

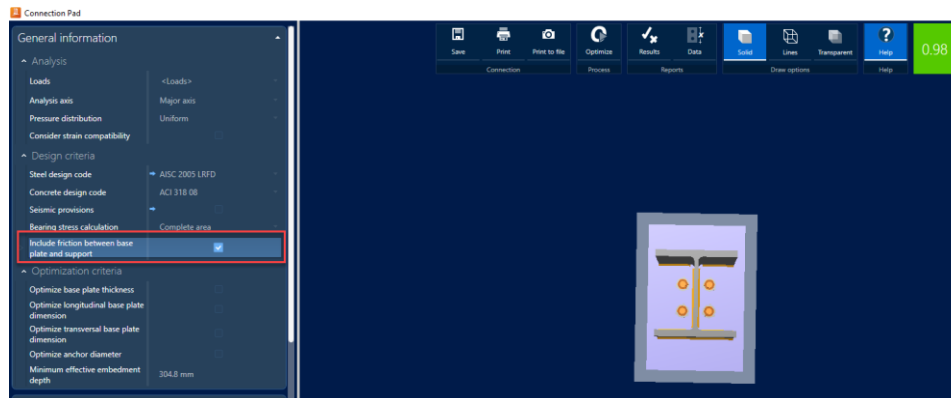
Hello Nazmul,

The AISC base plate design is based on the AISC Design Guide 1 Second Edition. According to the DG1 section 3.5, the shear in a base plate design can be handled in three ways:

1. Friction between the base plate and the grouting or concrete surface
2. Using a shear lug
3. Shear in anchors

By default in RAM Connection check the shear in anchors that is why you see all the shear capacities being calculated according to the ACI 318 Appendix D.

If you want consider the friction between the base plate and the concrete you need to check the “Include friction between base plate and support” option in Design criteria.

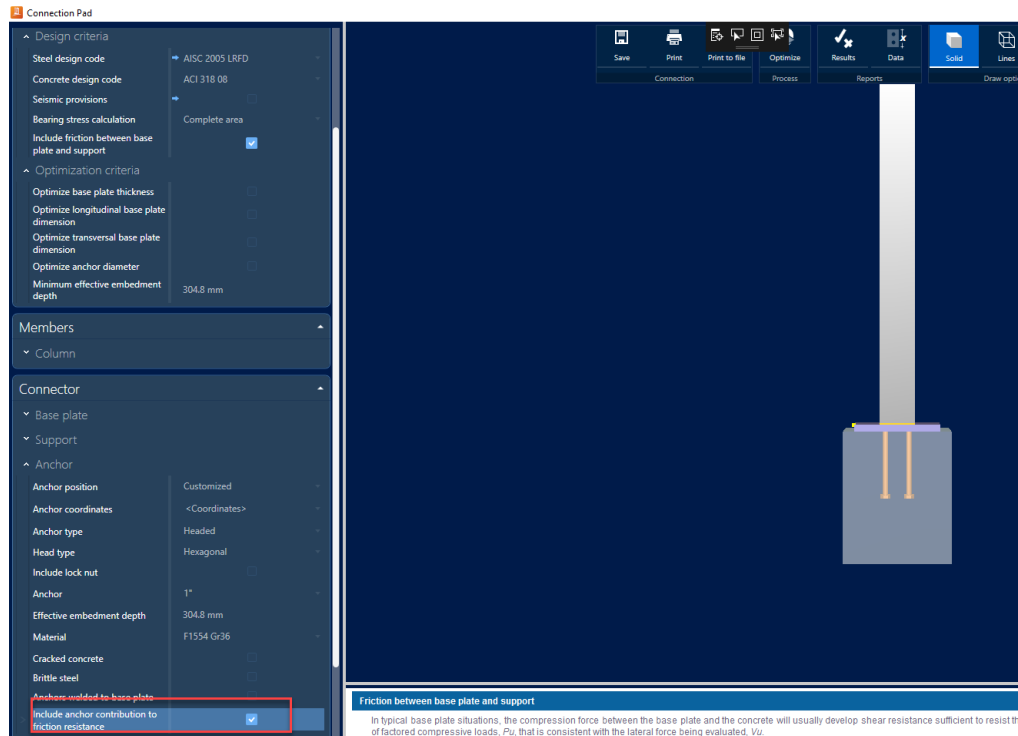


This will enable the friction calculation which can be calculated just for the plate or Include it in the anchors shear capacity.

