

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





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Main-secondary connection; main beam clamped in place; 30 minutes in case of fire

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Main-secondary connection; main beam clamped in place; 60 minutes in case of fire

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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 ($_{\rm \rho k}$ = 385 kg/m 3)
Secondary beam:	b/h = 120 / 200mm laminated wood, strength class GL 24h in accordance with EN 14080 ($_{\rm \rho k}$ = 385 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.



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

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$\begin{array}{cccccccccccccccccccccccccccccccccccc$
240 85 60 170 85 170 112,5 14,01 8,62 C24 240 85 60 170 85 170 112,5 15,12 9,30 GL24h
240 85 60 170 85 170 112,5 <u>14,01 8,62 C24</u> 15,12 9,30 GL24h
170 112,5 15,12 9.30 GL24h
10/12 //00 012111
260 92 60 184 92 184 122.5 15,25 9,38 C24
200 72 00 184 72 164 122,5 16,45 10,12 GL24h
280 00 60 108 00 108 122.5 16,49 10,15 C24
280 77 00 178 77 178 132,5 17,80 10,95 GL24h
300 106 60 212 106 212 142.5 17,73 10,91 C24
300 100 212 100 212 142,5 19,14 11,78 GL24h
330 117 60 233 117 233 157.5 19,60 12,06 C24 (
550 117 00 255 117 255 157,5 21,15 13,02 GL24h

η =	0,829	< 1.0	$\eta = \frac{F_{\nu,Ed}}{F_{\nu,Rd}}$
$F_{v,Ed} =$	6,8	kN	
$F_{v,Rd} =$	8,2	kN	



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



KEY FOR MAIN-SECONDARY BEAM CONNECTION

	F _{v,Rk}	F _{v,Rd}	
	kN	kN	
C24 softwood	8,93	5,49	
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	l
	18,72	11,52	É
	18,92	11,64	
	20,42	12,57	1

Notes

Load-bearing capacities apply for a characteristic Bulk density ρ_k≥ 350 kg/m³ / 385 kg/m³.

Bases for calculation

DIN EN 1995-1-1:2010-12

DIN EN 1995-1-1/NA:2013-08 DIN 20000-6

ETA-11/0190 EN 14081-1 EN 14080 EN 338 Design and construction of timber structures - Common rules and rules for timber constructions National Annex - Nationally determined parameters Application of construction products in structures - Part 6: Dowel-type fasteners and connectors Würth self-tapping screws for use in timber constructions Timber structures - General requirements Laminated wood for load bearing purposes, strength classes Construction wood for load bearing purposes, strength classes



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 EN14080 ($_{\rm pk}$ = 385 kg/m ³)			
Secondary beam:	b/h = 120 / 200mm laminated wood, strength class GL 24h in accordance with EN 14080 ($_{\rm \rho k}$ = 385 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.Fd} = 6,8 kN			



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

d =	8	mm
d _h =	10	mm
d ₁ =	5	mm
$f_{\alpha x,k} =$	11	N/mm²
f _{tens,k} =	20000	Ν
m =	80	mm
n =	2	Piece



Axial and edge clearances

Minimum distances i	rdance with ETA-11/0190	Edge spacings for calculation			
a ₁ =	40	mm			
a ₂ =	20	mm	a _{1,c} =	40	mm
a _{1,c} =	40	mm	a _{2,c} =	24	mm
a _{2,c} =	24	mm			

Derivation I_{ef}

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





Pull-out strength or push in strength

α =	45	0
$k_{ax} =$	1,00	
$f_{head,k} =$	13	N/mm²
$f_{tens,k} =$	20000	Ν
$I_{ef} =$	99,40	mm
$F_{ax,Rk,1} =$	9440	N
$F_{ax,Rd,1} =$	5809	Ν
$F_{ax,Rk,2} =$	20000	Ν
$F_{ax,Rd,2} =$	15385	Ν

"Angle between screw axis and direction of grain" Factor [A.1.3.1]

"Head pull-through parameter [A.1.3.2]"

"Characteristic tensile strength [Annex 1 Table 1.1]" "Effective thread length in wood minus head height"

$$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0.6}$$

k_{mod} = 0.8; ym = 1.3

"Characteristic tensile strength [Annex 1 Table 1.1]" $\gamma_m = 1.3$

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

Bending the screw

η =	0,83	< 1.0	$\eta = \frac{F_{\nu,Ed}}{F_{\nu,Rd}}$
F _{v,Rd} =	8216	Ν	$F_{\nu,Rd} = F_{ax,Rd} \times n \times \sin(45) \tag{1.0}$
$F_{ax,Rd} =$	5809	Ν	$F_{ax,Rd} = Min\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$
$F_{\alpha x, Rd, 3} =$	10220	Ν	$F_{ax,Rd,3} = N_{pl,d} \times k_c$
N _{pl,d} =	17850	Ν	
k _c =	0,573		$\kappa_c = \frac{1}{k + \sqrt{k^2 - {\lambda_k}^2}}$
k =	1,13		$k = 0.5 \times [1 + 0.49 \times (\lambda_k - 0.2) + \lambda_k]$
$\lambda_k =$	0,94		$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{kl,k}}}$
N _{pl,k} =	19635	Ν	$N_{pl,k} = \pi \times \frac{{d_1}^2}{4} \times f_{y,k}$
N _{ki,k} =	21993	Ν	$N_{ki,k} = \sqrt{c_h \times E_s \times l_s}$
$E_s =$	210000	N/mm ²	"E-module" 64
_s =	30,68	mm^4	"Moment of inertia" $ls = \frac{\pi \times d_1^4}{\epsilon_4}$
c _{h,min} =	75,08	N/mm ²	α = Angle between screw axis and direction of grain
c _{h,Neben} =	75,08	N/mm²	$c_h = (0,19+0,012 \times d) * \rho_k \times \left(\frac{50+a}{180^\circ}\right)$
Ch Haupt =	100,10	N/mm ²	$\langle 90^{\circ} + \alpha \rangle$

