

1. Input parameters

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

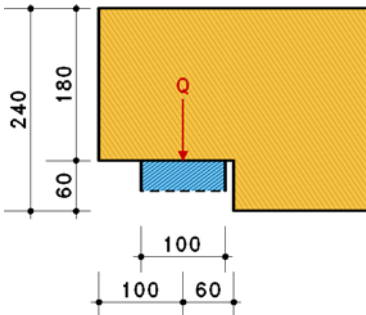
1.2. beam

beam from solid coniferous timber, C24 (S10) 140/240 mm, $\rho_k = 350 \text{ kg/m}^3$, NKL 1

$h_{ef} = 180 \text{ mm}$, $x = 60 \text{ mm}$ (expressions acc. to EC 5, 6.5 figure 6.11)

$f_{m,k} = 24.00 \text{ N/mm}^2$, $f_{t,k} = 14.00 \text{ N/mm}^2$, $f_{c,k} = 21.00 \text{ N/mm}^2$, $f_{v,k} = 4.00 \text{ N/mm}^2$, $f_{t90,k} = 0.40 \text{ N/mm}^2$

elevation scale 1:90, unit of length [mm]



1.3. support reactions

Nr.	name	V_d kN	KLED	k_{mod} -	γ -
1	Eig + p Endfeld	9.87	med.-term	0.800	1.30

2. results

2.1. shear stresses

$k_{cr} = 0.500 \Rightarrow b_{eff} = 70.000 \text{ mm}$

$k_N = 5.0$, $\alpha = 0.750 \Rightarrow k_v = 0.530$

Nr	V_d kN	$f_{v,d}$ N/mm ²	τ_d N/mm ²	$\tau_{d,zul}$ N/mm ²	$u_{\tau,d}$ N/mm ²	u -
1	9.87	2.46	1.175	1.305	0.900	0.900

$u_{max} = 0.900 \leq 1 \Rightarrow \text{ok.}$

2.2. bearing stress

bearing width = 100 mm, bearing depth = 140 mm $\Rightarrow A = 14000 \text{ mm}^2$

Nr	V_d kN	$f_{c90,d}$ N/mm ²	$\sigma_{c90,d}$ N/mm ²	u -
1	9.87	1.54	0.705	0.458

$u_{max} = 0.458 \leq 1 \Rightarrow \text{ok.}$

2.3. bending at the notch angle

beam width = 140 mm, beam height = 180 mm $\Rightarrow W = 756000 \text{ mm}^3$, $e = 60 \text{ mm}$

Nr	M_d kNm	$f_{m,d}$ N/mm ²	$\sigma_{m,d}$ N/mm ²	u -
1	0.59	14.77	0.783	0.053

$u_{max} = 0.053 \leq 1 \Rightarrow \text{ok.}$

2.4. shear at the reduced cross section

beam width = 140 mm, beam height = 180 mm, $k_{cr} = 0.500 \Rightarrow A_{ef} = 12600 \text{ mm}^2$

Nr	V_d kN	$f_{v,d}$ N/mm ²	$\tau_{m,d}$ N/mm ²	u -
1	9.87	2.46	1.175	0.477

$u_{max} = 0.477 \leq 1 \Rightarrow \text{ok.}$

3. Summary

total utilization all verifications $u_{max,Ges} = 0.900 \leq 1 \Rightarrow \text{ok.}$