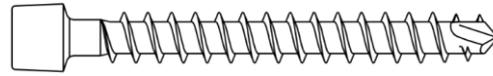
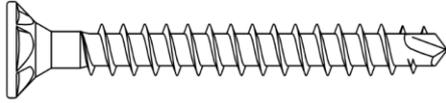


**MAIN/SECONDARY BEAM CONNECTION  
WITH ASSY®PLUS VG SCREWS  
SOFTWOOD - SOFTWOOD**



**CONNECTS THE WOOD -  
SIMPLY AND IDEAL  
WHERE THE JOIN IS**

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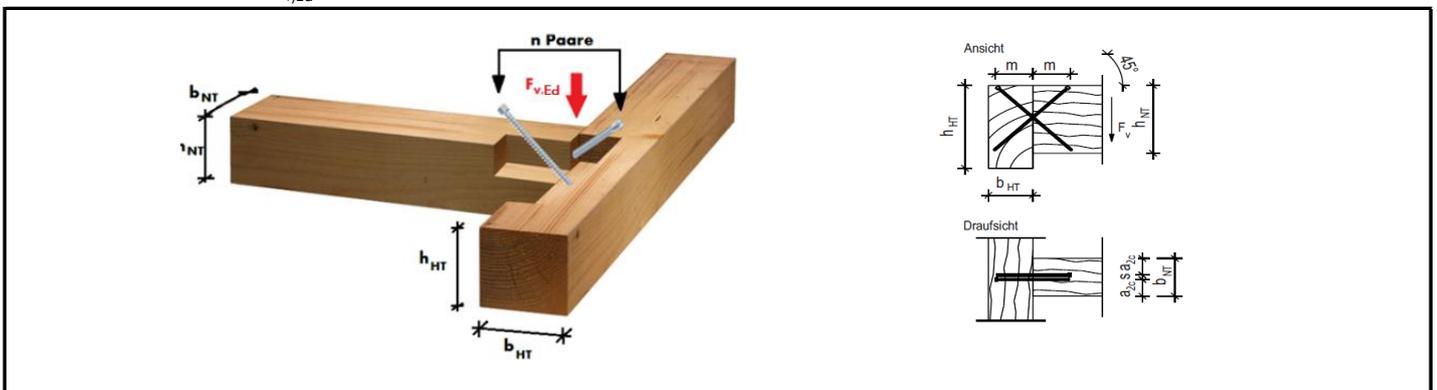
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NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## USING THE TABLE VALUES - EXAMPLE

### Boundary conditions

System:	Main-secondary beam connection, without fire consideration
Main beam:	b/h = 160 / 200mm laminated wood, strength class GL 24h in accordance with EN 14080 ( $\rho_k = 385 \text{ kg/m}^3$ )
Secondary beam:	b/h = 120 / 200mm laminated wood, strength class GL 24h in accordance with EN 14080 ( $\rho_k = 385 \text{ kg/m}^3$ )
Basis for calculation:	EC5 or DIN EN 1995-1-1:2010-12 and national German application document DIN 20000-6:2012-06; ETA-11/0190 ASSY wood screws.
Design force:	$F_{v,Ed} = 6.8 \text{ kN}$



**Selected: Würth ASSY plus FT Ø8x220 mm (full thread + drill bit)**

d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
8	220	78	60	156	78	156	99,4	12,37	7,61	C24
								13,35	8,22	GL24h
8	240	85	60	170	85	170	112,5	14,01	8,62	C24
								15,12	9,30	GL24h
8	260	92	60	184	92	184	122,5	15,25	9,38	C24
								16,45	10,12	GL24h
8	280	99	60	198	99	198	132,5	16,49	10,15	C24
								17,80	10,95	GL24h
8	300	106	60	212	106	212	142,5	17,73	10,91	C24
								19,14	11,78	GL24h
8	330	117	60	233	117	233	157,5	19,60	12,06	C24
								21,15	13,02	GL24h

<sup>1)</sup> Zur Bemessung maßgebende Gewindelänge

### Proof

$$F_{v,Rd} = 8,2 \text{ kN}$$

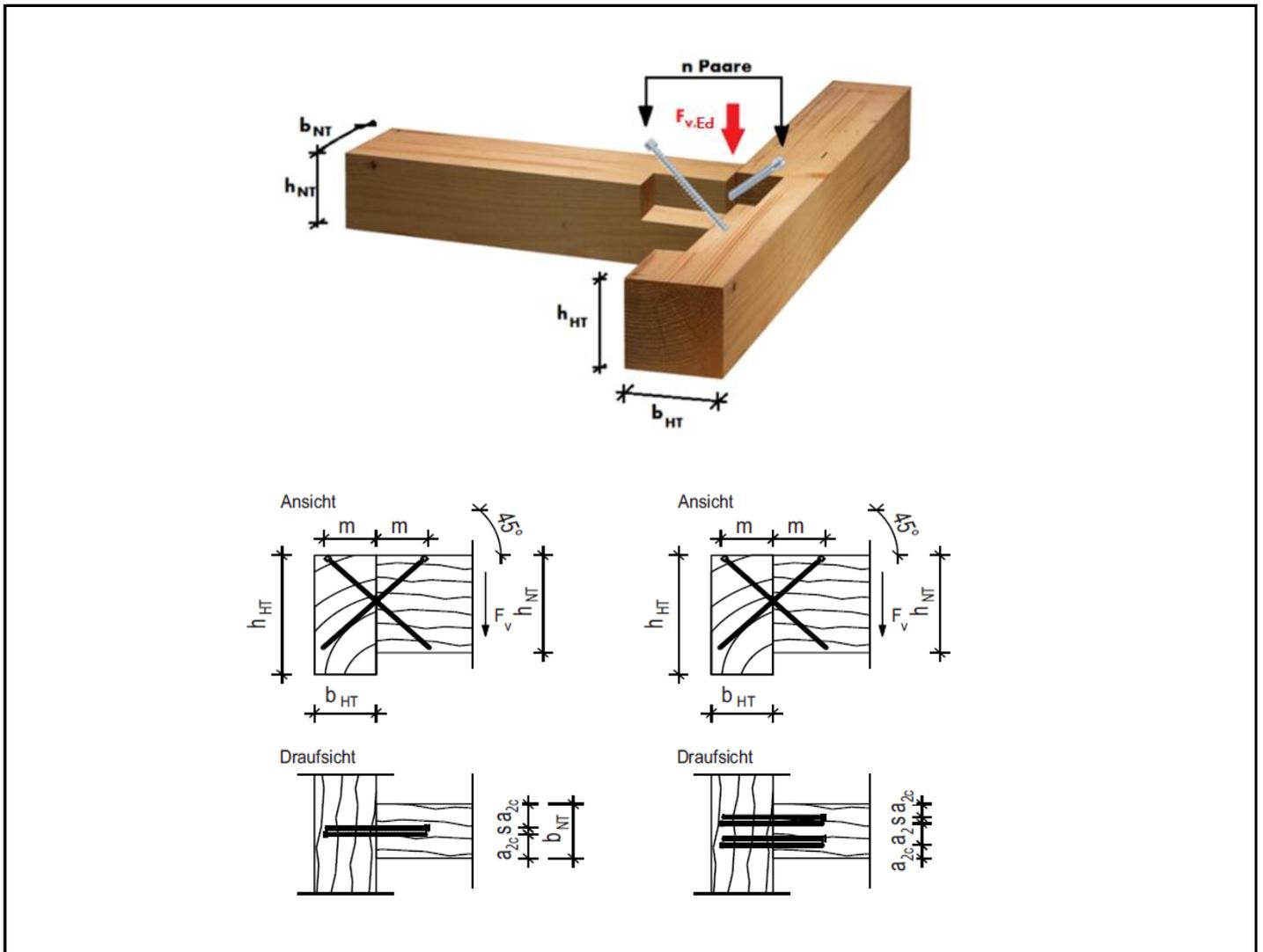
$$F_{v,Ed} = 6,8 \text{ kN}$$

$$\eta = 0,829 < 1,0 \quad \eta = \frac{F_{v,Ed}}{F_{v,Rd}}$$

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## KEY FOR MAIN-SECONDARY BEAM CONNECTION

### Key



$F_{Rk}$	Characteristic load bearing capacity of the connection
$F_{Rd}$	Design value of the load bearing capacity of the connection for $k_{mod} = 0.8$ and $\gamma_M = 1.3$
$F_{Rd}$	Nominal diameter / outer thread diameter of screw
$F_{Rd}$	Screw length
$F_{Rd}$	Mounting dimension
$F_{Rd}$	Minimum width of the secondary beam
$F_{Rd}$	Minimum height of the secondary beam
$F_{Rd}$	Minimum width of the main beam
$F_{Rd}$	Minimum height of the main beam

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## KEY FOR MAIN-SECONDARY BEAM CONNECTION

	<b>F<sub>v,Rk</sub></b>	<b>F<sub>v,Rd</sub></b>	
	<b>kN</b>	<b>kN</b>	
C24 softwood	8,93	5,49	<b>Thread pull-out</b>
Gl24h laminated wood	9,64	5,93	
	11,97	7,37	
	12,92	7,95	
	15,53	9,56	
	16,76	10,31	
	17,35	10,68	
	18,72	11,52	
	18,92	11,64	
	20,42	12,57	

### Notes

- Load-bearing capacities apply for a characteristic Bulk density  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$ .

### Bases for calculation

DIN EN 1995-1-1:2010-12

Design and construction of timber structures – Common rules and rules for timber constructions

DIN EN 1995-1-1/NA:2013-08

National Annex – Nationally determined parameters

DIN 20000-6

Application of construction products in structures – Part 6: Dowel-type fasteners and connectors

ETA-11/0190

Würth self-tapping screws for use in timber constructions

EN 14081-1

Timber structures – General requirements

EN 14080

Laminated wood for load bearing purposes, strength classes

EN 338

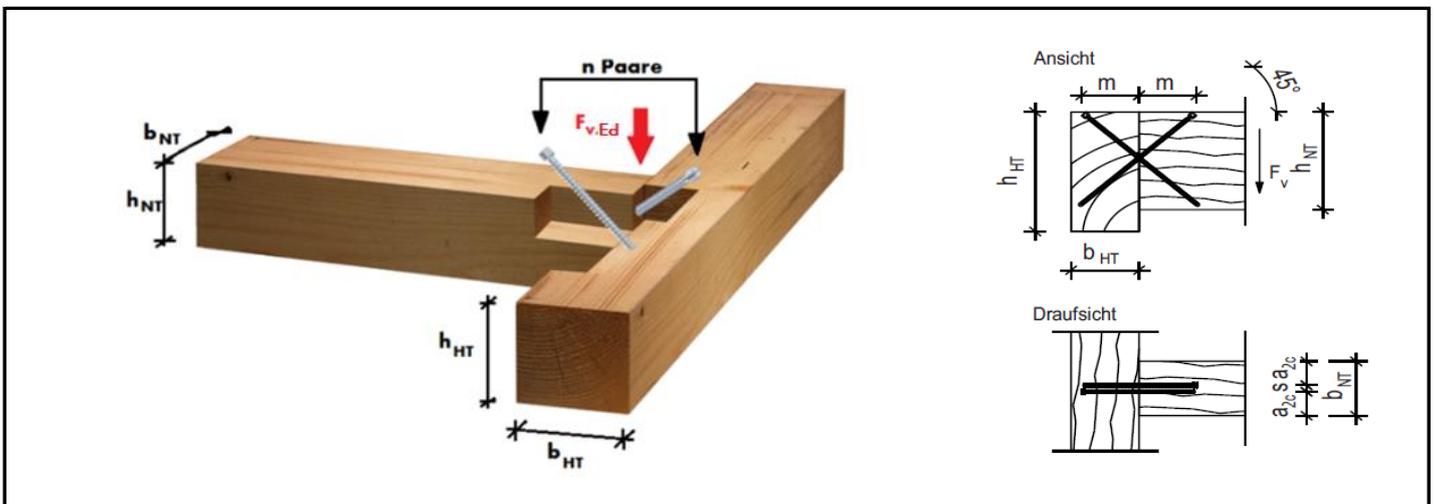
Construction wood for load bearing purposes, strength classes

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

### Boundary conditions

System:	Main-secondary beam connection, without fire consideration
Main beam:	$b/h = 160 / 200\text{mm}$ laminated wood, strength class GL 24h in accordance with EN14080 ( $\rho_k = 385 \text{ kg/m}^3$ )
Secondary beam:	$b/h = 120 / 200\text{mm}$ laminated wood, strength class GL 24h in accordance with EN 14080 ( $\rho_k = 385 \text{ kg/m}^3$ )
Basis for calculation:	EC5 or DIN EN 1995-1-1:2010-12 and national German application document DIN 20000-6:2012-06; ETA 11/0190 ASSY wood screws.
Design force:	$F_{v,Ed} = \quad 6,8 \quad \text{kN}$



### Würth ASSY® plus VG Ø8x220mm (full thread + drill bit)

$d =$	8	mm
$d_h =$	10	mm
$d_1 =$	5	mm
$f_{ax,k} =$	11	N/mm <sup>2</sup>
$f_{tens,k} =$	20000	N
$m =$	80	mm
$n =$	2	Piece

