TITAN S

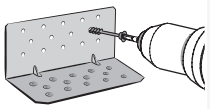
CE
ETA 11/0496

Angle bracket with screws for shear loads

Bright zinc plated carbon steel three-dimensional perforated plate

Ø8 SCREWS

Fastening with HBS+ Ø8 screws using a powered screwdriver makes installation easy and allows you to work safely and comfortably

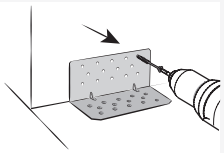


CONVENIENT INSTALLATION

Installation is made easy thanks to a 50% reduction in the number of fastenings

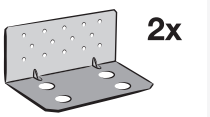
PRECISION

Fastening with screws makes positioning and tightening the XLAM panel on the angle bracket easy by facilitating assembly



CONCRETE HOLES

The angle TCS bracket is designed to offer two fixing possibilities, in order to avoid interference with the rebars in the concrete support



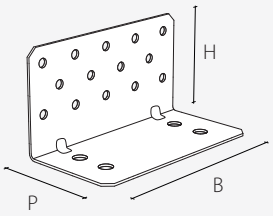
FIELD OF USE

Timber-to-timber and timber-to-concrete shear joints for panels and timber beams

- XLAM (Cross Laminated Timber)
- framed structures (platform frame)
- wood-based panels
- LVL (Laminated Veneer Lumber)
- solid timber
- glulam (Glued Laminated Timber)

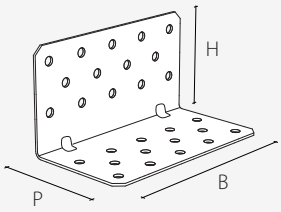
CODES AND DIMENSIONS

TITAN S - TCS



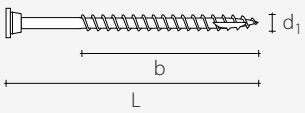
code	type	B [mm]	P [mm]	H [mm]	holes [mm]	n_v Ø11 [pcs]	s [mm]		pcs/box
TCS240	**TCS240**	240	123	130	4 x Ø17	14	3	•	10

TITAN S - TTS



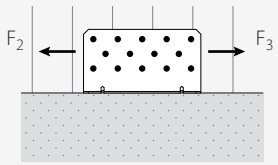
code	type	B [mm]	P [mm]	H [mm]	n_H Ø11 [pcs]	n_v Ø11 [pcs]	s [mm]		pcs/box
TTS240	**TTS240**	240	130	130	14	14	3	•	10

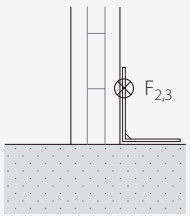
HBS+



code	d_1 [mm]	L [mm]	b [mm]	TX	pcs/box
HBSP880	8	80	55	40	100

EXTERNAL LOADS





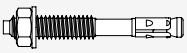
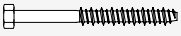
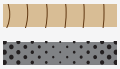
MATERIAL AND DURABILITY

TITAN S: Z275 bright zinc plated DX51D carbon steel.
To be used in Service class 1 and 2 (EN 1995:2008).

FIELD OF USE

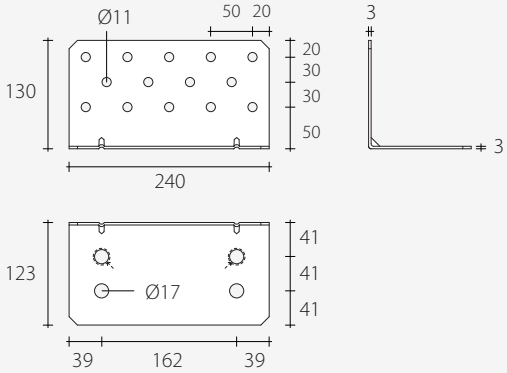
Timber to concrete joints
Timber to timber joints
Steel to timber joints

ADDITIONAL PRODUCTS - FASTENERS

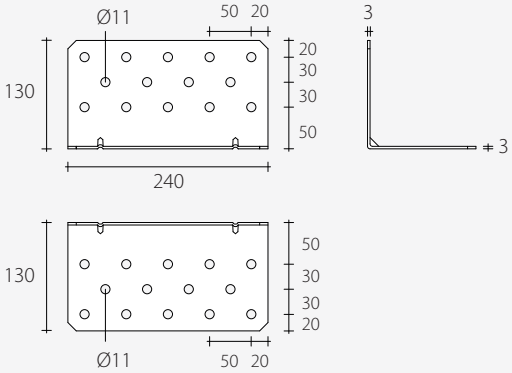
type	description		d_1 [mm]	support
HBS+	pan head screw		8	
AB1	mechanical anchor		16	
SKR	screw anchor		16	
VIN-FIX PRO	chemical anchor		M16	
EPO-FIX PLUS	chemical anchor		M16	
KOS	bolt		M16	