Proof



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

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

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



Determining the minimum widths of the secondary beam

a_{2,c} = 3 x d

		Ø 6 mm	Ø8 mm	Ø10 mm	Ø12 mm
A pair of screws:	$b_{NT} = a_{2,c} + 1.5 \text{ x d} + a_{2,c}$	45 mm	60 mm	75 mm	90 mm
Two pairs of screws:	$b_{NT} = a_{2,c} + 5 \times d + 1.5 \times d + a_{2,c}$	75 mm	100 mm	125 mm	150 mm
	*b _{NI} = a _{2,c} + 4 x d + 1.5 x d + a _{2,c}	69 mm	92 mm	115 mm	138 mm

*In the case that the screw is so long that the gap of 7 x 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 x d compared with the original 5 x 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

$$\frac{l}{2} \ge 2 \times a_{4,t} \times \sqrt{2}$$
$$l \ge 4 \times \sqrt{2} \times 7 \times d$$
$$l \ge 28 \times \sqrt{2} \times d$$





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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
4	140	40	45	100	50	100	14.0	4,46	2,75	C24	
0	140	00	43	109	29	109	40,0	4,82	2,96	GL24h	
4	140	40	45	100	47	100	45.0	6,42	3,95	C24	ŧ
0	100	00	45	123	07	123	03,8	6,92	4,26	GL24h	<u>-</u>
	100		4.5	107	74	107	05.0	8,32	5,12	C24	hud
0	180	04	45	137	74	137	80,3	8,98	5,53	GL24h	ad
4	200	71	4.5	151	0.1	151	04.0	9,30	5,72	C24	Jre
0	200		45	151	81	121	94,9	10,04	6,18	GL24h	É
4	220	70	4.5	144	00	144	104.0	10,10	6,22	C24	
0	220	/8	45	100	90	100	104,9	10,90	6,71	GL24h	

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
6	140	60	75	100	50	100	16.0	8,93	5,49	C24	
0	140	00	75	109	59	109	40,0	9,64	5,93	GL24h	
4	140	40	75	100	47	100	45.0	11,97	7,37	C24	ŧ
0	100	80	75	123	07	123	05,0	12,92	7,95	GL24h	-01
6	100	61	75	127	74	127	05.2	15,53	9,56	C24	pul
0	100	04	/ J	137	74	137	00,0	16,76	10,31	GL24h	ad
4	200	71	75	151	0 1	151	04.0	17,35	10,68	C24	hre
0	200	71	75	151	01	151	94,9	18,72	11,52	GL24h	μ
6	220	70	75	144	00	166	104.0	18,92	11,64	C24	
0	220	/0	/5	100	70	100	104,9	20,42	12,57	GL24h	

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}	7	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
0	220	00	40	144	00	144	00.4	12,37	7,61	C24	
0	220	80	00	100	90	100	99,4	13,35	8,22	GL24h	
8	240	85	60	180	05	180	112.5	14,01	8,62	C24	
0	240	0.5	00	100	,2	100	112,5	15,12	9,30	GL24h	_ <u>+</u>
8	260	02	60	101	102	104	122.5	15,25	9,38	C24	- Ā
0	200	12	00	174	102	174	122,5	16,45	10,12	GL24h	5
Q	280	00	60	208	100	208	122.5	16,49	10,15	C24	
0	200	//	00	200	107	200	152,5	17,80	10,95	GL24h	ğ
8	300	106	60	222	116	222	142 5	17,73	10,91	C24	, Ļ
0	500	100	00		110		142,5	19,14	11,78	GL24h	
8	330	117	60	2/3	127	243	157 5	19,60	12,06	C24	
0	000	117	00	240	127	245	137,3	21,15	13,02	GL24h	
8	380	134	60	279	144	279	182.5	22,71	13,98	C24	
0	500	104	00	277	144	2/ /	102,5	24,04	14,79	GL24h	
8	130	152	60	311	162	314	207.5	23,49	14,45	C24	
0	400	152	00	514	102	514	207,5	24,04	14,79	GL24h	
8	180	170	60	319	180	310	232.5	23,49	14,45	C24	g
0	400	170	00	547	100	547	252,5	24,04	14,79	GL24h	eu
8	530	187	60	385	197	385	257 5	23,49	14,45	C24	8
0	550	107	00	505	177	505	237,3	24,04	14,79	GL24h	
8	580	205	60	120	215	120	282.5	23,49	14,45	C24	
0	500	205	00	420	215	420	202,5	24,04	14,79	GL24h	

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
0	220	00	100	144	00	144	00.4	23,1	14,20	C24	
0	220	00	100	100	90	100	99,4	24,91	15,33	GL24h	
8	240	85	100	180	05	180	112.5	26,1	16,08	C24	
0	240	05	100	100	,3	100	112,5	28,20	17,35	GL24h	<u>+</u>
8	260	02	100	101	102	104	122.5	28,5	17,51	C24	- 7 I
0	200	72	100	174	102	174	122,5	30,70	18,89	GL24h	5
Q	280	00	100	208	100	208	122.5	30,8	18,94	C24	
0	200	77	100	200	107	200	152,5	33,21	20,44	GL24h	ğ
8	300	106	100	222	116	222	142 5	33,1	20,36	C24	Ļ
0	500	100	100		110		142,5	35,71	21,98	GL24h	
8	330	117	02	2/3	127	243	1575	36,6	22,51	C24	
0	550	117	12	243	127	245	157,5	39,48	24,29	GL24h	
8	380	134	02	270	144	270	182.5	42,38	26,08	C24	
0	300	154	12	277	144	2/ /	102,5	44,85	27,60	GL24h	
8	130	152	02	314	162	314	207.5	43,82	26,97	C24	
0	430	132	12	514	102	514	207,5	44,85	27,60	GL24h	
Q	180	170	02	340	180	340	222.5	43,82	26,97	C24	σ
0	400	170	72	547	100	547	232,5	44,85	27,60	GL24h	en
Q	530	197	02	285	107	295	257.5	43,82	26,97	C24	8
0	550	107	72	303	177	305	257,5	44,85	27,60	GL24h	
Q	580	205	02	120	215	120	282.5	43,82	26,97	C24	
0	500	205	72	420	215	420	202,5	44,85	27,60	GL24h	

