø4,0x60	Ø5,0x50					

The design resistances duplicate using 2 angle brackets TYP WKR for a single connection.