

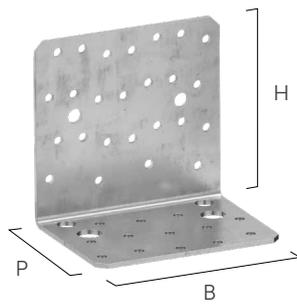
# JOKER 100

## ANGLE BRACKET 100 FOR SHEAR AND TENSILE LOADS

- Versatile angle bracket with an excellent cost-performance ratio
- Partial nailing, suitable for CLT or frame walls, even with grout
- Excellent strength values for forces in all directions, with the possibility of use in timber-to-timber or timber-to-concrete configurations



SERVICE CLASS	<b>SC2</b>	MATERIAL	<b>S250</b> Z275
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CODE	B		P		H		s				pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]			
JKR100100	104	4 1/8	78	3 1/16	100	4	2,5	0.098	•	•	50

Number of holes:

$n_H \varnothing 5$	$n_H \varnothing 0.20$	$n_H \varnothing 10$	$n_H \varnothing 0.40$	$n_H \varnothing 13$	$n_H \varnothing 0.51$	$n_V \varnothing 5$	$n_V \varnothing 0.20$	$n_V \varnothing 8$	$n_V \varnothing 0.31$
13		2		2		25		2	

### FASTENERS

#### LBA-HT | ANKER NAIL

see page <?>

d	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
4 0.16	HT4060	60 2 3/8	50 1 15/16	250

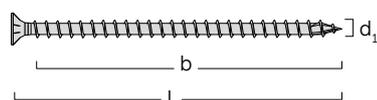
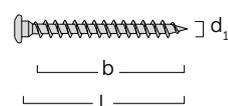
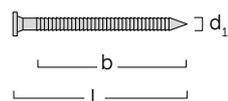
#### SBL | ROUND-HEAD SCREW AND FLAT UNDERHEAD

see page <?>

d <sub>1</sub>	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
5 0.20 TX 20	SBL560	60 2 3/8	56 2 3/16	200

#### VGS | SCREW FOR 45° FASTENING

d <sub>1</sub>	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
9 0.36 TX 40	VGS9140	140 5 1/2	130 5 1/8	25

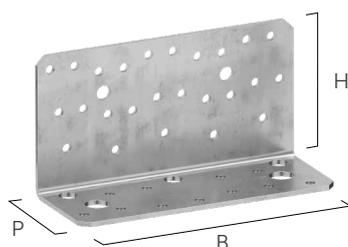


## ASYMMETRIC ANGLE BRACKET FOR SHEAR AND TENSILE LOADS

- Asymmetric 55 mm angle bracket, perfect for tight spaces and offering outstanding performance
- Extremely versatile: the additional washer on concrete provides higher strength
- Excellent strength values for forces in all directions, with the possibility of use in timber-to-timber or timber-to-concrete configurations
- The new NINO15080S model offers exceptional performance with fewer fasteners



SERVICE CLASS	<b>SC2</b>	<b>SC2</b>
MATERIAL	<b>S250</b> Z275	<b>S350</b> Z275
	JKR15080	NINO15080S



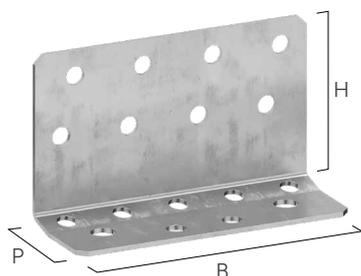
CODE	B		P		H		s				pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]			
JKR15080	146	5 3/4	55	2 3/16	77	3 1/16	2,5	0.098	●	●	50

Number of holes:

$n_H \varnothing 5$	$n_H \varnothing 0.20$	$n_H \varnothing 10$	$n_H \varnothing 0.40$	$n_H \varnothing 13$	$n_H \varnothing 0.51$	$n_V \varnothing 5$	$n_V \varnothing 0.20$	$n_V \varnothing 8$	$n_V \varnothing 0.31$
11		3		2		25		2	



CODE	B		P		s		n $\varnothing 14$			pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	n $\varnothing 0.55$			
NINOW15080	146	5 3/4	50	1 15/16	6	0.236	2	●	10	



CODE	B		P		H		s				pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]			
NINO15080S	156	6 1/8	55	2 3/16	94	3 11/16	2,5	0.098	●	●	10

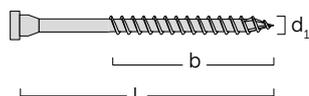
Number of holes:

$n_H \varnothing 10,5$	$n_H \varnothing 0.40$	$n_H \varnothing 13$	$n_H \varnothing 0.51$	$n_V \varnothing 10,5$	$n_V \varnothing 0.40$
7		2		8	

### FASTENERS | NINO15080S

**KGL EVO | PAN HEAD SCREW**

see page <?>

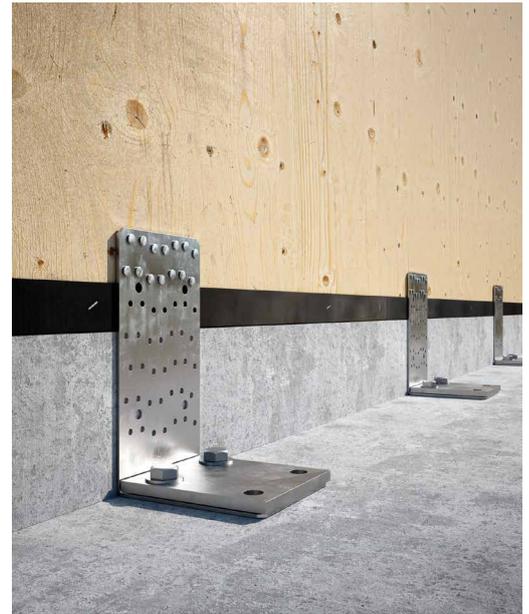


d	CODE	L	b	pcs
[mm]	[in]	[mm]	[in]	
8	KGLPEVO8100	100	4	100
0,32 TX 40			75	2 15/16

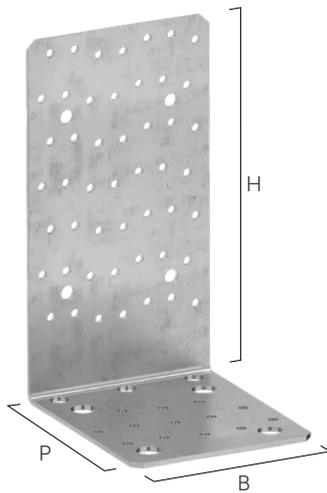
# JOKER 200

## HIGH ANGLE BRACKET FOR SHEAR AND TENSILE LOADS

- Tall angle bracket, ideal for CLT walls with raised installation (on a kerb or timber platform with a maximum height of 12 cm)
- On concrete, the additional washer provides excellent strength
- Excellent strength values for forces in all directions, with the possibility of use in timber-to-timber or timber-to-concrete configurations



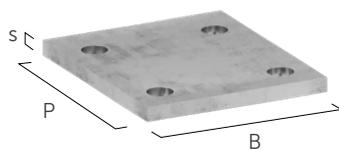
SERVICE CLASS	<b>SC2</b>	MATERIAL	<b>S250</b> Z275
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CODE	B		P		H		s				pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]			
JKR100200	104	4 1/8	122	4 13/16	197	7 3/4	3	0.118			25

Number of holes:

$n_H \varnothing 5$	$n_H \varnothing 0.20$	$n_H \varnothing 10$	$n_H \varnothing 0.40$	$n_H \varnothing 13$	$n_H \varnothing 0.51$	$n_V \varnothing 5$	$n_V \varnothing 0.20$	$n_V \varnothing 8$	$n_V \varnothing 0.31$
13		3		4		49			4

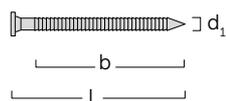


CODE	B		P		s		$n \varnothing 14$			pcs
	[mm]	[in]	[mm]	[in]	[mm]	[in]	$n \varnothing 0.55$			
NINOW100200	104	4 1/8	120	4 3/4	8	0.315	4		10	

### FASTENERS

#### LBA-HT | ANKER NAIL

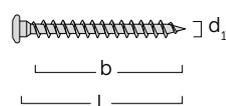
see page <?>



d	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
4 0.16	HT4060	60 2 3/8	50 1 15/16	250

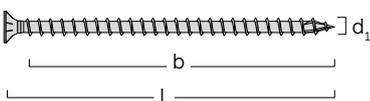
#### SBL | ROUND-HEAD SCREW AND FLAT UNDERHEAD

see page <?>



d <sub>1</sub>	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
5 0.20 TX 20	SBL560	60 2 3/8	56 2 3/16	200

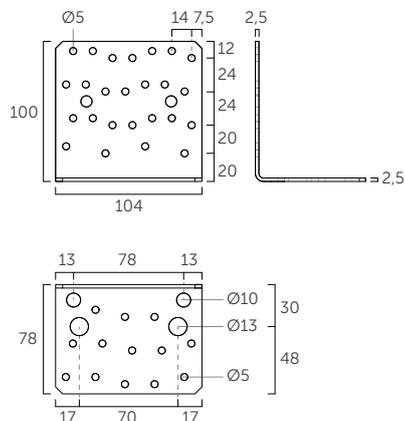
#### VGS | SCREW FOR 45° FASTENING



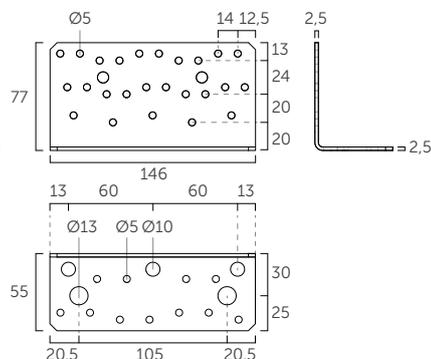
d <sub>1</sub>	CODE	L	b	pcs
[mm] [in]		[mm] [in]	[mm] [in]	
9 0.36 TX 40	VGS9140	140 5 1/2	130 5 1/8	25