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	240	100	75	100	0.5	100	00.4	12,80	7,88	C24	
10	240	100	75	180	90	180	90,0	13,81	8,50	GL24h	
10	240	100	75	104	102	104	110.5	15,63	9,62	C24	
10	200	100	75	194	102	194	110,5	16,87	10,38	GL24h	
10	200	100	75	209	100	209	120.4	18,47	11,36	C24	
10	280	100	75	200	109	200	130,0	19,93	12,26	GL24h	
10	200	106	75	22	114	22	142.0	20,08	12,36	C24	
10	300	100	/5	22	110	22	142,0	21,67	13,34	GL24h	
10	320	113	75	236	123	236	152.0	21,50	13,23	C24	5
10	520	115	/ 5	230	125	230	152,0	23,20	14,28	GL24h	<u> </u>
10	240	120	75	250	120	250	162.0	22,91	14,10	C24	
10	540	120	/5	230	130	250	102,0	24,73	15,22	GL24h	g
10	360	107	75	265	127	265	172.0	24,32	14,97	C24	Jree
10	300	127	/5	205	137	205	172,0	26,25	16,15	GL24h	⊨
10	200	124	75	270	144	270	102.0	25,74	15,84	C24	
10	300	134	75	279	144	2/9	102,0	27,78	17,09	GL24h	
10	400	1.41	75	202	151	202	102.0	27,15	16,71	C24	
10	400	141	75	293	151	293	192,0	29,30	18,03	GL24h	
10	420	150	75	014	1/0	214	007.0	29,27	18,01	C24	
10	430	152	/5	314	102	314	207,0	31,59	19,44	GL24h	
10	490	170	75	240	100	240	222.0	32,81	20,19	C24	
10	480	170	/5	349	180	349	232,0	35,41	21,79	GL24h	

¹⁾ For measuring crucial thread length



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	520	107	75	205	107	295	257	36,3	22,37	C24	Thread pull-out
10	530	107	/5	300	177	365	237	37,7	23,18	GL24h	
10	580	205	75	420	215	120	282	36,8	22,67	C24	
10	200	205	75	420	215	420	202	37,7	23,18	GL24h	
10	650	230	75	470	240	470	217	36,8	22,67	C24	
10	030	230	75	470	240	470	517	37,7	23,18	GL24h	-
10	700	247	75	505	257	505	242	36,8	22,67	C24	ene
10	700	247	/5	202	237	505	542	37,7	23,18	GL24h	8
10	750	245	75	540	075	5.40	247	36,8	22,67	C24	
10	750	205	/5	540	275	540	307	37,7	23,18	GL24h	
10	800	202	75	574	202	574	202	36,8	22,67	C24	
10	000	283	/5	576	293	570	392	37,7	23,18	GL24h]

¹⁾ For measuring crucial thread length

Notes:

- Load-bearing capacities apply for a characteristic bulk density of $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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 secti 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}	7	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	240	100	105	100	0.5	100	01	23,90	14,71	C24	
10	240	100	125	180	90	180	91	25,80	15,87	GL24h	
10	240	100	105	104	102	104	111	29,18	17,96	C24	
10	200	100	125	174	102	174	111	31,49	19,38	GL24h	
10	200	100	105	209	100	200	121	34,45	21,20	C24	
10	260	100	125	200	109	206	131	37,18	22,88	GL24h	
10	200	106	125	22	116	22	140	37,47	23,06	C24	
10	300	100	125	22	110	22	142	40,44	24,89	GL24h	
10	320	113	125	236	123	236	152	40,11	24,68	C24	5
10	520	115	125	230	125	230	132	43,29	26,64	GL24h	<u> </u>
10	240	120	125	250	120	250	140	42,75	26,31	C24	Du l
10	340	120	125	230	130	250	102	46,14	28,39	GL24h	p
10	240	107	125	245	127	245	170	45,39	27,93	C24	Jree
10	300	127	125	205	137	205	172	48,99	30,15	GL24h	⊨
10	200	124	105	270	144	270	100	48,03	29,56	C24	
10	300	134	125	279	144	2/9	102	51,84	31,90	GL24h	
10	400	1.41	115	202	151	202	102	50,67	31,18	C24	
10	400	141	115	293	151	293	192	54,68	33,65	GL24h	
10	420	150	115	01.4	1/0	214	007	54,63	33,62	C24	
10	430	152	115	314	102	314	207	58,96	36,28	GL24h	
10	190	170	115	240	100	240	222	61,25	37,69	C24	
10	480	170	115	349	180	349	232	66,10	40,68	GL24h	

¹⁾ For measuring crucial thread length



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	$F_{v,Rd}$		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	520	107	115	205	107	205	257	67,8	41,74	C24	Thread pull-out
10	530	107	115	305	197	305	237	70,3	43,26	GL24h	
10	590	205	115	420	215	420	202	68,7	42,29	C24	
10	200	205	115	420	215	420	202	70,3	43,26	GL24h	
10	650	220	115	470	240	470	217	68,7	42,29	C24	
10	030	230	115	470	240	470	517	70,3	43,26	GL24h	
10	700	247	115	505	257	505	242	68,7	42,29	C24	ene
10	700	247	115	505	237	505	342	70,3	43,26	GL24h	•
10	750	045	115	5.40	075	5.40	247	68,7	42,29	C24	
10	/50	205	115	540	275	540	307	70,3	43,26	GL24h	
10	000	202	115	574	202	574	202	68,7	42,29	C24	
10	800	283	115	576	293	5/6	392	70,3	43,26	GL24h	

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	$F_{v,Rd}$		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	200	120	00	222	104	222	120.7	20,48	12,60	C24	
ΙZ	300	120	90		120		120,7	22,10	13,60	GL24h	5
10	200	124	00	270	154	270	190.4	30,61	18,84	C24	ļ
12	300	134	90	279	150	2/9	160,4	33,04	20,33	GL24h	d p
10	400	170	00	240	100	2.40	220.4	39,10	24,06	C24	ea
ΙZ	480	170	90	349	190	349	230,4	42,20	25,97	GL24h	Ē
10	400	010	00	12.4	222	12.4	200.4	49,16	30,25	C24	pu
12	000	212	90	434	232	434	290,4	50,25	30,92	GL24h	Be

¹⁾ For measuring crucial thread length

Notes:

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



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}]	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	200	120	150	222	104	222 120,7	38,22	23,52	C24		
12	300	120	150		120		222 120,7	41,25	25,38	GL24h	o to
12		0.70 1.0	270 190 4	57,13	35,16	C24	Ľ,				
12	360	134	150	279	100	279 100,4	277 100,4	61,66	37,94	GL24h	d p
10	490	170	120	240	100	349 230,4	220.4	73,12	45,00	C24	e e
12	400	170	130	549	190		230,4	78,91	48,56	GL24h	Тh
12 0	400		100 404	12.4	222		10.1	91,74	56,46	C24	pu
	000	212	130	434	232	434	290,4	93,77	57,71	GL24h	Be