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

### Axial and edge clearances

#### Minimum distances in accordance with ETA-11/0190

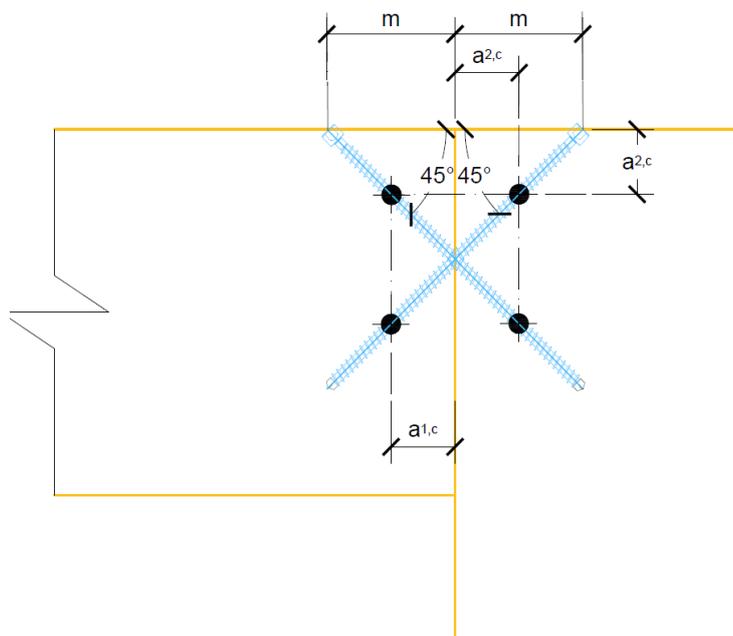
$a_1 =$	40	mm
$a_2 =$	20	mm
$a_{1,c} =$	40	mm
$a_{2,c} =$	24	mm

#### Edge spacings for calculation

$a_{1,c} =$	40	mm
$a_{2,c} =$	24	mm

### Derivation $l_{ef}$

$a_{1,c} =$	40,0	mm	$a_{1,c} = 5 \times d$
$h_k =$	7,5	mm	"Head height"
$l =$	220	mm	"Screw length"
$l_{ef,2} =$	113,1	mm	$l_{ef,2} = a_{1,c} \times \sqrt{2} \times 2$
$l_{ef} =$	99,4	mm	$l_{ef} = l - h_k - l_{ef,2}$



NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

### Pull-out strength or push in strength

$\alpha =$	45	°	"Angle between screw axis and direction of grain"
$k_{ax} =$	1,00		Factor [A.1.3.1]
$f_{head,k} =$	13	N/mm <sup>2</sup>	"Head pull-through parameter [A.1.3.2]"
$f_{tens,k} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$l_{ef} =$	99,40	mm	"Effective thread length in wood minus head height"
$F_{ax,Rk,1} =$	9440	N	$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0,8}$
$F_{ax,Rd,1} =$	<b>5809</b>	N	$k_{mod} = 0,8; \gamma_m = 1,3$
$F_{ax,Rk,2} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$F_{ax,Rd,2} =$	<b>15385</b>	N	$\gamma_m = 1,3$

\* Head pull-through is not taken into account with full thread screws and sufficient thread length in component 1

### Bending the screw

$c_{h,Haupt} =$	100,10	N/mm <sup>2</sup>	$c_h = (0,19 + 0,012 \times d) * \rho_k \times \left(\frac{90^\circ + \alpha}{180^\circ}\right)$ $\alpha =$ Angle between screw axis and direction of grain
$c_{h,Neben} =$	75,08	N/mm <sup>2</sup>	
$c_{h,min} =$	75,08	N/mm <sup>2</sup>	
$I_s =$	30,68	mm <sup>4</sup>	"Moment of inertia" $I_s = \frac{\pi \times d_1^4}{64}$
$E_s =$	210000	N/mm <sup>2</sup>	"E-module"
$N_{ki,k} =$	21993	N	$N_{ki,k} = \sqrt{c_h \times E_s \times I_s}$
$N_{pl,k} =$	19635	N	$N_{pl,k} = \pi \times \frac{d_1^2}{4} \times f_{y,k}$
$\lambda_k =$	0,94		$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$
$k =$	1,13		$k = 0,5 \times [1 + 0,49 \times (\lambda_k - 0,2) + \lambda_k]$
$k_c =$	0,573		$k_c = \frac{1}{k + \sqrt{k^2 - \lambda_k^2}}$
$N_{pl,d} =$	17850	N	
$F_{ax,Rd,3} =$	<b>10220</b>	<b>N</b>	$F_{ax,Rd,3} = N_{pl,d} \times k_c$
$F_{ax,Rd} =$	<b>5809</b>	<b>N</b>	$F_{ax,Rd} = \text{Min}\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$
$F_{v,Rd} =$	<b>8216</b>	<b>N</b>	$F_{v,Rd} = F_{ax,Rd} \times n \times \sin(45)$ (1.0)
$\eta =$	<b>0,83</b>	<b>&lt; 1.0</b>	$\eta = \frac{F_{v,Ed}}{F_{v,Rd}}$

### Proof

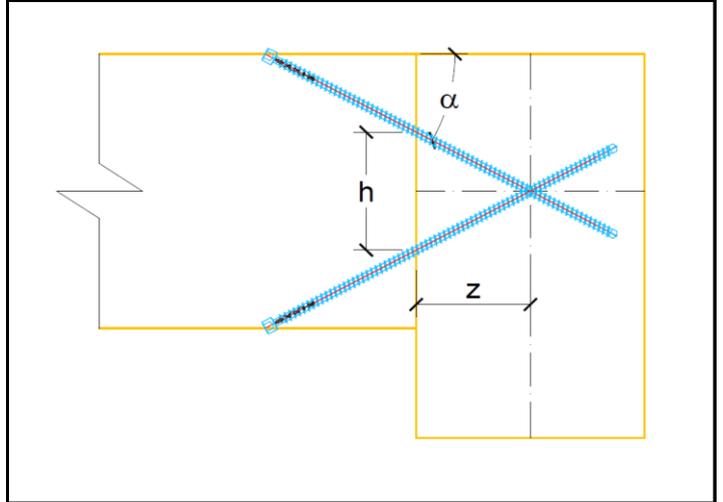
NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

For connections with hinged main beams, the equation (1.0) may only be applied, if the condition (1.1) is satisfied.

$$F_{v,Rd} = F_{ax,Rd} \times n \times \sin(45) \quad (1.0)$$

$$\alpha = \tan^{-1}\left(\frac{h}{2 \times z}\right) \quad (1.1)$$



### Determining the minimum widths of the secondary beam

$$a_{2,c} = 3 \times d$$

A pair of screws:

$$b_{NT} = a_{2,c} + 1.5 \times d + a_{2,c}$$

Two pairs of screws:

$$b_{NT} = a_{2,c} + 5 \times d + 1.5 \times d + a_{2,c}$$

$$*b_{NT} = a_{2,c} + 4 \times d + 1.5 \times d + a_{2,c}$$

Ø6 mm	Ø8 mm	Ø10 mm	Ø12 mm
45 mm	60 mm	75 mm	90 mm
75 mm	100 mm	125 mm	150 mm
69 mm	92 mm	115 mm	138 mm

\*In the case that the screw is so long that the gap of  $7 \times d$  to the edge of the main beam is maintained in accordance with DIN EN 1995-1-1, the gap  $a_2$  can be applied in accordance with the standard for predrilled holes, by doing this, the value  $a_2$  is reduced to  $4 \times d$  compared with the original  $5 \times d$ .

### Edge distances in accordance with DIN EN 1995-1-1

$$a_1 = (4 \times \cos\alpha) \times d = 4 \times d$$

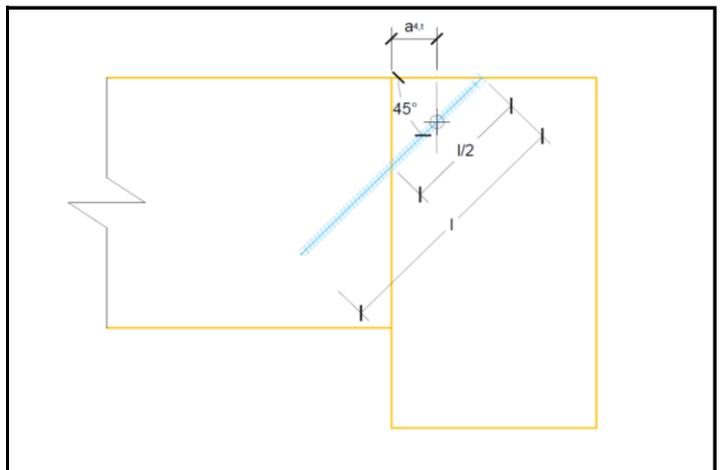
$$a_{4,t} = (3 + 4 \times \sin\alpha) \times d = 7 \times d$$

Edge distances apply for predrilled holes

$$\frac{l}{2} \geq 2 \times a_{4,t} \times \sqrt{2}$$

$$l \geq 4 \times \sqrt{2} \times 7 \times d$$

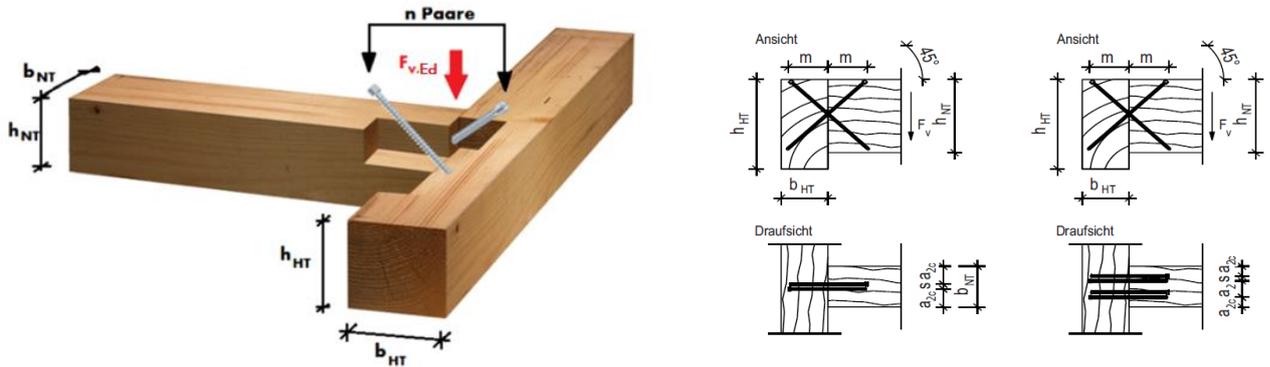
$$l \geq 28 \times \sqrt{2} \times d$$



NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
6	140	60	45	109	59	109	46,0	4,46	2,75	C24
								4,82	2,96	GL24h
6	160	60	45	123	67	123	65,8	6,42	3,95	C24
								6,92	4,26	GL24h
6	180	64	45	137	74	137	85,3	8,32	5,12	C24
								8,98	5,53	GL24h
6	200	71	45	151	81	151	94,9	9,30	5,72	C24
								10,04	6,18	GL24h
6	220	78	45	166	90	166	104,9	10,10	6,22	C24
								10,90	6,71	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

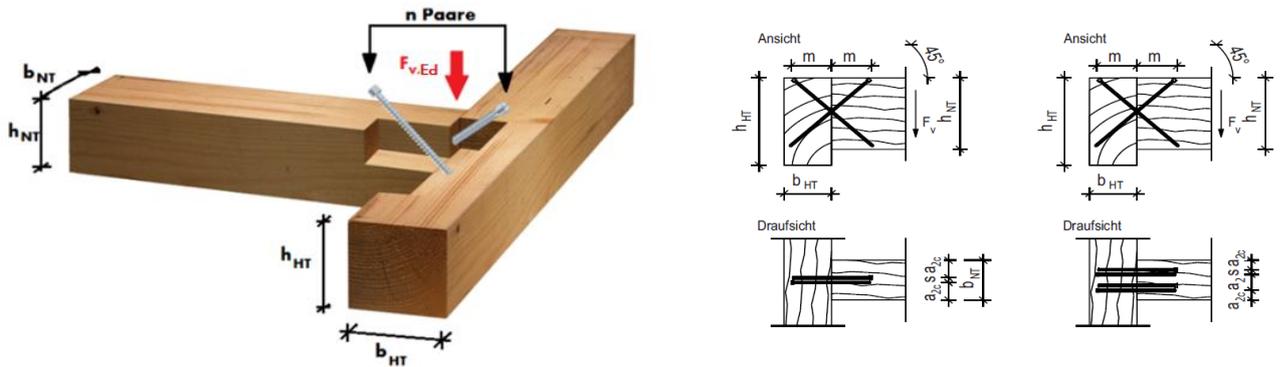
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus Vg Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
6	140	60	75	109	59	109	46,0	8,93	5,49	C24
								9,64	5,93	GL24h
6	160	60	75	123	67	123	65,8	11,97	7,37	C24
								12,92	7,95	GL24h
6	180	64	75	137	74	137	85,3	15,53	9,56	C24
								16,76	10,31	GL24h
6	200	71	75	151	81	151	94,9	17,35	10,68	C24
								18,72	11,52	GL24h
6	220	78	75	166	90	166	104,9	18,92	11,64	C24
								20,42	12,57	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