## GEOMETRY

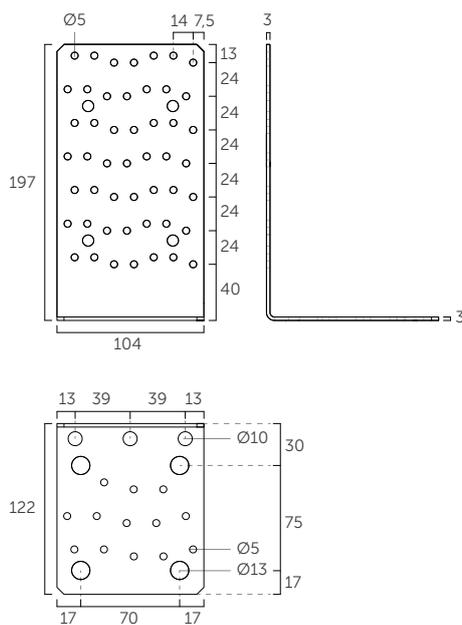
**JKR100100**



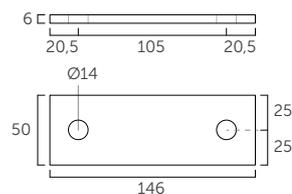
**JKR15080**



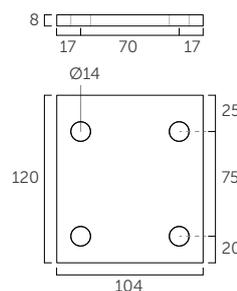
**JKR100200**



**NINOW15080**



**NINOW100200**

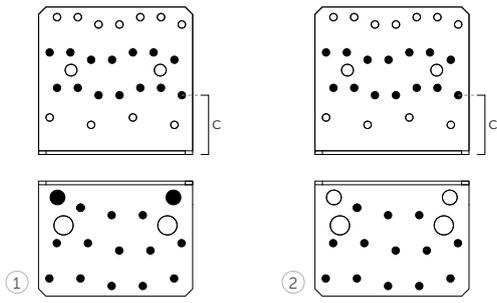


## ADDITIONAL PRODUCTS - FASTENING

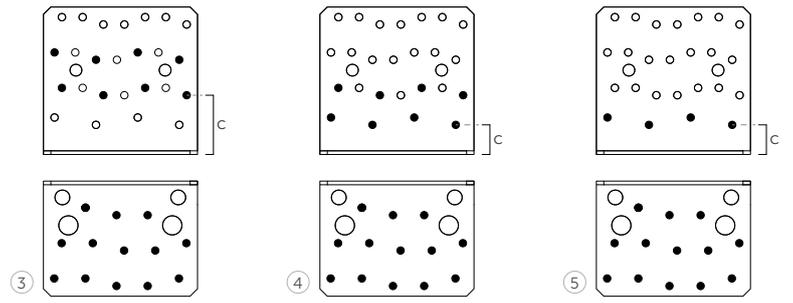
type	description		d [mm]	support
LBA-HT	Anker nail		4	
SBL	round-head screw and flat underhead		5	
VGS	full thread screw		9	
KGL EVO	pan head screw		8	
AB1	mechanical anchor		12	
SKR	screw-in anchor		12	
H-NEX	chemical anchor		M12	
V-NEX	chemical anchor		M12	
EPO-FIX	epoxy chemical anchor		M12	

## JKR100100 | TIMBER-TO-TIMBER FASTENING DIAGRAMS

### INSTALLATION ON CLT

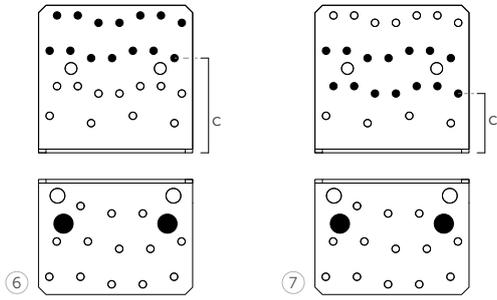


### INSTALLATION ON TIMBER FRAME

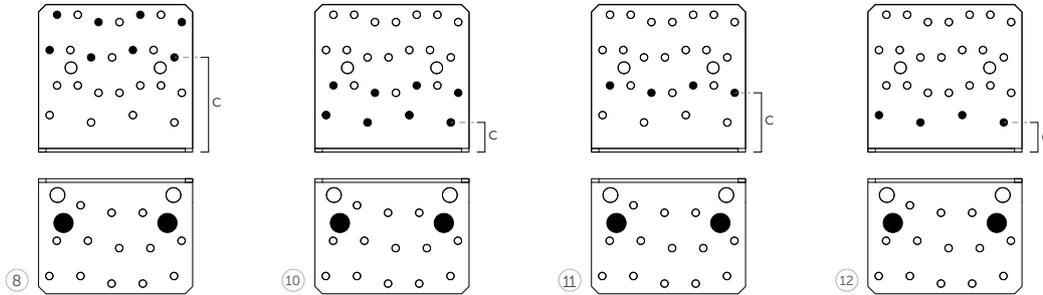


## JKR100100 | TIMBER-TO-CONCRETE FASTENING DIAGRAMS

### INSTALLATION ON CLT



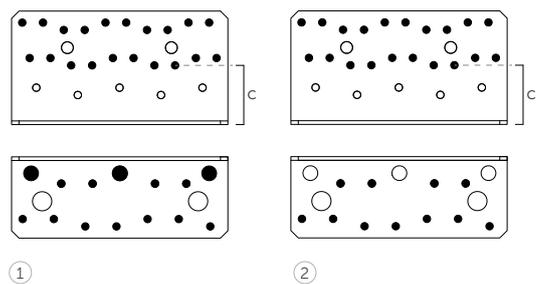
### INSTALLATION ON TIMBER FRAME



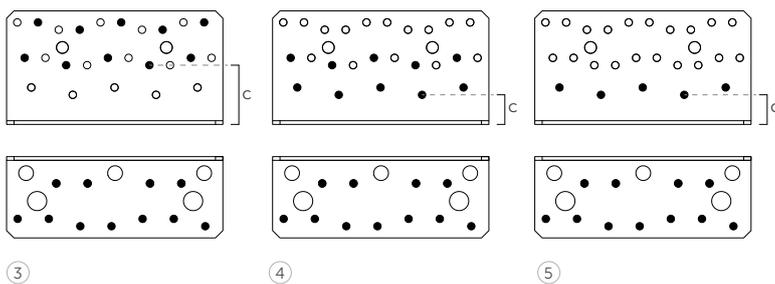
CODE	configuration	fastening holes Ø5		fastening holes Ø10	fastening holes Ø13	c [mm]	support	
		n <sub>v</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs			
JKR100100	pattern 1	14	13	2	-	40	●	-
	pattern 2	14	13	-	-	40	●	-
	pattern 3	8	13	-	-	40	●	-
	pattern 4	8	13	-	-	20	●	-
	pattern 5	4	13	-	-	20	●	-
	pattern 6	14	-	-	2	64	-	●
	pattern 7	14	-	-	2	40	-	●
	pattern 8	8	-	-	2	64	-	●
	pattern 10	8	-	-	2	20	-	●
	pattern 11	4	-	-	2	40	-	●
	pattern 12	4	-	-	2	20	-	●

# JKR15080 | TIMBER-TO-TIMBER FASTENING DIAGRAMS

## INSTALLATION ON CLT

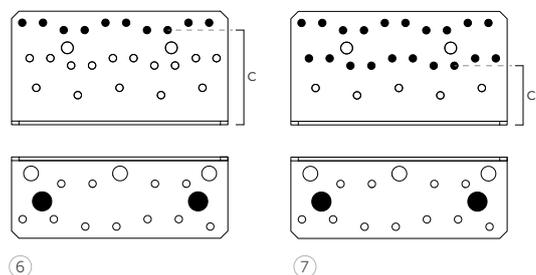


## INSTALLATION ON TIMBER FRAME

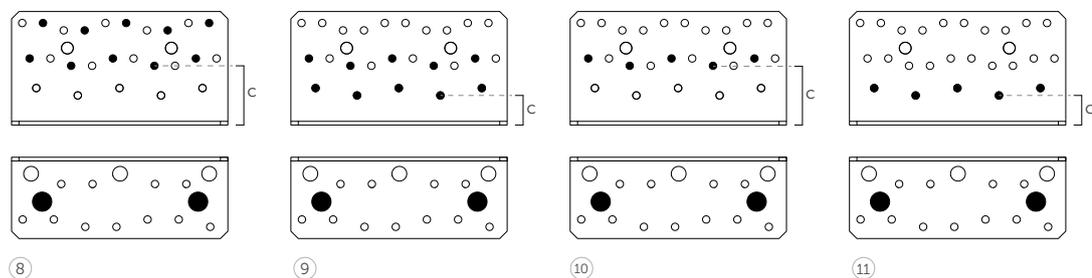


# JKR15080 | TIMBER-TO-CONCRETE FASTENING DIAGRAMS

## INSTALLATION ON CLT



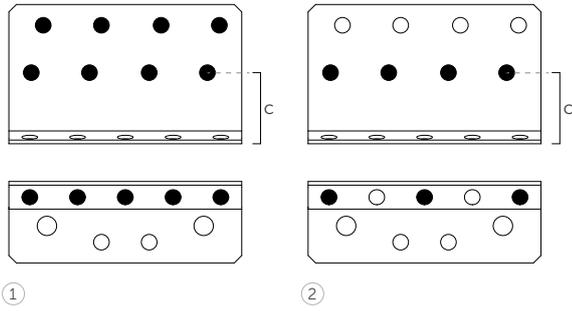
## INSTALLATION ON TIMBER FRAME



CODE	configuration	fastening holes Ø5		fastening holes Ø10	fastening holes Ø13	c [mm]	support	
		n <sub>V</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs			
JKR15080	pattern 1	20	11	3	-	40	●	-
	pattern 2	20	11	-	-	40	●	-
	pattern 3	10	11	-	-	40	●	-
	pattern 4	10	11	-	-	20	●	-
	pattern 5	5	11	-	-	20	●	-
	pattern 6	10	-	-	2	64	-	●
	pattern 7	20	-	-	2	40	-	●
	pattern 8	10	-	-	2	40	-	●
	pattern 9	10	-	-	2	20	-	●
	pattern 10	5	-	-	2	40	-	●
	pattern 11	5	-	-	2	20	-	●

