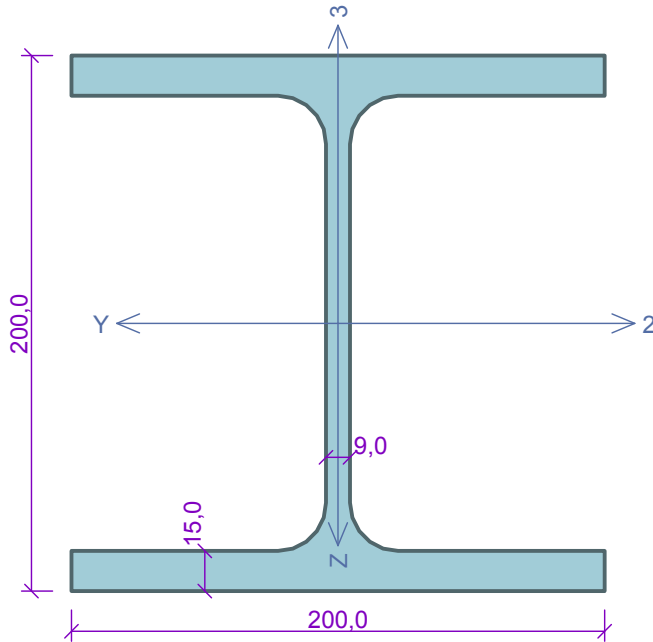


Section A (2,000m)



Calculation standard EN 1993-1-2
Calculation in accordance with Czech national annex.
Fire reliability factor $\gamma_{M,fi} = 1,000$

Section HE 200 B
Cross-sectional area:
 $A = 7,810E03 \text{ mm}^2$
Center of gravity position:
 $y_T = 100,0 \text{ mm}$ $z_T = 100,0 \text{ mm}$
Second moments of area:
 $I_y = 5,700E07 \text{ mm}^4$ $I_z = 2,000E07 \text{ mm}^4$
Cross-section moduli:
 $W_{y,1} = -5,696E05 \text{ mm}^3$ $W_{z,1} = 2,003E05 \text{ mm}^3$
 $W_{y,2} = 5,696E05 \text{ mm}^3$ $W_{z,2} = -2,003E05 \text{ mm}^3$
Torsion constant:
 $I_k = 5,960E05 \text{ mm}^4$
Warping constant:
 $I_\omega = 1,710E11 \text{ mm}^6$
Plastic cross-section moduli:
 $W_{pl,y} = 6,425E05 \text{ mm}^3$ $W_{pl,z} = 3,058E05 \text{ mm}^3$

Material: EN 10025 : Fe 360
Material characteristics:
Elastic modulus $E : 210000 \text{ MPa}$
Shear modulus $G : 81000 \text{ MPa}$
Yield strength $f_y : 235,0 \text{ MPa}$
Ultimate strength $f_u : 360,0 \text{ MPa}$

Temperature curve:
Standard temperature curve

Fire detail:
Cross-section protected by spray, exposed to fire on all sides
Fire protection material: Spray-coatings - vermiculite
Thickness $d_p : 8,5 \text{ mm}$
Density $\rho_p : 350,0 \text{ kg/m}^3$
Heat capacity $C_p : 1200,0 \text{ J/kg/K}$
Thermal conduction $\lambda_p : 0,120 \text{ W/m/K}$

Internal forces in system of cross-section coordinates
Load with maximal utilization
Load 1: compression + bending
 $N = -82,000 \text{ kN}$
 $V_z = 30,000 \text{ kN}$ $M_y = 11,913 \text{ kNm}$
 $V_y = 0,000 \text{ kN}$ $M_z = 0,000 \text{ kNm}$
 $T_t = 0,000 \text{ kNm}$
 $T_\omega = 0,000 \text{ kNm}$ $B = 0,000 \text{ kNm}^2$

Buckling parameters
Length: 8,730 m
 $L_z = 4,365 \text{ m}$ $k_z = 1,000$ $L_{cr,z} = 4,365 \text{ m}$
 $L_y = 4,365 \text{ m}$ $k_y = 1,000$ $L_{cr,y} = 4,365 \text{ m}$
 $L_\omega = 4,365 \text{ m}$ $k_\omega = 1,000$ $L_{cr,\omega} = 4,365 \text{ m}$

LTB parameters
End condition factors: $k_y = 1.0$ $k_z = 1.0$ $k_w = 1.0$
 $l_{z1} = 8,730 \text{ m}$ $M_y: \text{Shape no.1}$
 $l_{y1} = 8,730 \text{ m}$ $M_z: \text{Shape no.1}$

Results
Decisive load: Load 1: compression + bending
Cross-section class: 1
Critical temperature: 659,5°C
Fire resistance period: 61,5 min \geq 60,0 min **Pass**
Check at time t = 60,0 min:
Gas temperature: 945,3°C Steel temperature: 652,6°C
Shear check due to shear force V_z :
 $30,000 \text{ kN} < 115,935 \text{ kN}$ **Pass**
Critical combination check - compression and b. moment:
Internal forces: $N = -82,000 \text{ kN}$; $M_y = 11,913 \text{ kNm}$; $M_z = 0,000 \text{ kNm}$
Buckling Y: Resistances: $N_R = -387,335 \text{ kN}$; $M_{y,R} = 19,507 \text{ kNm}$
 $|0,212 + 0,611 + 0,000| = |0,822| < 1$ **Pass**
Buckling Z: Resistances: $N_R = -244,724 \text{ kN}$; $M_{y,R} = 19,507 \text{ kNm}$
 $|0,335 + 0,611 + 0,000| = |0,946| < 1$ **Pass**
Section ok

PASS