TITAN V

CE
ETA 11/0496

ANGLE BRACKET WITH FULL THREAD SCREWS FOR TENSILE AND SHEAR LOADS

INVISIBLE

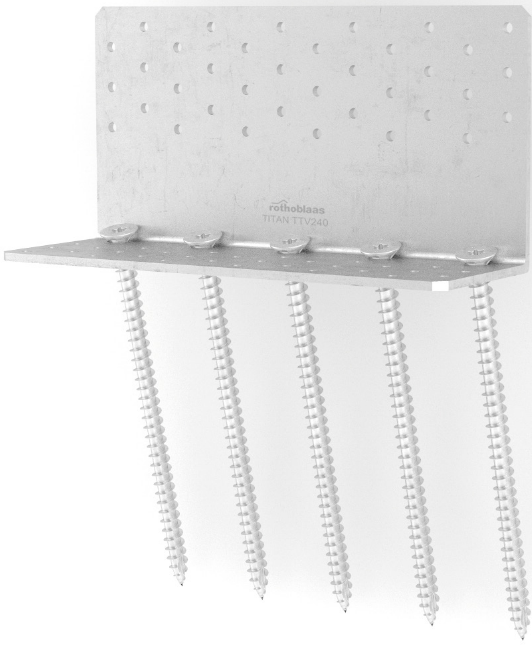
The reduced height of the vertical flange allows hidden installation of the bracket within the floor panels.

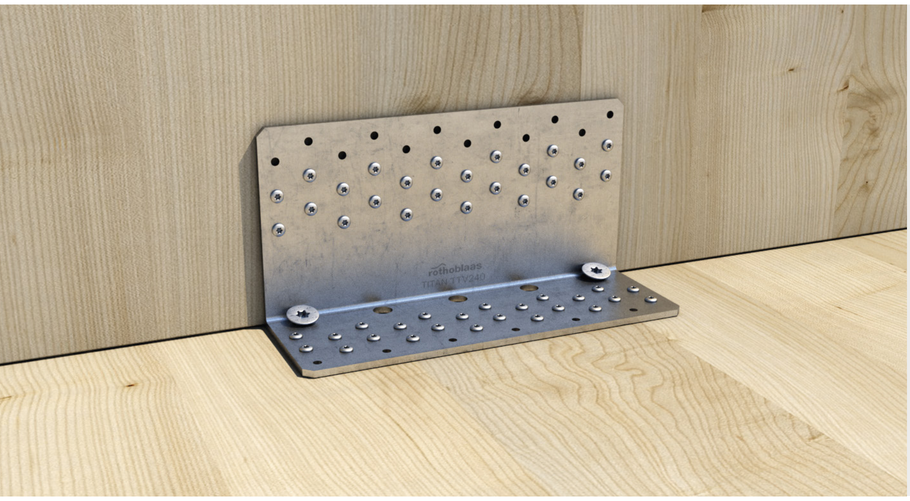
SHEAR/TENSILE

Exceptional tensile strength (100 kN) and shear strength (60 kN). 4-mm thick steel. Partial fastening possibilities.

STAGGERED WALLS

VGS Ø11 full thread screws enable the installation of the interstorey walls without any additional intervention, even if the thickness between one floor and the next differs.





MATERIAL

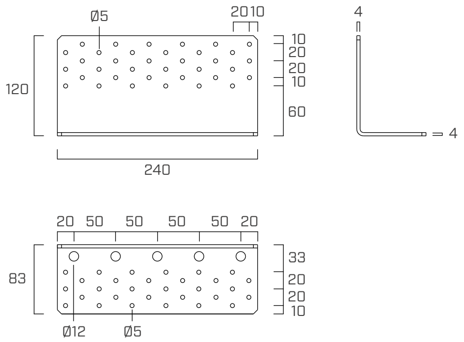
Galvanized carbon steel.

SINGLE ANGLE BRACKET

Using a single type of angle bracket for fastening both tensile and shear loads in walls. Optimisation and consistency of fastenings.

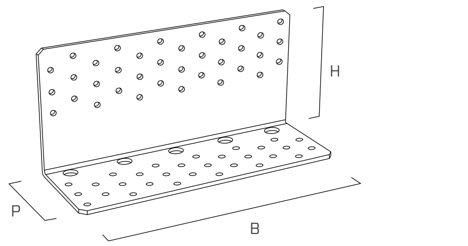
GEOMETRY

TTV240



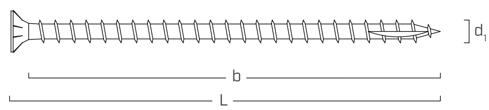
CODES AND DIMENSIONS

TITAN V



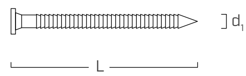
CODE	B [mm]	P [mm]	H [mm]	n_V Ø5 [mm]	n_H Ø5 [pcs.]	n_H Ø12 [pcs.]	s [mm]	pcs.
TTV240	240	83	120	36	30	5	4	10