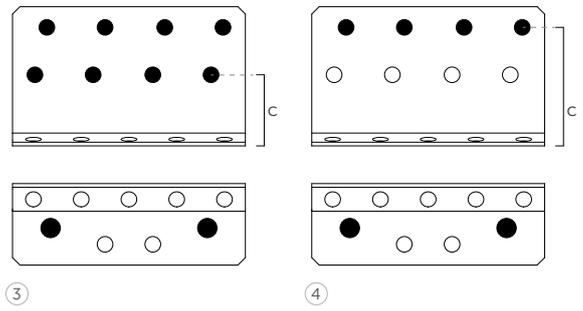
## NINO15080S | TIMBER-TO-TIMBER FASTENING DIAGRAMS

INSTALLATION ON CLT



## NINO15080S | TIMBER-TO-CONCRETE FASTENING DIAGRAMS

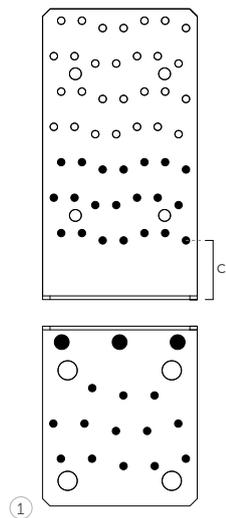
INSTALLATION ON CLT



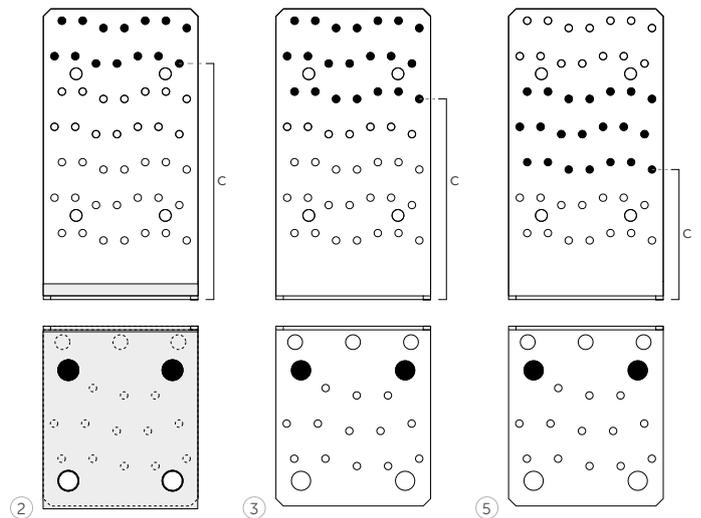
CODE	configuration	fastening holes Ø10,5		fastening holes Ø13	c [mm]	support	
		n <sub>v</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs			
NINO15080S	pattern 1	8	5	-	48	●	-
	pattern 2	4	3	-	48	●	-
	pattern 3	8	-	2	48	-	●
	pattern 4	4	-	2	80	-	●

## JKR100200 | TIMBER-TO-TIMBER FASTENING DIAGRAMS | JKR100200 | TIMBER-TO-CONCRETE FASTENING DIAGRAMS

INSTALLATION ON CLT



INSTALLATION ON CLT

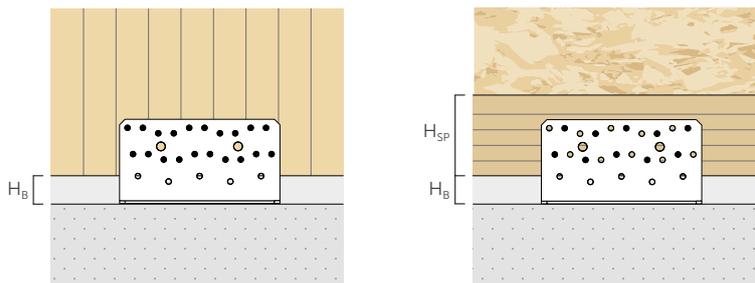


CODE	configuration	fastening holes Ø5		fastening holes Ø10	fastening holes Ø13	c [mm]	support	
		n <sub>v</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs	n <sub>H</sub> pcs			
JKR100200	pattern 1	21	13	3	-	40	●	-
	pattern 2 <sup>(*)</sup>	14	-	-	2	160	-	●
	pattern 3	21	-	-	2	136	-	●
	pattern 5	21	-	-	2	88	-	●

(\*) Installation with washer NINOW100200.

## INSTALLATION

### MAXIMUM HEIGHT OF THE INTERMEDIATE $H_B$ LAYER



### INSTALLATION ON CLT

CODE	configuration	$n_V - \emptyset$	$H_{B \max}$ (mm)		
			nails LBA-HT $\emptyset 4$	screws	
				SBL $\emptyset 5$	KGL EVO $\emptyset 8$
JKR100100	pattern 1	14 - $\emptyset 5$	0	10	-
	pattern 2	14 - $\emptyset 5$	0	10	-
	pattern 6	14 - $\emptyset 5$	24	34	-
	pattern 7	14 - $\emptyset 5$	0	10	-
JKR15080	pattern 1	20 - $\emptyset 5$	0	10	-
	pattern 2	20 - $\emptyset 5$	0	10	-
	pattern 6	10 - $\emptyset 5$	24	34	-
	pattern 7	20 - $\emptyset 5$	0	10	-
NINO15080S	pattern 3	8 - $\emptyset 10,5$	-	-	0
	pattern 4	4 - $\emptyset 10,5$	-	-	32
JKR100200	pattern 1	21 - $\emptyset 5$	0	10	-
	pattern 2	14 - $\emptyset 5$	120	130	-
	pattern 3	21 - $\emptyset 5$	96	106	-
	pattern 5	21 - $\emptyset 5$	48	58	-

### INSTALLATION ON TIMBER FRAME

CODE	configuration	$n_V - \emptyset$	$H_{B \max}$ (mm)		
			nails LBA-HT $\emptyset 4$	screws SBL $\emptyset 5$	$H_{SP \min}$
					KGL EVO $\emptyset 8$
JKR100100	pattern 3	8 - $\emptyset 5$	27	27	60
	pattern 4	8 - $\emptyset 5$	7	7	60
	pattern 5	4 - $\emptyset 5$	7	7	38
	pattern 8	8 - $\emptyset 5$	51	51	120
	pattern 10	8 - $\emptyset 5$	7	7	60
	pattern 11	4 - $\emptyset 5$	27	27	60
	pattern 12	4 - $\emptyset 5$	7	7	38
JKR15080	pattern 3	10 - $\emptyset 5$	27	27	60
	pattern 4	10 - $\emptyset 5$	7	7	60
	pattern 5	5 - $\emptyset 5$	7	7	38
	pattern 8	10 - $\emptyset 5$	27	27	100
	pattern 9	10 - $\emptyset 5$	7	7	60
	pattern 10	5 - $\emptyset 5$	27	27	60
	pattern 11	5 - $\emptyset 5$	7	7	38

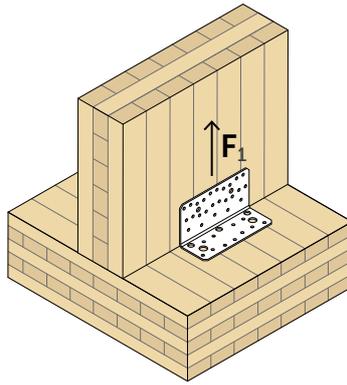
#### NOTES:

The height of the  $H_B$  intermediate layer (levelling grout, sill or timber platform beam) is determined by taking into account the regulatory requirements for fastenings on timber:

- CLT: minimum distances according to ÖNORM EN 1995:2014 - Annex K for nails and ETA-11/0030 for screws.
- C/GL: minimum distances for solid timber or glulam consistent with EN 1995:2014 according to ETA considering a timber density  $\rho_k \leq 420 \text{ kg/m}^3$ .
- The minimum platform thickness  $H_{SP \min}$  was determined by considering  $a_{4,c} \geq 13 \text{ mm}$  and  $a_{4,t} \geq 13 \text{ mm}$  with a minimum height of 38 mm in accordance with the requirements in ETA-22/0089.