If it is just for the plate a new capacity is added in the base plate section called “Friction shear capacity”. This depends on axial compression so for a base plate under tension the friction capacity will be zero.

Base plate				
Flexural yielding (bearing interface)	[kN/mm]	69.81	0.00	DL
$\phi M_n = \phi F_y A_g / 4$				
$= 0.9 * 344.74 \text{ [N/mm}^2\text{]} * 30 \text{ [mm]}^2 / 4$				
$= 69.81 \text{ [kN/mm]}$				
Flexural yielding (tension interface)	[kN/mm]	69.81	43.75	DL
$\phi M_n = \phi F_y A_g / 4$				
$= 0.9 * 344.74 \text{ [N/mm}^2\text{]} * 30 \text{ [mm]}^2 / 4$				
$= 69.81 \text{ [kN/mm]}$				
$M_{pr} = M_{eq} / B_{pr}$				
$= 4.42 \text{ [kN/m]} / 101.11 \text{ [mm]}$				
$= 43.75 \text{ [kN/mm]}$				
Friction shear capacity	[kN]	0.00	100.00	DL
$\phi V_n = \min(\phi * \mu * P_u, 0.2 * F_y * A_g)$				
$= \min(0.75 * 0.7 * 0 \text{ [kN]}, 0.2 * 27.58 \text{ [N/mm}^2\text{]} * 0 \text{ [mm]}^2)$				
$= 0 \text{ [kN]}$				

If you want the friction to be considered as a contribution of the anchor shear capacity then you need to check “Include anchor contribution to friction resistance”



This will include the friction contribution to the anchor shear resistance.

Anchor shear [kN] 60.95 25.00 DL 0.41 Eq. D-20, DG1 Sec 3.5.1

$$A_{se} = \pi/4 \cdot 0.0 \cdot (d_s - 0.9743 \text{ [in]} / n_s)^2$$

$$= \pi/4 \cdot 0.0 \cdot (25.4 \text{ [mm]} - 0.9743 \text{ [in]} / 8)^2$$

$$= 390.8 \text{ [mm}^2\text{]}$$

Sec. D.5.1.1,
D.6.1.2

$$f_{uta} = \min(f_{uta}, 1.9 \cdot f_{yt}, 125 \text{ [ksi]})$$

$$= \min(399.89 \text{ [N/mm}^2\text{]}, 1.9 \cdot 248.21 \text{ [N/mm}^2\text{]}, 125 \text{ [ksi]})$$

$$= 399.89 \text{ [N/mm}^2\text{]}$$

Sec. D.5.1.2

HasGroutPad → False

$$\phi V_{sa} = \phi \cdot 0.6 \cdot n \cdot A_{se} \cdot f_{uta}$$

$$= 0.65 \cdot 0.6 \cdot 1 \cdot 390.8 \text{ [mm}^2\text{]} \cdot 399.89 \text{ [N/mm}^2\text{]}$$

$$= 60.95 \text{ [kN]}$$

Eq. D-20

$$\phi V_{fb} = \min(\phi \cdot \mu \cdot P_u, 0.2 \cdot f'_c \cdot A_c)$$

$$= \min(0.75 \cdot 0.7 \cdot 0 \text{ [kN]}, 0.2 \cdot 27.58 \text{ [N/mm}^2\text{]} \cdot 0 \text{ [mm}^2\text{]})$$