VGS



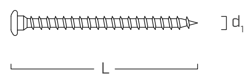
CODE	d_1 [mm]	L [mm]	b [mm]	TX [mm]	pcs.
VGS11150	11	150	140	50	25
VGS11200	11	200	190	50	25

LBA



CODE	d_1 [mm]	L [mm]	pcs.
PF601460	4	60	250

LBS



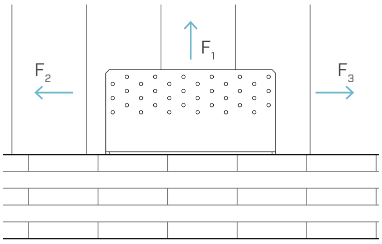
CODE	d_1 [mm]	L [mm]	TX [mm]	pcs.
PF603550	5	50	20	200

FIELDS OF USE

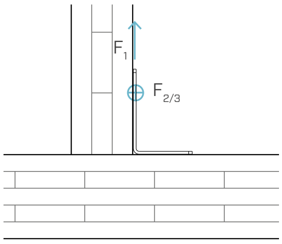
Timber-timber tensile or shear joints:

- CLT (Cross Laminated Timber);
- solid timber;
- glulam (Glued Laminated Timber);
- LVL (Laminated Veneer Lumber).

EXTERNAL LOADS

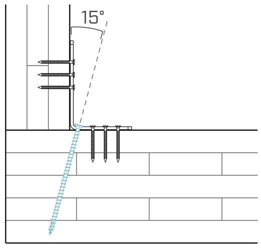


Front



Section

INSTALLATION

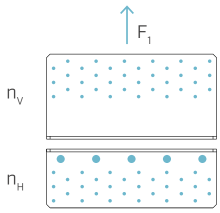


VGS Ø11screws installation angle.

STATIC VALUES - TENSILE JOINT - TIMBER-TO-TIMBER

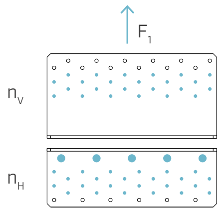
CHARACTERISTIC STRENGTH R₁

fastening diagram
TTV240 full



	holes fastening Ø5			holes fastening Ø12				
	Ø x L [mm]	n_V [pcs.]	n_H [pcs.]		**Ø x L** [mm]	n_H [pcs.]	$R_{1,k\ timber}$ [kN]	$K_{1,ser}$ [kN/mm]
nails LBA	Ø4 x 60	36	30	**VGS screws**	Ø11 x 200	5	**101.0**	12.5
screws LBS	Ø5 x 50	36	30					

fastening diagram
TTV240 partial

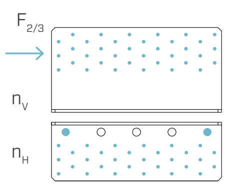


	holes fastening Ø5			holes fastening Ø12				
	Ø x L [mm]	**nV** [pcs.]	**nH** [pcs.]		**Ø x L** [mm]	n_H [pcs.]	$R_{1,k\ timber}$ [kN]	$K_{1,ser}$ [kN/mm]
nails LBA	Ø4 x 60	24	24	**VGS screws**	Ø11 x 150	5	**64.5**	10.5
screws LBS	Ø5 x 50	24	24					

STATIC VALUES - SHEAR JOINT - TIMBER-TO-TIMBER

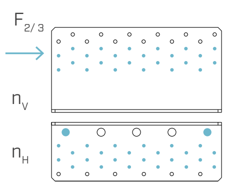
CHARACTERISTIC STRENGTH $R_{2/3}$

fastening diagram
TTV240 full



	holes fastening Ø5			holes fastening Ø12				
	Ø x L [mm]	n_V [pcs.]	n_H [pcs.]		**Ø x L** [mm]	n_H [pcs.]	$R_{2/3,k\ timber}$ [kN]	$K_{2/3,ser}$ [kN/mm]
nails LBA	Ø4 x 60	36	30	**VGS screws**	Ø11 x 200	2	**59.7**	6.6
screws LBS	Ø5 x 50	36	30					

fastening diagram
TTV240 partial



	holes fastening Ø5			holes fastening Ø12				
	Ø x L [mm]	n_V [pcs.]	n_H [pcs.]		**Ø x L** [mm]	n_H [pcs.]	$R_{2/3,k\ timber}$ [kN]	$K_{2/3,ser}$ [kN/mm]
nails LBA	Ø4 x 60	24	24	**VGS screws**	Ø11 x 150	2	**51.5**	4.8
screws LBS	Ø5 x 50	24	24					

DETAILS

- European Technical Assessment ETA-11/0496:
  Rotho Blaas TITAN Angle Brackets

- Tensile and shear behaviour of an innovative angle bracket for CLT structures - *WCTE World Conference on Timber Engineering - Seoul, Republic of Korea - August 2018*