## STRUCTURAL VALUES | TENSILE JOINT $F_1$ | TIMBER-TO-TIMBER

JKR100100 | JKR15080 | NINO15080S | JKR100200



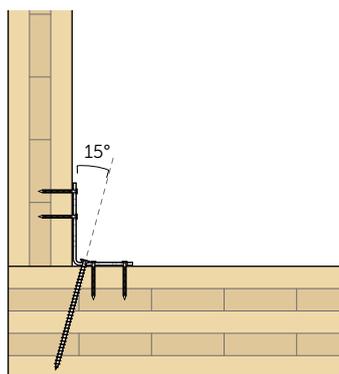
### TIMBER STRENGTH

CODE	configuration on timber	fastening holes				$R_{1,k \text{ timber}}$ [kN]	$K_{1,ser}$ $R_{1,k \text{ timber}}$ [kN/mm]
		type	$\varnothing \times L$ [mm]	$n_v$ pcs	$n_H$ pcs		
JKR100100	pattern 1 <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	14	13 + 2 VGS $\varnothing 9 \times 140$	20,0	$R_{1,k \text{ timber}}/6$
		SBL screws	$\varnothing 5,0 \times 50$			20,0	
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	14	13	5,9	
		SBL screws	$\varnothing 5,0 \times 50$			6,8	
JKR15080	pattern 1 <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	20	11 + 3 VGS $\varnothing 9 \times 140$	39,5 <sup>(*)</sup>	$R_{1,k \text{ timber}}/6$
		SBL screws	$\varnothing 5,0 \times 50$			39,5 <sup>(*)</sup>	
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	20	11	4,0	
		SBL screws	$\varnothing 5,0 \times 50$			6,0	
NINO15080S	pattern 1	KGL EVO	$\varnothing 8,0 \times 100$	8	5	49,9	$R_{1,k \text{ timber}}/5$
	pattern 2	KGL EVO	$\varnothing 8,0 \times 100$	4	3	32,0	
JKR100200	pattern 1 <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	21	13 + 3 VGS $\varnothing 9 \times 140$	41,2	$R_{1,k \text{ timber}}/5$
		SBL screws	$\varnothing 5,0 \times 50$			41,2	

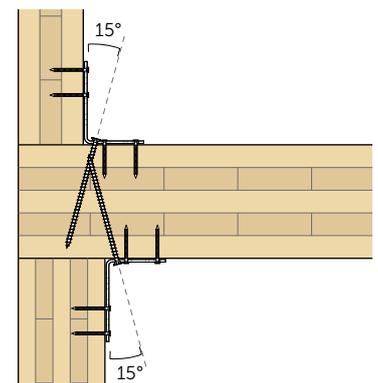
(\*) In the case of installation coupled with an acoustic profile, the  $R_{1,k \text{ timber}}$  strength must be assumed to be 37.2 kN.

### INSTALLATION WITH INCLINED SCREWS | TIMBER-TO-TIMBER

The possibility of installing inclined VGS screws in all models broadens the design possibilities and offers solutions for a wide range of applications, confirming JOKER angle brackets as an excellent choice for excellent performance in terms of both shear and tensile loads.



Example: installation of a JOKER15080 angle bracket with inclined VGS screws



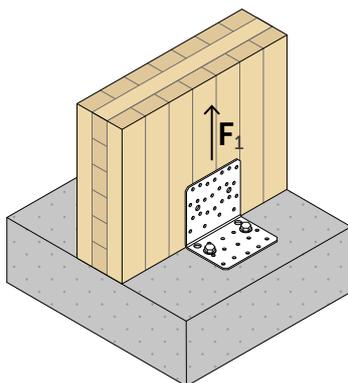
Example: installation of JOKER15080 angle brackets with inclined VGS screws for fastening inter-storey walls with different thickness values

#### NOTES:

- (1) The load-bearing capacity values listed are valid for installation with  $\varnothing 9$  VGS screws of length  $\geq 140$  mm. For screws of shorter length  $L$ ,  $R_{1,k \text{ timber}}$  must be multiplied by a reduction factor of  $L/140$ .
- The strength values listed are also valid for installation with XYLOFON acoustic profile below the horizontal flange.

# STRUCTURAL VALUES | TENSILE JOINT F<sub>1</sub> | TIMBER-TO-CONCRETE

JKR100100



## TIMBER STRENGTH

configuration on timber	fastening holes Ø5			R <sub>1,k</sub> timber [kN]	K <sub>1,ser</sub> [kN/mm]
	type	Ø x L [mm]	n <sub>v</sub> pcs		
pattern 6 - 7	LBA nails	Ø4,0 x 60	14	14,0	R <sub>1,k</sub> timber/18
	SBL screws	Ø5,0 x 50		14,0	

## CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

configuration on concrete	fastening holes Ø13			R <sub>1,d</sub> concrete [kN]	K <sub>t//</sub>
	type	Ø x L [mm]	n <sub>H</sub> pcs		
• uncracked	V-NEX 5.8	M12 x 140	2	23,8	1,21
• cracked	V-NEX 5.8	M12 x 195		26,2	
• seismic	H-NEX 8.8	M12 x 195		15,5	
		M12 x 245		20,1	
	EPO-FIX 8.8	M12 x 195		24,0	

## ANCHORS INSTALLATION PARAMETERS

anchor type		d <sub>0</sub>	h <sub>ef</sub>	h <sub>nom</sub>	h <sub>1</sub>	h <sub>min</sub>
type	Ø x L [mm]	[mm]	[mm]	[mm]	[mm]	[mm]
V-NEX 5.8	M12 x 140	14	115	115	115	200
	M12 x 195		170	170	175	200
H-NEX 8.8	M12 x 195		170	170	175	200
	M12 x 245		220	220	225	250
EPO-FIX 8.8	M12 x 195		170	170	175	200

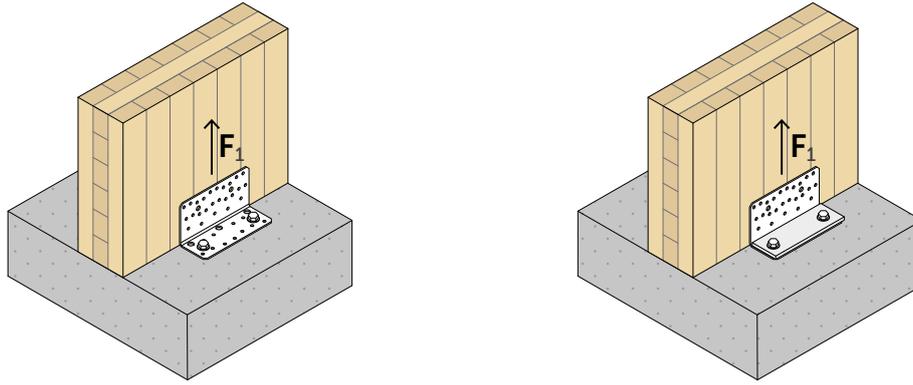
Precut INA threaded rod, with nut and washer.  
 MGS threaded rod class 8.8 to be cut to size.  
 Concrete-side strength values were calculated assuming a t<sub>fix</sub> thickness of 2 mm.

## GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

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

JKR15080 | JKR15080 + NINOW15080



### TIMBER STRENGTH

configuration on timber	fastening holes $\varnothing 5$			no washer		washer	
	type	$\varnothing \times L$ [mm]	$n_V$ pcs	$R_{1,k \text{ timber}}$ [kN]	$K_{1,ser}$ [kN/mm]	$R_{1,k \text{ timber}}$ [kN]	$K_{1,ser}$ [kN/mm]
pattern 6	LBA nails	$\varnothing 4,0 \times 60$	10	14,7	$R_{1,k \text{ timber}}/16$	24,9	$R_{1,k \text{ timber}}/8$
	SBL screws	$\varnothing 5,0 \times 50$		14,7		20,9	
pattern 7	LBA nails	$\varnothing 4,0 \times 60$	20	14,7		24,9	
	SBL screws	$\varnothing 5,0 \times 50$		14,7		24,9	

### CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

configuration on concrete	fastening holes $\varnothing 13$			no washer pattern 6-7		washer pattern 6-7	
	type	$\varnothing \times L$ [mm]	$n_H$ pcs	$R_{1,d \text{ concrete}}$ [kN]	$K_{t//}$	$R_{1,d \text{ concrete}}$ [kN]	$K_{t//}$
• uncracked	V-NEX 5.8	M12 x 195	2	33,8	1,38	25,9	1,75
• cracked	V-NEX 5.8	M12 x 195		18,8		14,4	
	H-NEX 5.8	M12 x 195		36,2		27,7	
• seismic	H-NEX 8.8	M12 x 195		14,3		10,9	
		M12 x 245		18,6		13,9	
	EPO-FIX 8.8	M12 x 195		22,2		17,0	

### ANCHORS INSTALLATION PARAMETERS

anchor type		$d_0$ [mm]	no washer				washer			
			$h_{ef}$ [mm]	$h_{nom}$ [mm]	$h_1$ [mm]	$h_{min}$ [mm]	$h_{ef}$ [mm]	$h_{nom}$ [mm]	$h_1$ [mm]	$h_{min}$ [mm]
V-NEX 5.8	M12 x 195	14	170	170	175	200	165	165	170	200
H-NEX 5.8/8.8	M12 x 195		170	170	175	200	165	165	170	200
	M12 x 245		220	220	225	250	210	210	215	240
EPO-FIX 8.8	M12 x 195		170	170	175	200	165	165	170	200

Precut INA threaded rod, with nut and washer.

MGS threaded rod class 8.8 to be cut to size.

The concrete-side strength values for installation with a washer were calculated assuming a  $t_{fix}$  thickness of 8 mm. For installation without washer, a  $t_{fix}$  value of 2 mm was assumed.

