

1. Input parameters

1.1. notch at the support bottom perpendicular acc. to EC5-1-1, 6.5, NA Germany

1.2. beam

beam of glue laminated timber EC, GL32h 160/1150 mm, $\rho_k = 440 \text{ kg/m}^3$, NKL 1

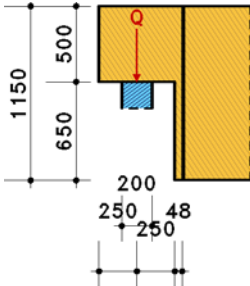
$h_{ef} = 500 \text{ mm}$, $x = 250 \text{ mm}$ (expressions acc. to EC 5, 6.5 figure 6.11)

$f_{m,k} = 32.00 \text{ N/mm}^2$, $f_{t,k} = 25.60 \text{ N/mm}^2$, $f_{c,k} = 32.00 \text{ N/mm}^2$, $f_{v,k} = 3.50 \text{ N/mm}^2$, $f_{t90,k} = 0.50 \text{ N/mm}^2$

1.3. reinforcement by 2 glued in steelbars

$d_r = 16 \text{ mm}$, $d_{ef} = 16.0 \text{ mm}$, $l_e = 1150 \text{ mm}$, BST500A/B, $a_{3,c} = 48 \text{ mm}$, $a_2 = 48 \text{ mm}$, $a_{4,c} = 48 \text{ mm}$

elevation scale 1:500, unit of length [mm]



1.4. support reactions

Nr.	name	V_d kN	KLED	k_{mod} -	γ -
1	V	77.00	sh.-term	0.900	1.30

2. results

2.1. shear stresses

$k_{cr} = 0.714 \Rightarrow b_{eff} = 114.286 \text{ mm}$

$l_{ad} = 500 \text{ mm}$

Nr	V_d kN	$f_{k1,d}$ N/mm ²	$F_{t90,d}$ kN	$\tau_{ef,d}$ N/mm ²	$N_{R,d}$ kN	$u_{\tau_{ef,d}}$ -	$u_{NR,d}$ -	u -
1	77.00	1.904	59.787	1.189	80.425	0.625	0.37	0.625

$u_{max} = 0.625 \leq 1 \Rightarrow \text{ok.}$

2.2. bending at the notch angle

beam width = 160 mm, beam height = 500 mm $\Rightarrow W = 6666667 \text{ mm}^3$, $e = 250 \text{ mm}$

Nr	M_d kNm	$f_{m,d}$ N/mm ²	$\sigma_{m,d}$ N/mm ²	u -
1	19.25	22.15	2.888	0.130

$u_{max} = 0.130 \leq 1 \Rightarrow \text{ok.}$

2.3. shear at the reduced cross section

beam width = 160 mm, beam height = 500 mm, $k_{cr} = 0.714 \Rightarrow A_{ef} = 57143 \text{ mm}^2$

Nr	V_d kN	$f_{v,d}$ N/mm ²	$\tau_{m,d}$ N/mm ²	u -
1	77.00	2.42	2.021	0.834

$u_{max} = 0.834 \leq 1 \Rightarrow \text{ok.}$

3. Summary

total utilization all verifications $u_{max,Ges} = 0.834 \leq 1 \Rightarrow \text{ok.}$