WHT VG

HIGH-STIFFNESS TENSION ANGLE BRACKET

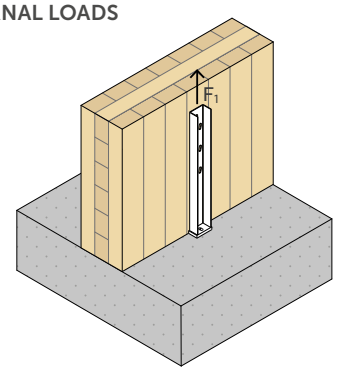
CE

SERVICE CLASS	SC1	SC2

MATERIAL

S355 Fe/Zn12c **WHTVG900**:
S355 + Fe/Zn12c carbon steel

EXTERNAL LOADS



TIMXTEND SYSTEM

The WHT VG connector is the structural component used to connect precast reinforced concrete balconies to CLT floor structures as part of the TimXtend system. It enables the construction of cantilever balconies in multi-storey timber buildings, overcoming design constraints related to safety, fire resistance and structural performance.

HIGH STIFFNESS

The configuration with fully threaded screws installed at a 45° angle provides high connection stiffness while limiting balcony deflection and vibration. The system ensures reliable performance, comfort and long-term durability, even under high load conditions.

VERSATILE APPLICATION

The connector can also be used in high-performance steel-to-timber connections outside the TimXtend system. The combination of the reinforced connector and certified screws enables load transfer in compact configurations, expanding design possibilities.

FIELDS OF USE

Tension connection within the TimXtend system for connecting the precast reinforced concrete balcony to the timber floor structure.

Suitable for:

- CLT panels

PREFABRICATION

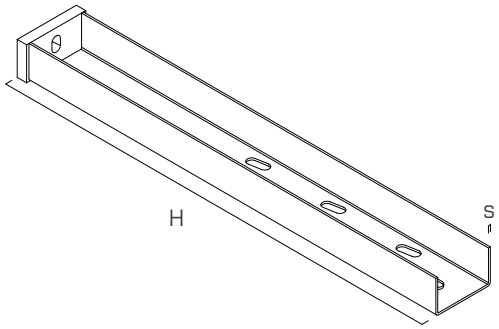
Ideal for the construction of precast reinforced concrete balconies within the TimXtend system.

MULTI-STOREY CLT BUILDINGS

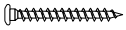
Ideal for the construction of cantilever balconies in multi-storey timber buildings.

CODES AND DIMENSIONS

CODE	H [mm]	s [mm]	n_v Ø18 [pcs]	hole [mm]	pcs
WHTVG900	886	5	9	Ø18	20

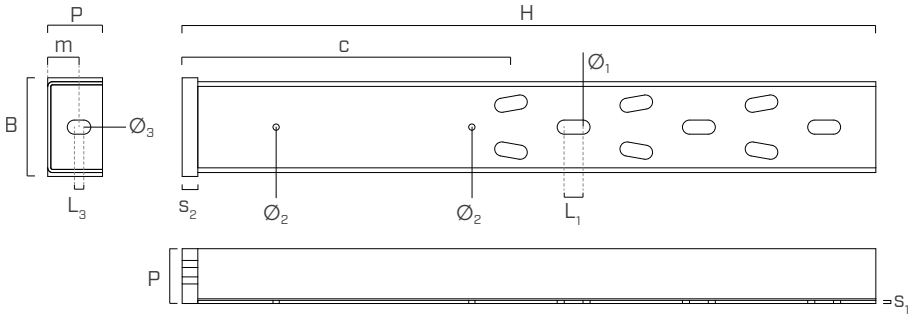


FASTENERS

type	description		d [mm]	support
VGU	45° washer		11	
VGS*	fully threaded countersunk screw		11	
LBS	screw for plates		7	

* For the TimXtend system, the connector length is fixed at L = 200 mm.