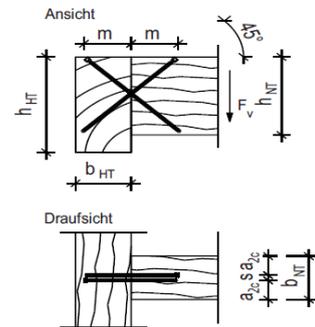
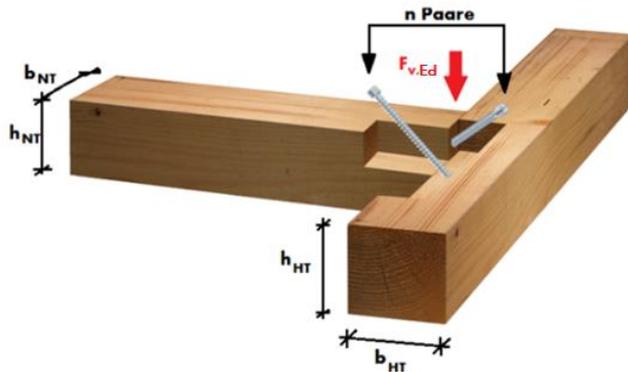
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
8	220	80	60	166	90	166	99,4	12,37	7,61	C24
								13,35	8,22	GL24h
8	240	85	60	180	95	180	112,5	14,01	8,62	C24
								15,12	9,30	GL24h
8	260	92	60	194	102	194	122,5	15,25	9,38	C24
								16,45	10,12	GL24h
8	280	99	60	208	109	208	132,5	16,49	10,15	C24
								17,80	10,95	GL24h
8	300	106	60	222	116	222	142,5	17,73	10,91	C24
								19,14	11,78	GL24h
8	330	117	60	243	127	243	157,5	19,60	12,06	C24
								21,15	13,02	GL24h
8	380	134	60	279	144	279	182,5	22,71	13,98	C24
								24,04	14,79	GL24h
8	430	152	60	314	162	314	207,5	23,49	14,45	C24
								24,04	14,79	GL24h
8	480	170	60	349	180	349	232,5	23,49	14,45	C24
								24,04	14,79	GL24h
8	530	187	60	385	197	385	257,5	23,49	14,45	C24
								24,04	14,79	GL24h
8	580	205	60	420	215	420	282,5	23,49	14,45	C24
								24,04	14,79	GL24h

<sup>1)</sup> For measuring crucial thread length

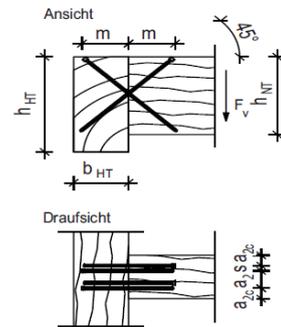
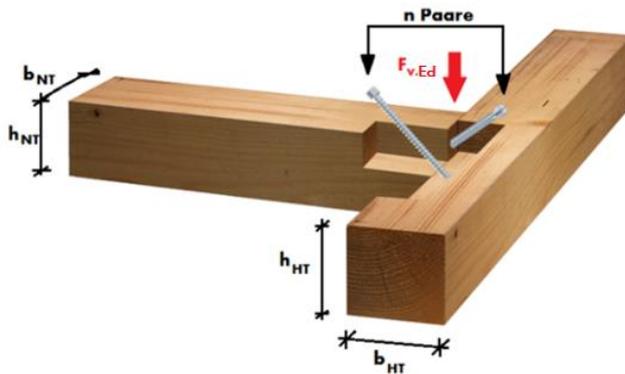
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
8	220	80	100	166	90	166	99,4	23,1	14,20	C24
								24,91	15,33	GL24h
8	240	85	100	180	95	180	112,5	26,1	16,08	C24
								28,20	17,35	GL24h
8	260	92	100	194	102	194	122,5	28,5	17,51	C24
								30,70	18,89	GL24h
8	280	99	100	208	109	208	132,5	30,8	18,94	C24
								33,21	20,44	GL24h
8	300	106	100	222	116	222	142,5	33,1	20,36	C24
								35,71	21,98	GL24h
8	330	117	92	243	127	243	157,5	36,6	22,51	C24
								39,48	24,29	GL24h
8	380	134	92	279	144	279	182,5	42,38	26,08	C24
								44,85	27,60	GL24h
8	430	152	92	314	162	314	207,5	43,82	26,97	C24
								44,85	27,60	GL24h
8	480	170	92	349	180	349	232,5	43,82	26,97	C24
								44,85	27,60	GL24h
8	530	187	92	385	197	385	257,5	43,82	26,97	C24
								44,85	27,60	GL24h
8	580	205	92	420	215	420	282,5	43,82	26,97	C24
								44,85	27,60	GL24h

<sup>1)</sup> For measuring crucial thread length

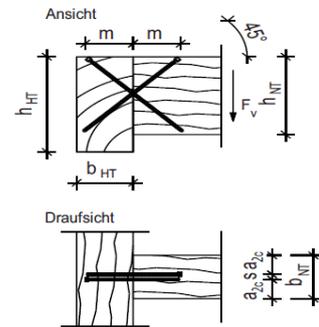
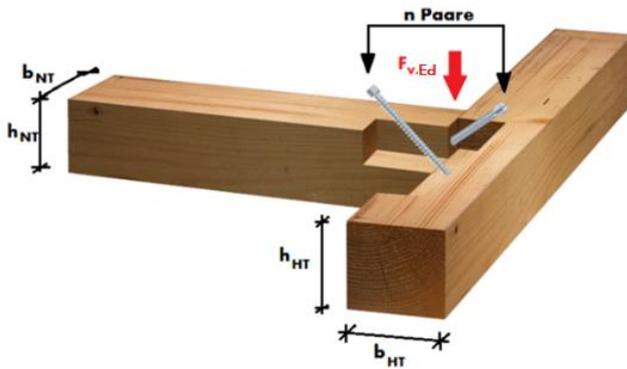
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



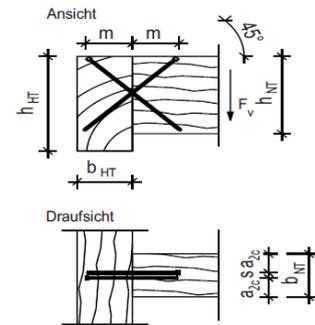
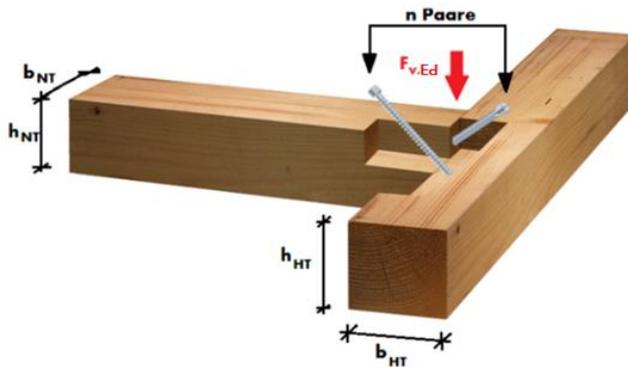
d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
10	240	100	75	180	95	180	90,6	12,80	7,88	C24
								13,81	8,50	GL24h
10	260	100	75	194	102	194	110,5	15,63	9,62	C24
								16,87	10,38	GL24h
10	280	100	75	208	109	208	130,6	18,47	11,36	C24
								19,93	12,26	GL24h
10	300	106	75	22	116	22	142,0	20,08	12,36	C24
								21,67	13,34	GL24h
10	320	113	75	236	123	236	152,0	21,50	13,23	C24
								23,20	14,28	GL24h
10	340	120	75	250	130	250	162,0	22,91	14,10	C24
								24,73	15,22	GL24h
10	360	127	75	265	137	265	172,0	24,32	14,97	C24
								26,25	16,15	GL24h
10	380	134	75	279	144	279	182,0	25,74	15,84	C24
								27,78	17,09	GL24h
10	400	141	75	293	151	293	192,0	27,15	16,71	C24
								29,30	18,03	GL24h
10	430	152	75	314	162	314	207,0	29,27	18,01	C24
								31,59	19,44	GL24h
10	480	170	75	349	180	349	232,0	32,81	20,19	C24
								35,41	21,79	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		Thread pull-out
10	530	187	75	385	197	385	257	36,3	22,37	C24	<b>Bend</b>
								37,7	23,18	GL24h	
10	580	205	75	420	215	420	282	36,8	22,67	C24	
								37,7	23,18	GL24h	
10	650	230	75	470	240	470	317	36,8	22,67	C24	
								37,7	23,18	GL24h	
10	700	247	75	505	257	505	342	36,8	22,67	C24	
								37,7	23,18	GL24h	
10	750	265	75	540	275	540	367	36,8	22,67	C24	
								37,7	23,18	GL24h	
10	800	283	75	576	293	576	392	36,8	22,67	C24	
								37,7	23,18	GL24h	

<sup>1)</sup> For measuring crucial thread length

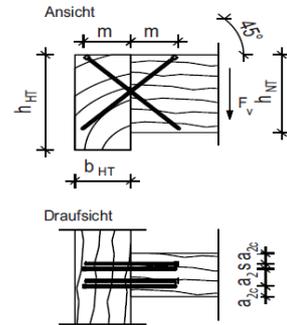
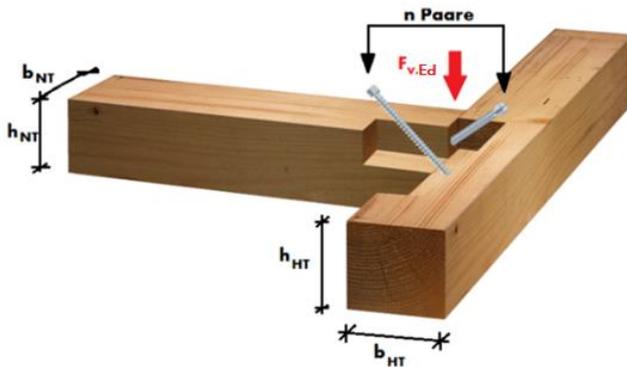
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



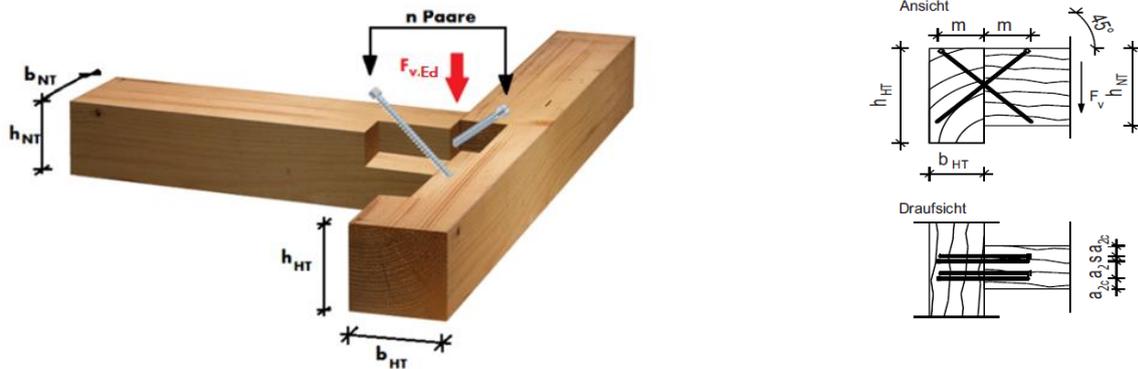
d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
10	240	100	125	180	95	180	91	23,90	14,71	C24
								25,80	15,87	GL24h
10	260	100	125	194	102	194	111	29,18	17,96	C24
								31,49	19,38	GL24h
10	280	100	125	208	109	208	131	34,45	21,20	C24
								37,18	22,88	GL24h
10	300	106	125	22	116	22	142	37,47	23,06	C24
								40,44	24,89	GL24h
10	320	113	125	236	123	236	152	40,11	24,68	C24
								43,29	26,64	GL24h
10	340	120	125	250	130	250	162	42,75	26,31	C24
								46,14	28,39	GL24h
10	360	127	125	265	137	265	172	45,39	27,93	C24
								48,99	30,15	GL24h
10	380	134	125	279	144	279	182	48,03	29,56	C24
								51,84	31,90	GL24h
10	400	141	115	293	151	293	192	50,67	31,18	C24
								54,68	33,65	GL24h
10	430	152	115	314	162	314	207	54,63	33,62	C24
								58,96	36,28	GL24h
10	480	170	115	349	180	349	232	61,25	37,69	C24
								66,10	40,68	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	530	187	115	385	197	385	257	67,8	41,74	C24	Thread pull-out
								70,3	43,26	GL24h	
10	580	205	115	420	215	420	282	68,7	42,29	C24	
								70,3	43,26	GL24h	
10	650	230	115	470	240	470	317	68,7	42,29	C24	
								70,3	43,26	GL24h	
10	700	247	115	505	257	505	342	68,7	42,29	C24	
								70,3	43,26	GL24h	
10	750	265	115	540	275	540	367	68,7	42,29	C24	
								70,3	43,26	GL24h	
10	800	283	115	576	293	576	392	68,7	42,29	C24	
								70,3	43,26	GL24h	

