

PLACA BASE IPE 240

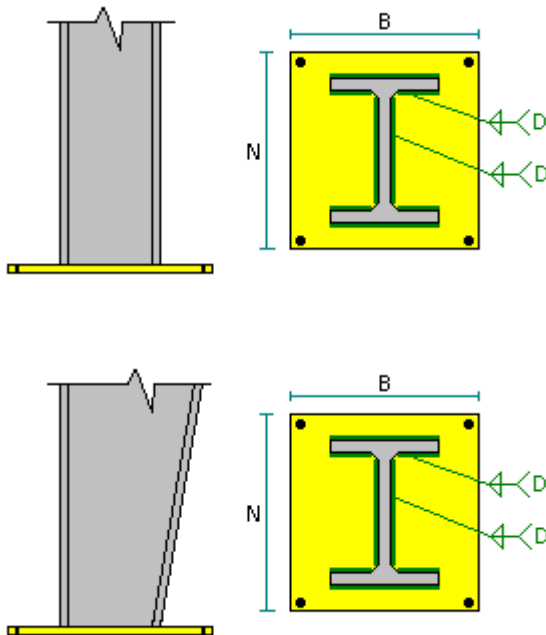
Data

Connection name : Fixed biaxial BP
Connection ID : 1

Family: Column - Base (CB)
Type: Base plate

GENERAL INFORMATION

Connector



MEMBERS

Column

Column type : Prismatic member
Section : IPE 240
Material : A572 Gr50
Longitudinal offset : 0 mm
Transversal offset : 0 mm

CONNECTOR

Base plate

Connection type : Unstiffened
Position on the support : Center
N: Longitudinal dimension : 390 mm
B: Transversal dimension : 260 mm
Thickness : 12 mm
Material : A36
Column weld : E70XX
Outer welds flanges only : No
D: Column weld size (1/16 in) : 5
Override A2/A1 ratio : No
Include shear lug : No

Support

With pedestal : No
Longitudinal dimension : 500 mm
Transversal dimension : 350 mm

Thickness	:	1000 mm
Material	:	C 4-60
Include grouting	:	No
<u>Anchor</u>		
Anchor position	:	Longitudinal position
Rows number per side	:	1
Anchors per row	:	3
Longitudinal edge distance on the plate	:	40 mm
Transverse edge distance on the plate	:	40 mm
Anchor type	:	Headed
Head type	:	Hexagonal
Include lock nut	:	No
Anchor	:	5/8"
Effective embedment depth	:	300 mm
Total length	:	332.96 mm
Material	:	A36 (anchor)
Fy	:	0.248 kN/mm ²
Fu	:	0.4 kN/mm ²
Cracked concrete	:	No
Brittle steel	:	No
Anchors welded to base plate	:	No
<u>Anchor reinforcement</u>		
Type of reinforcement	:	Primary
Tension reinforcement	:	Yes
Tension bar size	:	no. 5
Tension bar grade	:	0.42 kN/mm ²
Tension number of bars	:	8
Shear reinforcement	:	Yes
Shear bar size	:	no. 3
Shear bar grade	:	0.42 kN/mm ²
Shear number of bars in major axis direction	:	3
Shear number of bars in minor axis direction	:	3

Steel connections

Results

Connection name : Fixed biaxial BP
Connection ID : 1

Family: Column - Base (CB)
Type: Base plate
Design code: AISC 360-16 LRFD, ACI 318-08

DEMANDS

Description	Pu [KN]	Mu22 [KN*m]	Mu33 [KN*m]	Vu2 [KN]	Vu3 [KN]	Load type
DL	-10.70	-2.50	-6.60	-3.62	1.70	Design

Design for major axis Base plate (AISC 360-16 LRFD)

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Base plate</u>						
Distance from anchor to edge	[mm]	32.06	6.35	--	✓	
Weld size	[1/16in]	5	2	--	✓	table J2.4