GEOMETRY



WHT VG			WHTVG900
height	**H**	[mm]	886
base	**B**	[mm]	126
depth	**P**	[mm]	70
vertical flange thickness	**s_1**	[mm]	5
horizontal flange thickness	**s_2**	[mm]	20
hole position in timber	**c**	[mm]	420
hole position in concrete	**m**	[mm]	40
flange holes 1	**$Ø_1$ x L_1**	[mm]	18 x 24
flange holes 2	**$Ø_2$**	[mm]	8
base hole	**$Ø_3$ x L_2**	[mm]	18 x 12

ADDITIONAL PRODUCTS

SNAIL HSS

JIG VGU

BEAR

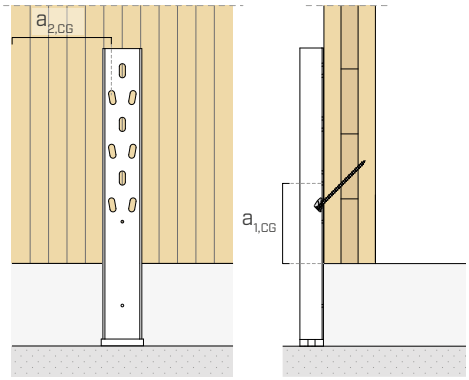
BIT

TORQUE LIMITER

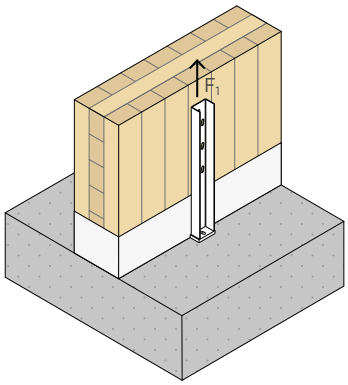
INSTALLATION

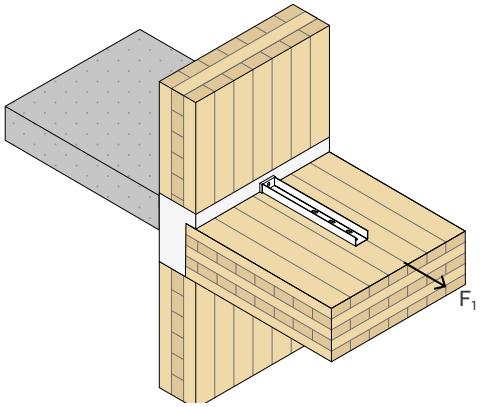
MINIMUM DISTANCES

TIMBER	L [mm]	H_{1min} [mm]	$a_{1,CG}$ [mm]	$a_{2,CG}$ [mm]
VGS Ø11	175	125	110	65
	200	240	110	69
	225	160	110	72
	250	175	110	75
	275	195	110	78
	300	210	110	81



STRUCTURAL VALUES | TENSILE JOINT F_1 | TIMBER-TO-CONCRETE





	TIMBER				STEEL	
CODE	fasteners(*)			$R_{1,k,timber}$	$R_{steel,k}$	$R_{bolt,k}$
	type	VGS - Ø x L [mm]	n_v [pcs]	[kN]	[kN]	[kN]
WHTVG900	VGU1145	11 x 175	9	112.2	**183.6**	**112.3**
		11 x 200		131.6		
		11 x 225		150.9		
		11 x 250		170.3		

(*) For the TimXtend system, the connector length is fixed at L = 200 mm. The anchor rod resistance must be verified considering the connection system as an isolated assembly.

