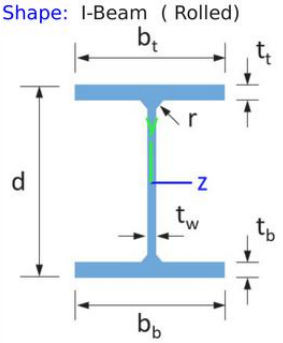
REFERENCES	CALCULATIONS	RESULTS
Code: CSA S16-14	# MEMBER #10 DESIGN REPORT	

Project details

Project Name: CSA-s16-frame
Project ID:
Company:
Designer:
Client:
Project Notes:
Project Units: metric

General member design information

Section Name: W1000x321
Shape: I-Beam (Rolled)



Dimensions:
Height $d = 990.000\ \text{mm}$
Web Thick $t_w = 16.500\ \text{mm}$
Top Flange Width $b_t = 400.000\ \text{mm}$
Top Flange Thick $t_t = 31.000\ \text{mm}$
Bottom Flange Width $b_b = 400.000\ \text{mm}$
Bottom Flange Thick $t_b = 31.000\ \text{mm}$
Fillet $r = 32.000\ \text{mm}$

Properties:
Area $A = 40900.000\ \text{mm}^2$
Moment of Inertia about the z-axis $I_z = 6960000000.000\ \text{mm}^4$
Moment of Inertia about the y-axis $I_y = 331000000.000\ \text{mm}^4$
Plastic Section Modulus about the z-axis $Z_z = 15800000000.000\ \text{mm}^3$
Plastic Section Modulus about the y-axis $Z_y = 2550000000.000\ \text{mm}^3$
Torsion Contant $J = 10300000.000\ \text{mm}^4$
Warping Contant $I_w = 76100000000000.000\ \text{mm}^6$

Material properties:
Material Name: Structural Steel
Modulus of Elasticity $E = 200000.000\ \text{MPa}$
Yield Strength $F_y = 260.000\ \text{MPa}$
Ultimate Tensile Strength $F_u = 410.000\ \text{MPa}$

Design parameters:
Member length $L = 10.439\ \text{m}$
Length between braced points $L_e = 10.439\ \text{m}$
Effective Length factor for flexural buckling about y-axis $K_y = 1.000$
Effective Length factor for flexural buckling about z-axis $K_z = 1.000$

Design Internal Forces

For check axial strength:
Absolute Maximum Axial Force $P = 0.017\ \text{kN}$

For check axial buckling strength:

For check flexural strength about the major axis:
Absolute Maximum Major Bending Moment $M_z = 43.680\ \text{kN-m}$

For check flexural strength about the minor axis:
Absolute Maximum Minor Bending Moment $M_y = 0.240\ \text{kN-m}$

For check shear strength y-axis:
Absolute Maximum Shear Force $V_z = 0.109\ \text{kN}$

For check shear strength z-axis:

Aluminum Aluminum Shear Force V_u = 0.0 kips

Per Clause Appendix J2 combined strength

Shear Force = 0 kips

Shear Capacity ϕV_n = 0.0 kips

Shear Demand/Capacity Ratio = 0.0 / 0.0 = 0.0

3.3 BEAM-TO-COLUMN CONNECTION | 3.3 BEAM-TO-COLUMN CONNECTION

Beam to column check

Beam to column connection is not applicable for this member

Bolt to Plate Connection

$$V_n = \frac{\frac{\pi}{4}}{\Omega} \cdot \frac{d_b^2}{\Omega} \cdot \frac{n_b \cdot F_{nv} \cdot A_b}{\Omega} = 0.0 \text{ kips}$$

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Bolt Bearing

$$V_n = \frac{n_b \cdot t}{\Omega} \cdot \frac{2.4 \cdot d_b \cdot F_u}{\Omega} = 0.0 \text{ kips}$$

$$V_n = \frac{n_b \cdot t}{\Omega} \cdot \frac{2.4 \cdot d_b \cdot F_u}{\Omega} = 0.0 \text{ kips}$$

V_n = min(V_{n1}, V_{n2}) = min(0.0, 0.0) = 0.0 kips

Check ratio of bolt/plate bearing

$$\frac{V_u}{\phi V_n} = \frac{0.0 \text{ kips}}{0.0 \text{ kips}} = 0.0 \text{ OK} \leq 1.0$$

Beam to substructure connection is not applicable for this member

V_u = 0.0 kips, V_n = 0.0 kips, ϕ = 0.0, Shear Capacity = 0.0 kips, Shear Demand = 0.0 kips, Ratio = 0.0

Check ratio of weld strength

$$\frac{V_u}{\phi V_n} = \frac{0.0 \text{ kips}}{0.0 \text{ kips}} = 0.0 \text{ OK} \leq 1.0$$

Connection is adequate

3.4 BEAM-TO-CONCRETE WALL | 3.4 BEAM-TO-CONCRETE WALL

Check of anchors

Shear = 0.0

Beam to substructure connection is not applicable for this member

V_{nb} = 0.0 x 0.0 kips = 0.0 kips

Check ratio of Shear to strength

$$\frac{M_{y,1}}{M_{y,1}} = \frac{[illegible]}{[illegible]} = [illegible] < 1.0$$

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Axial [illegible]

$$[illegible] = [illegible]$$

Maximum resistance [illegible] [illegible] [illegible]

$$M_{y,1} = [illegible] \, kN \cdot m$$

Check ratio of flexural strength

$$\frac{M_{y,1}}{M_{y,1}} = \frac{[illegible]}{[illegible]} = [illegible] < 1.0$$

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Axial [illegible]

$$[illegible] = [illegible]$$

Check interaction ratio of combined axial tension and bending resistance
[illegible] [illegible]

$$\frac{T}{T} = \frac{M_{y,1}}{M_{y,1}} = \frac{M_{y,1}}{M_{y,1}} = \frac{[illegible]}{[illegible]} = \frac{[illegible]}{[illegible]} = \frac{[illegible]}{[illegible]} = [illegible] < 1$$

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Shear resistance [illegible] [illegible] [illegible] [illegible]

$$V_{y,1} = [illegible] \, kN$$

Check ratio of shear strength

$$\frac{V_{y,1}}{V_{y,1}} = \frac{[illegible]}{[illegible]} = [illegible] < 1.0$$

[illegible]

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Shear resistance [illegible] [illegible] [illegible] [illegible]

$$V_{y,1} = [illegible] \, kN$$

Check ratio of shear strength

$$\frac{V_{y,1}}{V_{y,1}} = \frac{[illegible]}{[illegible]} = [illegible] < 1.0$$

[illegible]