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Date	05 /06 /2016	Method	Limit State Design (No Earthquake Load)

Design Conclusion	
Cleat Angle	Pass
Cleat Angle	
Connection Properties	
Connection	
Connection Title	Double Angle Web Cleat
Connection Type	Shear Connection
Connection Category	
Connectivity	Beam-Beam
Beam Connection	Bolted
Column Connection	Bolted
Loading (Factored Load)	
Shear Force (kN)	100.0
Components	
Column Section	ISMB 450
Material	Fe 410
Beam Section	ISMB 300
Material	Fe 410
Hole	STD
Cleat Section	ISA 100X100X8
Thickness (mm)	8
Cleat Leg Size B (mm)	100
Cleat Leg Size A (mm)	100
Hole	STD
Bolts on Beam	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	4
Columns (Vertical Lines)	1
Bolts Per Column	4
Gauge (mm)	0
Pitch (mm)	50
End Distance (mm)	37

Edge Distance (mm)	37
Bolts on Column	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	6
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0
Pitch (mm)	50
End Distance (mm)	62
Edge Distance (mm)	37
Assembly	
Column-Beam Clearance (mm)	20

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Design Check: Secondary Beam Connectivity			
Check	Required	Provided	Remark
Bolt shear capacity (kN)		$V_{dsb} = ((2 \times 400 \times 0.6126 \times 20 \times 20) / (\sqrt{3} \times 1.25 \times 1000)) = 90.529$ [cl. 10.3.3]	
Bolt bearing capacity (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 7.7 \times 400) / (1.25 \times 1000) = 62.586$ [cl. 10.3.4]	
Bearing capacity of beam web (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 7.7 \times 410) / (1.25 \times 1000) = 64.15$ [cl. 10.3.4]	
Bearing capacity of cleat (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8 \times 410) / (1.25 \times 1000) = 66.65$ [cl. 10.3.4]	
Bearing capacity (kN)		Min (62.586, 64.15, 66.65) = 62.586	
Bolt capacity (kN)		Min (90.529, 62.586) = 62.586	
Critical bolt shear (kN)	≤ 62.586	22.66	Pass
No. of bolts		4	
No. of column(s)	≤ 2	1	
No. of bolts per column		4	
Bolt pitch (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 7.7, 300) = 247$ [cl. 10.2.2]	50	Pass
Bolt gauge (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 7.7, 300) = 247$ [cl. 10.2.2]	0	
End distance (mm)	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 7.7 = 92.4$ [cl. 10.2.4]	37	Pass
Edge distance	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 7.7 = 92.4$	37	Pass

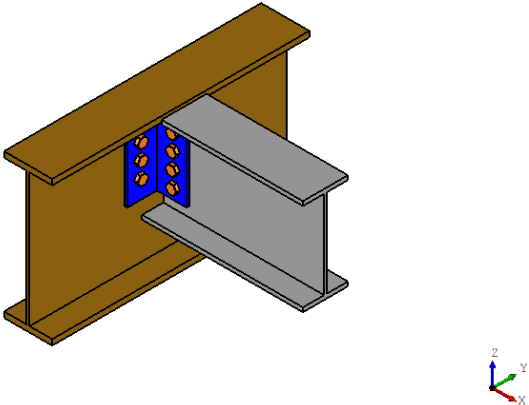
(mm)	[cl. 10.2.4]		
Block shear capacity (kN)	≥ 100.0	$V_{db} = 217.254$ [cl. 6.4.1]	Pass
Cleat height (mm)	$\geq 0.6 \cdot 300.0 = 180.0, \leq 300.0 - 13.1 - 14.0 - 17.4 - 15.0 - 5 = 235.5$ [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	Pass
Cleat moment capacity (kNm)	$(2 \cdot 90.529 \cdot 50^2) / (50 \cdot 1000) = 3.15$	$M_d = (1.2 \cdot 250 \cdot Z) / (1000 \cdot 1.1) = 120.422$ [cl. 8.2.1.2]	Pass


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Design Check: Primary Beam Connectivity			
Check	Required	Provided	Remark
Bolt shear capacity (kN)		$V_{dsb} = ((400 \times 0.6126 \times 20 \times 20) / (\sqrt{3} \times 1.25 \times 1000)) = 45.264$ [cl. 10.3.3]	
Bolt bearing capacity (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8.0 \times 400) / (1.25 \times 1000) = 65.024$ [cl. 10.3.4]	
Bearing capacity of beam web (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 9.4 \times 410) / (1.25 \times 1000) = 78.313$ [cl. 10.3.4]	
Bearing capacity of cleat (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8 \times 410) / (1.25 \times 1000) = 66.65$ [cl. 10.3.4]	
Bearing capacity (kN)		Min (65.024, 78.313, 66.65) = 66.65	
Bolt capacity (kN)		Min (45.264, 66.65) = 45.264	
Critical bolt shear (kN)	≤ 45.264	37.35	Pass
No. of bolts		6	
No. of column(s) per angle	≤ 2	1	
No. of bolts per column per angle		3	
Bolt pitch (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 8.0, 300) = 256$ [cl. 10.2.2]	50	Pass
Bolt gauge (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 8.0, 300) = 256$ [cl. 10.2.2]	0	
End distance (mm)	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 8.0 = 96.0$ [cl. 10.2.4]	62	Pass
	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 8.0 =$		

Edge distance (mm)	96.0 [cl. 10.2.4]	37	Pass
Block shear capacity (kN)	≥ 100.0	$V_{db} = 213.164$ [cl. 6.4.1]	Pass
Cleat height (mm)	$\geq 0.6 \cdot 300.0 = 180.0, \leq 300.0 - 13.1 - 14.0 - 17.4 - 15.0 - 5 = 235.5$ [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	Pass
Cleat moment capacity (kNm)	$(2 \cdot 45.264 \cdot 50^2) / (50 \cdot 1000) = 3.342$	$M_d = (1.2 \cdot 250 \cdot Z) / (1000 \cdot 1.1) = 120.422$ [cl. 8.2.1.2]	Pass

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Additional Comments			