¹⁾ For measuring crucial thread length

Notes:

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



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 EN140 ($_{\rm pk}$ = 385 kg/m ³)								
Secondary beam:	$b/h = 120 / 240 \mu$ (_{pk} = 385 kg/m ³)	mm laminated v	wood, streng	th class GL 24h in accordance with EN 14080					
Basis for calculation:	EC5 or DIN EN 19 DIN 20000-6:201	995-1-1:2010- 12-06; ETA-11/	12 and natic ′0190 ASSY	onal German application document ' 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 _h =	10	mm
d ₁ =	5	mm
$f_{ax,k} =$	11	N/mm ²
f _{tens,k} =	20000	Ν
m =	85,0	mm
n =	2,000	Piece



Axial and edge clearances taking the fire protection status into account

Minimum distances in accordance			Edge spacings for calculation for F30					
	90	mm	a. =	40	mm			
u	40		u _{1,c}	40		"		
a ₂ =	20	mm	a _{2,c} /a ₁ =	30	mm	constructive combustion depth		
a _{1,c} =	40	mm	a ₂ =	70	mm	$a_2 \ge a_1 + 40$		
a _{2,c} =	24	mm	a ₃ =	50	mm	$a_3 \ge a_1 + 20$		

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

Minimum cross section

b _{NT} =	100	mm	≤ 120 mm
h _{NT} =	206	mm	≤ 240 mm
b _{HT} =	128	mm	≤ 160 mm
h _{HT} =	206	mm	≤ 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"
=	220	mm	"Screw length"
l _{ef,2} =	113,1	mm	$l_{ef,2} = a_{1,c} \times \sqrt{2} \times$
l _{ef} =	99,4	mm	$l_{ef} = l - h_k - l_{ef}$





Pull-out strength or push in strength

α =	45	0
k _{ax} =	1,00	
$f_{head,k} =$	13	N/mm²
$f_{tens,k} =$	20000	Ν
$I_{ef} =$	99,40	mm
$F_{ax,Rk,1} =$	9440	Ν
$F_{ax,Rd,1} =$	9440	Ν
$F_{ax,Rk,2} =$	20000	Ν
$F_{ax,Rd,2} =$	20000	Ν

"Angle between screw axis and direction of grain" Factor [A.1.3.1] "Head pull-through parameter [A.1.3.2] "Characteristic tensile strength [Annex 1 Table 1.1]" "Effective thread length in wood minus head height"

$$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0,8}$$

"Characteristic tensile strength [Annex 1 Table 1.1]"

Bending the screw

c _h =	100,10	N/mm²
$I_s = E_s =$	30,68 210000	mm ⁴ N/mm²
N _{ki,k} =	25395	Ν
N _{pl,k} =	19635	Ν
$\lambda_k =$	0,88	
k =	1,05	
k _c =	0,613	
N _{pl,d} =	19635	Ν
F _{ax,Rd,3} =	12028	Ν
$F_{\alpha x, Rd} =$	9440	Ν
F _{v,Rd} =	13351	N

$$c_{h} = (0,19 + 0,012 \times d) * \rho_{k} \times \left(\frac{90^{\circ} + \alpha}{180^{\circ}}\right)$$

"Moment of inertia"
$$ls = \frac{\pi \times d_{1}^{4}}{64}$$

"E-module"
$$N_{ki,k} = \sqrt{c_{h} \times E_{s} \times l_{s}}$$

$$N_{pl,k} = \pi \times \frac{d_1^2}{4} \times f_{y,k}$$
$$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{kl,k}}}$$
$$k = 0.5 \times [1 + 0.49 \times (\lambda_k - 0.2) + \lambda_k]$$
$$\kappa_c = \frac{1}{k + \sqrt{k^2 - \lambda_k^2}}$$

$$F_{ax,Rd,3} = N_{pl,d} \times k_c$$

$$F_{ax,Rd} = Min\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$$

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



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

F,	, _{Rd,fi} =	6,43	kN	$F_{v,Rd,fi} = \eta \times F_{v,Rd} \times k_{fi}$
	k _{fi} =	1,05		"Factor $k_{\rm fi}$ in accordance with table 2.1"
for $a_1 \ge t_{d,fi} + 28$		d) η=	1,0	1,0
for 0.8 $t_{d,f_1 + 5} \le \alpha_1 \le t_{d,f_1} + 2$	8	c) η =	0,459	$\frac{0.50 \times u_1^2 - 0.50 \times u_{a,f1} + 7.52}{0.2 \times t_{a,f1} + 23}$
for 0.6 $t_{d,fi} \le a_1 \le 0.8 t_{d,fi} + .$	5	b) η=	0,48	$\eta = \begin{cases} \frac{0.44 \times a_1 - 0.264 \times t_{d,fl}}{0.2 \times t_{d,fl} + 5} \\ 0.56 \times a_2 - 0.36 \times t_{d,fl} + 7.32 \end{cases}$
for $a_1 \le 0.6 t_{d,fi}$		a) η =	0	0

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

$\eta_{\rm fi}$ =	0,6		
E _{d,fi} =	3,12	kN	$E_{d,fi} = \eta_{fi} \times F_{\nu,Ed}$

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

η = 0,48 < 1.0
$$η = \frac{E_{d,fi}}{F_{V,Rd,fi}}$$



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}			
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN			
,	140	40	100	140	00	140	44.0	4,69	2,15	C24	1	
0	140	00	100	149	99 99	149	40,0	5,06	2,32	GL24h		
4	140	160 60 10	1/0 /0 100	100	140	107	107 142 4	140 450	6,74	3,09	C24	ŧ
0 100	100		100	103	107	105	5 05,6	7,27	3,34	GL24h	-01	
4	100 (4	64 100	100 17	177	114	14 177	85,3	8,74	4,01	C24	hud	
0	160		100	1//				9,43	4,33	GL24h	ad	
4	200	71	100	101	1 121	101	0.4.0	9,76	4,48	C24	ure	
0	200			191		121 191	191 94,9	10,54	4,84	GL24h	F	
4	220	70	100	204	100	204	104.0	10,61	4,87	C24		
6	220	78 100	100 206	206 128	128	206	104,9	11,45	5,26	GL24h		

