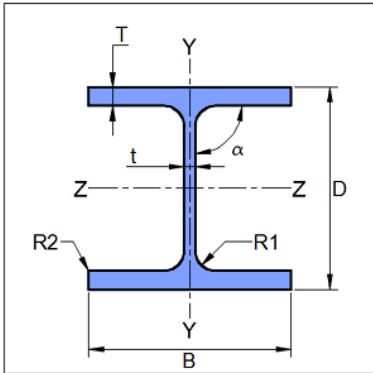
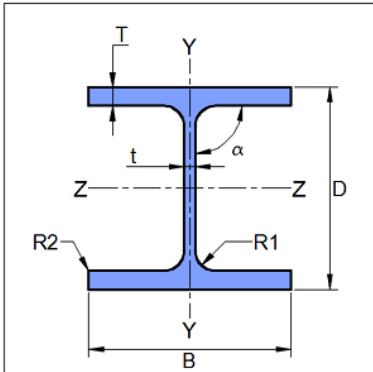




Company Name	IIT Bombay	Project Title	Sample Connection Design
Group/Team Name	Osdag	Subtitle	Fin Plate
Designer	Engineer #1	Job Number	1.1.1.2.2
Date	17 /12 /2020	Client	Meera Raghunandan, Professor, IIT Bombay

1 Input Parameters

Main Module		Shear Connection		
Module		Fin Plate		
Connectivity		Column Web-Beam Web		
Shear Force (kN)		140.0		
Axial Force (kN)		0.0		
Supporting Section - Mechanical Properties				
	Supporting Section		UC 356 x 368 x 129	
	Material		E 250 (Fe 410 W)A	
	Ultimate Strength, Fu (MPa)		410	
	Yield Strength, Fy (MPa)		250	
	Mass, m (kg/m)	129.0	Iz (cm4)	40246.0
	Area, A (cm2)	164.3	Iy(cm4)	14610.0
	D (mm)	355.6	rz (cm)	15.6
	B (mm)	368.6	ry (cm)	9.43
	t (mm)	10.4	Zz (cm3)	2264.0
	T (mm)	17.5	Zy (cm3)	793.0
	Flange Slope	90	Zpz (cm3)	2479.0
	R1 (mm)	15.2	Zpy (cm3)	1199.0
	R2 (mm)	0.0		
	Supported Section - Mechanical Properties			
	Supported Section		WPB 300 X 300 X 100.85	
	Material		E 250 (Fe 410 W)A	
	Ultimate Strength, Fu (MPa)		410	
	Yield Strength, Fy (MPa)		250	
	Mass, m (kg/m)	100.85	Iz (cm4)	21000.0
	Area, A (cm2)	128.0	Iy(cm4)	7210.0
	D (mm)	294.0	rz (cm)	12.8
	B (mm)	300.0	ry (cm)	7.49
	t (mm)	10.0	Zz (cm3)	1430.0
	T (mm)	16.0	Zy (cm3)	480.0
	Flange Slope	90	Zpz (cm3)	1580.0
	R1 (mm)	27.0	Zpy (cm3)	733.0
	R2 (mm)	0.0		



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Bolt Details - Input and Design Preference	
Diameter (mm)	[16]
Property Class	[4.6]
Type	Bearing Bolt
Hole Type	Standard
Bolt Tension	Non pre-tensioned
Slip Factor, (μ_f)	0.3
Detailing - Design Preference	
Edge Preparation Method	Rolled, machine-flame cut, sawn and planed
Gap Between Members (mm)	10.0
Are the Members Exposed to Corrosive Influences?	False
Plate Details - Input and Design Preference	
Thickness (mm)	[16]
Material	E 250 (Fe 410 W)A
Ultimate Strength, F_u (MPa)	410
Yield Strength, F_y (MPa)	250
Weld Details - Input and Design Preference	
Weld Type	Fillet
Type of Weld Fabrication	Shop Weld
Material Grade Overwrite, F_u (MPa)	410.0



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2 Design Checks

Design Status	Fail
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2.1 Initial Section Check

Check	Required	Provided	Remarks
Shear Yielding Capacity (kN)	140.0	$V_{dy} = \frac{A_v f_y}{\sqrt{3} \gamma_{mo}}$ $= \frac{294.0 \times 10.0 \times 250}{\sqrt{3} \times 1.1 \times 1000}$ $= 385.77$ [Ref. IS 800 : 2007, Cl.10.4.3]	Pass
Allowable Shear Capacity (kN)	140.0	$V_d = 0.6 V_{dy}$ $= 0.6 \times 385.77$ $= 231.46$ [Limited to low shear]	Pass
Tension Yielding Capacity (kN)	0.0	$T_{dg} = \frac{A_g f_y}{\gamma_{mo}}$ $A_g = l \times t = 294.0 \times 10.0$ $= \frac{2940.0 \times 250}{1.1 \times 10^3}$ $= 668.18$ [Ref. IS 800 : 2007, Cl. 6.2]	

2.2 Load Consideration

Check	Required	Provided	Remarks
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Date	17 /12 /2020	Client	Meera Raghunandan, Professor, IIT Bombay

Check	Required	Provided	Remarks
Applied Shear Force (kN)	140.0	$V_{ymin} = \min(0.15 \times V_{dy}, 40.0)$ $= \min(0.15 \times 385.77, 40.0)$ $= 40$ $V_u = \max(V_y, V_{ymin})$ $= \max(140.0, 40)$ $= 140.0$ $[Ref. IS 800 : 2007, Cl. 10.7]$	
Applied Axial Force (kN)	0.0	0.0	

2.3 Bolt Design

Check	Required	Provided	Remarks
Diameter (mm)		16.0	
Property Class		4.6	
Plate Thickness (mm)	$t_w = 10.0$	16.0	Pass
No. of Bolt Columns		3	Fail
No. of Bolt Rows		3	
Min. Pitch Distance (mm)	$p_{min} = 2.5 d$ $= 2.5 \times 16.0$ $= 40.0$ $[Ref IS 800 : 2007, Cl. 10.2.2]$	40	Pass
Min. End Distance (mm)	$e_{min} = 1.5 d_0$ $= 1.5 \times 18.0$ $= 27.0$ $[Ref. IS 800 : 2007, Cl. 10.2.4.2]$	30	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 294.0 - 2 \times (16.0 + 27.0 + 10)$ $= 208.0$	140	Pass



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3 Design Log

2020-12-17 22:48:28 - Osdag - ERROR - Bolt line limit is reached. Select higher grade/Diameter or choose different connection