CONCRETE STRENGTH

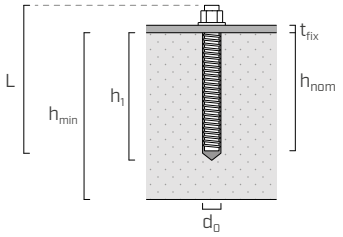
CODE	configuration on concrete	fastening		$R_{1,d,concrete}$
		type	Ø x L [mm]	[kN]
WHTVG900	**uncracked**	HYB-FIX 8.8	M16 X 245	**83.5**
	cracked	HYB-FIX 8.8	M16 X 245	**68,0**
		HYB-FIX 8.8	M16 X 330	**83.5**

Strength values of some of the possible fastening solutions. For additional solutions, different from those indicated in the table, it is possible to use the My Project software available at www.rothoblaas.com. The concrete-side resistances refer to the use of WHTVG900 outside the TimXtend system.

CHEMICAL ANCHOR INSTALLATION PARAMETERS[1]

type of rod	Ø x L [mm]	t_{fix} [mm]	$h_{nom} = h_{ef}$ [mm]	h_1 [mm]	d_0 [mm]	h_{min} [mm]
M16	245	20	220	225	18	256
	330	20	305	310	18	341

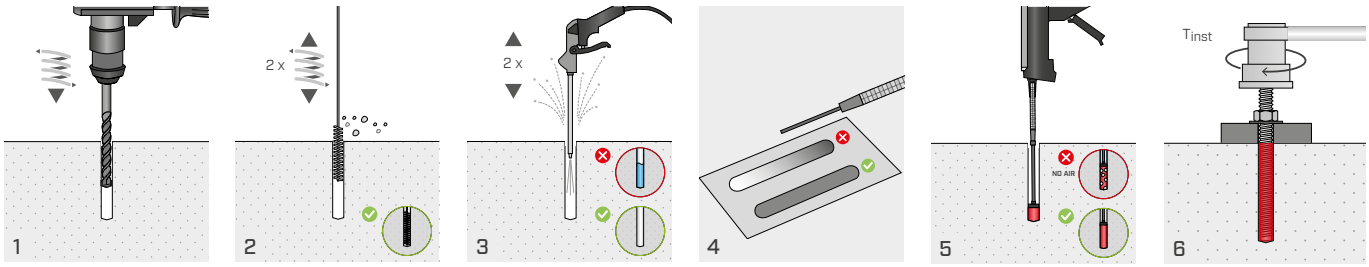
Pre-cut INA class 8.8 threaded rod, including nut and washer.
MGS threaded rod to be cut to size.

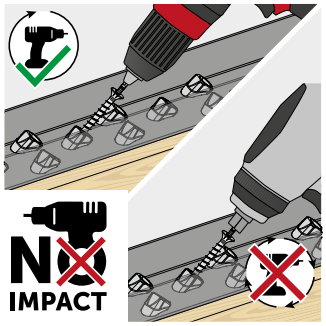


t_{fix}	fastened plate thickness
h_{nom}	nominal anchoring depth
h_{ef}	effective anchoring depth
h_1	minimum hole depth
d_0	hole diameter in the concrete support
h_{min}	concrete minimum thickness

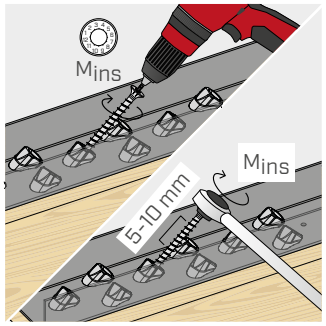
MANUALS

INSTALLATION INSTRUCTIONS





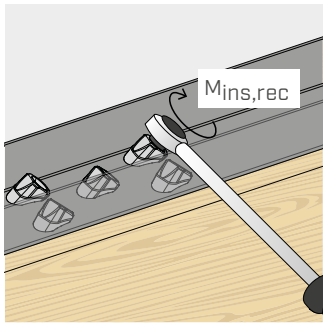
The use of pulse screw guns/impact wrenches is not permitted. Use of VGU washer with jig and pilot hole.



Ensure correct tightening. We recommend the use of torque-controlled screwdrivers, e.g. with TORQUE LIMITER. Alternatively, tighten with a torque wrench.

pilot hole diameter for VGS screw in softwood		
$d_{V,S}$	[mm]	6,0

VGS	d_1 [mm]	$M_{ins,rec}$ [Nm]
Ø11 L < 400 mm	11	20



After installation, the fasteners can be inspected using a torque wrench.