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Concrete base</u>						
Axial bearing	[KN/mm2]	0.02	0.00	DL	0.10	DG1 3.1.1;
<u>Base plate</u>						
Flexural yielding (bearing interface)	[KN*m/m]	8.04	6.10	DL	0.76	DG1 Eq. 3.3.13, DG1 Sec 3.1.2
Flexural yielding (tension interface)	[KN*m/m]	8.04	4.20	DL	0.52	DG1 Eq. 3.3.13
<u>Column</u>						
Weld capacity	[KN/m]	1828.47	88.90	DL	0.05	p. 8-9, Sec. J2.5, Sec. J2.4, DG1 p. 35
Elastic method weld shear capacity	[KN/m]	1218.98	9.51	DL	0.01	p. 8-9, Sec. J2.5, Sec. J2.4
Elastic method weld axial capacity	[KN/m]	1828.47	119.25	DL	0.07	p. 8-9, Sec. J2.5, Sec. J2.4
Ratio	0.76					

Design for minor axis Base plate (AISC 360-16 LRFD)

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Base plate</u>						
Distance from anchor to edge	[mm]	32.06	6.35	--	✓	
Weld size	[1/16in]	5	2	--	✓	table J2.4

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Concrete base</u>						
Axial bearing	[KN/mm2]	0.02	0.00	DL	0.10	DG1 3.1.1;
<u>Base plate</u>						
Flexural yielding (bearing interface)	[KN*m/m]	8.04	5.56	DL	0.69	DG1 Eq. 3.3.13, DG1 Sec 3.1.2
Flexural yielding (tension interface)	[KN*m/m]	8.04	4.20	DL	0.52	DG1 Eq. 3.3.13
<u>Column</u>						
Weld capacity	[KN/m]	1828.47	88.90	DL	0.05	p. 8-9, Sec. J2.5, Sec. J2.4, DG1 p. 35
Elastic method weld shear capacity	[KN/m]	1218.98	4.17	DL	0.00	p. 8-9, Sec. J2.5, Sec. J2.4
Elastic method weld axial capacity	[KN/m]	1828.47	262.35	DL	0.14	p. 8-9, Sec. J2.5, Sec. J2.4
Ratio	0.69					

Major axis Anchors

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Anchors</u>						
Anchor spacing	[mm]	155.00	63.50	--	✓	Sec. D.8.1
Concrete cover	[mm]	77.06	76.20	--	✓	Sec. 7.7.1
Effective length	[mm]	310.32	--	989.68	✓	
Ratio	0.27					

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[KN]	43.73	8.20	DL	0.19	Eq. D-3
Pullout of anchor in tension	[KN]	47.51	8.20	DL	0.17	Sec. D.3.3.3
Side-face blowout of anchor in tension	[KN]	30.23	8.20	DL	0.27	Sec. D.5.4.1, Sec. D.3.3.3
Side-face blowout of group of anchors in tension	[KN]	83.97	13.56	DL	0.16	Eq. D-17, Sec. D.3.3.3
Group of Anchors reinforcement in tension	[KN]	504.00	21.05	DL	0.04	Sec. D.5.2.9, D.6.2.9
Anchor shear	[KN]	23.68	0.67	DL	0.03	Eq. D-20, DG1 Sec 3.5.1
Pryout of anchor in shear	[KN]	62.50	0.60	DL	0.01	Eq. D-4, Sec. D.3.3.3
Pryout of group of anchors in shear	[KN]	72.21	3.02	DL	0.04	Eq. D-5, Sec. D.3.3.3
Group of Anchors reinforcement in shear	[KN]	67.06	3.62	DL	0.05	Sec. D.5.2.9, D.6.2.9
Interaction of tensile and shear forces	[KN]	1.20	0.00	DL	0.00	Eq. D-3, Sec. D.3.3.3, Sec. D.5.4.1, Eq. D-17, Eq. D-20, DG1 Sec 3.5.1, Eq. D-4, Eq. D-5, Sec. D.7

Minor axis Anchors

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
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Anchors

Anchor spacing	[mm]	155.00	63.50	--	✓	Sec. D.8.1
Concrete cover	[mm]	77.06	76.20	--	✓	Sec. 7.7.1
Effective length	[mm]	310.32	--	989.68	✓	

