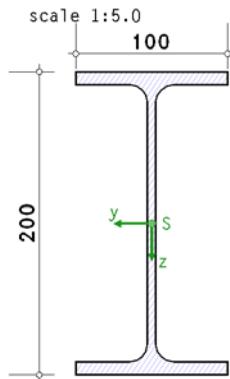


POS. 10: KINDMANN/KRÜGER 5.6.2

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 IPE200

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: $N_{Ed} = 130.00$ kN, $M_{y,Ed} = 4800.00$ kNcm

notes

buckling is not investigated.

2. Lk 1

2.1. verification of cross-section

internal forces and moments: $N = 130.00$ kN, $M_y = 4800.00$ kNcm

2.1.1. plastic verification

plastic verification for $N = 130.00$ kN, $M_y = 48.00$ kNm

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

plastic values: $N_{pl,Rd} = A \cdot f_y / \gamma_{M0} = 669.38$ kN, $M_{pl,y,Rd} = W_{pl,y} \cdot f_y / \gamma_{M0} = 51.84$ kNm

bending and axial force

deduction M_y : $N_{c,lim} = \min(0.25 \cdot N_{pl,Rd}, 0.5 \cdot A_w \cdot f_y / \gamma_{M0}) = 120.41$ kN, $A_w = h_w \cdot t_w = 1024.80$ cm²

$N_{Ed} > N_{c,lim}$: $f_{N,y} = (1-n)/(1-0.5 \cdot a) = 1.009 > 1 \Rightarrow f_{N,y} = 1$, $n = |N_{Ed}| / N_{pl,Rd} = 0.194$, $a = (A - A_f) / A = 0.403 \leq 0.5$

$A_f = 2 \cdot b_f \cdot t_f = 17.00$ cm², $A = 28.48$ cm² $\Rightarrow M_{pl,y,Rd} = M_{pl,y,Rd} \cdot f_{N,y} = 51.84$ kNm

bending

verification: $|M_{y,Ed}| / M_{pl,y,Rd} = 0.926 < 1$ **ok**

3. final result

maximum utilization: resistance max U = 0.926 < 1 **ok**

verification succeeded