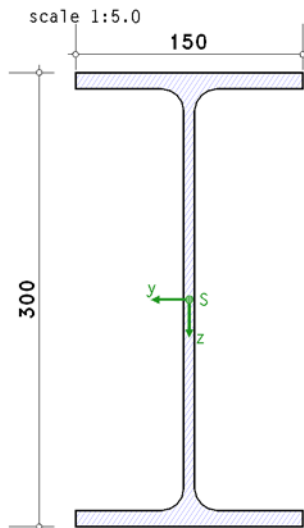


POS. 3: WAGENKNECHT 2.6.3

verification of cross-section EC 3-1-8 (12.10), NA: Deutschland

1. input report



steel

steel grade S235

material safety factor

resistance of cross-sections $\gamma_{M0} = 1.00$

geometry

section IPE300

resistance

plastic verification acc. to EC 3-1-1, 6.2

internal forces and moments referring to local axes of cross-section

σ -generating forces (N, M) work at centroid, τ -generating forces (V, T_t) work at shear center

Lk 1: $N_{Ed} = -469.00$ kN, $M_{y,Ed} = 95.00$ kNm, $V_{z,Ed} = 129.00$ kN

notes

buckling is not investigated.

2. Lk 1

2.1. verification of cross-section

internal forces and moments: $N = -469.00$ kN, $M_y = 95.00$ kNm, $V_z = 129.00$ kN

2.1.1. plastic verification

plastic verification for $N = -469.00$ kN, $M_y = 95.00$ kNm, $V_z = 129.00$ kN

plate buckling: section class of the section $1 \leq 2$ **ok**

shear buckling: $h_p/t_p = 39.24 \leq 72 \cdot \epsilon/\eta = 60.00$ **ok**

plastic values: $N_{pl,Rd} = A \cdot f_y/\gamma_{M0} = 1264.58$ kN, $M_{pl,y,Rd} = W_{pl,y} \cdot f_y/\gamma_{M0} = 147.65$ kNm

$V_{pl,z,Rd} = A_{vz} \cdot f_y/(3^{1/2} \cdot \gamma_{M0}) = 348.44$ kN

shear force

reduction factors:

web: $0.5 \cdot V_{pl,z,Rd} = 174.22$ kN $> |V_{z,Ed}| = 129.00$ kN: $\rho_z = 0$ (no deduction)

$|V_{y,Ed}| = 0$: $\rho_y = 0$ (no deduction)

bending and axial force

deduction M_y : $N_{c,lim} = \min(0.25 \cdot N_{pl,Rd}, 0.5 \cdot A_w \cdot f_y/\gamma_{M0}) = 232.42$ kN, $A_w = h_w \cdot t_w = 1978.06$ cm²

$N_{Ed} > N_{c,lim}$: $f_{N,y} = (1-n)/(1-0.5 \cdot a) = 0.788 < 1$, $n = |N_{Ed}|/N_{pl,Rd} = 0.371$, $a = (A - A_f)/A = 0.403 \leq 0.5$

$A_f = 2 \cdot b_f \cdot t_f = 32.10$ cm², $A = 53.81$ cm² $\Rightarrow M_{pl,N,y,Rd} = M_{pl,y,Rd} \cdot f_{N,y} = 116.36$ kNm

bending

verification: $|M_{y,Ed}|/M_{pl,N,y,Rd} = 0.816 < 1$ **ok**

3. final result

maximum utilization: resistance $\max U = 0.816 < 1$ **ok**

verification succeeded