<sup>1)</sup> For measuring crucial thread length

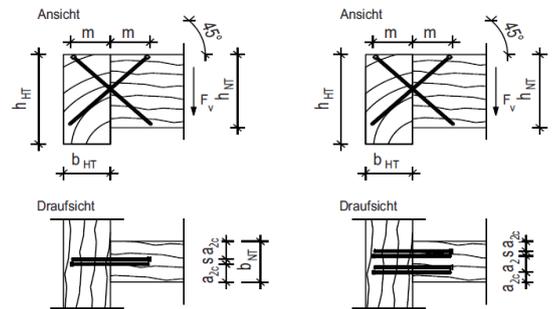
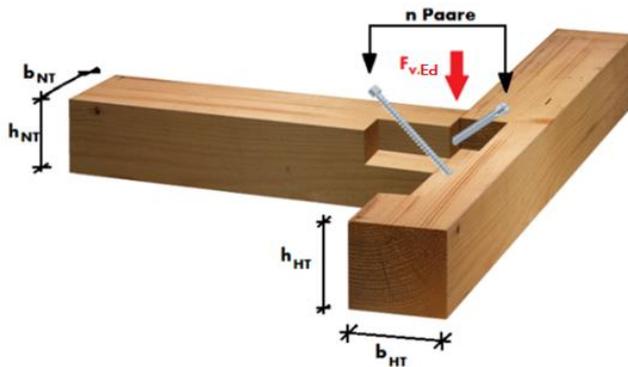
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		Bend Thread pull-out
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
12	300	120	90	222	126	222	120,7	20,48	12,60	C24	
								22,10	13,60	GL24h	
12	380	134	90	279	156	279	180,4	30,61	18,84	C24	
								33,04	20,33	GL24h	
12	480	170	90	349	190	349	230,4	39,10	24,06	C24	
								42,20	25,97	GL24h	
12	600	212	90	434	232	434	290,4	49,16	30,25	C24	
								50,25	30,92	GL24h	

<sup>1)</sup> For measuring crucial thread length

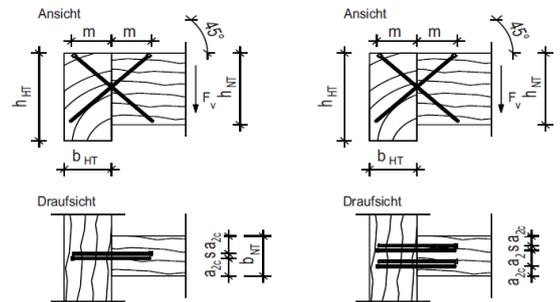
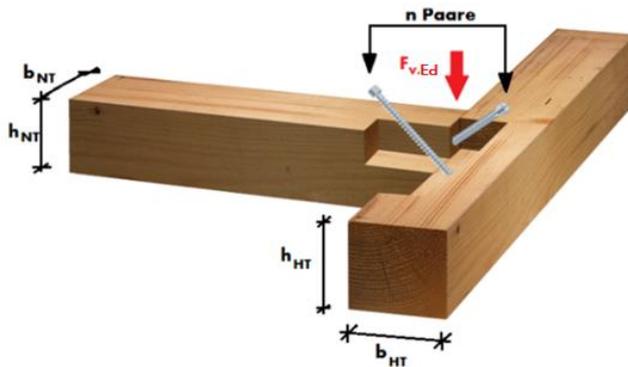
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, WITHOUT FIRE

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d mm	ℓ mm	m mm	b <sub>NT</sub> mm	h <sub>NT</sub> mm	b <sub>HT</sub> mm	h <sub>HT</sub> mm	l <sub>ef</sub> <sup>1)</sup> mm	F <sub>v,Rk</sub> kN	F <sub>v,Rd</sub> kN		Bend Thread pull-out
12	300	120	150	222	126	222	120,7	38,22	23,52	C24	
								41,25	25,38	GL24h	
12	380	134	150	279	156	279	180,4	57,13	35,16	C24	
								61,66	37,94	GL24h	
12	480	170	138	349	190	349	230,4	73,12	45,00	C24	
								78,91	48,56	GL24h	
12	600	212	138	434	232	434	290,4	91,74	56,46	C24	
								93,77	57,71	GL24h	

<sup>1)</sup> For measuring crucial thread length

### Notes:

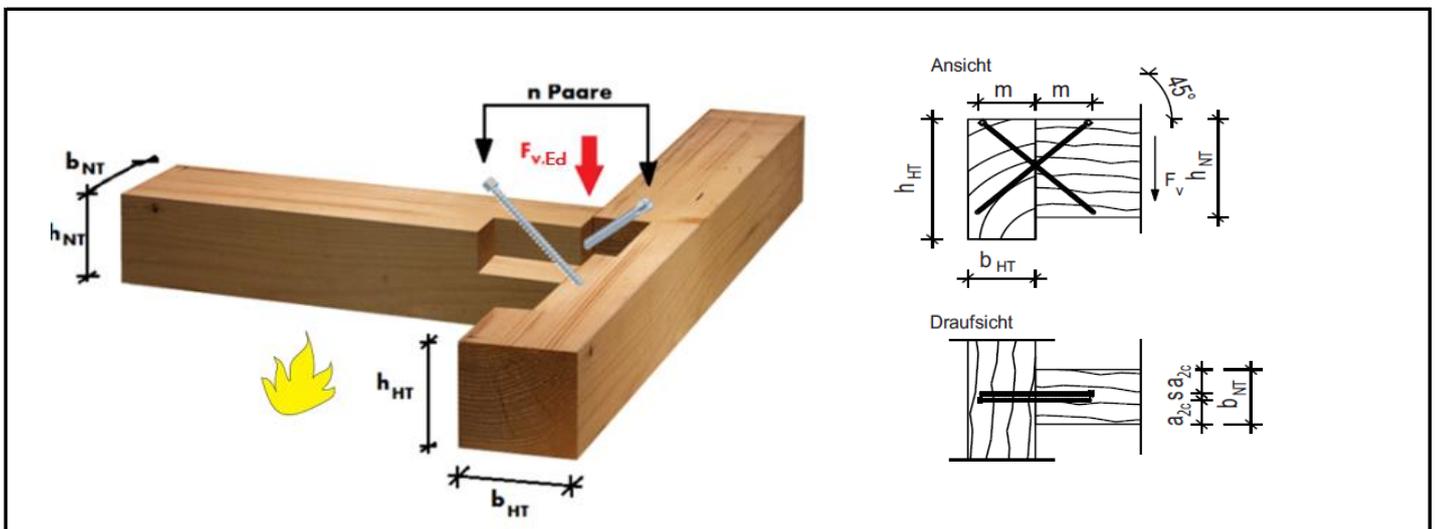
- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

### Boundary conditions

System:	Main-secondary connection (case of fire F30)		
Main beam:	b/h = 160 / 240mm laminated wood, strength class GL 24h in accordance with EN14080 ( $\rho_k = 385 \text{ kg/m}^3$ )		
Secondary beam:	b/h = 120 / 240mm laminated wood, strength class GL 24h in accordance with EN14080 ( $\rho_k = 385 \text{ kg/m}^3$ )		
Basis for calculation:	EC5 or DIN EN 1995-1-1:2010-12 and national German application document DIN 20000-6:2012-06; ETA-11/0190 ASSY wood screws.		
Design force:	$F_{v,Ed} =$	5,2	kN "Normal temperature"



### Würth ASSY plus VG Ø8x220mm (full thread + drill bit)

d =	8	mm
d <sub>h</sub> =	10	mm
d <sub>1</sub> =	5	mm
f <sub>ax,k</sub> =	11	N/mm <sup>2</sup>
f <sub>tens,k</sub> =	20000	N
m =	85,0	mm
n =	2,000	Piece

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

### Axial and edge clearances taking the fire protection status into account

#### Minimum distances in accordance with ETA-11/0190

$a_1 =$	40	mm
$a_2 =$	20	mm
$a_{1,c} =$	40	mm
$a_{2,c} =$	24	mm

#### Edge spacings for calculation for F30

$a_{1,c} =$	40	mm
$a_{2,c} / a_1 =$	30	mm
$a_2 =$	70	mm
$a_3 =$	50	mm

"constructive combustion depth"

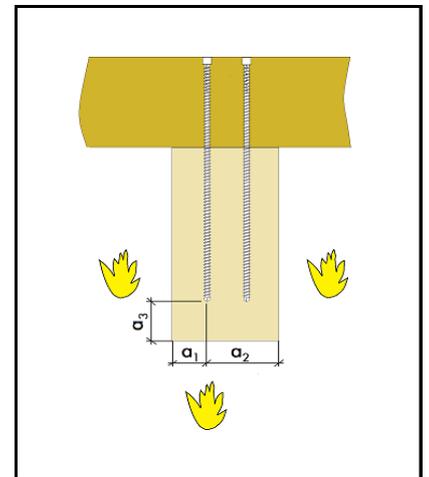
$$a_2 \geq a_1 + 40$$

$$a_3 \geq a_1 + 20$$

" $a_{2,c} / a_1$  = recommended value from the 2009 handbook on fire safety of wood"

#### Minimum cross section

$b_{NT} =$	100	mm	$\leq 120$ mm
$h_{NT} =$	206	mm	$\leq 240$ mm
$b_{HT} =$	128	mm	$\leq 160$ mm
$h_{HT} =$	206	mm	$\leq 240$ mm



These minimum cross sections only relate to the gaps for the means of connection. In the case of fire, the load-bearing proof must be examined separately.

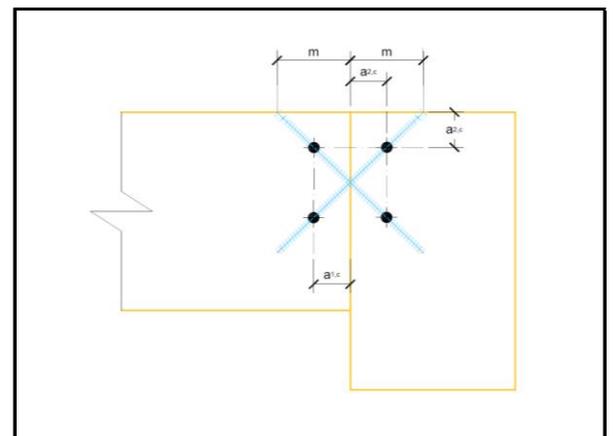
$a_{1,c} =$	40,0	mm
$h_k =$	7,5	mm
$l =$	220	mm
$l_{ef,2} =$	113,1	mm
$l_{ef} =$	99,4	mm

$$a_{1,c} = 5 \times d$$

"Head height"

$$l_{ef,2} = a_{1,c} \times \sqrt{2} \times 2$$

$$l_{ef} = l - h_k - l_{ef,2}$$



NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

### Pull-out strength or push in strength

$\alpha =$	45	°	"Angle between screw axis and direction of grain"
$k_{ax} =$	1,00		Factor [A.1.3.1]
$f_{head,k} =$	13	N/mm <sup>2</sup>	"Head pull-through parameter [A.1.3.2]
$f_{tens,k} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$l_{ef} =$	99,40	mm	"Effective thread length in wood minus head height"
$F_{ax,Rk,1} =$	9440	N	$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0,8}$
$F_{ax,Rd,1} =$	<b>9440</b>	N	
$F_{ax,Rk,2} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$F_{ax,Rd,2} =$	<b>20000</b>	N	

### Bending the screw

$c_h =$	100,10	N/mm <sup>2</sup>	$c_h = (0,19 + 0,012 \times d) * \rho_k \times \left(\frac{90^\circ + \alpha}{180^\circ}\right)$
$I_s =$	30,68	mm <sup>4</sup>	"Moment of inertia" $I_s = \frac{\pi \times d_1^4}{64}$
$E_s =$	210000	N/mm <sup>2</sup>	"E-module"
$N_{ki,k} =$	25395	N	$N_{ki,k} = \sqrt{c_h \times E_s \times I_s}$
$N_{pl,k} =$	19635	N	$N_{pl,k} = \pi \times \frac{d_1^2}{4} \times f_{y,k}$
$\lambda_k =$	0,88		$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$
$k =$	1,05		$k = 0,5 \times [1 + 0,49 \times (\lambda_k - 0,2) + \lambda_k]$
$k_c =$	0,613		$k_c = \frac{1}{k + \sqrt{k^2 - \lambda_k^2}}$
$N_{pl,d} =$	19635	N	
$F_{ax,Rd,3} =$	<b>12028</b>	N	$F_{ax,Rd,3} = N_{pl,d} \times k_c$
$F_{ax,Rd} =$	<b>9440</b>	N	$F_{ax,Rd} = \text{Min}\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$
$F_{v,Rd} =$	<b>13351</b>	N	$F_{v,Rd} = F_{ax,Rd} \times n \times \sin(45)$ (1.0)

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

### Reduction in the event of fire in accordance with 6.4 DIN EN 1995-1-2:2010-12

for $\alpha_1 \leq 0.6 t_{d,fi}$	a) $\eta =$	0	$\eta = \begin{cases} 0 \\ \frac{0,44 \times \alpha_1 - 0,264 \times t_{d,fi}}{0,2 \times t_{d,fi} + 5} \\ \frac{0,56 \times \alpha_1 - 0,36 \times t_{d,fi} + 7,32}{0,2 \times t_{d,fi} + 23} \\ 1,0 \end{cases}$
for $0.6 t_{d,fi} \leq \alpha_1 \leq 0.8 t_{d,fi} + 5$	b) $\eta =$	0,48	
for $0.8 t_{d,fi} + 5 \leq \alpha_1 \leq t_{d,fi} + 28$	c) $\eta =$	<b>0,459</b>	
for $\alpha_1 \geq t_{d,fi} + 28$	d) $\eta =$	1,0	

$k_{fi} = 1,05$  "Factor  $k_{fi}$  in accordance with table 2.1"