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}]					
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN						
4		14.0	9,37	4,31	C24										
0	140	00	100	149 99 149	40,0	10,12	4,65	GL24h							
4	140	40	100	140	107	1.40	1/0		12,57	5,77	C24	ŧ			
0	100	00	100 103 107 103	103 03,0	13,56	6,23	GL24h	-01							
4	100 44		100	177	114	177	177 05.0	16,31	7,49	C24	hud				
0	160	04	100	1//	114	1//	00,0	17,60	8,08	GL24h	ad				
4	200	71	100	101	101	101	04.0	18,22	8,37	C24	hre				
0	200	7 I	100	191	121 191	121	121	121	141	141	191 94,9	19,66	9,03	GL24h	F
4	220	70	100	204	100	204	104.0	19,87	9,12	C24					
0	220	/0	100	200	128 20	128	200	104,9	21,44	9,85	GL24h				

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
Q	220	80	100	206	128	206	00 /	12,99	5,97	C24	
0	220	80	100	200	120	200	77,4	14,02	6,44	GL24h	
8	240	85	100	220	135	220	112 5	14,71	6,76	C24	
0	240	00	100	220	100	220	112,5	15,88	7,29	GL24h	5
8	260	92	100	234	1/2	234	122.5	16,01	7,35	C24	<u> </u>
0	200	12	100	204	142	204	122,5	17,28	7,93	GL24h	5
8	280	00	100	248	140	248	132.5	17,31	7,95	C24	
0	200	//	100	240	147	240	152,5	18,69	8,58	GL24h	ğ
Q	300	106	100	262	156	262	1425	17,73	8,15	C24	Ĕ
0	300	100	100	202	150	202	142,5	19,14	8,79	GL24h	
Q	330	117	100	283	167	283	1575	20,58	9,45	C24	
0	550	117	100	205	107	205	157,5	22,21	10,20	GL24h	
Q	380	124	100	210	184	210	182.5	23,85	10,95	C24	
0	500	134	100	517	104	517	102,5	25,24	11,59	GL24h	
Q	130	152	100	351	202	354	207.5	24,66	11,33	C24	
0	430	152	100	554	202	554	207,3	25,24	11,59	GL24h	
Q	180	170	100	380	220	380	222.5	24,66	11,33	C24	σ
C	400	170	100	307	220	307	232,5	25,24	11,59	GL24h	e
0	520	107	100	125	227	125	2575	24,66	11,33	C24	6
0	530	107	100	423	237	423	257,5	25,24	11,59	GL24h	
Q	580	205	100	160	255	160	282.5	24,66	11,33	C24	
0	500	205	100	400	233	400	202,5	25,24	11,59	GL24h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{HT}	$I_{ef}^{(1)}$	F _{v.Rk}	F _{v.Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
8	220	80	112	206	128	206	99 /	24,23	11,13	C24	
0	220	00	112	200	120	200	//,4	26,15	12,01	GL24h	
8	240	85	104	220	135	220	112.5	27,44	12,60	C24	4
	210					220	112,0	29,61	13,60	GL24h	5
8	260	92	104	234	142	234	122.5	29,87	13,72	C24	오
-	200						/-	32,24	14,81	GL24h	2
8	280	99	104	248	149	248	132.5	32,31	14,84	C24	
	_	_			_	_	,	34,87	16,02	GL24h	e e
8	300	106	104	262	156	262	142,5	34,74	15,96	<u>C24</u>	<u>È</u>
							,	37,50	17,22	GL24h	4 - 1
8	330	117	104	283	167	283	157,5	38,41	17,64	C24	-
	_	_	_	_	_			41,45	19,04	GL24h	- 1
8	380	134	104	319	184	319	182,5	44,50	20,44	C24	
								47,09	21,63	GL24h	4 I I
8	430	152	104	354	202	354	207,5	46,01	21,13	C24	-
	_	_	_	_	_			47,09	21,63	GL24h	- 1
8	480	170	104	389	220	389	232,5	46,01	21,13	C24	2
							-	47,09	21,63	GL24h	- Be
8	530	187	104	425	237	425	257,5	46,01	21,13	C24	-
					_			47,09	21,63	GL24h	- 1
8	580	205	104	460	255	460	282,5	46,01	21,13	C24	- 1
								47,09	21,63	GL24h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}	7	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	2.40	100	100	220	105	220	01	13,4	6,17	C24	
10	240	100	100	220	135	220	91	14,50	6,66	GL24h	
10	260	100	100	224	142	224	111	16,4084	7,54	C24	
10	200	100	100	234	142	234	111	17,71	8,13	GL24h	
10	280	100	100	249	140	249	121	19,39	8,91	C24	
10	260	100	100	240	149	240	131	20,92	9,61	GL24h	
10	200	104	100	242	154	242	140	21,09	9,68	C24	
10	300	100	100	202	130	202	142	22,76	10,45	GL24h	
10	320	112	100	276	163	276	152	22,57	10,37	C24	5
10	520	115	100	270	105	270	152	24,36	11,19	GL24h	<u> </u>
10	240	120	100	200	170	200	160	24,06	11,05	C24	
10	540	120	100	270	170	270	102	25,96	11,92	GL24h	g
10	260	107	100	205	177	205	170	25,54	11,73	C24	Jre
10	300	127	100	305	177	305	172	27,56	12,66	GL24h	F
10	200	124	100	210	104	210	100	27,03	12,41	C24	
10	360	134	100	519	104	519	102	29,17	13,40	GL24h	
10	400	1.4.1	100	222	101	222	102	28,51	13,10	C24	
10	400	141	100	333	171	333	192	30,77	14,13	GL24h	
10	120	150	100	254	202	254	207	30,74	14,12	C24	
10	430	152	100	354	202	354	207	33,17	15,24	GL24h	
10	190	170	100	200	220	200	222	34,45	15,82	C24	
10	480	170	100	389	220	389	232	37,18	17,08	GL24h	

¹⁾ For measuring crucial thread length

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



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 _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}]			
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN				
10	520	107	100	105	227	105	257	38,16	17,53	C24	Thread pull-out		
10	530	107	100	423	237	425	237	39,59	18,18	GL24h			
10	500	205	100	460	255	440 000	202	38,64	17,75	C24			
10	200	203	100	400	233	400	202	39,59	18,18	GL24h			
10	650	220	100	510	200	510	217	38,64	17,75	C24			
10	000	230	100	510	200	510	517	39,59	18,18	GL24h	70		
10	700	247	100	515	207	515	242	38,64	17,75	C24	ene		
10	/00	247	100	545	297	545	34Z	39,59	18,18	GL24h			
10	750	045	100	500	215	500	247	38,64	17,75	C24			
10	750	203	100	580	315	580	30/	39,59	18,18	GL24h			
10	000	202	100	414	222	414	202	38,64	17,75	C24			
10	800	203	100	616 333	616 333 61	333 0	616 392	616	33 616 392	39,59	18,18	GL24h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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 secti 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.