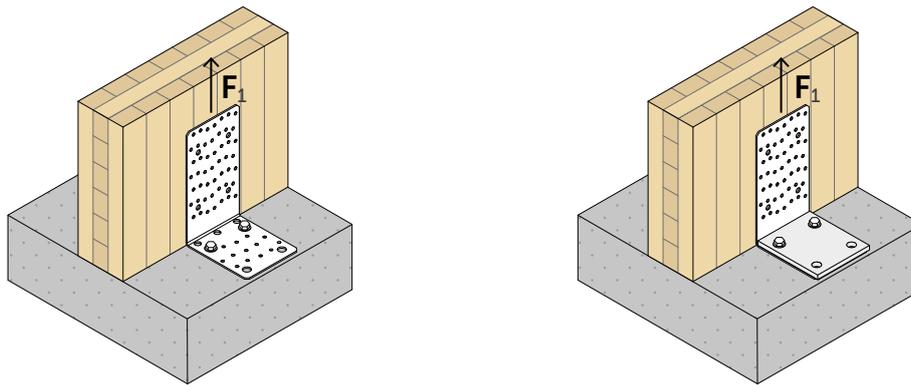
### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.



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

JKR100200 | JKR100200 + NINOW100200



## TIMBER STRENGTH

configuration on timber	fastening holes $\varnothing 5$			no washer		washer	
	type	$\varnothing \times L$ [mm]	$n_V$ pcs	$R_{1,k}$ timber [kN]	$K_{1,ser}$ [kN/mm]	$R_{1,k}$ timber [kN]	$K_{1,ser}$ [kN/mm]
pattern 2	LBA nails	$\varnothing 4,0 \times 60$	14	-	$R_{1,k}$ timber/16	34,7	$R_{1,k}$ timber/8
	SBL screws	$\varnothing 5,0 \times 50$		-		29,3	
pattern 3	LBA nails	$\varnothing 4,0 \times 60$	21	14,7		-	
	SBL screws	$\varnothing 5,0 \times 50$		14,7		-	
pattern 5	LBA nails	$\varnothing 4,0 \times 60$	21	14,7	-		
	SBL screws	$\varnothing 5,0 \times 50$		14,7	-		

## CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

configuration on concrete	fastening holes $\varnothing 13$			no washer pattern 3-5		washer pattern 2	
	type	$\varnothing \times L$ [mm]	$n_H$ pcs	$R_{1,d}$ concrete [kN]	$K_{t//}$	$R_{1,d}$ concrete [kN]	$K_{t//}$
• uncracked	V-NEX 5.8	M12 x 195	2	39,0	1,11	34,2	1,23
	H-NEX 5.8	M12 x 195		50,4		45,5	
• cracked	V-NEX 5.8	M12 x 195		21,8		19,1	
	H-NEX 5.8	M12 x 195		42,3		37,0	
• seismic	H-NEX 8.8	M12 x 195		16,4		14,8	
		M12 x 245		22,0		18,9	
	EPO-FIX 8.8	M12 x 195	26,2	22,9			

## ANCHORS INSTALLATION PARAMETERS

anchor type		$d_0$ [mm]	no washer				washer			
	[mm]		$h_{ef}$ [mm]	$h_{nom}$ [mm]	$h_1$ [mm]	$h_{min}$ [mm]	$h_{ef}$ [mm]	$h_{nom}$ [mm]	$h_1$ [mm]	$h_{min}$ [mm]
V-NEX 5.8	M12 x 195	14	170	170	175	200	165	165	170	200
H-NEX 5.8	M12 x 195		170	170	175	200	165	165	170	200
H-NEX 8.8	M12 x 195		170	170	175	200	165	165	170	200
	M12 x 245		220	220	225	250	210	210	215	240
EPO-FIX 8.8	M12 x 195		170	170	175	200	165	165	170	200

Precut INA threaded rod, with nut and washer.

MGS threaded rod class 8.8 to be cut to size.

The concrete-side strength values for installation with a washer were calculated assuming a  $t_{fix}$  thickness of 11 mm. For installation without washer, a  $t_{fix}$  value of 3 mm was assumed.

## GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

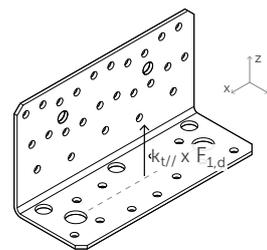
## ANCHORS VERIFICATION FOR STRESS LOADING $F_1$

### INSTALLATION WITH AND WITHOUT JOKER WASHER

Fastening elements to the concrete through anchors shall be verified according to the load acting on the anchor, which can be evaluated through the geometric parameters on the table ( $k_t$ ).

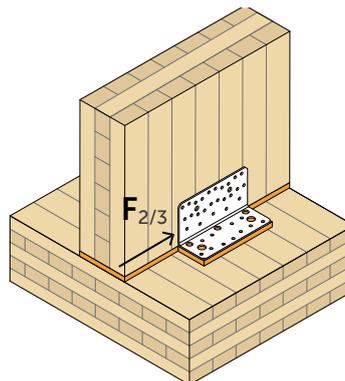
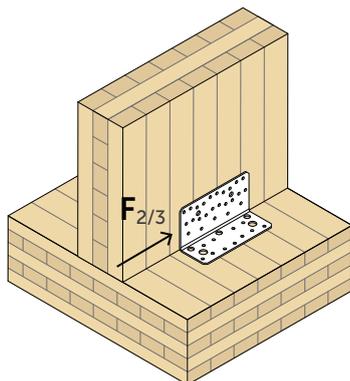
The anchor group must be verified for:

$$N_{sd,z} = k_{t//} \times F_{1,d}$$



## STRUCTURAL VALUES | SHEAR JOINT $F_{2/3}$ | TIMBER-TO-TIMBER

JKR100100 | JKR15080 | NINO15080S | JKR100200



### TIMBER STRENGTH

CODE	configuration on timber	type	fastening holes			no XYLOFON	XYLOFON	$K_{2/3,ser}$ [kN/mm]
			$\varnothing \times L$ [mm]	$n_V$ pcs	$n_H$ pcs	$R_{2/3,k}$ timber [kN]	$R_{2/3,k}$ timber [kN]	
JKR100100	pattern 1 <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	14	13 + 2 VGS $\varnothing 9 \times 140$	38,1	34,6	$R_{2/3,k}$ timber/5
		SBL screws	$\varnothing 5,0 \times 50$			18,5	16,9	
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	14	13	17,2	9,4	
		SBL screws	$\varnothing 5,0 \times 50$			9,5	7,4	
	pattern 3	LBA nails	$\varnothing 4,0 \times 60$	8	13	9,8	8,9	
		SBL screws	$\varnothing 5,0 \times 50$			9,0	7,4	
	pattern 4	LBA nails	$\varnothing 4,0 \times 60$	8	13	11,3	9,4	
		SBL screws	$\varnothing 5,0 \times 50$			9,5	7,4	
	pattern 5	LBA nails	$\varnothing 4,0 \times 60$	4	13	9,8	8,9	
		SBL screws	$\varnothing 5,0 \times 50$			9,0	7,4	
JKR15080	pattern <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	20	11 + 3 VGS $\varnothing 9 \times 140$	38,1	34,6	$R_{2/3,k}$ timber/5
		SBL screws	$\varnothing 5,0 \times 50$			27,6	25,5	
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	20	11	15,5	13,0	
		SBL screws	$\varnothing 5,0 \times 50$			13,1	10,2	
	pattern 3	LBA nails	$\varnothing 4,0 \times 60$	10	11	13,3	12,3	
		SBL screws	$\varnothing 5,0 \times 50$			12,3	10,1	
	pattern 4	LBA nails	$\varnothing 4,0 \times 60$	10	11	15,5	13,0	
		SBL screws	$\varnothing 5,0 \times 50$			13,1	10,2	
	pattern 5	LBA nails	$\varnothing 4,0 \times 60$	5	11	12,7	11,8	
		SBL screws	$\varnothing 5,0 \times 50$			11,2	10,0	
NINO15080S	pattern 1	KGL EVO	$\varnothing 8,0 \times 100$	8	5	35,0	35,0	$R_{2/3,k}$ timber/5
	pattern 2	KGL EVO	$\varnothing 8,0 \times 100$	4	3	25,8	25,8	
JKR100200	pattern 1 <sup>(1)</sup>	LBA nails	$\varnothing 4,0 \times 60$	21	13 + 3 VGS $\varnothing 9 \times 140$	26,7	18,7	$R_{2/3,k}$ timber/6
		SBL screws	$\varnothing 5,0 \times 50$			18,7	17,2	

### NOTES:

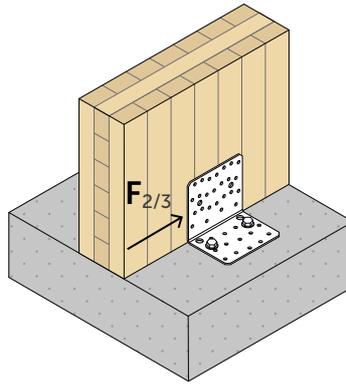
<sup>(1)</sup> The load-bearing capacity values listed are valid for installation with  $\varnothing 9$  VGS screws of length  $\geq 140$  mm. For screws of shorter length L,  $R_{2/3,k}$  timber must be multiplied by a reduction factor of L/140.

### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

## STRUCTURAL VALUES | SHEAR JOINT $F_{2/3}$ | TIMBER-TO-CONCRETE

JKR100100



### TIMBER STRENGTH

configuration on timber	fastening holes $\varnothing 5$			$R_{2/3,k}$ timber [kN]	$K_{2/3,ser}$ [kN/mm]	
	type	$\varnothing \times L$ [mm]	$n_V$ pcs			
pattern 6	LBA nails	$\varnothing 4,0 \times 60$	14	18,1	$R_{2/3,k}$ timber/5	
	SBL screws	$\varnothing 5,0 \times 50$		7,2		
pattern 7	LBA nails	$\varnothing 4,0 \times 60$	14	18,1		
	SBL screws	$\varnothing 5,0 \times 50$		9,8		
pattern 8	LBA nails	$\varnothing 4,0 \times 60$	8	5,8		
	SBL screws	$\varnothing 5,0 \times 50$		4,9		
pattern 10	LBA nails	$\varnothing 4,0 \times 60$	8	11,2		
	SBL screws	$\varnothing 5,0 \times 50$		9,4		
pattern 11	LBA nails	$\varnothing 4,0 \times 60$	4	9,3		$R_{2/3,k}$ timber/2
	SBL screws	$\varnothing 4,0 \times 60$		4,2		
pattern 12	LBA nails	$\varnothing 4,0 \times 60$	4	9,3		
	SBL screws	$\varnothing 5,0 \times 50$		6,3		

### CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

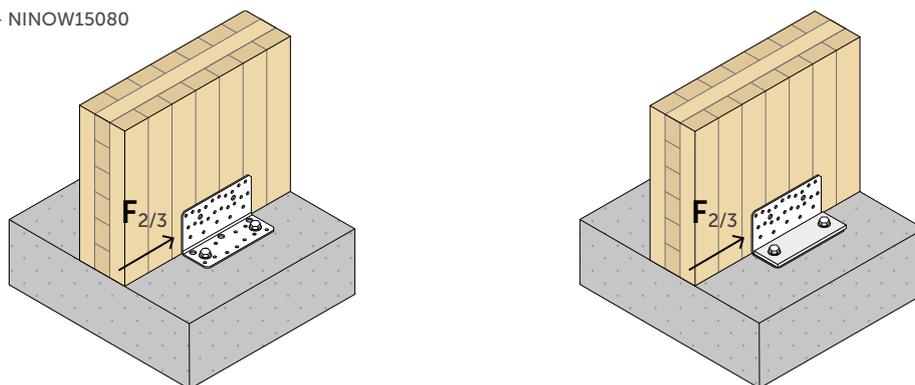
configuration on concrete	fastening holes $\varnothing 14$			$R_{2/3,d}$ concrete [kN]	$e_y$ [mm]
	type	$\varnothing \times L$ [mm]	$n_H$ pcs		
• uncracked	V-NEX 5.8	M12 x 140	2	30,3	30
	SKR	12 x 90		22,8	
	AB1	M12 x 100		30,7	
• cracked	V-NEX 5.8	M12 x 140	2	26,9	
	H-NEX 5.8	M12 x 140		30,2	
	SKR	12 x 90		15,9	
	AB1	M12 x 100		26,5	
• seismic	H-NEX 8.8	M12 x 140	2	14,8	
		M12 x 195		21,0	
	EPO-FIX 8.8	M12 x 140		23,8	
	SKR	12 x 90		6,0	
	AB1	M12 x 100		7,6	

### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

# STRUCTURAL VALUES | SHEAR JOINT $F_{2/3}$ | TIMBER-TO-CONCRETE

JKR100100 | JKR15080 + NINOW15080



## TIMBER STRENGTH

configuration on timber	type	fastening holes $\varnothing 5$		$n_V$ pcs	no washer	washer
		$\varnothing \times L$ [mm]			$R_{2/3,k}$ timber [kN]	$R_{2/3,k}$ timber [kN]
pattern 6	LBA nails	$\varnothing 4,0 \times 60$		10	21,1	26,7
	SBL screws	$\varnothing 5,0 \times 50$			7,9	7,9
pattern 7	LBA nails	$\varnothing 4,0 \times 60$		20	21,3	21,3
	SBL screws	$\varnothing 5,0 \times 50$			17,9	17,9
pattern 8	LBA nails	$\varnothing 4,0 \times 60$		10	11,0	11,0
	SBL screws	$\varnothing 5,0 \times 50$			9,3	9,3
pattern 9	LBA nails	$\varnothing 4,0 \times 60$		10	15,7	15,7
	SBL screws	$\varnothing 5,0 \times 50$			13,2	13,2
pattern 10	LBA nails	$\varnothing 4,0 \times 60$		5	9,3	9,3
	SBL screws	$\varnothing 5,0 \times 50$			6,0	6,0
pattern 11	LBA nails	$\varnothing 4,0 \times 60$		5	10,0	10,0
	SBL screws	$\varnothing 5,0 \times 50$			8,5	8,5

## CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

configuration on concrete	fastening holes $\varnothing 13$			no washer	washer		$e_y$ [mm]	pattern 6 $e_z^{(1)}$ [mm]
	type	$\varnothing \times L$ [mm]	$n_H$ pcs	$R_{2/3,d}$ concrete [kN]	pattern 6 $R_{2/3,d}$ concrete [kN]	pattern 7-8-9-10-11 $R_{2/3,d}$ concrete [kN]		
• uncracked	V-NEX 5.8	M12 x 140	2	34,8	26,5	34,8	30	66,5
	V-NEX 8.8	M12 x 195		47,2	39,2	47,4		
	SKR	12 x 90		29,7	13,8	29,7		
	AB1	M12 x 100		35,2	-	-		
M12 x 120		-	23,4	35,2				
• cracked	V-NEX 5.8	M12 x 140	2	34,4	14,7	33,0		
		M12 x 195		-	21,6	34,8		
	H-NEX 8.8	M12 x 140		47,2	28,5	47,4		
	SKR	12 x 90		20,8	8,7	20,8		
	AB1	M12 x 100		34,3	-	-		
M12 x 120		-	14,4	34,2				
• seismic	H-NEX 8.8	M12 x 140	2	18,4	8,8	17,8		
		M12 x 195		26,2	13,0	26,1		
	EPO-FIX 8.8	M12 x 140		28,5	14,1	28,4		
	SKR	12 x 90		7,8	-	7,8		
AB1	M12 x 120	8,8	-	8,8				

### NOTES:

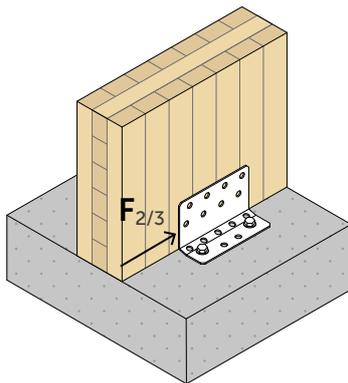
<sup>(1)</sup> For patterns 7-8-9-10-11, eccentricity  $e_z$  is assumed to be zero, in accordance with ETA-22/0089.

### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

## STRUCTURAL VALUES | SHEAR JOINT $F_{2/3}$ | TIMBER-TO-CONCRETE

NINO15080S



### TIMBER STRENGTH

configuration on timber	type	fastening holes $\text{Ø}10,5$		$R_{2/3,k}$ timber [kN]
		$\text{Ø} \times L$ [mm]	$n_V$ pcs	
pattern 3	KGL EVO	$\text{Ø}8,0 \times 100$	8	41,3
pattern 4	KGL EVO	$\text{Ø}8,0 \times 100$	4	22,6

### CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

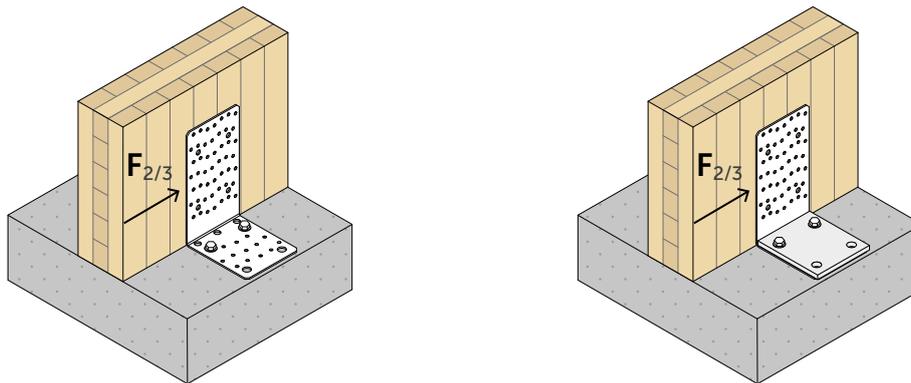
configuration on concrete	type	fastening holes $\text{Ø}13$		$R_{2/3,d}$ concrete [kN]	$e_y$ [mm]
		$\text{Ø} \times L$ [mm]	$n_H$ pcs		
• uncracked	V-NEX 5.8	M12 x 140	2	34,8	30
	V-NEX 8.8	M12 x 195		47,2	
	SKR	12 x 90		29,7	
	AB1	M12 x 100		35,2	
• cracked	V-NEX 5.8	M12 x 140	2	34,4	30
	H-NEX 8.8	M12 x 140		47,2	
	SKR	12 x 90		20,8	
	AB1	M12 x 100		34,3	
• seismic	H-NEX 8.8	M12 x 140	2	18,4	30
	EPO-FIX 8.8	M12 x 195		26,2	
		M12 x 140		28,5	
	SKR	12 x 90		7,8	
AB1	M12 x 120	8,8			

### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

# STRUCTURAL VALUES | SHEAR JOINT $F_{2/3}$ | TIMBER-TO-CONCRETE

JKR100200 | JKR100200 + NINOW100200



## TIMBER STRENGTH

configuration on timber	fastening holes Ø5			no washer	washer
	type	Ø x L [mm]	$n_V$ pcs	$R_{2/3,k}$ timber [kN]	$R_{2/3,k}$ timber [kN]
pattern 2	LBA nails	Ø4,0 x 60	14	-	<b>11,6</b>
	SBL screws	Ø5,0 x 50		-	<b>3,5</b>
pattern 3	LBA nails	Ø4,0 x 60	21	<b>10,7</b>	-
	SBL screws	Ø5,0 x 50		<b>6,0</b>	-
pattern 5	LBA nails	Ø4,0 x 60	21	<b>16,9</b>	-
	SBL screws	Ø5,0 x 50		<b>8,3</b>	-

