

POSITION 53: FASTENER

1. Input parameters

2. General statements

single shear plane connection, exact verification acc. to DIN EN 1995, 8.2.2
crossing angle $\delta = 90.0^\circ$

3. materials

3.1. outer timber member 1

NKL 1, solid coniferous timber C24, $\rho_k = 350 \text{ kg/m}^3$, $t/b = 60.0/260.0 \text{ mm}$
angle between force and the grain direction $\alpha = 0.0^\circ$
bar on one side right with overhang $\bar{u}_{\text{left}} = 195.0 \text{ mm}$ (measured from the node)

3.2. outer timber member 2

NKL 1, solid coniferous timber C24, $\rho_k = 350 \text{ kg/m}^3$, $t/b = 120.0/240.0 \text{ mm}$
bar on one side right with overhang $\bar{u}_{\text{left}} = 195.0 \text{ mm}$ (measured from the node)

4. fasteners

bolt 10 mm, FK 4.8

washer $d = 34 \text{ mm}$

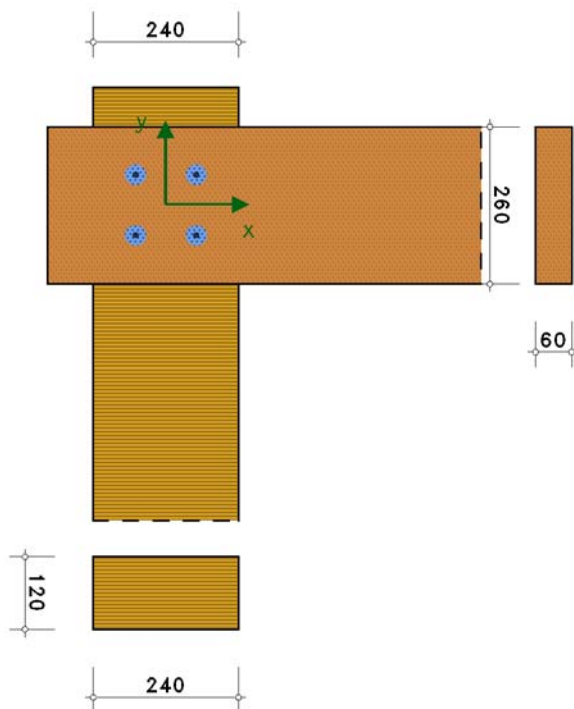
$F_{v,Rk}$ increased acc. to DIN EN 1995, 8.2.2(2) with washer $d = 34 \text{ mm}$

4.1. load combinations (design internal forces)

4.1.1. load, KLED: short-term

Nr	bar	N_d kN	M_d kNm	V_d kN	k_{mod} -	γ -
1	out.t.memb 1 right	0.000	0.000	0.000	0.900	1.30
2	out.t.memb 2 right	0.000	-1.000	0.000	0.900	1.30
3	ΣH , ΣM , ΣV	0.000	-1.000	0.000	---	---

5. view



6. Results only decisive load case combination

6.1. Results fasteners

6.2. fasteners

6.2.1. load

$N_d = 0.000$ kN, $V_d = 0.000$ kN, $M_{v,d} = -1.000$ kNm

forces per connection centre point, case = decisive failure case acc. to DIN EN 1995-1-1, 8.2.2

Nr	F_{M1} kN	F_{MH1} kN	F_{MV1} kN	F_{totH1} kN	F_{totV1} kN	F_{tot1} kN	α_{tot1} °	$f_{h,\alpha,k}$ N/mm ²	case	$F_{v,Rd}$ kN	$U_{n,ef}$ -	$U_{F,v}$ -
1	-3.536	-2.500	-2.500	-2.500	-2.500	3.536	-135.0	20.31	G1.(d)	4.3825	0.61	0.81
2	-3.536	-2.500	2.500	-2.500	2.500	3.536	135.0	20.31	G1.(d)	4.3825	0.61	0.81
3	-3.536	2.500	-2.500	2.500	-2.500	3.536	-45.0	20.31	G1.(d)	4.3825	0.61	0.81
4	-3.536	2.500	2.500	2.500	2.500	3.536	45.0	20.31	G1.(d)	4.3825	0.61	0.81

maximum utilisation of the fasteners $U_{max} = 0.81 \leq 1 \Rightarrow$ verification fulfilled

6.3. results bars

6.3.1. outer timber member 1 mit $A_n = 14280$ mm², $W_n = 650513$ mm³, $I_n = 84566690$ mm⁴, $k_h = 1.000$

load	$f_{m,d}$ N/mm ²	$f_{t,d}$ N/mm ²	$f_{c,d}$ N/mm ²	$f_{v,d}$ N/mm ²	N_d kN	M_d kNm	$\sigma_{0,d}$ N/mm ²	$\sigma_{m0,d}$ N/mm ²	$\sigma_{mu,d}$ N/mm ²	V_d kN	τ_d N/mm ²	U_σ -	U_τ -
1	16.62	10.04	14.54	2.77	0.000	0.000	0.00	0.00	0.00	5.000	1.05	0.00	0.38

maximum utilisation of the bar $U_{max} = 0.38 \leq 1 \Rightarrow$ verification fulfilled

6.3.2. outer timber member 2 mit $A_n = 26160$ mm², $W_n = 1096778$ mm³, $I_n = 131613380$ mm⁴, $k_h = 1.000$

load	$f_{m,d}$ N/mm ²	$f_{t,d}$ N/mm ²	$f_{c,d}$ N/mm ²	$f_{v,d}$ N/mm ²	N_d kN	M_d kNm	$\sigma_{0,d}$ N/mm ²	$\sigma_{m0,d}$ N/mm ²	$\sigma_{mu,d}$ N/mm ²	V_d kN	τ_d N/mm ²	U_σ -	U_τ -
1	16.62	10.04	14.54	2.77	0.000	-1.000	0.00	-0.91	-0.91	5.000	0.57	0.05	0.21

maximum utilisation of the bar $U_{max} = 0.21 \leq 1 \Rightarrow$ verification fulfilled