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Company Name	IIT Bombay	Project Title	
Group/Team Name	Osdag FOSSEE	Subtitle	
Designer	Parth K	Job Number	
Date	18 /09 /2024	Client	

1 Input Parameters

Module	Tension Member Design - Bolted to End Gusset
Axial (kN)*	76.0
Length (mm) *	1250.0
Section Profile*	Angles
Section Size*	Ref List of Input Section
Section Material	E 250 (Fe 410 W)A
Ultimate Strength, F_u (MPa)	410
Yield Strength, F_y (MPa)	250
Bolt Details - Input and Design Preference	
Diameter (mm)	[8]
Property Class	[4.6]
Type	Bearing Bolt
Hole Type	Standard
Detailing - Design Preference	
Edge Preparation Method	Sheared or hand flame cut
Are the Members Exposed to Corrosive Influences?	False
Plate Details - Input and Design Preference	
Thickness (mm)	[8, 10, 12, 14, 16, 18, 20, 22, 25, 28, 32, 36, 40, 45, 50, 56, 63, 75, 80, 90, 100, 110, 120]
Material	E 250 (Fe 410 W)A

1.1 List of Input Section

Section Size*	'40 x 40 x 5'

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2 Design Checks

Design Status	Fail

2.1 Selected Member Data

C:/Users/parth/Downloads/Osdag/ResourceFiles/images/equaldp.png

Section Size*			('40 x 40 x 5', 'Angles')	
Material			E 250 (Fe 410 W)A	
Mass, m (kg/m)			2.99	
Area, A (cm^2)			381.0	
A (mm)	40.0		I_v(cm^4)	2.33
B (mm)	40.0		r_z (cm)	1.21
t (mm)	5.0		r_y (cm)	1.21
R_1 (mm)	5.5		r_u (cm)	1.52
R_2 (mm)	0.0		r_v (cm)	0.78
C_y (mm)	11.7		Z_z (cm^3)	1.97
C_z (mm)	11.7		Z_y (cm^3)	1.97
I_z (cm^4)	5.58		Z_{pz} (cm^3)	3.55
I_y(cm^4)	5.58		Z_{py} (cm^3)	3.57
I_u (cm^4)	8.83		Radius of gyration, r (cm)	7.8

2.2 Spacing Check

Check	Required	Provided	Remarks
Min. Diameter (mm)		$d = 8$	
Hole Diameter (mm)		$d_0 = 8$	
Minimum Bolts (nos)		$r_l = 1$	
Min. Gauge Distance (mm)	$p/g_{\min} = 2.5d$ $= 2.5 \times 8.0$ $= 20.0$ [Ref. IS 800:2007, Cl.10.2.2]	0.0	

Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e_{\min} = 1.5d_0$ $= 1.5 \times 8$ $= 12.0$ [Ref. IS 800:2007, Cl.10.2.4.2]	15	
Spacing Check	depth $= 2\ e + (r_l - 1)\ g$ $= 2 \times 15 + (1 - 1) \times 20$ $= 30$	29.5	**Fail**

2.3 Member Check

Check	Required	Provided	Remarks
Tension Yielding Capacity (kN)		$T_{\text{dg}} = \frac{A_g f_y}{\gamma_{m0}}$ $= \frac{381.0 \times 250}{1.1 \times 10^3}$ $= 86.59$ [Ref. IS 800:2007, Cl.6.2]	
Slenderness	$\frac{KL}{r} \leq 400$	$\frac{KL}{r} = \frac{1 \times 1250.0}{7.8}$ $= 160.26$ [Ref. IS 800:2007, Cl.7.1.2]	**Pass**

3 Design Log

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2024-09-18 13:03:16 - Osdag - WARNING - : The available depth of the member cannot accommodate the minimum available bolt diameter of 8.0 mm considering the minimum spacing limit [Ref. Cl. 10.2, IS 800:2007].
2024-09-18 13:03:16 - Osdag - INFO - : Reduce the bolt diameter or increase the member depth and re-design.
2024-09-18 13:03:16 - Osdag - ERROR - : Design is unsafe.
2024-09-18 13:03:16 - Osdag - INFO - :==========End Of design==========