## CONCRETE STRENGTH

Strength values of some of the possible fastening solutions.

configuration on concrete	fastening holes Ø13			no washer pattern 3-5	washer pattern 2	$e_y$ [mm]	pattern 2 $e_z^{(1)}$ [mm]
	type	Ø x L [mm]	$n_H$ pcs	$R_{2/3,d}$ concrete [kN]	$R_{2/3,d}$ concrete [kN]		
• uncracked	V-NEX 5.8	M12 x 140	2	<b>30,3</b>	<b>11,4</b>	30	174,5
	V-NEX 8.8	M12 x 195		<b>41,2</b>	<b>12,5</b>		
	SKR	12 x 90		<b>22,7</b>	-		
	AB1	M12 x 100		-	<b>4,6</b>		
M12 x 120		<b>30,7</b>	-				
• cracked	V-NEX 5.8	M12 x 140	2	-	<b>7,9</b>		
		M12 x 195		<b>38,1</b>	<b>6,8</b>		
	H-NEX 8.8	M12 x 140		<b>41,2</b>	<b>14,3</b>		
	SKR	12 x 90		<b>15,9</b>	-		
	AB1	M12 x 100		<b>26,4</b>	-		
		M12 x 120		-	<b>4,6</b>		
• seismic	H-NEX 8.8	M12 x 140	2	<b>14,8</b>	-		
		M12 x 195		<b>21,0</b>	<b>5,0</b>		
	EPO-FIX 8.8	M12 x 140		<b>23,7</b>	<b>5,5</b>		
	SKR	12 x 90		<b>6,0</b>	-		
	AB1	M12 x 120		<b>7,7</b>	-		

### NOTES:

<sup>(1)</sup> For patterns 3-5, eccentricity  $e_z$  is assumed to be zero.

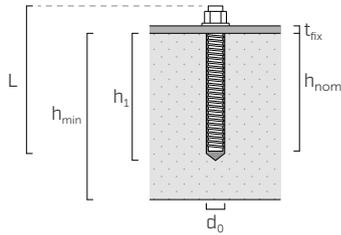
### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

## CHEMICAL ANCHORS INSTALLATION PARAMETERS

anchor type		d <sub>0</sub> [mm]	h <sub>min</sub> [mm]	no washer			washer		
				h <sub>ef</sub> [mm]	h <sub>nom</sub> [mm]	h <sub>1</sub> [mm]	h <sub>ef</sub> [mm]	h <sub>nom</sub> [mm]	h <sub>1</sub> [mm]
V-NEX 5.8	M12 x 140	14	200	120	120	125	115	115	120
	M12 x 195	14		170	170	175	170	170	175
V-NEX 8.8	M12 x 195	14		170	170	175	170	170	175
H-NEX 8.8	M12 x 140	14		120	120	125	115	115	120
	M12 x 195	14		170	170	175	170	170	175
EPO-FIX 8.8	M12 x 140	14		120	120	125	115	115	120
SKR	12 x 90	10		64	88	110	64	82	105
	12 x 110	10		-	-	-	64	99	120
AB1	M12 x 100	12		70	80	85	-	-	-
	M12 x 120	12		-	-	-	70	80	85

Pre-cut INA class 5.8 / 8.8 threaded rod, including nut and washer.



- t<sub>fix</sub> fastened plate thickness
- h<sub>nom</sub> nominal anchoring depth
- h<sub>ef</sub> effective anchoring depth
- h<sub>1</sub> minimum hole depth
- d<sub>0</sub> hole diameter in the concrete support
- h<sub>min</sub> concrete minimum thickness

## ANCHORS VERIFICATION FOR STRESS LOADING F<sub>2/3</sub>

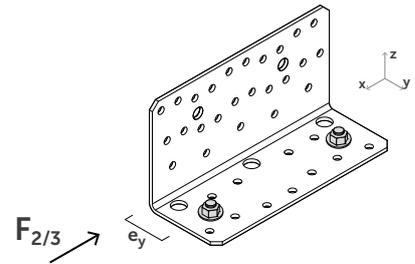
### INSTALLATION WITHOUT WASHER

Fastening elements to the concrete through anchors shall be verified according to the load acting on the anchor, which can be evaluated through the tabulated geometric parameters (e).

The anchor group must be verified for:

$$V_{Sd,x} = F_{2/3,d}$$

$$M_{Sd,z} = F_{2/3,d} \cdot e_y$$



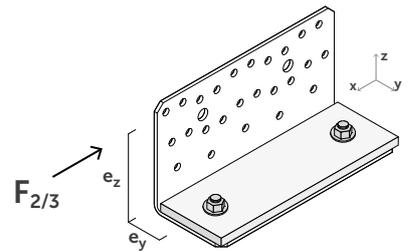
### INSTALLATION WITH WASHER

In the case of installation with washer, the fastening elements to the concrete through anchors must be verified according to the load acting on the anchor, which can be evaluated through the tabulated geometric parameters (e).

The anchor group must be verified for:

$$V_{Sd,x} = F_{2/3,d}$$

$$M_{Sd,z} = F_{2/3,d} \cdot e_y$$

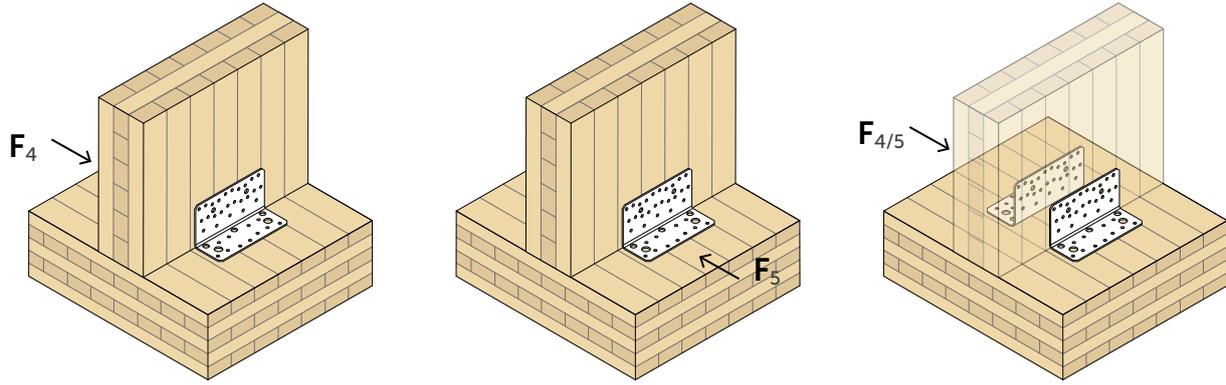


### GENERAL PRINCIPLES:

For the general principles of calculation, see page 22.

STRUCTURAL VALUES |  $F_4$  -  $F_5$  -  $F_{4/5}$  | TIMBER-TO-TIMBER

JKR100100 | JKR15080 | NINO15080S | JKR100200



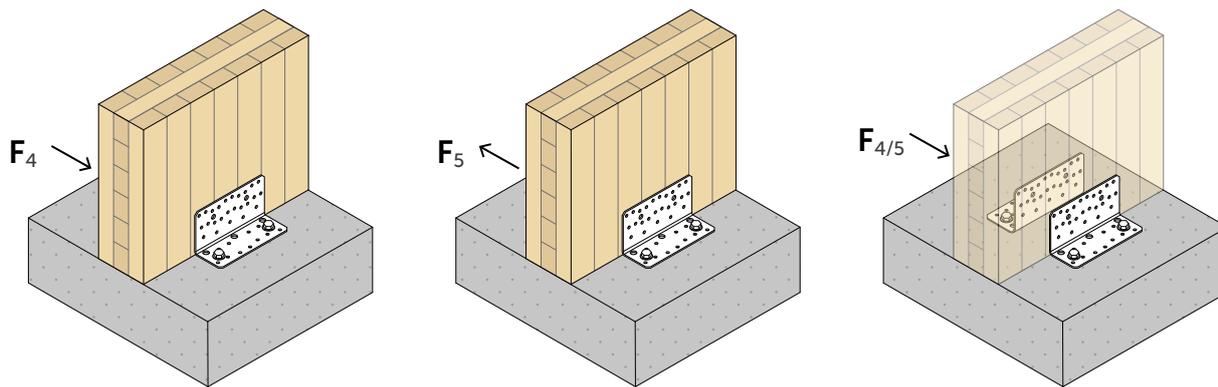
CODE	configuration	TIMBER			$R_{4,k}$ timber [kN]	$R_{5,k}$ timber [kN]	$R_{4/5,k}$ timber [kN]	
		fastening holes type	$\varnothing \times L$ [mm]	$n_V$ pcs				$n_H$ pcs
JKR100100	pattern 1	LBA nails	$\varnothing 4,0 \times 60$	14	13 + 2 VGS $\varnothing 9 \times 140$	23,2	1,8	25,0
		SBL screws	$\varnothing 5,0 \times 50$			22,0	1,8	23,8
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	14	13	23,2	1,8	25,0
		SBL screws	$\varnothing 5,0 \times 50$			22,0	1,8	23,8
	pattern 3	LBA nails	$\varnothing 4,0 \times 60$	8	13	7,4	1,8	9,2
		SBL screws	$\varnothing 5,0 \times 50$			7,4	1,8	9,2
	pattern 4	LBA nails	$\varnothing 4,0 \times 60$	8	13	23,2	3,4	26,6
		SBL screws	$\varnothing 5,0 \times 50$			22,0	3,4	25,4
	pattern 5	LBA nails	$\varnothing 4,0 \times 60$	4	13	9,2	3,4	12,6
		SBL screws	$\varnothing 5,0 \times 50$			9,2	3,4	12,6
JKR15080	pattern 1	LBA nails	$\varnothing 4,0 \times 60$	20	11 + 3 VGS $\varnothing 9 \times 140$	22,3	2,5	24,8
		SBL screws	$\varnothing 5,0 \times 50$			21,6	2,5	24,1
	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	20	11	22,3	2,5	24,8
		SBL screws	$\varnothing 5,0 \times 50$			21,6	2,5	24,1
	pattern 3	LBA nails	$\varnothing 4,0 \times 60$	10	11	10,2	2,5	12,7
		SBL screws	$\varnothing 5,0 \times 50$			10,2	2,5	12,7
	pattern 4	LBA nails	$\varnothing 4,0 \times 60$	10	11	18,7	4,8	23,5
		SBL screws	$\varnothing 5,0 \times 50$			17,7	4,8	22,5
	pattern 5	LBA nails	$\varnothing 4,0 \times 60$	5	11	14,7	4,8	19,5
		SBL screws	$\varnothing 5,0 \times 50$			14,7	4,8	19,5
NINO15080S	pattern 1	KGL EVO	$\varnothing 8,0 \times 100$	8	5	18,9	2,4	21,3
	pattern 2	KGL EVO	$\varnothing 8,0 \times 100$	4	3	14,2	2,4	16,6
JKR100200	pattern 1	LBA nails	$\varnothing 4,0 \times 60$	21	13 + 3 VGS $\varnothing 9 \times 140$	19,1	2,6	21,7
		SBL screws	$\varnothing 5,0 \times 50$			19,1	2,6	21,7