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	Ь _{NT}	h _{NT}	ь _{нт}	h _{HT}	$I_{ef}^{(1)}$	F _{v/Rk}	F _{v/Rd}	7												
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN													
10	2.40	100	105	220	105	220	01	25,10	11,53	C24												
10	240	100	125	220	135	220	91	27,09	12,44	GL24h												
10	240	100	105	224	1.42	224	111	30,64	14,07	C24												
10	200	100	125	234	142	234	111	33,07	15,19	GL24h												
10	280	100	115	248	140	248	121	36,17	16,61	C24												
10	200	100	115	240	147	240	151	39,04	17,93	GL24h												
10	200	104	115	262	156	242	142	39,34	18,07	C24												
10	300	100	115	202	150	202	142	42,46	19,50	GL24h												
10	320	113	115	276	163	276	152	42,12	19,35	C24	5											
10	520	115	115	270	103	270	132	45,46	20,88	GL24h	<u> </u>											
10	340	120	115	200	170	200	162	44,89	20,62	C24	D D											
10	540	120	115	270	170	270	102	48,44	22,25	GL24h	g											
10	360	127	115	305	177	205	172	47,66	21,89	C24	- L											
10	300	127	115	303	177	303	172	51,44	23,63	GL24h	F											
10	200	124	115	210	104	210	100	50,43	23,16	C24												
10	300	134	115	519	104	519	102	54,43	25,00	GL24h												
10	400	1.4.1	115	222	101	222	102	53,20	24,44	C24												
10	400	141	115	333	191	333	192	57,42	26,37	GL24h												
10	420	150	115	254	202	254	207	57,36	26,35	C24												
10	430	152	115	354	202	354	207	61,91	28,43	GL24h												
10	490	170	115	200	220 200	220 200	220 280	000 000	200	0.00	222	0 200	200	0 200	220	200	200	222	64,31	29,54	C24	
10	460	170	115	307	220	307	232	69,41	31,88	GL24h												

¹⁾ For measuring crucial thread length

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



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}					
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN					
10	520	107	115	125	227	105	5 057	71,21	32,71	C24	Thread pull-out			
10	530	107	115	423	237	425	257	73,82	33,90	GL24h				
10	590	205	115	160	255	160	202	72,14	33,13	C24				
10	200	205	115	400	233	400	202	73,82	33,90	GL24h				
10	650	230	115	510	280	510	217	72,14	33,13	C24				
10	000	230	115	510	200	310 317	73,82	33,90	GL24h	ъ				
10	700	247	115	515	207	515	242	72,14	33,13	C24	ene			
10	700	247	115	545	297	545	34Z	73,82	33,90	GL24h				
10	750	245	115	590	215	590	247	72,14	33,13	C24				
10	750	205	115	200	315	280	307	73,82	33,90	GL24h				
10	800	202	115	414	222	616	202	72,14	33,13	C24				
10	800	203	115	010	333		616	010	010	616 392	616 392	73,82	33,90	GL24h

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3$ / 385 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}										
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN										
10	200	120	104	240	140	260	120.7	21,50	12,37	C24									
12	300	120	100	200	102	200	120,7	23,21	13,35	GL24h	out								
10	200	124	104	225	100	205	100 4	32,14	18,49	C24	- E								
12	300	134	100	323	190	325	100,4	34,69	19,95	GL24h	dр								
10	190	170	104	205	226	205	220 4	41,06	23,61	C24	ea								
12	400	170	100	393	220	395	230,4	44,31	25,48	GL24h	Thi								
10	400	010	104	190	240	490	200.4	51,62	29,69	C24	pu								
12	000	212	100	400	200	480	480	480	480	480	480	480	480	480	270,4	52,76	30,35	GL24h	Be

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.

11.02.2019 Design aid for main-secondary beam connection with softwood



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}											
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN											
10	300 120	120	150	240	162	240	120.7	40,13	23,08	C24										
12	300	120	150	200	102	200	120,7	43,31	24,91	GL24h	out									
10	200	124	150	225	100	225	100 4	59,99	34,50	C24	Ľ,									
١Z	300	134	150	325	190	525 100,4	100,4	64,74	37,24	GL 24h	dр									
10	490	170	150	205	224	205	220 4	76,78	44,16	C24	ea									
١Z	400	170	150	395	220	393	230,4	82,86	47,66	GL24h	Thi									
10	600	212	150	190	260	190	200 4	96,33	55,40	C24	pu									
12	000	212	150	400	268 480	480	480	480	480	480	480	480	480	480	480	270,4	98,46	56,63	GL24h	Be

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.

11.02.2019 Design aid for main-secondary beam connection with softwood



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 ($_{ ho k}$ = 385 kg/m ³)
Secondary beam:	b/h = 160 / 240mm laminated wood, strength class GL 24h in accordance with EN 14080 ($_{\rm pk}$ = 385 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 _h =	10	mm
d ₁ =	5	mm
$f_{ax,k} =$	11	N/mm²
f _{tens,k} =	20000	Ν
m =	85,0	mm
n =	2,000	Piece



Axial and edge clearances taking the fire protection status into account

Minimum distances in accordance wit 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	$a_2 \ge a_1 + 40$
a _{2,c} =	24	mm	a ₃ =	75	mm	$a_3 \ge a_1 + 20$