$$= 0 \text{ [kN]}$$

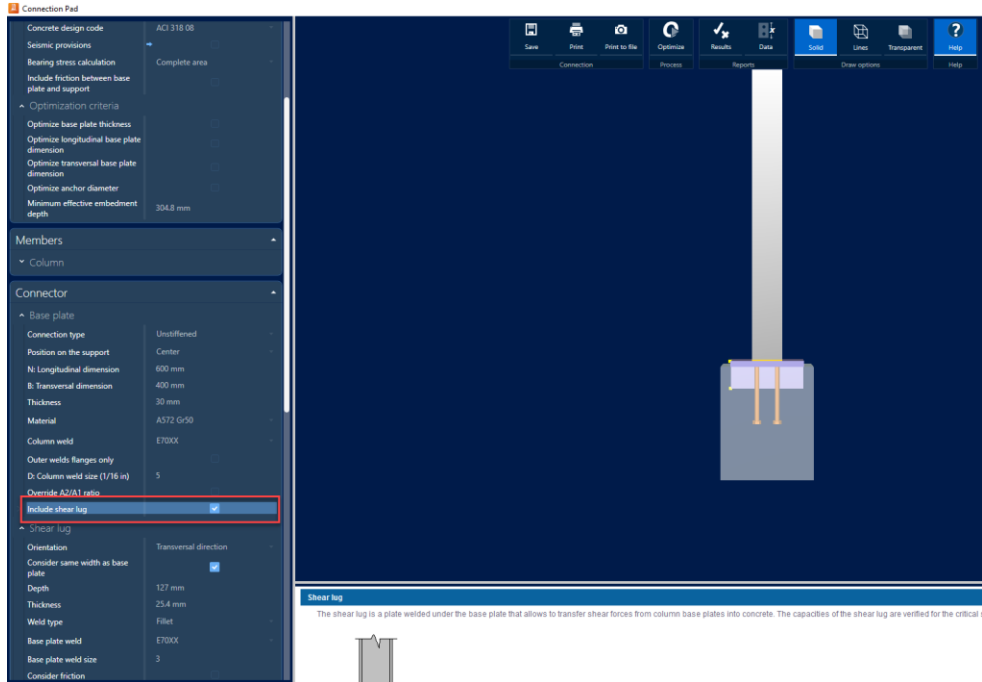
DG1 Sec 3.5.1

$$\phi V_n = \phi V_{sa} + \phi V_{fb}$$

$$= 60.95 \text{ [kN]} + 0 \text{ [kN]}$$


$$= 60.95 \text{ [kN]}$$


Finally, shear can also be resisted by a shear lug. If this is the case you need to check the option





This will enable all section capacities for the shear lug.


Report - RAM Connection Standalone CE


 Print


 Printer configuration


 Repeat headings
/x/ View formulas


 Select all


 Copy

 Save as TXT

 MS Word (format not included)

 MS Excel (format not included)

 MS Word (format included)

 Close

Print

Edit

MS Word (format not included)

Export

MS Word (format included)

Close

Family: Column - Base (CB)
Type: Base plate
Design code: AISC 360-05 LRFD, ACI 318-08

DEMANDS

Description	Pu [kN]	Mu22 [kN*m]	Mu33 [kN*m]	Vu2 [kN]	Vu3 [kN]	Load type
DL	350.00	0.00	0.00	100.00	0.00	Design

**Design for major axis
Base plate (AISC 360-05 LRFD)**

GEOMETRIC CONSIDERATIONS

Dimensions	Unit	Value	Min. value	Max. value	Sta.	References
<u>Base plate</u>						
Distance from anchor to edge	[mm]	132.30	6.35	--	✓	
Weld size	[1/16in]	5	3	--	✓	table J2.4
<u>Shear lug</u>						
Weld size	[1/16in]	3	5	--	✗	table J2.4

DESIGN CHECK

Verification	Unit	Capacity	Demand	Ctrl EQ	Ratio	References
<u>Concrete base</u>						
Axial bearing	[kN/mm ²]	0.02	0.00	DL	0.00	DG1 3.1.1;
<u>Base plate</u>						
Flexural yielding (bearing interface)	[kN*m/m]	69.81	0.00	DL	0.00	DG1 Eq. 3.3.13
Flexural yielding (tension interface)	[kN*m/m]	69.81	43.75	DL	0.63	DG1 Eq. 3.3.13
<u>Shear lug</u>						
Bearing on the concrete	[kN]	1183.85	100.00	DL	0.08	DG1 Sec 3.5.2
Shear on the concrete	[kN]	237.24	100.00	DL	0.42	DG1 Sec 3.5.2, DG1 p. 42
Flexural yielding	[kN*m]	20.02	6.35	DL	0.32	DG1 p. 43, DG1 Sec 3.5.2
Weld capacity	[kN/m]	1097.08	569.44	DL	0.52	p. 8-9, Sec. J2.5, Sec. J2.4, DG1 Sec 3.5.2, DG1 p. 43