GENERAL PRINCIPLES

- Characteristic values according to EN 1995:2014.
- The connection design strength values are obtained from the values on the table as follows:

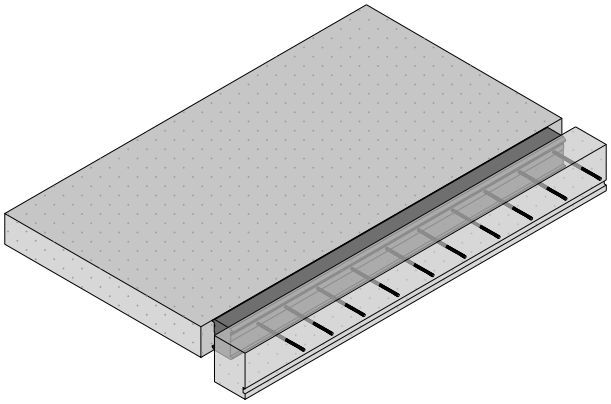
$$R_d = min \begin{cases} R_{k,\,timber} \cdot \frac{k_{mod}}{\gamma_M} \\ \frac{R_{k,steel}}{\gamma_{M0}} \\ R_{d,concrete} \end{cases}$$

The coefficients k_{mod}, γ_M and γ_{M0} should be taken according to the current regulations used for the calculation. The tensile resistance of the steel section exceeds the resistance associated with the connector and anchor failure modes.

- The calculation process used a timber characteristic density of ρ_k = 350 kg/m^3 and a C25/30 concrete strength class with a thin reinforcing layer, where there is no spacing and edge-distance and minimum thickness indicated in the installation parameters tables of the anchors used. The strength values are valid for the calculation hypothesis defined in the table; for boundary conditions different from the ones in the table (e.g. minimum distances from the edge or different concrete thickness), the concrete-side anchors can be verified using MyProject calculation software according to the design requirements.
- Concrete design strength values are supplied for uncracked ($R_{1,d\ uncracked}$), cracked ($R_{1,d\ cracked}$) concrete and in case of seismic verification ($R_{1,d\ seismic}$) for use of chemical anchor with threaded rod in steel class 8.8.
- Seismic design in performance category C2, without ductility requirements on anchors (option a2) and elastic design according to EN 1992-4.
- Dimensioning and verification of timber and concrete elements must be carried out separately.
- **TimXtend was developed through a collaboration between three construction specialists: RWT plus ZT GmbH** (structural engineering, fire protection), **Leviat/Halfen** (thermally insulated connection technology) and **Rothoblaas** (steel connectors for timber). The project was developed by **RWT plus ZT GmbH** , a company specialised in lightweight structures, sustainable building systems and multi-storey timber constructions.