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

Minimum cross section

b _{NT} =	150	mm	≤ 160 mm
h _{NT} =	231	mm	≤ 240 mm
b _{HT} =	153	mm	≤ 160 mm
h _{HT} =	231	mm	≤ 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 = =	7,5 220	mm	"Screw length"
{ef,2} =	113,1	mm	$l{ef,2} = a_{1,c} \times \sqrt{2} \times 2$
l _{ef} =	99,4	mm	$l_{ef} = l - h_k - l_{ef,2}$





Pull-out strength or push in strength

α =	45	0
k _{ax} =	1,00	
$f_{head,k} =$	13	N/mm²
$f_{tens,k} =$	20000	Ν
$ _{ef} =$	99,40	mm
$F_{ax,Rk,1} =$	9440	Ν
$F_{ax,Rd,1} =$	9440	Ν
$F_{ax,Rk,2} =$	20000	Ν
$F_{ax,Rd,2} =$	20000	N

"Angle between screw axis and direction of grain" Factor [A.1.3.1] "Head pull-through parameter [A.1.3.2] "Characteristic tensile strength [Annex 1 Table 1.1]" "Effective thread length in wood minus head height"

$$= k_{ax} \times f_{ax,k} \times d \times l_{ef} \times \left(\frac{\rho_k}{350}\right)^{0,8}$$

"Characteristic tensile strength [Annex 1 Table 1.1]"

Bending the screw

F=	13351	N	
$F_{\alpha x,Rd} =$	9440	N	
$F_{ax,Rd,3} =$	12028	N	
N _{pl,d} =	19635	Ν	
k _c =	0,613		
k =	1,05		
$\lambda_k =$	0,88		
N _{pl,k} =	19635	Ν	
N _{ki,k} =	25395	Ν	
$E_s =$	210000	N/mm²	
-n =	30.68	, mm ⁴	
_{Ch} =	100,10	N/mm²	

$$c_{h} = (0,19 + 0,012 \times d) * \rho_{k} \times \left(\frac{90^{\circ} + \alpha}{180^{\circ}}\right)$$

"Moment of inertia"
$$ls = \frac{\pi \times d_{1}^{4}}{64}$$

"E-module"
$$N_{kl,k} = \sqrt{c_{h} \times E_{s} \times l_{s}}$$

$$N_{pl,k} = \pi \times \frac{d_1^2}{4} \times f_{y,k}$$
$$\lambda_k = \sqrt{\frac{N_{pl,k}}{N_{kl,k}}}$$
$$k = 0.5 \times [1 + 0.49 \times (\lambda_k - 0.2) + \lambda_k]$$
$$\kappa_c = \frac{1}{k + \sqrt{k^2 - \lambda_k^2}}$$

 $F_{ax,Rd,3} = N_{pl,d} \times k_c$ $F_{ax,Rd} = Min\{F_{ax,Rd,1}; F_{ax,Rd,2}; F_{ax,Rd,3}\}$ $F_{v,Rd} = F_{ax,Rd} \times n \times \sin(45)$ (1.0)



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

	1,05		"Factor \mathbf{k}_{fi} in accordance with table 2.1"
$k_{fi} =$	1.05		
for $a_1 \ge t_{d,fi} + 28$	d) η=	1,0	-,-
for 0.8 $t_{d,f_{1}+5} \le \alpha_{1} \le t_{d,f_{1}} + 28$	c) η=	0,472	$\frac{1}{0.2 \times t_{d,fl} + 23}$
for 0.6 $t_{d,fi} \le a_1 \le 0.8 t_{d,fi} + 5$	b) η=	0,492	$\eta = \begin{cases} 0.2 \times t_{d,fl} + 5 \\ 0.56 \times a_1 - 0.36 \times t_{d,fl} + 7.32 \end{cases}$
for $a_1 \leq 0.6 t_{d,fi}$	a) η =	0	$ \begin{pmatrix} 0 \\ 0,44 \times a_1 - 0,264 \times t_{d,fi} \end{pmatrix} $

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

E _{d.fi} =	3,12	kN	$E_{d,fi} = \eta_{fi} \times F_{\nu,Ed}$
$\eta_{\rm fi}$ =	0,6		

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

η = **0,47** < **1.0**
$$\eta = \frac{E_{d,fi}}{F_{V,Rd,fi}}$$



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
4	140	40	150	174	124	174	44.0	4,69	2,21	C24	
0	140	00	150	1/4 1/4 46,0 5,06					2,39	GL24h	
1	140	40	150	100	100	100	45.0	6,74	3,18	C24] <u>+</u>
0	100	60 150 188 132 188	03,8	7,27	3,43	GL24h	<u>י</u>				
,	100		150	000	100	000	05.0	8,74	4,13	C24	
0	180	04	150	202	139	202	83,3	9,43	4,45	GL24h	ad l
,	000	71	150	017	1.47	017	04.0	9,76	4,61	C24	J. é
0	200	/1	150	210	140	210	94,9	10,54	4,97	GL24h	F
,	000	70	150	0.0.1	1.50	0.01	104.0	10,61	5,01	C24	
0	220	/8	150	231	153	231	104,9	11,45	5,40	GL24h	1

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3$ / 385 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}								
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN								
4	140	60	150	174	124	174	16.0	9,37	4,42	C24							
0	140	00	150	174	124 174	40,0	40,0	10,12	4,78	GL24h							
4	140	40	150	100	122	100	45.0	12,57	5,93	C24	ŧ						
0	100	00	150	100	132	188 63	100 05	100	100	100	100 00,0	100 00,0	03,0	13,56	6,40	GL24h	-01
4	100	4.4	150	202	120	202	05.0	16,31	7,70	C24	hud						
0	160	04	150	202	137	202	00,0	17,60	8,31	GL24h	ad						
4	200	71	150	214	1 4 4	214	04.0	18,22	8,60	C24	hre						
0	200	71	150	210	140	210	94,9	19,66	9,28	GL24h	F						
4	220	70	150	221	152	221	104.0	19,87	9,38	C24							
0	220	/0	150	231	155	231	104,9	21,44	10,12	GL24h							