NOTES:

- The  $F_4$ ,  $F_5$ ,  $F_{4/5}$  values in the table are valid for the acting stress calculation eccentricity  $e=0$  (timber elements prevented from rotating).
- Refer to ETA-22/0089 for  $K_{4,ser}$  stiffness values in timber-to-timber and timber-to-concrete configuration.
- The strength values listed are also valid for installation with XYLOFON acoustic profile below the horizontal flange.

## STRUCTURAL VALUES | $F_4$ - $F_5$ - $F_{4/5}$ | TIMBER-TO-TIMBER

JKR100100 | JKR15080 | NINO15080S | JKR100200



CODE	configuration	TIMBER					
		fastening holes	$R_{4,k}$ timber	$R_{5,k}$ timber	$R_{4/5,k}$ timber		
		type	$\varnothing \times L$ [mm]	$n_v$ pcs	[kN]	[kN]	[kN]
JKR100100	pattern 6	LBA nails	$\varnothing 4,0 \times 60$	14	6,2	1,1	7,4
		SBL screws	$\varnothing 5,0 \times 50$		6,2	1,1	7,4
	pattern 7	LBA nails	$\varnothing 4,0 \times 60$	14	23,2	1,8	25,0
		SBL screws	$\varnothing 5,0 \times 50$		22,0	1,8	23,8
	pattern 8	LBA nails	$\varnothing 4,0 \times 60$	8	3,8	1,1	5,0
		SBL screws	$\varnothing 5,0 \times 50$		3,8	1,1	5,0
	pattern 10	LBA nails	$\varnothing 4,0 \times 60$	8	14,4	3,4	17,8
		SBL screws	$\varnothing 5,0 \times 50$		13,6	3,4	17,0
	pattern 11	LBA nails	$\varnothing 4,0 \times 60$	4	6,3	1,8	8,1
		SBL screws	$\varnothing 5,0 \times 50$		5,9	1,8	7,7
	pattern 12	LBA nails	$\varnothing 4,0 \times 60$	4	9,2	3,4	12,6
		SBL screws	$\varnothing 5,0 \times 50$		9,2	3,4	12,6
JKR15080	pattern 6	LBA nails	$\varnothing 4,0 \times 60$	10	8,7	1,6	10,3
		SBL screws	$\varnothing 5,0 \times 50$		8,7	1,6	10,3
	pattern 7	LBA nails	$\varnothing 4,0 \times 60$	20	22,3	2,5	24,8
		SBL screws	$\varnothing 5,0 \times 50$		21,6	2,5	24,1
	pattern 8	LBA nails	$\varnothing 4,0 \times 60$	10	10,2	2,5	12,7
		SBL screws	$\varnothing 5,0 \times 50$		10,2	2,5	12,7
	pattern 9	LBA nails	$\varnothing 4,0 \times 60$	10	18,7	4,8	23,5
		SBL screws	$\varnothing 5,0 \times 50$		17,7	4,8	22,5
	pattern 10	LBA nails	$\varnothing 4,0 \times 60$	5	8,4	2,5	10,9
		SBL screws	$\varnothing 5,0 \times 50$		7,9	2,5	10,4
	pattern 11	LBA nails	$\varnothing 4,0 \times 60$	5	11,6	4,8	16,4
		SBL screws	$\varnothing 5,0 \times 50$		11,6	4,8	16,4
NINO15080S	pattern 3	KGL EVO	$\varnothing 8,0 \times 100$	8	18,9	2,3	21,3
	pattern 4	KGL EVO	$\varnothing 8,0 \times 100$	4	14,2	1,4	15,6
JKR100200	pattern 2	LBA nails	$\varnothing 4,0 \times 60$	14	2,1	0,7	2,8
		SBL screws	$\varnothing 5,0 \times 50$		2,1	0,7	2,8
	pattern 3	LBA nails	$\varnothing 4,0 \times 60$	21	2,6	0,8	3,4
		SBL screws	$\varnothing 5,0 \times 50$		2,6	0,8	3,4
	pattern 5	LBA nails	$\varnothing 4,0 \times 60$	21	4,9	1,2	6,1
SBL screws	$\varnothing 5,0 \times 50$	4,9	1,2		6,1		

### NOTES:

- The  $F_4$ ,  $F_5$ ,  $F_{4/5}$  values in the table are valid for the acting stress calculation eccentricity  $e=0$  (timber elements prevented from rotating).
- Refer to ETA-22/0089 for  $K_{4,ser}$  stiffness values in timber-to-timber and timber-to-concrete configuration.

## GENERAL PRINCIPLES:

- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-22/0089.
- Design values can be obtained from values in the table as follows:

$$R_d = \min \left\{ \begin{array}{l} \frac{R_{k \text{ timber}} \cdot k_{mod}}{\gamma_M} \\ R_{d \text{ concrete}} \end{array} \right.$$

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

- The characteristic values of the load-bearing capacity  $R_{k \text{ timber}}$  are determined for the combined timber-side and steel-side failure.
- Installation with nails and screws of shorter length than proposed in the table is possible. In this case, the bearing capacity values  $R_{k \text{ timber}}$  must be multiplied by the following reductive factor  $k_F$ :

- for nails

$$k_F = \min \left\{ \frac{F_{v,short,Rk}}{2,83 \text{ kN}} ; \frac{F_{ax,short,Rk}}{1,39 \text{ kN}} \right\}$$

- for screws

$$k_F = \min \left\{ \frac{F_{v,short,Rk}}{2,26 \text{ kN}} ; \frac{F_{ax,short,Rk}}{2,69 \text{ kN}} \right\}$$

$F_{v,short,Rk}$  = characteristic shear strength of the nail or screw

$F_{ax,short,Rk}$  = characteristic withdrawal strength of the nail or screw

- Dimensioning and verification of timber and concrete elements must be carried out separately. Verify that there are no brittle failures before reaching the connection strength.
- Structural elements in timber, to which the connection devices are fastened, must be prevented from rotating.
- A timber density of  $\rho_k = 350 \text{ kg/m}^3$  was considered for the calculation process. For higher  $\rho_k$  values, the strength on timber side can be converted by the  $k_{dens}$  value:

$$k_{dens} = \left( \frac{\rho_k}{350} \right)^{0,5} \quad \text{for } 350 \text{ kg/m}^3 \leq \rho_k \leq 420 \text{ kg/m}^3 \qquad k_{dens} = \left( \frac{\rho_k}{350} \right)^{0,5} \quad \text{for LVL with } \rho_k \leq 500 \text{ kg/m}^3$$

- In the calculation phase, a strength class of C25/30 concrete with thin reinforcement was considered, in the absence of spacing and distances from the edge and minimum thickness indicated in the tables listing the installation parameters 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.
- The anchors seismic design was carried out in performance category C2, without ductility requirements on anchors (option a2) and elastic design according to EN 1992:2018, with  $\mu_{sus} = 0,6$ . For chemical anchors it is assumed that the annular space between the anchor and the plate hole is filled ( $\alpha_{gap} = 1$ ).
- The product ETAs for the anchors used in the concrete-side strength calculation are indicated below:
  - VIN-FIX chemical anchor according to ETA-20/0363;
  - HYB-FIX chemical anchor according to ETA-20/1285;
  - EPO-FIX chemical anchor according to ETA-23/0419;
  - SKR screw-in anchor according to ETA-24/0024;
  - AB1 mechanical anchor according to ETA-17/0481 (M12).

## INTELLECTUAL PROPERTY

- JOKER angle brackets are protected by the following patents:
  - EP3.568.535;
  - US10.655.320;
  - CA3.049.483.
- They are also protected by the following Registered Community Designs:
  - RCD 015032190-0016;
  - RCD 015032190-0017;
  - RCD 015032190-0018;
  - RCD 015051914-0001.