Ratio 0.27

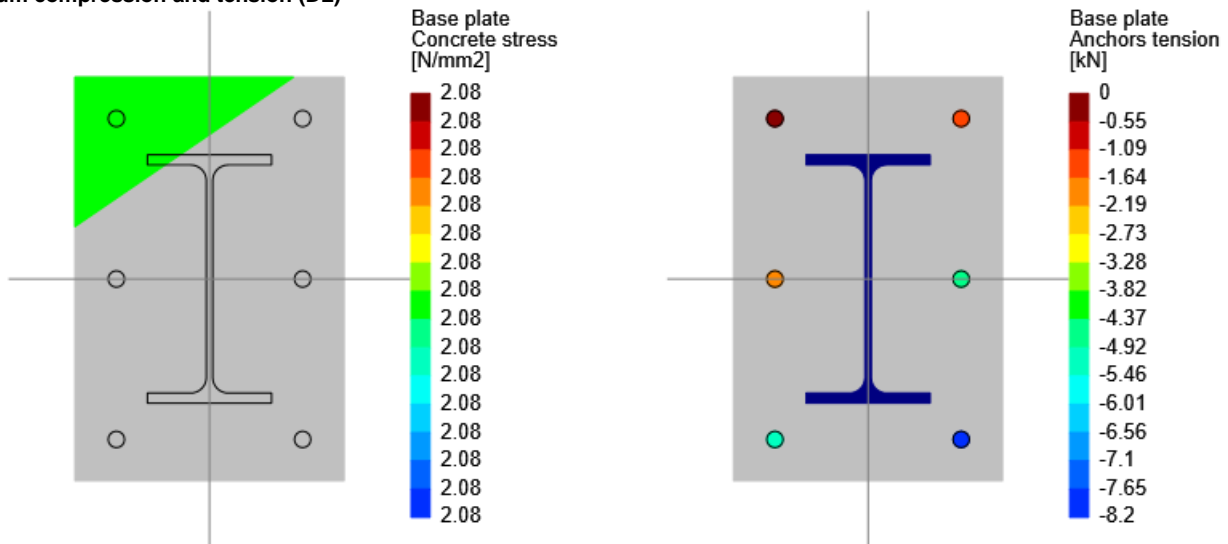
DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
Anchor tension	[KN]	43.73	8.20	DL	0.19	Eq. D-3
Pullout of anchor in tension	[KN]	47.51	8.20	DL	0.17	Sec. D.3.3.3
Side-face blowout of anchor in tension	[KN]	30.23	8.20	DL	0.27	Sec. D.5.4.1, Sec. D.3.3.3
Side-face blowout of group of anchors in tension	[KN]	91.81	13.89	DL	0.15	Eq. D-17, Sec. D.3.3.3
Group of Anchors reinforcement in tension	[KN]	504.00	21.05	DL	0.04	Sec. D.5.2.9, D.6.2.9
Anchor shear	[KN]	23.68	0.67	DL	0.03	Eq. D-20, DG1 Sec 3.5.1
Pryout of anchor in shear	[KN]	62.50	0.28	DL	0.00	Eq. D-4, Sec. D.3.3.3
Pryout of group of anchors in shear	[KN]	72.21	1.42	DL	0.02	Eq. D-5, Sec. D.3.3.3
Group of Anchors reinforcement in shear	[KN]	67.06	1.70	DL	0.03	Sec. D.5.2.9, D.6.2.9
Interaction of tensile and shear forces	[KN]	1.20	0.00	DL	0.00	Eq. D-3, Sec. D.3.3.3, Sec. D.5.4.1, Eq. D-17, Eq. D-20, DG1 Sec 3.5.1, Eq. D-4,

Global critical strength ratio 0.76

Biaxial

Maximum compression and tension (DL)



Maximum bearing pressure	2.08	[N/mm2]
Minimum bearing pressure	2.08	[N/mm2]
Maximum anchor tension	8.20	[KN]
Minimum anchor tension	0.00	[KN]
Neutral axis angle	0.00	
Bearing length	119.13	[mm]

Anchors tensions

Anchor	Transverse [mm]	Longitudinal [mm]	Shear [KN]	Tension [KN]
1	-90.00	-155.00	-0.60	5.36
2	-90.00	0.00	-0.60	1.80
3	-90.00	155.00	-0.60	0.00
4	90.00	155.00	-0.60	1.06
5	90.00	0.00	-0.60	4.63
6	90.00	-155.00	-0.60	8.20