

# My test project

Steel cross-section check – EN 1993-1-1

Roof  
Datum: 24.06.2026  
Elements: 2

Material: **S355** fy: **355 MPa** fu: **510 MPa**  $\gamma_{M0}$ : **1**

## Element 1 SHS SHS50×50×4

**SATISFACTORY 88,5 %**

Loads		Section properties	
My	4 kNm	A	7,36 cm <sup>2</sup>
		I <sub>y</sub>	26 cm <sup>4</sup>
Mz	0 kNm	I <sub>z</sub>	26 cm <sup>4</sup>
		W <sub>pl,y</sub>	13 cm <sup>3</sup>
T	0 kNm	W <sub>pl,z</sub>	13 cm <sup>3</sup>
		A <sub>v,z</sub>	3,36 cm <sup>2</sup>
V <sub>y</sub>	0 kN	I <sub>T</sub>	38,934 cm <sup>4</sup>
		f <sub>y,d</sub>	355 MPa
V <sub>z</sub>	0 kN	N <sub>pl,Rd</sub>	261,3 kN
		Mc <sub>y,Rd</sub>	4,5 kNm
N (+ tension / – compression)	0 kN	Mc <sub>z,Rd</sub>	4,5 kNm
		V <sub>pl,z,Rd</sub>	68,9 kN

### Section utilisation check

Condition	Utilisation
Axial force N (6.2.3/6.2.4)	0 %
Bending My (6.2.5/6.2.8)	88,5 %
Bending Mz (6.2.5/6.2.8)	0 %
Shear V <sub>z</sub> (6.2.6)	0 %
Shear V <sub>y</sub> (6.2.6)	0 %
Torsion T (6.2.7)	0 %
Interaction N+My+Mz (6.2.9)	81,7 %
<b>Governing utilisation</b>	<b>88,5 %</b>

### Deflection – Simply supported · L = 2 000 mm · Limit L/300

Deflection component	Value [mm]
$\delta_q$ – od rovnoměrného zatížení $q_k = 1$ kN/m	3,79
$\delta_F$ – od bodové síly $F = 0$ kN	0
<b><math>\delta_{tot} = \delta_q + \delta_F</math></b>	<b>3,79</b>
Deflection limit L/300	6,67

## Element 2 HEA HEA200

**SATISFACTORY 42,9 %**

Loads		Section properties	
My	12 kNm	A	53,8 cm <sup>2</sup>
		I <sub>y</sub>	3 690 cm <sup>4</sup>
Mz	0 kNm	I <sub>z</sub>	1 330 cm <sup>4</sup>
		W <sub>pl,y</sub>	430 cm <sup>3</sup>
T	0 kNm	W <sub>pl,z</sub>	253 cm <sup>3</sup>
		A <sub>v,z</sub>	11,05 cm <sup>2</sup>
V <sub>y</sub>	0 kN	I <sub>T</sub>	7,31 cm <sup>4</sup>
		f <sub>y,d</sub>	355 MPa
V <sub>z</sub>	0 kN	N <sub>pl,Rd</sub>	1 909,9 kN
		Mc <sub>y,Rd</sub>	152,7 kNm

N (+ tension / – compression)	<b>-820 kN</b>	Mc,z,Rd	<b>89,8 kNm</b>
		Vpl,z,Rd	<b>226,5 kN</b>

#### Section utilisation check

Condition	Utilisation
Axial force N (6.2.3/6.2.4)	<b>42,9 %</b>
Bending My (6.2.5/6.2.8)	<b>7,9 %</b>
Bending Mz (6.2.5/6.2.8)	<b>0 %</b>
Shear Vz (6.2.6)	<b>0 %</b>
Shear Vy (6.2.6)	<b>0 %</b>
Torsion T (6.2.7)	<b>0 %</b>
Interaction N+My+Mz (6.2.9)	<b>1,4 %</b>
<b>Governing utilisation</b>	<b>42,9 %</b>

#### Column buckling – EN 1993-1-1 §6.3.1 · Lcr,y = 3 000 mm · Lcr,z = 3 000 mm

Condition	Value
Buckling curve y-y / z-z	<b>b / c (α = 0,34 / 0,49)</b>
Radius of gyration iy / iz	<b>82,8 / 49,7 mm</b>
Relative slenderness λy / λz	<b>0,474 / 0,79</b>
Buckling factor χy / χz	<b>0,896 / 0,669</b>
Nb,y,Rd = χy · A · fy / γM1	<b>1 710,4 kN</b>
Nb,z,Rd = χz · A · fy / γM1	<b>1 277,1 kN</b>
<b>NEd / Nb,Rd (governing axis)</b>	<b>64,2 %</b>