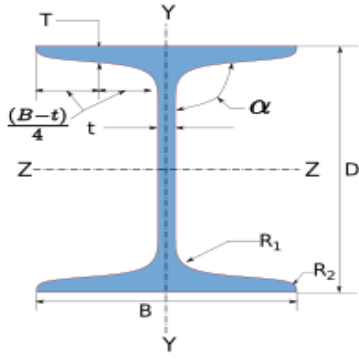
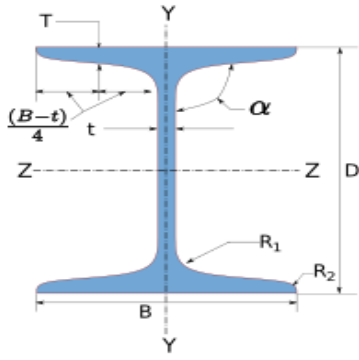


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1 Input Parameters

Module		Fin Plate		
MainModule		Shear Connection		
Connectivity		Beam-Beam		
Shear(kN)*		50.0		
Supporting Section				
	Supporting Section		NPB 330x160x57	
	Material *		E 250 (Fe 410 W)A	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		230	
	Mass	57.0	Iz(cm4)	139104000.0
	Area(cm2) - A	7259.999999999999	Iy(cm4)	9590400.0
	D(mm)	334.0	rz(cm)	138.4
	B(mm)	162.0	ry(cm)	36.3
	t(mm)	8.5	Zz(cm3)	832960.0
	T(mm)	13.5	Zy(cm3)	118400.0
	FlangeSlope	90	Zpz(cm3)	942790.0
	R1(mm)	1.8	Zpy(cm3)	118400.0
	R2(mm)	0.0		
Supported Section				
	Supported Section		MB 250	
	Material *		E 250 (Fe 410 W)A	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		230	
	Mass	37.2	Iz(cm4)	51190000.0
	Area(cm2) - A	4740.0	Iy(cm4)	3210000.0
	D(mm)	250.0	rz(cm)	104.0
	B(mm)	125.0	ry(cm)	26.0
	t(mm)	6.9	Zz(cm3)	409600.0
	T(mm)	12.5	Zy(cm3)	51000.0
	FlangeSlope	98	Zpz(cm3)	464500.0
	R1(mm)	13.0	Zpy(cm3)	51000.0
	R2(mm)	6.5		
Bolt Details				
Diameter(mm)*		[12.0, 16.0, 20.0, 24.0, 30.0, 36.0]		
Grade *		[3.6, 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9]		
Type *		Bearing Bolt		
Bolt hole type		Standard		
Slip factor (μ_f)		0.3		
Type of edges		a - Sheared or hand flame cut		

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Gap between beam and support (mm)	10.0
Are the members exposed to corrosive influences	False
Weld Details	
Weld Type	Fillet
Type of weld fabrication	Shop Weld
Material grade overwrite (MPa) Fu	410.0

2 Design Checks

2.1 Bolt Design Checks

Check	Required	Provided	Remarks
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b n_n A_{nb}}{\sqrt{3} \gamma_{mb}}$ $= \frac{410 * 1 * 353}{\sqrt{3} * 1.25}$ $= 57.82$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5 k_b d t f_u}{\gamma_{mb}}$ $= \frac{2.5 * 0.52 * 24.0 * 8.0 * 290}{1.25}$ $= 57.82$	
Capacity (KN)		$V_{db} = \min (V_{dsb}, V_{dpb})$ $= \min (57.82, 57.82)$ $= 57.82$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{50.0^2 + 50.0^2}}{57.82}$ $= 2$	2	
No of Columns		1	
No of Rows		2	
Min. Pitch (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 24.0 = 60.0$	0.0	N/A
Max. Pitch (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 6.9, 300 mm)$ $= 300$	0.0	N/A
Min. Gauge (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 24.0 = 60.0$	110	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 6.9, 300 mm)$ $= 300$	110	Pass
Min. End Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 26.0 = 44.2$	45	Pass

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Check	Required	Provided	Remarks
Max. End Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 8.0 * \sqrt{\frac{250}{165}}$ $= 118.08$	45	Pass
Min. Edge Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 26.0 = 44.2$	45	Pass
Max. Edge Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 8.0 * \sqrt{\frac{250}{165}}$ $= 118.08$	45	Pass
Capacity (KN)	55901.7	57821.54	Pass

2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 250.0 = 150.0$	200	Pass
Max. Plate Height (mm)	$d_b - t_{bf} + r_{b1} - notch_h$ $= 250.0 - 12.5 + 13.0 - 30$ $= 200.0$	200	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n_c - 1) * p_{min}$ $= 2 * 44.2 + (1 - 1) * 60.0$ $= 98.4$	100.0	Pass
Min. Plate Thickness (mm)	$t_w = 6.9$	8.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{200 * 8.0 * 165}{\sqrt{3} * 1.1}$ $= 83.14$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (200 - (2 * 26.0)) * 8.0 * 290$ $= 257.52$	
Block Shear Capacity in Shear (V_db) (kN)		234.92	
Shear Capacity (V_d) (kN)	50.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(83.14, 257.52, 234.92)$ $= 83.14$	Pass

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Check	Required	Provided	Remarks
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t * f_y}{\gamma_{mo}}$ $= \frac{100.0 * 8.0 * 165}{\sqrt{3} * 1.1}$ $= 120.0$	
Tension Rupture Capacity(kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (100.0 - 2 * 26.0) * 8.0 * 290}{1.25}$ $= 123.61$	
Block Shear Capacity in Tension (T_db) (kN)		234.92	
Tension Capacity (kN)	50.0	$T_d = \text{Min}(T_{dg}, T_{dn}, T_{db})$ $= \text{Min}(120.0, 123.61, 234.92)$ $= 120.0$	Pass
Moment Capacity (kNm)	2.75	9.6	Pass
Interaction Ratio	≤ 1	$\frac{2.75}{9.6} + \frac{50.0}{120.0} = 0.7$	Pass

2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$\text{Thickness of Thicker part}$ $= \text{Max}(8.5, 8.5) = 8.5$ $\text{IS800 : 2007 cl.10.5.2.3 Table 21,}$ $t_{w_{min}} = 3$	3	Pass
Max Weld Size (mm)	$\text{Thickness of Thinner part}$ $= \text{Min}(8.5, 8.5) = 8.0$ $t_{w_{max}} = 8.0$	3	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{I_{pw}} = \frac{2750000.0 * 97.0}{1216897.33}$ $T_{wv} = \frac{M * x_{max}}{I_{pw}} = \frac{2750000.0 * 0.0}{1216897.33}$ $V_{wv} = \frac{V}{l_w} = \frac{50000.0}{388}$ $A_{wh} = \frac{A}{l_w} = \frac{50000.0}{388}$ $R_w = \sqrt{(219.21 + 128.87)^2 + (0.0 + 128.87)^2}$ $= 371.16$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3 * 290}{\sqrt{3}} * 1.25$ $= 568.11$	Pass

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3 3D View



Figure 1: 3D View