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}	7	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
0	220	00	150	221	152	221	00.4	12,99	6,13	C24	
0	220	80	150	231	155	231	<i>99,</i> 4	14,02	6,62	GL24h	
8	240	85	150	245	160	245	112.5	14,71	6,94	C24	
0	240	05	150	245	100	245	112,5	15,88	7,49	GL24h	5
8	260	02	150	250	167	250	122.5	16,01	7,56	C24	Ŷ
0	200	12	150	237	107	2.57	122,5	17,28	8,15	GL24h	
8	280	00	150	273	174	273	132.5	17,31	8,17	C24	- -
0	200	//	150	275	174	275	152,5	18,69	8,82	GL24h	ğ
8	300	106	150	287	181	287	142 5	17,73	8,37	C24	Ľ,
0	300	100	150	207	101	207	142,5	19,14	9,03	GL24h	
8	330	117	150	308	192	308	1575	20,58	9,71	C24	
0	000	117	150	000	172	000	107,0	22,21	10,48	GL24h	
8	380	134	150	311	209	311	182.5	23,85	11,26	C24	
0	000	104	150	044	207	044	102,5	25,24	11,91	GL24h	
8	130	152	150	379	227	379	207 5	24,66	11,64	C24	
0	400	132	150	0/ /	~~~	0/ /	207,5	25,24	11,91	GL24h	
8	180	170	150	111	245	414	232.5	24,66	11,64	C24	ס
0	400	17.0	150	414	240	414	202,5	25,24	11,91	GL24h	eu
8	530	187	150	150	262	150	2575	24,66	11,64	C24	-
0	550	107	150	430	202	430	237,3	25,24	11,91	GL24h	
8	580	205	150	185	280	185	282.5	24,66	11,64	C24	
0	500	205	150	400	200	400	202,5	25,24	11,91	GL24h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
8	220	80	162	231	153	231	99 /	24,23	11,44	C24	
Ŭ	220	00	102	201	100	201	,,,4	26,15	12,34	GL24h	
8	240	85	154	245	160	245	112.5	27,44	12,95	C24	
							/-	29,61	13,98	GL24h	5
8	260	92	154	259	167	259	122.5	29,87	14,10	C24	<u> 오</u>
-							/-	32,24	15,22	GL24h	
8	280	99	154	273	174	273	132,5	32,31	15,25	C24	- p
	_	_		_	_	_	· ·	34,8/	16,46	GL24h	, e
8	300	106	154	287	181	287	142,5	34,/4	16,40	C24	논
								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		2
								47,09	22,23	GL24h	B
8	530	187	154	450	262	450	257,5	46,01	21,72		
								47,09	22,23	GLZ4h	
8	580	205	154	485	280	485	282,5	40,01	21,72	C24	-
								47,09	22,23	GLZ4h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	I_{ef}^{1}	F _{v/Rk}	F _{v/Rd}	7	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	2.40	100	175	0.45	140	0.45	01	25,10	11,85	C24	
10	240	100	175	245	100	245	91	27,09	12,78	GL24h	
10	240	100	175	250	147	250	111	30,64	14,46	C24	
10	200	100	175	239	107	239	111	33,07	15,61	GL24h	
10	280	100	165	273	174	273	121	36,17	17,07	C24	
10	200	100	105	275	174	275	131	39,04	18,43	GL24h	
10	200	104	165	207	101	207	140	39,34	18,57	C24	
10	300	100	105	207	101	207	142	42,46	20,04	GL24h	
10	320	113	165	301	188	301	152	42,12	19,88	C24	5
10	520	115	105	301	100	301	152	45,46	21,46	GL24h	<u> </u>
10	340	120	165	315	105	315	162	44,89	21,19	C24	pu
10	540	120	105	315	175	515	102	48,44	22,87	GL24h	ad
10	360	127	165	330	202	330	172	47,66	22,50	C24	Jre
10	300	127	105	330	202	330	172	51,44	24,28	GL24h	F
10	200	124	165	244	200	244	100	50,43	23,80	C24	
10	360	134	105	544	209	344	102	54,43	25,69	GL24h	
10	400	1.4.1	145	250	214	250	102	53,20	25,11	C24	
10	400	141	105	350	210	350	192	57,42	27,10	GL24h	
10	120	150	145	270	227	270	207	57,36	27,07	C24	
10	430	152	105	3/9	227	3/9	207	61,91	29,22	GL24h	
10	190	170	165	414	245	414	222	64,31	30,36	C24	
10	400	170	105	414	245	414	232	69,41	32,76	GL24h	

¹⁾ For measuring crucial thread length

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



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	Ь _{NT}	h _{NT}	Ь _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}]	
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	520	107	165	450	262	450	257	71,21	33,61	C24	Thread pull-out
10	530	107	105	430	202	430	237	73,82	34,84	GL24h	
10	590	205	165	105	200	105	202	72,14	34,05	C24	
10	280	205	105	405	200	405	202	73,82	34,84	GL24h	
10	650	220	165	525	205	525	217	72,14	34,05	C24	
10	030	230	105	222	303	555	317	73,82	34,84	GL24h	-
10	700	247	165	570	200	570	242	72,14	34,05	C24	ene
10	/00	247	105	570	322	570	34Z	73,82	34,84	GL24h	
10	750	045	145	405	240	405	247	72,14	34,05	C24	
10	750	205	105	605	340	605	30/	73,82	34,84	GL24h	
10	000	202	145	4 4 1	250	4 4 1	202	72,14	34,05	C24	
10	800	203	105	041	300	041	372	73,82	34,84	GL24h	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{1)}$	F _{v,Rk}	F _{v,Rd}		
mm	mm	mm	mm	mm	mm	mm	mm	kN	kN		
10	200	120	150	207	181	207	120.7	21,50	10,15	C24	_
12	300	120	150	207	101	207	120,7	23,21	10,95	GL24h	out
10	200	124	150	244	200	244	100 /	32,14	15,17	C24	- E
12	300	134	150	344	209	344	160,4	34,69	16,37	GL 24h	dр
10	490	170	150	41.4	2.45	414	220.4	41,06	19,38	C24	ea
12	400	170	150	414	245	414	230,4	44,31	20,91	GL24h	Thi
10	600	212	150	400	207	400	200.4	51,62	24,36	C24	pu
12	000	212	150	477	207	477	270,4	52,76	24,90	GL24h	Be

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



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	Ь _{NT}	h _{NT}	b _{нт}	h _{нт}	$I_{ef}^{(1)}$	F _{v,Rk}	F _{v,Rd}		
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	

¹⁾ 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 $\rho_k \ge 350 \text{ kg/m}^3 / 385 \text{ kg/m}^3$
- 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.



ASSY®-THE SCREW FOR WOOD AND BUILDING CRAFTS

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