EXPERIMENTAL INVESTIGATION

In collaboration with:

- CNR-IVALSA San Michele all'Adige
  Mechanical Testing Laboratory

- L.E.D.A. Research Institute "Kore" University of Enna
  Structures Laboratory

- Karlsruher Institut für Technologie Holzbau und Baukonstruktionen
  Versuchsanstalt für Stahl, Holz und Steine

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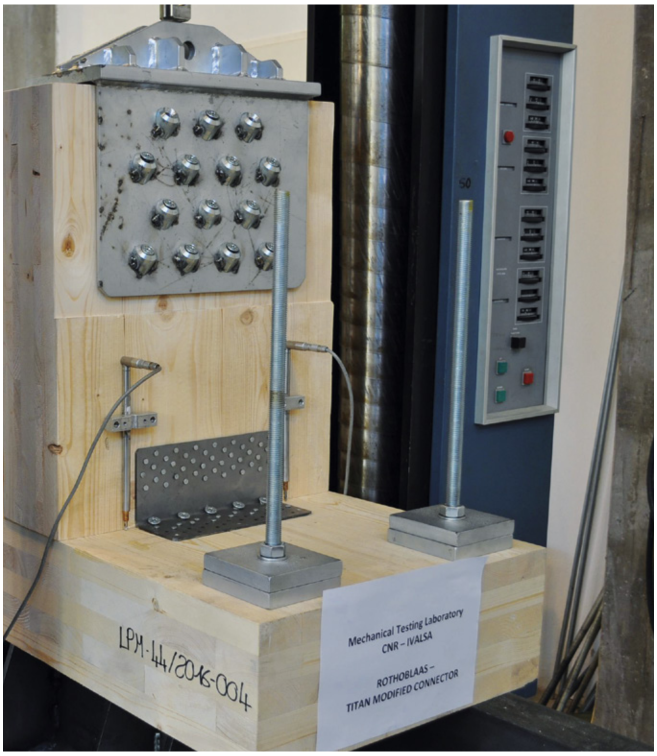
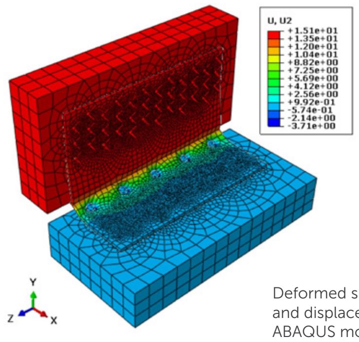
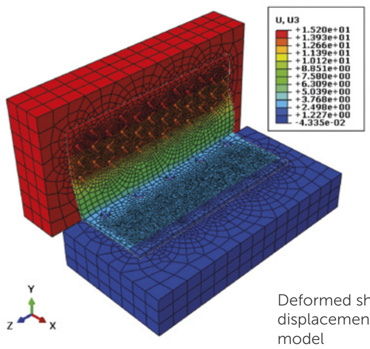




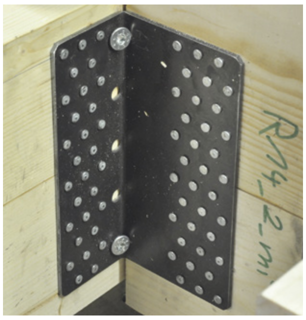
Deformed shape for **tension** action and displacement contour of the ABAQUS model

Tension test: **full** nailing

Tension test: **partial** nailing



Deformed shape for **shear** action and displacement contour of the ABAQUS model



Shear test: **full** nailing

Shear test: **partial** nailing

GENERAL PRINCIPLES:

- Characteristic values according to ETA-11/0496.
- Design values can be obtained from characteristic values as follows:

$$R_{i,d} = R_{i,k\ timber} \cdot \frac{k_{mod}}{\gamma_m}$$

The coefficients γ_m and k_{mod} should be taken according to the current regulations used for the calculation.

- For the calculation process a timber density ρ_k = 350 kg/m³ has been considered. For higher ρ_k values, resistance can be converted by the k_{dens} value equal to:

$$k_{dens} = \left(\frac{\rho_k}{350}\right)^{0,5} \quad \text{for } 350\ kg/m^3 \leq \rho_k \leq 420\ kg/m^3$$

$$k_{dens} = \left(\frac{\rho_k}{350}\right)^{0,5} \quad \text{for LVL with } \rho_k \leq 500\ kg/m^3$$

- Combined loading: if the F_1 and F_2/F_3 loads are working simultaneously, the following disparity must be met:

$$\frac{F_{1,d}}{R_{1,d}} + \frac{F_{2/3,d}}{R_{2/3,d}} \leq 1$$

- Structural elements in timber, to which the connection devices are fixed, must be prevented from rotating.
- Dimensioning and verification of the timber elements must be carried out separately. Verify that there are no brittle fractures before reaching the connection resistance.
- The use of two TITAN angle brackets, symmetrically-positioned, doubles the design strength of the joint.