Company Name	Aker Powergas Pvt Ltd	**Project Title**	YDP
Group/Team Name	Pune	**Subtitle**	
Designer	Yogesh Pisal	**Job Number**	Problem No 3
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 90X90X8
Thickness (mm)	8
Cleat Leg Size B (mm)	90
Cleat Leg Size A (mm)	90
Hole	STD
Bolts on Beam	
Type	Black Bolt
Grade	4.8
Diameter (mm)	16
Bolt Numbers	5
Columns (Vertical Lines)	1
Bolts Per Column	5
Gauge (mm)	0
Pitch (mm)	40
End Distance (mm)	30
Edge Distance (mm)	30
Bolts on Column	
Type	Black Bolt
Grade	4.8
Diameter (mm)	16
Bolt Numbers	8

Columns (Vertical Lines)	1
Bolts Per Column	4
Gauge (mm)	0
Pitch (mm)	40
End Distance (mm)	50
Edge Distance (mm)	30
Assembly	
Column-Beam Clearance (mm)	20

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Design Check: Secondary Beam Connectivity

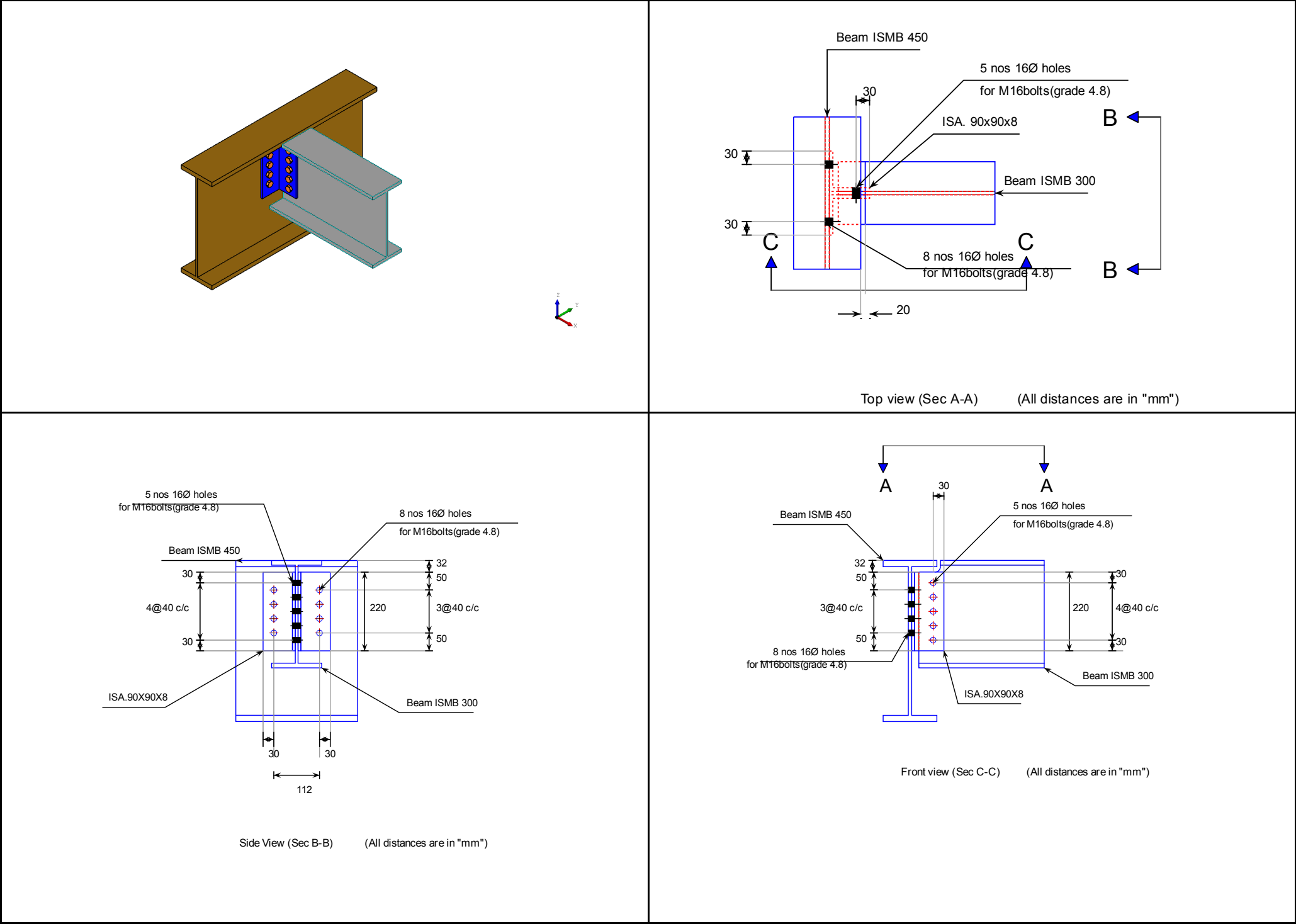| Check	Required	Provided	Remark
Bolt shear capacity (kN)		V_{dsb} = ((2*400*0.6126*16*16)/(√3*1.25*1000)) = 58.012 [cl. 10.3.3]	
Bolt bearing capacity (kN)		V_{dpb} = (2.5*0.491*16*7.7*400)/(1.25*1000) = 48.393 [cl. 10.3.4]	
Bearing capacity of beam web (kN)		V_{dpb} = (2.5*0.491*16*7.7*410)/(1.25*1000) = 49.603 [cl. 10.3.4]	
Bearing capacity of cleat (kN)		V_{dpb} = (2.5*0.491*16*8*410)/(1.25*1000) = 51.535 [cl. 10.3.4]	
Bearing capacity (kN)		Min (48.393, 49.603, 51.535) = 48.393	
Bolt capacity (kN)		Min (58.012, 48.393) = 48.393	
Critical bolt shear (kN)	≤ 48.393	18.028	Pass
No. of bolts		5	
No.of column(s)	≤ 2	1	
No. of bolts per column		5	
Bolt pitch (mm)	≥ 2.5* 16 = 40, ≤ Min(32*7.7, 300) = 247 [cl. 10.2.2]	40	Pass
Bolt gauge (mm)	≥ ;2.5*16 = 40, ≤ Min(32*7.7, 300) = 247 [cl. 10.2.2]	0	
End distance (mm)	≥ 1.7*18.0 = 30.6, ≤ 12*7.7 = 92.4 [cl. 10.2.4]	30	Pass
Edge distance (mm)	≥ 1.7*18.0 = 30.6, ≤ 12*7.7 = 92.4 [cl. 10.2.4]	30	Pass
Block shear capacity (kN)	≥ 100.0	V_{db} = 203.164 [cl. 6.4.1]	Pass
