

POS. 140: SHEAR PLATE CONNECTOR

1. Input parameters

2. general statements

single shear plane connection, exact verification acc. to DIN EN 1995, 8.2.2
duration of load: medium-term

3. materials

3.1. outer timber member 1

service class 1, solid coniferous timber, C24 (S10), $\rho_k = 350 \text{ kg/m}^3$, $t = 160.0 \text{ mm}$, $k_{mod} = 0.80$
angle between force and the grain direction $\alpha = 0.0^\circ$

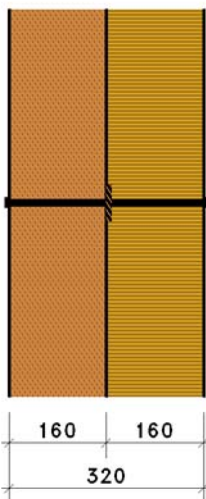
3.2. outer timber member 2

service class 1, solid coniferous timber, C24 (S10), $\rho_k = 350 \text{ kg/m}^3$, $t = 160.0 \text{ mm}$, $k_{mod} = 0.80$
angle between force and the grain direction $\alpha = 0.0^\circ$

4. fastener

shear plate connector C1 $d_c = 62 \text{ mm}$, FK 4.6
bolt M 12, FK 4.6
washer $d = 34 \text{ mm}$

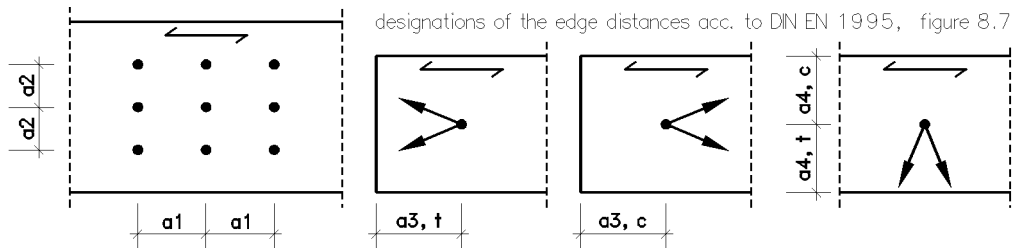
4.1. section scale 1:125



5. results acc. to DIN EN 1995:2010, Deutschland, $\gamma_1 = 1.30$, $\gamma_2 = 1.30$

5.1. minimum spacings (DIN EN 1995:2010, Tab. 8.8) and strengths

member	a1 mm	a2 mm	a3t mm	a4t mm	a3c mm	a4c mm	f _{td} N/mm ²	f _{md} N/mm ²	f _{cd} N/mm ²	f _{vd} N/mm ²	f _{h,α,d} N/mm ²	f _{h,α,k} N/mm ²
out. t. m. 1	93.0	74.4	124.0	37.2	74.4	37.2	8.62	14.77	12.92	1.23	15.37	24.97
out. t. m. 2	93.0	74.4	124.0	37.2	74.4	37.2	8.62	14.77	12.92	1.23	15.37	24.97



minimum widths one fastener row: outer timber member 1 = 74 mm, outer timber member 2 = 74 mm
 $f_{uk} = 400 \text{ N/mm}^2$, $M_{yk} = 76745 \text{ Nmm}$
 bolt: decisive is Eq. (f), $\gamma_M = 1.30$, $F_{v,Rk} = 7798.8 \text{ N}$, $F_{v,Rd} = 4799.3 \text{ N}$
 connector: $\gamma_M = 1.30$, $F_{v,Rk} = 7937.0 \text{ N}$, $F_{v,Rd} = 4884.3 \text{ N}$
 sum: $F_{v,Rk,sum} = 15735.8 \text{ N}$, $F_{v,Rd,sum} = 9683.6 \text{ N}$ per shear plane
 $F_{ax,Rk} = 5654.9 \text{ N}$, $F_{ax,Rd} = 3479.9 \text{ N}$ withdrawal capacity

5.2. effective number of fasteners parallel to the grain

table for ring and shear plate connector acc. to DIN EN 1995-1-1, Equ. (8.71)

n/α -/-	0°	15°	30°	45°	60°	75°	90°
2	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
3	2.8500	2.8750	2.9000	2.9250	2.9500	2.9750	3.0000
4	3.6000	3.6667	3.7333	3.8000	3.8667	3.9333	4.0000
5	4.2500	4.3750	4.5000	4.6250	4.7500	4.8750	5.0000
6	4.8000	5.0000	5.2000	5.4000	5.6000	5.8000	6.0000
7	5.2500	5.5417	5.8333	6.1250	6.4167	6.7083	7.0000
8	5.6000	6.0000	6.4000	6.8000	7.2000	7.6000	8.0000
9	5.8500	6.3750	6.9000	7.4250	7.9500	8.4750	9.0000
10	6.0000	6.6667	7.3333	8.0000	8.6667	9.3333	10.0000

5.3. effective number of fasteners parallel to the grain

table for dowel and bolt with $d = 12.0 \text{ mm}$, $a_1 = 93.0 \text{ mm}$ acc. to DIN EN 1995-1-1, Gl. (8.34)+(8.35)

n/α -/-	0°	15°	30°	45°	60°	75°	90°
2	1.6397	1.6998	1.7598	1.8199	1.8799	1.9400	2.0000
3	2.3618	2.4682	2.5746	2.6809	2.7873	2.8936	3.0000
4	3.0598	3.2165	3.3732	3.5299	3.6866	3.8433	4.0000
5	3.7404	3.9503	4.1602	4.3702	4.5801	4.7901	5.0000
6	4.4073	4.6728	4.9382	5.2037	5.4691	5.7346	6.0000
7	5.0632	5.3860	5.7088	6.0316	6.3544	6.6772	7.0000
8	5.7098	6.0915	6.4732	6.8549	7.2366	7.6183	8.0000
9	6.3483	6.7903	7.2322	7.6742	8.1161	8.5581	9.0000
10	6.9797	7.4831	7.9865	8.4899	8.9932	9.4966	10.0000
11	7.6049	8.1707	8.7366	9.3024	9.8683	10.4341	11.0000
12	8.2244	8.8536	9.4829	10.1122	10.7415	11.3707	12.0000
13	8.8387	9.5323	10.2258	10.9194	11.6129	12.3065	13.0000
14	9.4483	10.2069	10.9655	11.7242	12.4828	13.2414	14.0000
15	10.0536	10.8780	11.7024	12.5268	13.3512	14.1756	15.0000
16	10.6549	11.5457	12.4366	13.3274	14.2183	15.1091	16.0000
17	11.2524	12.2103	13.1682	14.1262	15.0841	16.0421	17.0000
18	11.8464	12.8720	13.8976	14.9232	15.9488	16.9744	18.0000
19	12.4371	13.5309	14.6247	15.7185	16.8124	17.9062	19.0000
20	13.0247	14.1872	15.3498	16.5123	17.6749	18.8374	20.0000