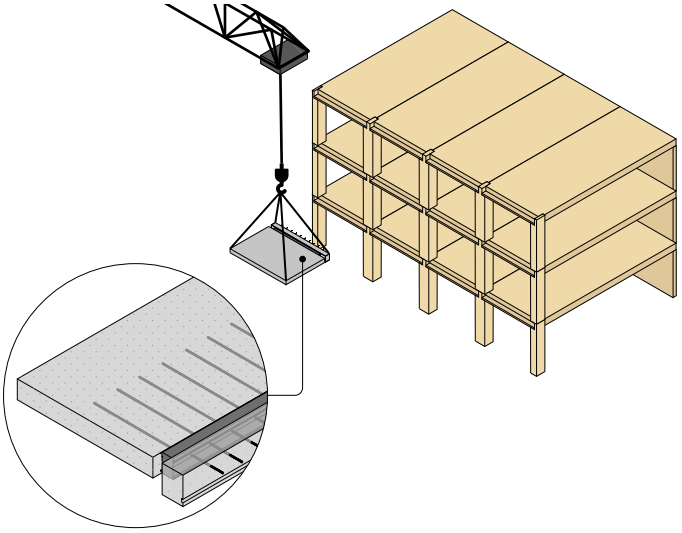
TimXtend SYSTEM INSTALLATION

The WHTVG900 component, thanks to its excellent stiffness and strength, is a key element for the effective connection of concrete cantilever balconies within the TimXtend system. The use of inclined fully threaded screws provides an optimal load-transfer mechanism, limiting slip that could otherwise increase deflection and the perception of user-induced vibrations. The system requires only a single connector type for installation, simplifying on-site operations and speeding up installation. The same procedure is used for all applications, promoting standardisation throughout the supply and installation process.



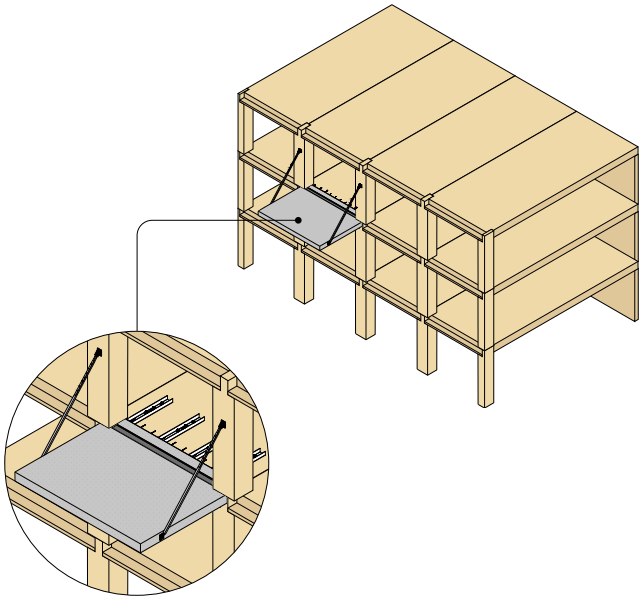
PRECAST REINFORCED CONCRETE ELEMENT

The concrete anchoring elements (HALFEN HIT) are integrated with the rebars of the reinforced concrete element to create a monolithic balcony.



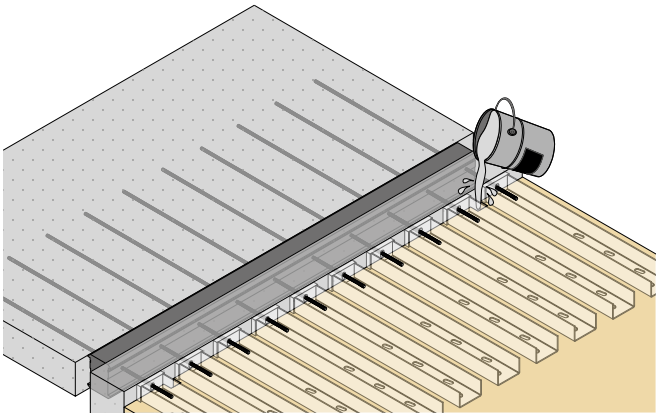
LIFTING THE ELEMENT INTO ITS DESIGN POSITION AND INSTALLING THE TEMPORARY TIE RODS

The reinforced concrete element is lifted into its design position and secured using temporary props.



FIXING THE BRACKETS USING LBS SCREWS AND VGU WASHERS

The WHTVG900 tension angle brackets are **fixed in position using LBS7 screws. The connection is then completed with VGS9 x 200 structural screws and VGU9 x 45 washers**. Follow the instructions provided in the SmartBook: Timber Screws during installation.



routing geometry

POURING THE GROUT IN THE COMPRESSION ZONE

To ensure a uniform bearing surface in the compression zone, apply a supplementary pour of low-shrink, flowable grout. The grout may be poured through openings along the support line, ensuring that vent holes are also provided to allow air to escape.