GEOMETRY

TCS240



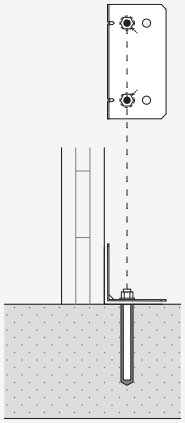
TTS240



INSTALLATION ON CONCRETE

To fix **TITAN TCS** angle bracket to the concrete foundation, **2 anchors** must be used, according to one of the following installation configurations:

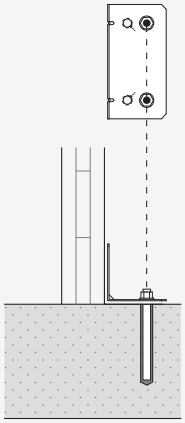
IDEAL INSTALLATION



2 anchors positioned in
INTERNAL HOLES (**IN**)
(identified by a mark on the product)

Reduced load on the dowel
($k_{t\perp}$ = minimum)

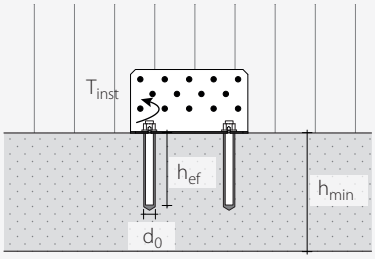
ALTERNATIVE INSTALLATION



2 anchors positioned in
EXTERNAL HOLES (**OUT**)
(eg. interaction between the anchor
and the rebars in the concrete support)

Maximum load on the dowel
($k_{t\perp}$ = maximum)

INSTALLATION PARAMETERS

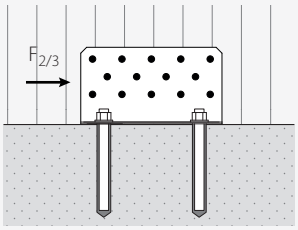


			screw anchor SKR CE	mechanical anchor AB1	chemical anchor VIN-FIX PRO	chemical anchor EPO-FIX PLUS
CONCRETE			**Ø16**	**M16**	**M16**	**M16**
Minimum support thickness	h_{min}	[mm]	165	170	h_{ef} + 30 mm ≥ 100 mm	h_{ef} + 2 d_0
Hole diameter in concrete	d_0	[mm]	14	16	18	18
Tightening torque	T_{inst}	[Nm]	160	120	80	80

h_{ef} = effective anchorage length in concrete

STATIC VALUES - SHEAR JOINT - TIMBER-TO-CONCRETE

TITAN TCS240



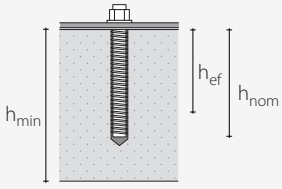
TIMBER STRENGTH $R_{2/3}$

configuration on timber	type	hole fixing Ø11 Ø x L [mm]	hole fixing Ø11 n_v [pcs]	CHARACTERISTIC VALUES $R_{2/3,k\ timber}$ [kN]	ADMISSIBLE VALUES $V_{2/3,\ adm,\ timber}$ [kg]
screw	HBS+	Ø8,0 x 80	14	**25,0**	*1111*

CONCRETE STRENGTH $R_{2/3}$ (1)

configuration for type of concrete	type of anchor (2)	hole fixing Ø13 Ø x L [mm]	hole fixing Ø13 n_H [pcs]	hole fixing Ø13 steel class	CHARACTERISTIC VALUES $R_{2/3,k\ cls}$ IN (3) [kN]	CHARACTERISTIC VALUES $R_{2/3,k\ cls}$ OUT (4) [kN]	CHARACTERISTIC VALUES γ_{cls}	ADMISSIBLE VALUES $V_{2/3,\ adm,\ cls}$ [kg]
• uncracked concrete • screw anchor	SKR	16 x 130	2	-	**76,9**	**58,1**	1,5	*2580*
• uncracked concrete • mechanical anchor	AB1	M16 x 138	2	-	**59,5**	**44,9**	1,5	*1995*
• uncracked concrete • chemical anchor	VIN-FIX PRO	M16 x 160	2	5.8	**52,7**	**39,8**	1,25	*2122*
• cracked concrete • chemical anchor	EPO-FIX PLUS	M16 x 160	2	5.8	**52,7**	**39,8**	1,25	*2122*

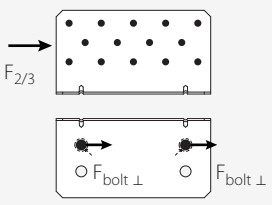
ANCHOR INSTALLATION PARAMETERS



	TYPE OF ANCHOR type	Ø x L [mm]	code	steel class	h_{ef} [mm]	h_{nom} [mm]	h_{min} [mm]
M16	SKR CE	M16 x 130	SKR16130CE	-	85	110	**200**
	AB1	M16 x 138	FE210493	-	85	96	**200**
	VIN-FIX PRO / EPO-FIX PLUS	M16 x 160	FE210116 (5)	5.8	133	133	**200**