**$F_{v,Rd,fi} = 6,43 \text{ kN}$**        $F_{v,Rd,fi} = \eta \times F_{v,Rd} \times k_{fi}$

### Reduction of the impact in accordance with 2.4.2 DIN EN 1995-1-2:2010-12

$\eta_{fi} = 0,6$

**$E_{d,fi} = 3,12 \text{ kN}$**        $E_{d,fi} = \eta_{fi} \times F_{v,Ed}$

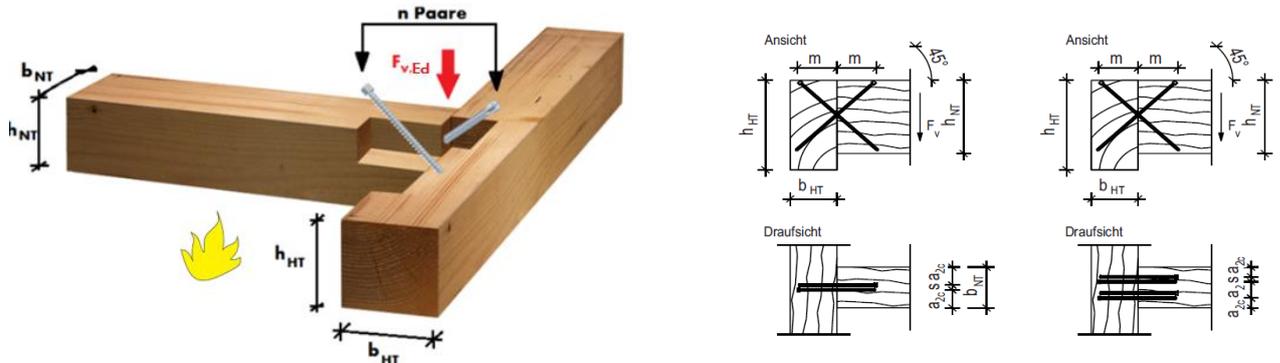
Remark 2: For simplification purposes, the value  $\eta_{fi} = 0.6$  is recommended, except for areas with larger payloads in accordance with Category E (storage rooms), for which the recommended value is  $\eta_{fi} = 0.7$ .

### Proof

$\eta = \mathbf{0,48} < \mathbf{1.0}$        $\eta = \frac{E_{d,fi}}{F_{v,Rd,fi}}$

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
6	140	60	100	149	99	149	46,0	4,69	2,15	C24
								5,06	2,32	GL24h
6	160	60	100	163	107	163	65,8	6,74	3,09	C24
								7,27	3,34	GL24h
6	180	64	100	177	114	177	85,3	8,74	4,01	C24
								9,43	4,33	GL24h
6	200	71	100	191	121	191	94,9	9,76	4,48	C24
								10,54	4,84	GL24h
6	220	78	100	206	128	206	104,9	10,61	4,87	C24
								11,45	5,26	GL24h

Thread pull-out

<sup>1)</sup> For measuring crucial thread length

η = 0.459 - conversion factor of the mechanical strength of the load-bearing capacity

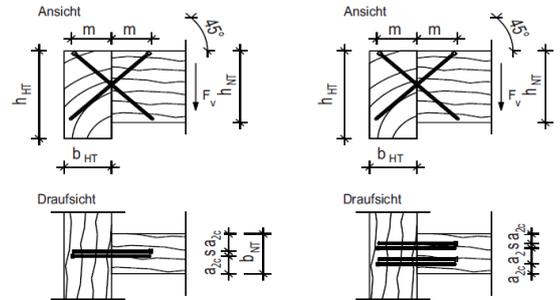
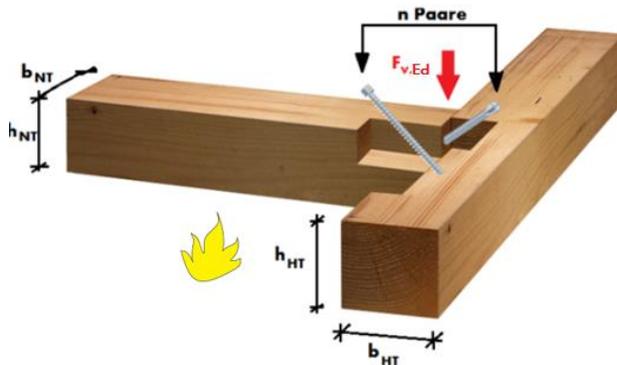
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
6	140	60	100	149	99	149	46,0	9,37	4,31	C24
								10,12	4,65	GL24h
6	160	60	100	163	107	163	65,8	12,57	5,77	C24
								13,56	6,23	GL24h
6	180	64	100	177	114	177	85,3	16,31	7,49	C24
								17,60	8,08	GL24h
6	200	71	100	191	121	191	94,9	18,22	8,37	C24
								19,66	9,03	GL24h
6	220	78	100	206	128	206	104,9	19,87	9,12	C24
								21,44	9,85	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.459$  - conversion factor of the mechanical strength of the load-bearing capacity

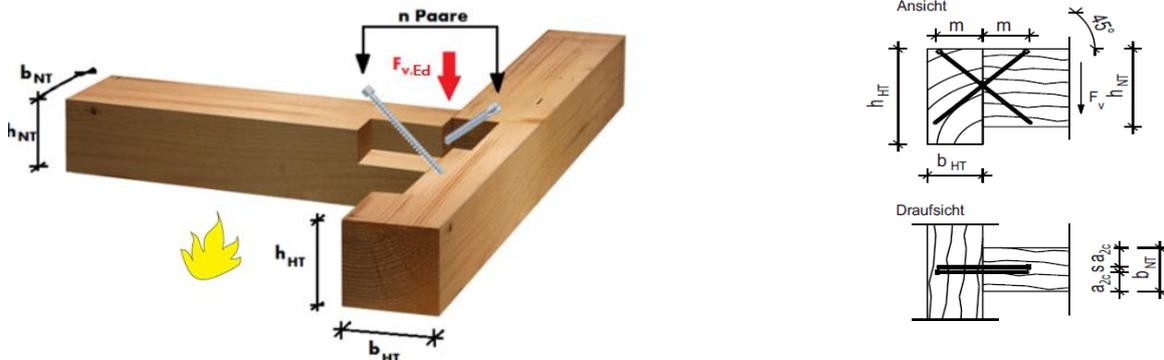
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
8	220	80	100	206	128	206	99,4	12,99	5,97	C24	Thread pull-out
								14,02	6,44	GL24h	
8	240	85	100	220	135	220	112,5	14,71	6,76	C24	
								15,88	7,29	GL24h	
8	260	92	100	234	142	234	122,5	16,01	7,35	C24	
								17,28	7,93	GL24h	
8	280	99	100	248	149	248	132,5	17,31	7,95	C24	
								18,69	8,58	GL24h	
8	300	106	100	262	156	262	142,5	17,73	8,15	C24	
								19,14	8,79	GL24h	
8	330	117	100	283	167	283	157,5	20,58	9,45	C24	
								22,21	10,20	GL24h	
8	380	134	100	319	184	319	182,5	23,85	10,95	C24	
								25,24	11,59	GL24h	
8	430	152	100	354	202	354	207,5	24,66	11,33	C24	Bend
								25,24	11,59	GL24h	
8	480	170	100	389	220	389	232,5	24,66	11,33	C24	
								25,24	11,59	GL24h	
8	530	187	100	425	237	425	257,5	24,66	11,33	C24	
								25,24	11,59	GL24h	
8	580	205	100	460	255	460	282,5	24,66	11,33	C24	
								25,24	11,59	GL24h	

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.459$  - conversion factor of the mechanical strength of the load-bearing capacity

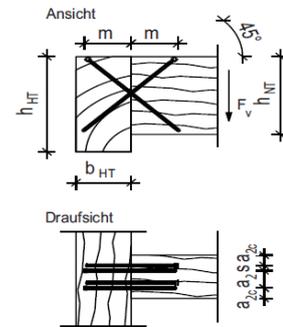
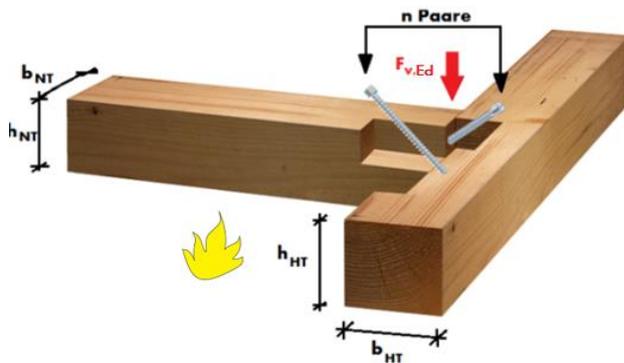
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
8	220	80	112	206	128	206	99,4	24,23	11,13	C24
								26,15	12,01	GL24h
8	240	85	104	220	135	220	112,5	27,44	12,60	C24
								29,61	13,60	GL24h
8	260	92	104	234	142	234	122,5	29,87	13,72	C24
								32,24	14,81	GL24h
8	280	99	104	248	149	248	132,5	32,31	14,84	C24
								34,87	16,02	GL24h
8	300	106	104	262	156	262	142,5	34,74	15,96	C24
								37,50	17,22	GL24h
8	330	117	104	283	167	283	157,5	38,41	17,64	C24
								41,45	19,04	GL24h
8	380	134	104	319	184	319	182,5	44,50	20,44	C24
								47,09	21,63	GL24h
8	430	152	104	354	202	354	207,5	46,01	21,13	C24
								47,09	21,63	GL24h
8	480	170	104	389	220	389	232,5	46,01	21,13	C24
								47,09	21,63	GL24h
8	530	187	104	425	237	425	257,5	46,01	21,13	C24
								47,09	21,63	GL24h
8	580	205	104	460	255	460	282,5	46,01	21,13	C24
								47,09	21,63	GL24h

Thread pull-out

Bend

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.459$  - conversion factor of the mechanical strength of the load-bearing capacity

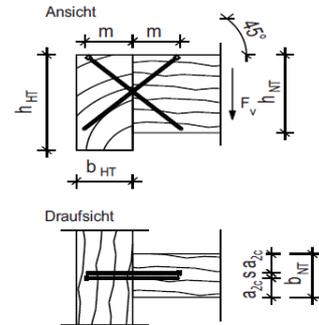
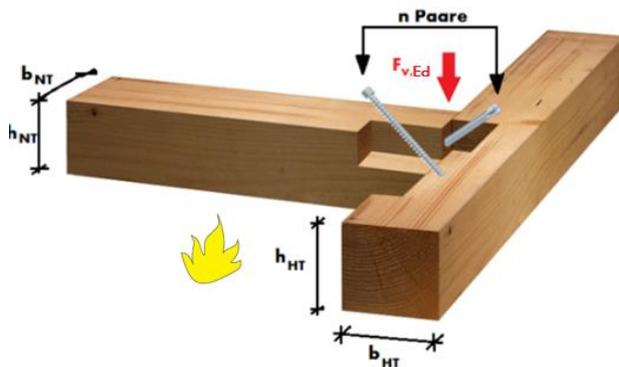
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
10	240	100	100	220	135	220	91	13,4	6,17	C24
								14,50	6,66	GL24h
10	260	100	100	234	142	234	111	16,4084	7,54	C24
								17,71	8,13	GL24h
10	280	100	100	248	149	248	131	19,39	8,91	C24
								20,92	9,61	GL24h
10	300	106	100	262	156	262	142	21,09	9,68	C24
								22,76	10,45	GL24h
10	320	113	100	276	163	276	152	22,57	10,37	C24
								24,36	11,19	GL24h
10	340	120	100	290	170	290	162	24,06	11,05	C24
								25,96	11,92	GL24h
10	360	127	100	305	177	305	172	25,54	11,73	C24
								27,56	12,66	GL24h
10	380	134	100	319	184	319	182	27,03	12,41	C24
								29,17	13,40	GL24h
10	400	141	100	333	191	333	192	28,51	13,10	C24
								30,77	14,13	GL24h
10	430	152	100	354	202	354	207	30,74	14,12	C24
								33,17	15,24	GL24h
10	480	170	100	389	220	389	232	34,45	15,82	C24
								37,18	17,08	GL24h

**Thread pull-out**

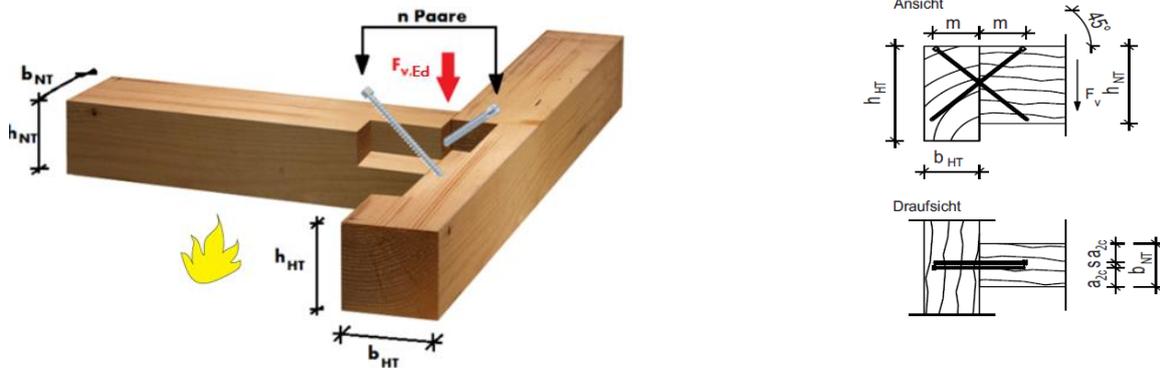
<sup>1)</sup> For measuring crucial thread length

