

POS. 137: DOWEL

1. Input parameters

2. general statements

single shear plane connection, design value method
duration of load: medium-term

3. materials

3.1. outer timber member 1

service class 2, glue laminated timber, GL24h (BS11), $\rho_k = 380 \text{ kg/m}^3$, $t = 50.0 \text{ mm}$, $k_{mod} = 0.80$
angle between force and the grain direction $\alpha = 0.0^\circ$

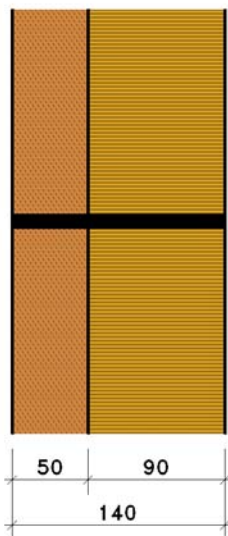
3.2. outer timber member 2

service class 2, glue laminated timber, GL24h (BS11), $\rho_k = 380 \text{ kg/m}^3$, $t = 90.0 \text{ mm}$, $k_{mod} = 0.80$
angle between force and the grain direction $\alpha = 0.0^\circ$

4. fastener

dowel 10 mm, S235 (1052)

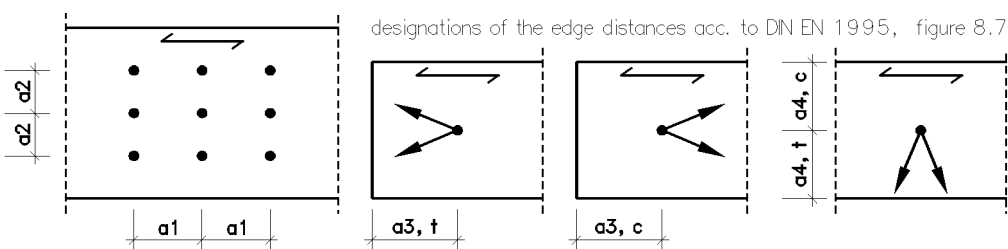
4.1. section scale 1:50



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. 8.5) 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 | 50.0 | 30.0 | 80.0 | 30.0 | 30.0 | 30.0 | 10.15 | 14.77 | 14.77 | 1.54 | 17.26 | 28.04 |
| out. t. m. 2 | 50.0 | 30.0 | 80.0 | 30.0 | 30.0 | 30.0 | 10.15 | 14.77 | 14.77 | 1.54 | 17.26 | 28.04 |



minimum widths one fastener row: outer timber member 1 = 60 mm, outer timber member 2 = 60 mm
 $f_{uk} = 360 \text{ N/mm}^2$, $M_{yd} = 39087 \text{ Nmm}$
 decisive is Eq. (f), $\gamma_M = 1.00$, $F_{v,Rk} = 4910.7 \text{ N}$, $F_{v,Rd} = 3611.1 \text{ N}$ per shear plane
 $F_{ax,Rk} = 0.0 \text{ N}$, $F_{ax,Rd} = 0.0 \text{ N}$ withdrawal capacity

5.2. effective number of fasteners parallel to the grain

table for dowel and bolt with $d = 10.0 \text{ mm}$, $a_1 = 50.0 \text{ mm}$ acc. to DIN EN 1995-1-1, Gl. (8.34)+(8.35)

| n/α -/- | 0° - | 15° - | 30° - | 45° - | 60° - | 75° - | 90° - |
|-------------------|---------|----------|----------|----------|----------|----------|----------|
| 2 | 1.4695 | 1.5580 | 1.6464 | 1.7348 | 1.8232 | 1.9116 | 2.0000 |
| 3 | 2.1167 | 2.2639 | 2.4112 | 2.5584 | 2.7056 | 2.8528 | 3.0000 |
| 4 | 2.7423 | 2.9519 | 3.1615 | 3.3711 | 3.5808 | 3.7904 | 4.0000 |
| 5 | 3.3522 | 3.6268 | 3.9015 | 4.1761 | 4.4507 | 4.7254 | 5.0000 |
| 6 | 3.9500 | 4.2916 | 4.6333 | 4.9750 | 5.3167 | 5.6583 | 6.0000 |
| 7 | 4.5378 | 4.9482 | 5.3585 | 5.7689 | 6.1793 | 6.5896 | 7.0000 |
| 8 | 5.1173 | 5.5977 | 6.0782 | 6.5586 | 7.0391 | 7.5195 | 8.0000 |
| 9 | 5.6895 | 6.2413 | 6.7930 | 7.3448 | 7.8965 | 8.4483 | 9.0000 |
| 10 | 6.2554 | 6.8795 | 7.5036 | 8.1277 | 8.7518 | 9.3759 | 10.0000 |
| 11 | 6.8157 | 7.5131 | 8.2105 | 8.9078 | 9.6052 | 10.3026 | 11.0000 |
| 12 | 7.3709 | 8.1424 | 8.9139 | 9.6854 | 10.4570 | 11.2285 | 12.0000 |
| 13 | 7.9215 | 8.7679 | 9.6143 | 10.4607 | 11.3072 | 12.1536 | 13.0000 |
| 14 | 8.4678 | 9.3899 | 10.3119 | 11.2339 | 12.1559 | 13.0780 | 14.0000 |
| 15 | 9.0103 | 10.0086 | 11.0069 | 12.0051 | 13.0034 | 14.0017 | 15.0000 |
| 16 | 9.5491 | 10.6243 | 11.6994 | 12.7746 | 13.8497 | 14.9249 | 16.0000 |
| 17 | 10.0846 | 11.2372 | 12.3898 | 13.5423 | 14.6949 | 15.8474 | 17.0000 |
| 18 | 10.6170 | 11.8475 | 13.0780 | 14.3085 | 15.5390 | 16.7695 | 18.0000 |
| 19 | 11.1464 | 12.4553 | 13.7643 | 15.0732 | 16.3821 | 17.6911 | 19.0000 |
| 20 | 11.6730 | 13.0609 | 14.4487 | 15.8365 | 17.2243 | 18.6122 | 20.0000 |