DIMENSIONING OF ALTERNATIVE ANCHORS

Fixing elements to the concrete ringbeam by means of anchors that are not listed in the table, shall be verified according to the load acting on the anchor, which can be evaluated through the $k_{t\perp}$. Coefficients $k_{t\perp}$ varies depending on the type of installation selected 2 internal anchors (IN) or 2 external anchors (OUT). The lateral shear load acting on the anchor can be obtained as follows:



$$F_{bolt\perp,d} = k_{t\perp} \cdot F_{2/3,d}$$

$k_{t\perp}$ = coefficient of eccentricity

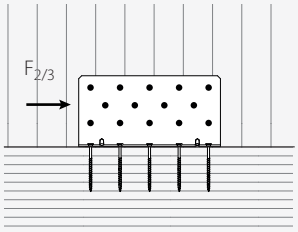
$F_{2/3}$ = shear load acting on the TITAN angle bracket

	$k_{t\perp}$ IN (3)	$k_{t\perp}$ OUT (4)
TCS240	0,74	0,98

The anchor check is satisfied if the design tensile strength, obtained considering the boundary effects, is greater than the design external load: $R_{bolt\perp,d} \geq F_{bolt\perp,d}$.

STATIC VALUES - SHEAR JOINT - TIMBER-TO-TIMBER

TITAN TTS240



TIMBER STRENGTH $R_{2/3}$

				CHARACTERISTIC VALUES	*ADMISSIBLE VALUES*
hole fixing Ø11				$R_{2/3,k\ timber}$	$V_{2/3,\ adm,\ timber}$
type	Ø x L [mm]	n_V [pcs]	n_H [pcs]	[kN]	*[kg]*
srews HBS+	Ø8,0 x 80	14	14	**25,0**	*1111*

NOTES

(1) The strength listed in the table is the maximum explicable strength on the concrete side from the TCS240 system considering the distribution of the external loads on the anchors in relation to their position (IN/OUT).
(2) Possible alternative fixing scheme through anchor type ABS has to be verified separately.
(3) Installation of the anchors in internal holes (IN).
(4) Installation of the anchors in external holes (OUT).
(5) INA pre-cut threaded rod with nut and washer, to be used with chemical anchor code VIN300, VIN410, EPO385.

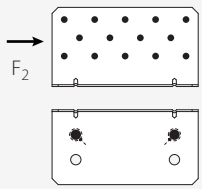
GENERAL PRINCIPLES

- Characteristic values are consistnt with EN 1995:2008 and in accordance with ETA-11/0496.
- Design values can be obtained from characteristic values as follows:

$$R_d = min \begin{cases} \dfrac{R_{2/3,k\ timber} \cdot k_{mod}}{\gamma_m} \\ \dfrac{R_{2/3,k\ cls}}{\gamma_{cls}} \end{cases}$$

  Coefficients γ_m and k_{mod} must be taken according to the current Standard adopted for the design. Coefficients γ_{cls} are listed in the table and are in accordance with the product's certificates.
- For the calculations, a timber density ρ_k = 350 kg/m^3 and a concrete grade C25/30 have been considered.
- Dimensioning and verificaiton of timber elements must be carried out separately.
- Strength values of the connection system are valid under the calculation hypotheses listed in the table; different boundary conditions (e.g.. minimum edge distance) shall be verified.
- The use of two TITAN angle brackets, symmetrically-positioned, doubles the design strength of the joint.
- Admissible values are obtained by reducing the design values of a safety coefficient equal to 1,5. The strength value is the minimum between the timber strength $V_{adm,timber}$ and the concrete strength $V_{adm,cls}$.

CALCULATION EXAMPLE - TIMBER-TO-CONCRETE JOINT



PROJECT DATA

- F_{2d} = 16,53 kN
- service class = 2
- load duration = instantaneous

CHOICE OF ANGLE BRACKET

- TITAN TCS40

CONFIGURATION

- uncracked concrete
- fixing on concrete: VIN-FIX PRO M16 x 160 (steel grade 5.8) anchors installed internally (IN)
- fixing on timber: HBS+ Ø8 x 80 screws

CALCULATION OF SHEAR CAPACITY

$$R_d = min \begin{cases} \frac{R_{V\,2/3,k\ timber} \cdot k_{mod}}{\gamma_m} \\ \frac{R_{V\,2/3,k\ cls}}{\gamma_{cls}} \end{cases}$$

$R_{V\,2/3,k\ timber}$ = 25,0 kN

$R_{V\,2/3,k\ cls}$ = 52,7 kN (IN)

γ_{cls} = 1,25

EN 1995:2008

k_{mod} = 1,1

γ_m = 1,3

R_d = min { 21,15 ; 42,16 } = 21,15 kN

VERIFICATION

$R_d \geq F_d$: **21,15** > 16,53 kN **OK**

Italia - NTC 2008

k_{mod} = 1,0

γ_m = 1,5

R_d = min { 16,67 ; 42,16 } = 16,67 kN

VERIFICATION

$R_d \geq F_d$: **16,67** > 16,53 kN **OK**