η = 0.459 - conversion factor of the mechanical strength of the load-bearing capacity

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	530	187	100	425	237	425	257	38,16	17,53	C24	Thread pull-out
								39,59	18,18	GL24h	
10	580	205	100	460	255	460	282	38,64	17,75	C24	
								39,59	18,18	GL24h	
10	650	230	100	510	280	510	317	38,64	17,75	C24	
								39,59	18,18	GL24h	
10	700	247	100	545	297	545	342	38,64	17,75	C24	
								39,59	18,18	GL24h	
10	750	265	100	580	315	580	367	38,64	17,75	C24	
								39,59	18,18	GL24h	
10	800	283	100	616	333	616	392	38,64	17,75	C24	
								39,59	18,18	GL24h	

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.459$  - conversion factor of the mechanical strength of the load-bearing capacity

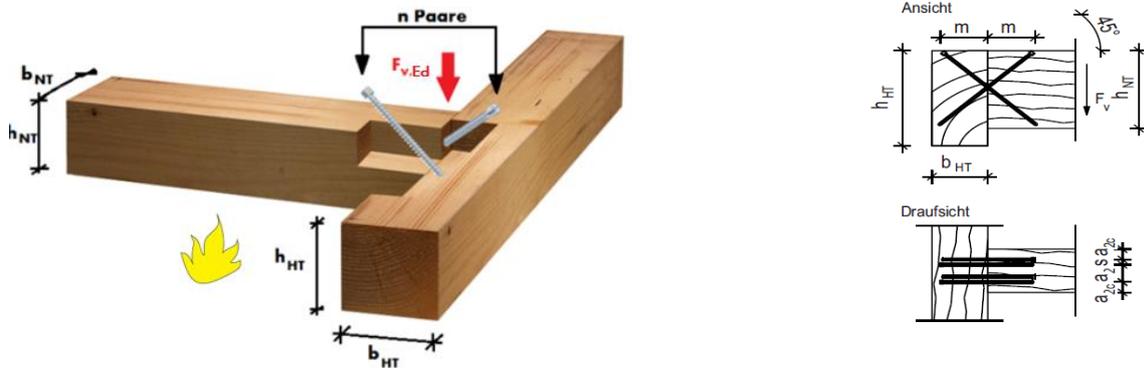
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
10	240	100	125	220	135	220	91	25,10	11,53	C24
								27,09	12,44	GL24h
10	260	100	125	234	142	234	111	30,64	14,07	C24
								33,07	15,19	GL24h
10	280	100	115	248	149	248	131	36,17	16,61	C24
								39,04	17,93	GL24h
10	300	106	115	262	156	262	142	39,34	18,07	C24
								42,46	19,50	GL24h
10	320	113	115	276	163	276	152	42,12	19,35	C24
								45,46	20,88	GL24h
10	340	120	115	290	170	290	162	44,89	20,62	C24
								48,44	22,25	GL24h
10	360	127	115	305	177	305	172	47,66	21,89	C24
								51,44	23,63	GL24h
10	380	134	115	319	184	319	182	50,43	23,16	C24
								54,43	25,00	GL24h
10	400	141	115	333	191	333	192	53,20	24,44	C24
								57,42	26,37	GL24h
10	430	152	115	354	202	354	207	57,36	26,35	C24
								61,91	28,43	GL24h
10	480	170	115	389	220	389	232	64,31	29,54	C24
								69,41	31,88	GL24h

**Thread pull-out**

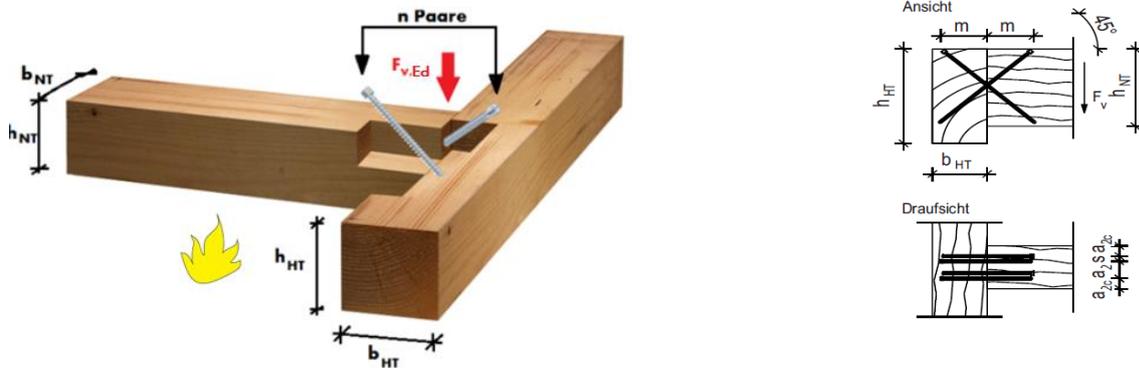
<sup>1)</sup> For measuring crucial thread length

η = 0.459 - conversion factor of the mechanical strength of the load-bearing capacity

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	530	187	115	425	237	425	257	71,21	32,71	C24	Thread pull-out
								73,82	33,90	GL24h	
10	580	205	115	460	255	460	282	72,14	33,13	C24	
								73,82	33,90	GL24h	
10	650	230	115	510	280	510	317	72,14	33,13	C24	
								73,82	33,90	GL24h	
10	700	247	115	545	297	545	342	72,14	33,13	C24	
								73,82	33,90	GL24h	
10	750	265	115	580	315	580	367	72,14	33,13	C24	
								73,82	33,90	GL24h	
10	800	283	115	616	333	616	392	72,14	33,13	C24	
								73,82	33,90	GL24h	

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.459$  - conversion factor of the mechanical strength of the load-bearing capacity

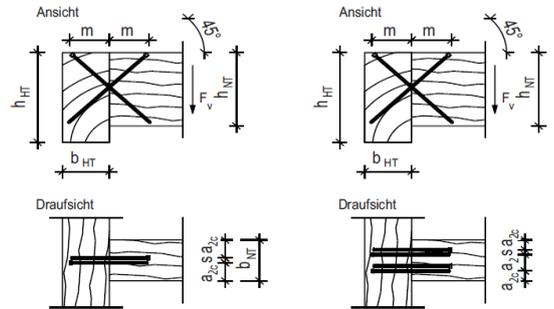
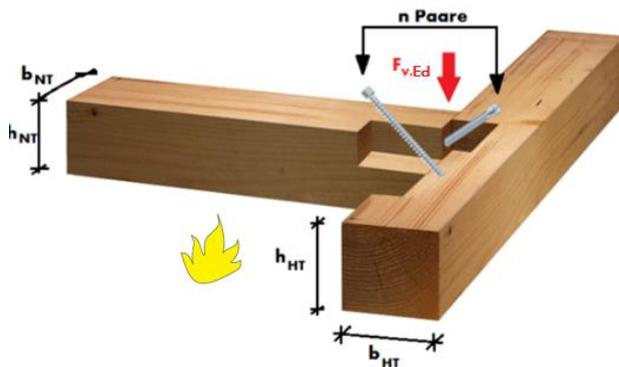
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

Load-bearing capacities for a main-secondary beam connection with a pair of screws  
**Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
12	300	120	106	268	162	268	120,7	21,50	12,37	C24	<b>Thread pull-out</b>
								23,21	13,35	GL24h	
12	380	134	106	325	190	325	180,4	32,14	18,49	C24	
								34,69	19,95	GL24h	
12	480	170	106	395	226	395	230,4	41,06	23,61	C24	
								44,31	25,48	GL24h	
12	600	212	106	480	268	480	290,4	51,62	29,69	C24	<b>Bend</b>
								52,76	30,35	GL24h	

<sup>1)</sup> For measuring crucial thread length

η = 0.459 - conversion factor of the mechanical strength of the load-bearing capacity

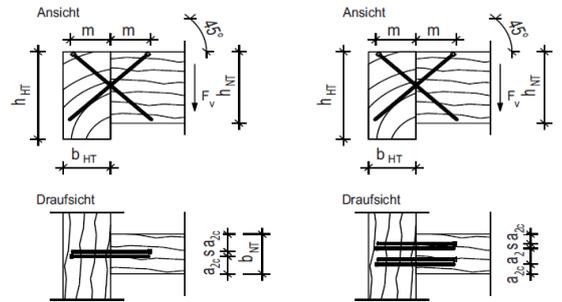
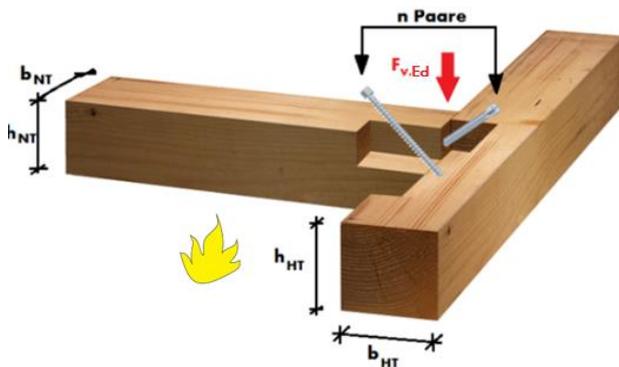
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 30 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
12	300	120	150	268	162	268	120,7	40,13	23,08	C24	Thread pull-out
								43,31	24,91	GL24h	
12	380	134	150	325	190	325	180,4	59,99	34,50	C24	Thread pull-out
								64,74	37,24	GL 24h	
12	480	170	150	395	226	395	230,4	76,78	44,16	C24	Thread pull-out
								82,86	47,66	GL24h	
12	600	212	150	480	268	480	290,4	96,33	55,40	C24	Bend
								98,46	56,63	GL24h	

<sup>1)</sup> For measuring crucial thread length

η = 0.459 - conversion factor of the mechanical strength of the load-bearing capacity

### Notes:

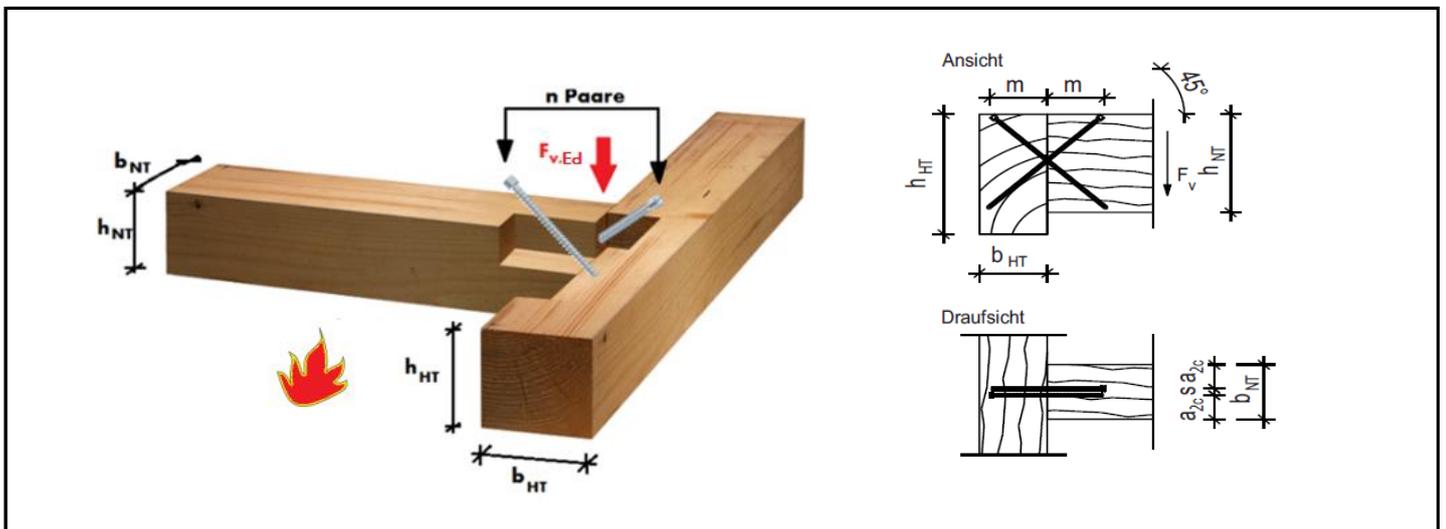
- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

### Boundary conditions

System:	Main-secondary connection (case of fire F60)		
Main beam:	b/h = 160 / 240mm laminated wood, strength class GL 24h in accordance with EN 14080 ( $\rho_k = 385 \text{ kg/m}^3$ )		
Secondary beam:	b/h = 160 / 240mm laminated wood, strength class GL 24h in accordance with EN 14080 ( $\rho_k = 385 \text{ kg/m}^3$ )		
Basis for calculation:	EC5 or DIN EN 1995-1-1:2010-12 and national German application document DIN 20000-6:2012-06; ETA-11/0190 ASSY wood screws.		
Design force:	$F_{v,Ed} =$	5,2 kN	"Normal temperature"