Cleat height (mm)	≥ 0.6*300.0=180.0, ≤ 300.0-13.1-14.0-17.4-15.0- 5=235.5 [cl. 10.2.4, Insdag Detailing Manual, 2002]	220	Pass
Cleat moment capacity (kNm)	(2*58.012*40²)/(40*1000) = 3.0	M_d = (1.2*250*Z)/(1000*1.1) = 116.16 [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*0.6126*16*16)/(√3*1.25*1000)) = 29.006 [cl. 10.3.3]	
Bolt bearing capacity (kN)		$V_{dpb} =$ (2.5*0.491*16*8.0*400)/(1.25*1000) = 50.278 [cl. 10.3.4]	
Bearing capacity of beam web (kN)		$V_{dpb} =$ (2.5*0.491*16*9.4*410)/(1.25*1000) = 60.554 [cl. 10.3.4]	
Bearing capacity of cleat (kN)		$V_{dpb} =$ (2.5*0.491*16*8*410)/(1.25*1000) = 51.535 [cl. 10.3.4]	
Bearing capacity (kN)		Min (50.278, 60.554, 51.535) = 51.535	
Bolt capacity (kN)		Min (29.006, 51.535) = 29.006	
Critical bolt shear (kN)	≤ 29.006	27.01	Pass
No. of bolts		8	
No.of column(s) per angle	≤ 2	1	
No. of bolts per column per angle		4	
Bolt pitch (mm)	≥ 2.5* 16 = 40, ≤ Min(32*8.0, 300) = 256 [cl. 10.2.2]	40	Pass
Bolt gauge (mm)	≥ 2.5*16 = 40, ≤ Min(32*8.0, 300) = 256 [cl. 10.2.2]	0	Pass
End distance (mm)	≥ 1.7*18.0 = 30.6, ≤ 12*8.0 = 96.0 [cl. 10.2.4]	50	Pass
Edge distance (mm)	≥1.7*18.0 = 30.6, ≤12*8.0 = 96.0 [cl. 10.2.4]	30	Pass
Block shear capacity (kN)	≥100.0	$V_{db} = 200.437$ [cl. 6.4.1]	Pass
Cleat height (mm)	≥ 0.6*300.0=180.0, ≤ 300.0-13.1-14.0-17.4-15.0- 5=235.5 [cl. 10.2.4, Insdag Detailing Manual, 2002]	220	Pass

Cleat moment capacity (kNm)	$(2*29.006*40^2)/(40*1000) = 3.192$	$M_{\mathrm{d}} = (1.2*250*Z)/(1000*1.1) = 116.16$ [cl. 8.2.1.2]	**Pass**

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Views

Top view (Sec A-A)   (All distances are in "mm")

Side View (Sec B-B)   (All distances are in "mm")

Front view (Sec C-C)   (All distances are in "mm")

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Additional Comments	