### Würth ASSY plusVGT Ø8x220mm (full thread + drill bit)

d =	8	mm
d <sub>h</sub> =	10	mm
d <sub>1</sub> =	5	mm
f <sub>ax,k</sub> =	11	N/mm <sup>2</sup>
f <sub>tens,k</sub> =	20000	N
m =	85,0	mm
n =	2,000	Piece

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

### Axial and edge clearances taking the fire protection status into account

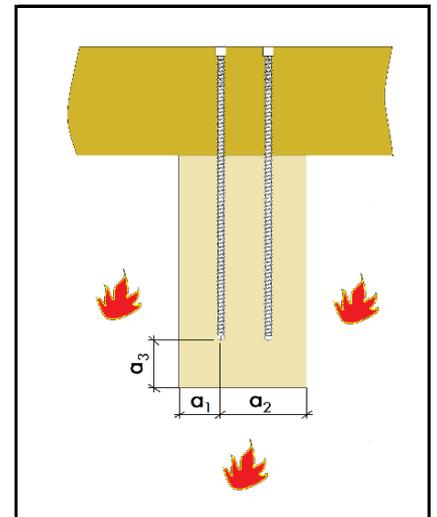
#### Minimum distances in accordance with Edge spacings for calculation for F60

$a_1 =$	40	mm	$a_{1,c} =$	40	mm	
$a_2 =$	20	mm	$a_{2,c} / a_1 =$	55	mm	"constructive combustion depth"
$a_{1,c} =$	40	mm	$a_2 =$	95	mm	$a_2 \geq a_1 + 40$
$a_{2,c} =$	24	mm	$a_3 =$	75	mm	$a_3 \geq a_1 + 20$

" $a_{2,c} / a_1$  = recommended value from the 2009 handbook on fire safety of wood"

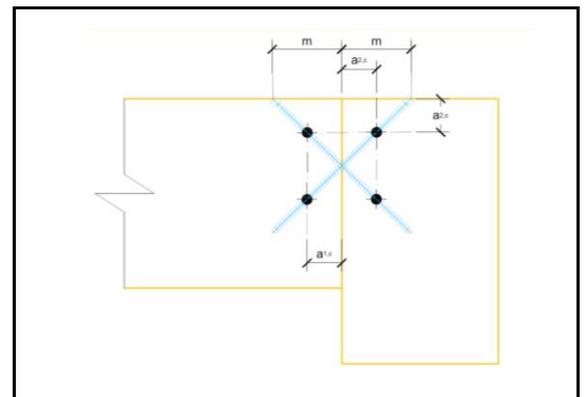
#### Minimum cross section

$b_{NT} =$	150	mm	$\leq$	160	mm
$h_{NT} =$	231	mm	$\leq$	240	mm
$b_{HT} =$	153	mm	$\leq$	160	mm
$h_{HT} =$	231	mm	$\leq$	240	mm



These minimum cross sections only relate to the gaps for the means of connection. In the case of fire, the load-bearing proof must be examined separately.

$a_{1,c} =$	40,0	mm	$a_{1,c} = 5 \times d$
$h_k =$	7,5	mm	"Head height"
$l =$	220	mm	"Screw length"
$l_{ef,2} =$	113,1	mm	$l_{ef,2} = a_{1,c} \times \sqrt{2} \times 2$
$l_{ef} =$	99,4	mm	$l_{ef} = l - h_k - l_{ef,2}$



NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

### Pull-out strength or push in strength

$\alpha =$	45	°	"Angle between screw axis and direction of grain"
$k_{ax} =$	1,00		Factor [A.1.3.1]
$f_{head,k} =$	13	N/mm <sup>2</sup>	"Head pull-through parameter [A.1.3.2]
$f_{tens,k} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$l_{ef} =$	99,40	mm	"Effective thread length in wood minus head height"
$F_{ax,Rk,1} =$	9440	N	$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0,8}$
$F_{ax,Rd,1} =$	<b>9440</b>	N	
$F_{ax,Rk,2} =$	20000	N	"Characteristic tensile strength [Annex 1 Table 1.1]"
$F_{ax,Rd,2} =$	<b>20000</b>	N	

### Bending the screw

$c_h =$	100,10	N/mm <sup>2</sup>	$c_h = (0,19 + 0,012 \times d) * \rho_k \times \left(\frac{90^\circ + \alpha}{180^\circ}\right)$
$I_s =$	30,68	mm <sup>4</sup>	"Moment of inertia"
$E_s =$	210000	N/mm <sup>2</sup>	"E-module"
			$l_s = \frac{\pi \times d_1^4}{64}$
$N_{ki,k} =$	25395	N	$N_{ki,k} = \sqrt{c_h \times E_s \times I_s}$
$N_{pl,k} =$	19635	N	$N_{pl,k} = \pi \times \frac{d_1^2}{4} \times f_{y,k}$
$\lambda_k =$	0,88		$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$
$k =$	1,05		$k = 0,5 \times [1 + 0,49 \times (\lambda_k - 0,2) + \lambda_k]$
$k_c =$	0,613		$k_c = \frac{1}{k + \sqrt{k^2 - \lambda_k^2}}$
$N_{pl,d} =$	19635	N	
$F_{ax,Rd,3} =$	<b>12028</b>	<b>N</b>	$F_{ax,Rd,3} = N_{pl,d} \times k_c$
$F_{ax,Rd} =$	<b>9440</b>	<b>N</b>	$F_{ax,Rd} = \text{Min}\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$
$F_{v,Rd} =$	<b>13351</b>	<b>N</b>	$F_{v,Rd} = F_{ax,Rd} \times n \times \sin(45)$ (1.0)

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## DETERMINING VALUES, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

### Reduction in the event of fire in accordance with 6.4 DIN EN 1995-1-2:2010-12

for $a_1 \leq 0.6 t_{d,fi}$	a) $\eta = 0$	$\eta = \begin{cases} 0 \\ \frac{0,44 \times a_1 - 0,264 \times t_{d,fi}}{0,2 \times t_{d,fi} + 5} \\ \frac{0,56 \times a_1 - 0,36 \times t_{d,fi} + 7,32}{0,2 \times t_{d,fi} + 23} \\ 1,0 \end{cases}$
for $0.6 t_{d,fi} \leq a_1 \leq 0.8 t_{d,fi} + 5$	b) $\eta = 0,492$	
for $0.8 t_{d,fi} + 5 \leq a_1 \leq t_{d,fi} + 28$	c) $\eta = \mathbf{0,472}$	
for $a_1 \geq t_{d,fi} + 28$	d) $\eta = 1,0$	

$k_{fi} = 1,05$  "Factor  $k_{fi}$  in accordance with table 2.1"

$F_{v,Rd,fi} = \mathbf{6,62 \text{ kN}}$        $F_{v,Rd,fi} = \eta \times F_{v,Rd} \times k_{fi}$

### Reduction of the impact in accordance with 2.4.2 DIN EN 1995-1-2:2010-12

$\eta_{fi} = 0,6$

$E_{d,fi} = \mathbf{3,12 \text{ kN}}$        $E_{d,fi} = \eta_{fi} \times F_{v,Ed}$

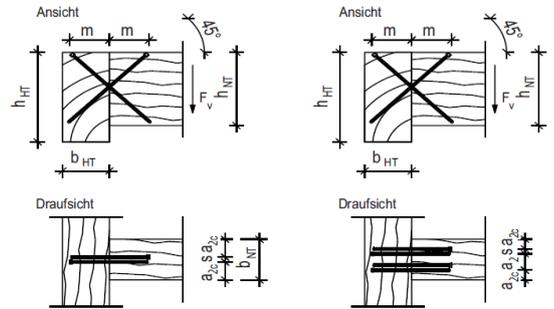
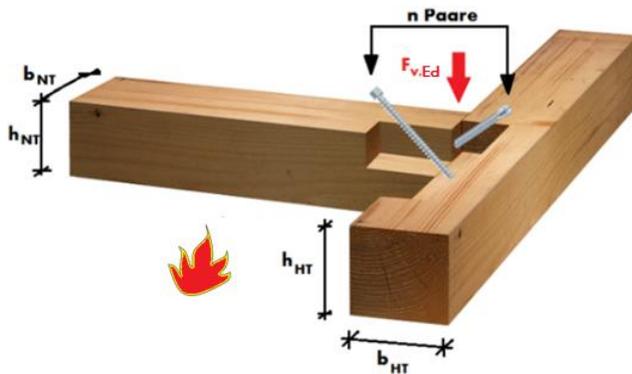
Remark 2: For simplification purposes, the value  $\eta_{fi} = 0.6$  is recommended, except for areas with larger payloads in accordance with Category E (storage rooms), for which the recommended value is  $\eta_{fi} = 0.7$ .

### Proof

$\eta = \mathbf{0,47} < \mathbf{1.0}$        $\eta = \frac{E_{d,fi}}{F_{v,Rd,fi}}$

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		Thread pull-out
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
6	140	60	150	174	124	174	46,0	4,69	2,21	C24	
								5,06	2,39	GL24h	
6	160	60	150	188	132	188	65,8	6,74	3,18	C24	
								7,27	3,43	GL24h	
6	180	64	150	202	139	202	85,3	8,74	4,13	C24	
								9,43	4,45	GL24h	
6	200	71	150	216	146	216	94,9	9,76	4,61	C24	
								10,54	4,97	GL24h	
6	220	78	150	231	153	231	104,9	10,61	5,01	C24	
								11,45	5,40	GL24h	

<sup>1)</sup> For measuring crucial thread length

η = 0.472 - conversion factor of the mechanical strength of the load-bearing capacity

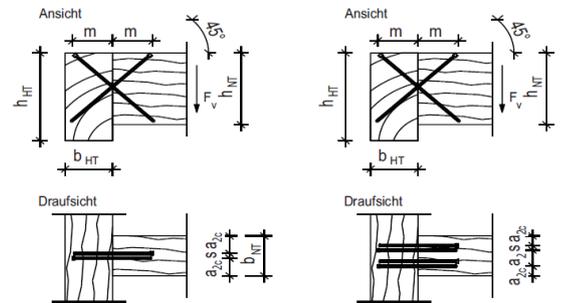
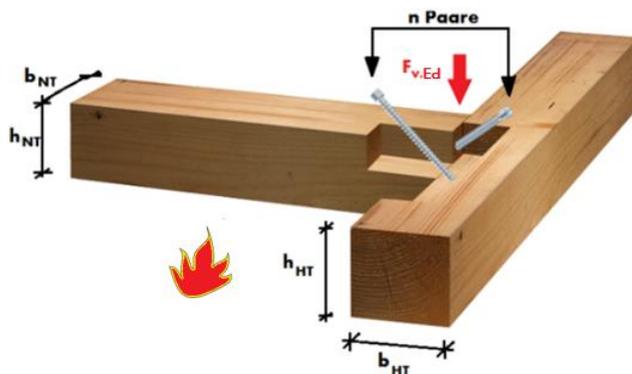
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø6 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
6	140	60	150	174	124	174	46,0	9,37	4,42	C24
								10,12	4,78	GL24h
6	160	60	150	188	132	188	65,8	12,57	5,93	C24
								13,56	6,40	GL24h
6	180	64	150	202	139	202	85,3	16,31	7,70	C24
								17,60	8,31	GL24h
6	200	71	150	216	146	216	94,9	18,22	8,60	C24
								19,66	9,28	GL24h
6	220	78	150	231	153	231	104,9	19,87	9,38	C24
								21,44	10,12	GL24h

**Thread pull-out**

<sup>1)</sup> For measuring crucial thread length

η = 0.472 - conversion factor of the mechanical strength of the load-bearing capacity

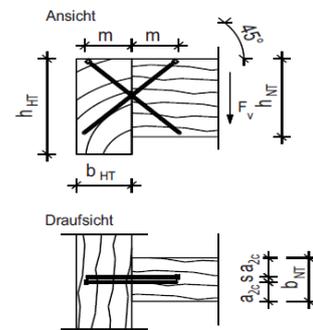
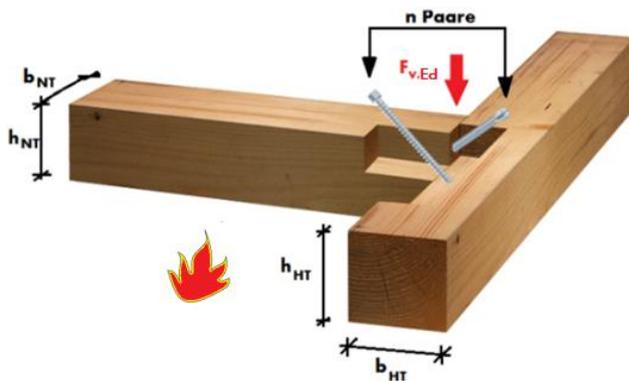
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
8	220	80	150	231	153	231	99,4	12,99	6,13	C24	Thread pull-out
								14,02	6,62	GL24h	
8	240	85	150	245	160	245	112,5	14,71	6,94	C24	
								15,88	7,49	GL24h	
8	260	92	150	259	167	259	122,5	16,01	7,56	C24	
								17,28	8,15	GL24h	
8	280	99	150	273	174	273	132,5	17,31	8,17	C24	
								18,69	8,82	GL24h	
8	300	106	150	287	181	287	142,5	17,73	8,37	C24	
								19,14	9,03	GL24h	
8	330	117	150	308	192	308	157,5	20,58	9,71	C24	
								22,21	10,48	GL24h	
8	380	134	150	344	209	344	182,5	23,85	11,26	C24	
								25,24	11,91	GL24h	
8	430	152	150	379	227	379	207,5	24,66	11,64	C24	Bend
								25,24	11,91	GL24h	
8	480	170	150	414	245	414	232,5	24,66	11,64	C24	
								25,24	11,91	GL24h	
8	530	187	150	450	262	450	257,5	24,66	11,64	C24	
								25,24	11,91	GL24h	
8	580	205	150	485	280	485	282,5	24,66	11,64	C24	
								25,24	11,91	GL24h	

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.472$  - conversion factor of the mechanical strength of the load-bearing capacity

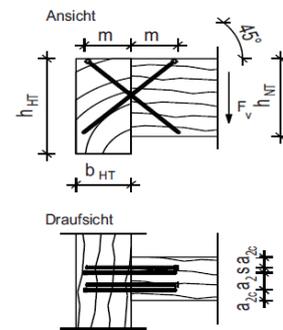
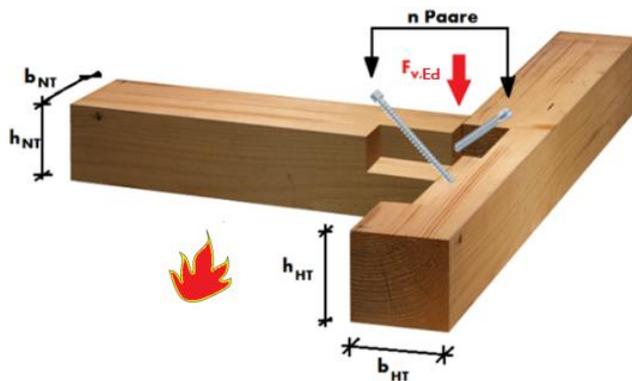
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø8 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
8	220	80	162	231	153	231	99,4	24,23	11,44	C24
								26,15	12,34	GL24h
8	240	85	154	245	160	245	112,5	27,44	12,95	C24
								29,61	13,98	GL24h
8	260	92	154	259	167	259	122,5	29,87	14,10	C24
								32,24	15,22	GL24h
8	280	99	154	273	174	273	132,5	32,31	15,25	C24
								34,87	16,46	GL24h
8	300	106	154	287	181	287	142,5	34,74	16,40	C24
								37,50	17,70	GL24h
8	330	117	154	308	192	308	157,5	38,41	18,13	C24
								41,45	19,57	GL24h
8	380	134	154	344	209	344	182,5	44,50	21,00	C24
								47,09	22,23	GL24h
8	430	152	154	379	227	379	207,5	46,01	21,72	C24
								47,09	22,23	GL24h
8	480	170	154	414	245	414	232,5	46,01	21,72	C24
								47,09	22,23	GL24h
8	530	187	154	450	262	450	257,5	46,01	21,72	C24
								47,09	22,23	GL24h
8	580	205	154	485	280	485	282,5	46,01	21,72	C24
								47,09	22,23	GL24h

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.472$  - conversion factor of the mechanical strength of the load-bearing capacity

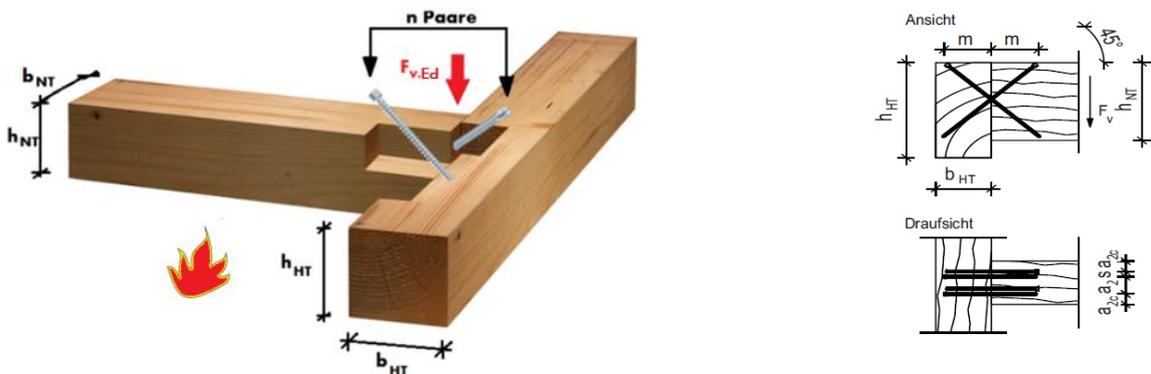
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3$  /  $385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN	
10	240	100	175	245	160	245	91	25,10	11,85	C24
								27,09	12,78	GL24h
10	260	100	175	259	167	259	111	30,64	14,46	C24
								33,07	15,61	GL24h
10	280	100	165	273	174	273	131	36,17	17,07	C24
								39,04	18,43	GL24h
10	300	106	165	287	181	287	142	39,34	18,57	C24
								42,46	20,04	GL24h
10	320	113	165	301	188	301	152	42,12	19,88	C24
								45,46	21,46	GL24h
10	340	120	165	315	195	315	162	44,89	21,19	C24
								48,44	22,87	GL24h
10	360	127	165	330	202	330	172	47,66	22,50	C24
								51,44	24,28	GL24h
10	380	134	165	344	209	344	182	50,43	23,80	C24
								54,43	25,69	GL24h
10	400	141	165	358	216	358	192	53,20	25,11	C24
								57,42	27,10	GL24h
10	430	152	165	379	227	379	207	57,36	27,07	C24
								61,91	29,22	GL24h
10	480	170	165	414	245	414	232	64,31	30,36	C24
								69,41	32,76	GL24h

**Thread pull-out**

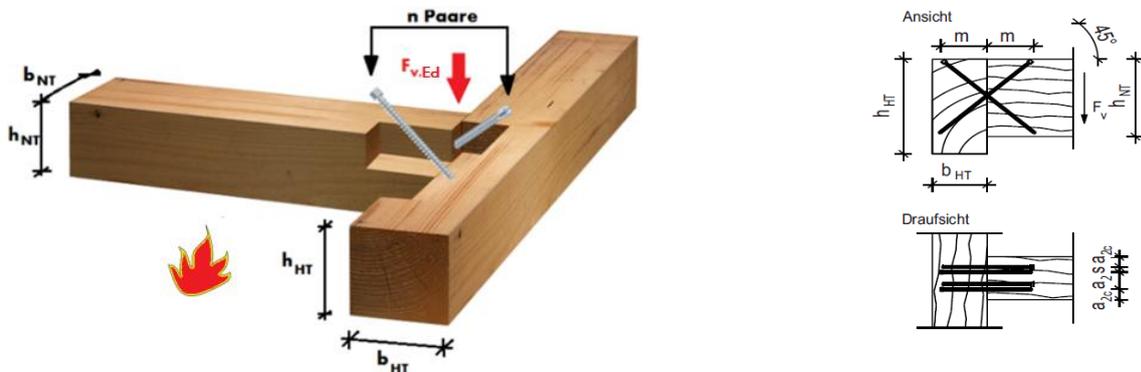
<sup>1)</sup> For measuring crucial thread length

η = 0.472 - conversion factor of the mechanical strength of the load-bearing capacity

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø10 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	530	187	165	450	262	450	257	71,21	33,61	C24	<b>Bend</b>
								73,82	34,84	GL24h	
10	580	205	165	485	280	485	282	72,14	34,05	C24	
								73,82	34,84	GL24h	
10	650	230	165	535	305	535	317	72,14	34,05	C24	
								73,82	34,84	GL24h	
10	700	247	165	570	322	570	342	72,14	34,05	C24	
								73,82	34,84	GL24h	
10	750	265	165	605	340	605	367	72,14	34,05	C24	
								73,82	34,84	GL24h	
10	800	283	165	641	358	641	392	72,14	34,05	C24	
								73,82	34,84	GL24h	

<sup>1)</sup> For measuring crucial thread length

$\eta = 0.472$  - conversion factor of the mechanical strength of the load-bearing capacity

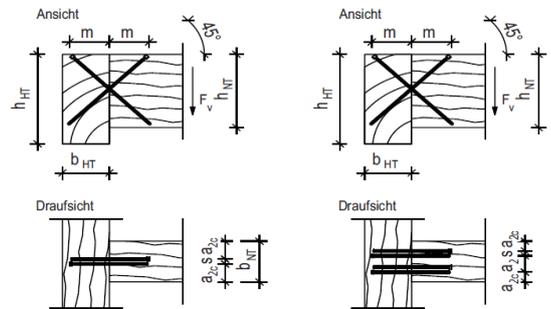
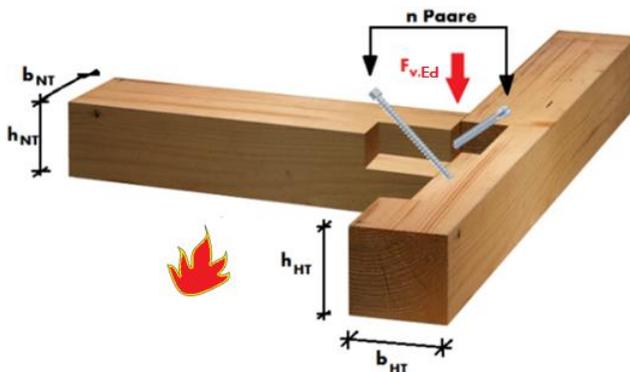
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with a pair of screws**  
**Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
12	300	120	150	287	181	287	120,7	21,50	10,15	C24	<b>Thread pull-out</b>
								23,21	10,95	GL24h	
12	380	134	150	344	209	344	180,4	32,14	15,17	C24	
								34,69	16,37	GL 24h	
12	480	170	150	414	245	414	230,4	41,06	19,38	C24	
								44,31	20,91	GL24h	
12	600	212	150	499	287	499	290,4	51,62	24,36	C24	<b>Bend</b>
								52,76	24,90	GL24h	

<sup>1)</sup> For measuring crucial thread length

η = 0.472 - conversion factor of the mechanical strength of the load-bearing capacity

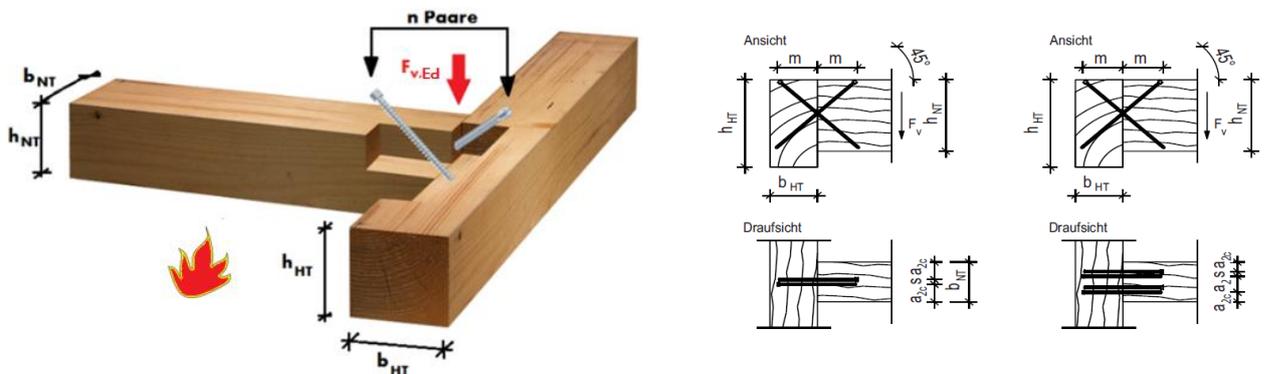
### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

## MAIN-SECONDARY BEAM, MAIN BEAM CLAMPED IN PLACE, FIRE-RESISTANCE 60 MINUTES

**Load-bearing capacities for a main-secondary beam connection with two pairs of screws  
Würth ASSY® plus VG Ø12 mm in NKL 1 and 2**



d	ℓ	m	b <sub>NT</sub>	h <sub>NT</sub>	b <sub>HT</sub>	h <sub>HT</sub>	l <sub>ef</sub> <sup>1)</sup>	F <sub>v,Rk</sub>	F <sub>v,Rd</sub>		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
12	300	120	188	7768	181	287	120,7	40,13	18,94	C24	Thread pull-out
								43,31	20,44	GL24h	
12	380	134	188	7825	209	344	180,4	59,99	28,31	C24	
								64,74	30,56	GL 24h	
12	480	170	188	7895	245	414	230,4	76,78	36,24	C24	
								82,86	39,11	GL24h	
12	600	212	188	7980	287	499	290,4	96,33	45,47	C24	Bend
								98,46	46,47	GL24h	

<sup>1)</sup> For measuring crucial thread length

η = 0.472 - conversion factor of the mechanical strength of the load-bearing capacity

### Notes:

- Load-bearing capacities apply for a characteristic bulk density of  $\rho_k \geq 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- All screws must be screwed in, head up, flush with the surface.
- The screws can be predrilled in accordance with ETA-11/0190 table 1.
- The upper edges of the main beam and secondary beam are fitted flush to each other.
- The main beam must be stored in a torsion-resistant position. Additional torque from the eccentricity of the connection, as well as cross section weaknesses due to the means of connection must be considered when verifying components.
- The minimum distances of the screws must be maintained in accordance with ETA-11/0190.

NOTE: These are planning aids. These values must be measured by authorized persons for each project.

# **ASSY® - THE SCREW FOR WOOD AND BUILDING CRAFTS**

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