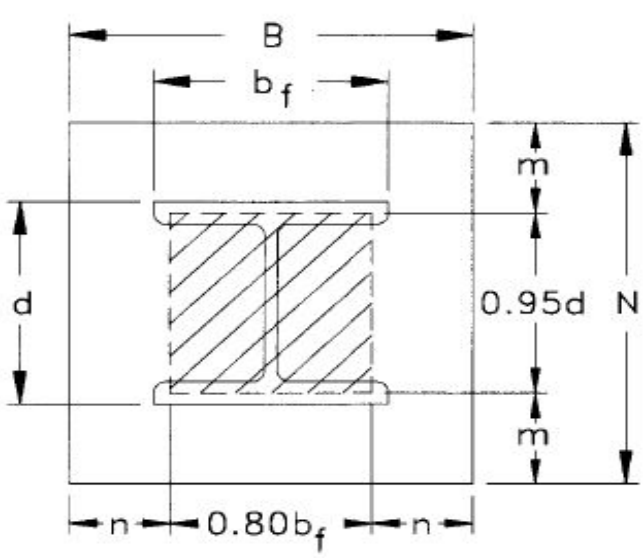


	Description	Parameter	Unit	Remark	
	Column E2	D ISMC 250			
	Yield Stress of Plate (F _y)	36	ksi		
	Base Plate Size	500 x 500	mm		
	Base Plate Thickness	40	mm	38	Pass
	Flange Width	250	mm		
		9.84	inches		
	Depth	274	mm		
		10.79	inches		
	m	4.72	inches		
	Base Plate Dimension - N	19.685	inches	500	mm
	n	5.91	inches		
	Base Plate Dimension - B	19.685	inches	500	mm
	Area of base plate - A1	387.50	inches		
	Load Case	8	9	10	11
	Load Combination	SW+DL+LL	SW+W+WX	SW+W+WZ	SW+W+Z
	F _x (Ton)	2.52	-5.92	6.72	2.52
	F _y (Ton)	48.78	8.8	29.86	82.59
	F _z (Ton)	0.14	0.03	0.01	2.65
	Resultant shear force	2.5	5.9	6.7	3.7
	Allowable Stress Design				
	Area of base plate A1				387.50
	Area of concrete A2				387.50
	Axial compressive load (Pa) - kips	107.51	19.40	65.81	182.03
	Compressive Strength of concrete- f _c (kg/m ²)				134.88
	Compressive Strength of concrete (ksi)				65.11
	Required Base Plate area (Q ² Pa / 0.85 *f _c) inches ²				150.29
	Delta				266.51
	Base plate Breadth (N) in inches				50.38
	N considered				
	Base Plate length (B) in inches				
	B considered				
	Condition (0.85*F _c *A1 *VA2/A1)/Z.50) > F _y (Kips)				
	Factor X				
	λ				
	λn'				
	I				
	Base Plate Thickness (inches)				
	Base Plate Thickness (mm)				
	Uplift Condition				
	Yield Stress of Plate (F _y)				
	v2 bf				
	Guage Distance (Centre to centre) mm				
	Guage Distance (Centre to centre) inches				
	Allowable Stress Design				
	Condition 1 (v2 bf < d)				
	Plate thickness (inches)				
	Condition 1 (v2 bf > d)				
	Plate thickness (inches)				
	Plate Thickness (inches)				
	Plate Thickness (mm)				



Sr No	Description	Paramter	Unit	Remark
1	Hole diameter	33	mm	
2	No of bolts in X Direction	3		
3	No of bolts in Z Direction	3		
4	Edge distance (Along X Direction)	60	mm	Condition satisfied
5	Minimum edge distance	49.5	mm	As per IS:800
6	Edge distance (Along Z Direction)	60	mm	
7	Distance between Hole centre & channel (Z)	65.00	mm	

	Description	Parameter	Unit		Remarks
	Bolt Considered M33				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	396	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	33	mm		
	Pitch	55	mm		
	Core Diameter	26.706	mm		
	Shank Area of bolt	855.299	mm ²		
	Stress Area	694	mm ²		
	Root Area	635.70	mm ²		
	Hole diameter	36	mm		
	Edge distance (For Side N)	69	mm		
	Minimum edge distance	54	mm		IS:800 10.4.2
	Edge distance (For Side B)	69	mm		
	Guage Distance between Holes (For Side "B")	181.0	mm		
	Guage Distance between Holes (For Side "N")	181.0	mm		
	Tensile stress in anchor rod				
	Required tension in bolt	61.2	Tons		
	Required tension per bolt	7.650	Tons		
	Actual tensile stress per bolt	8.94	kg/mm ²	Accepted	IS:800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	178835.16	N		
	Design Strength due to yielding	178835.16	N	18.22	Tons
	Design Strength due to rupture at threaded section	204868.80	N	20.88	Tons
	Shear Stress in anchor rod				
	Shear force in bolt	8.7	Tons		
	Shear force per bolt	1.088	Tons		
	Actual shear stress in bolt	1.27	kg/mm ²	Accepted	IS:800 11.6.2.1
	Permissible Shear stress per bolt	11.74	kg/mm ²		IS:800 11.6.2.1
	Nominal shear capacity of bolt	164279.2	N		IS:800 10.3.3
	Bearing Stress of bolt on plate				
	Actual Stress of bolt in bearing	0.82	kg/mm ²	Accepted	IS:800 11.6.2.2
	Nominal bearing area of bolt on plate	1320.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS:800 11.6.2.2
	Nominal bearing strength of bolt	1353000.0	N		
	Combined Shear and Tension				
	Actual Shear stress in bolt	1.27	kg/mm ²		
	Permissible Shear stress per bolt	11.74	kg/mm ²		
	Actual tensile stress per bolt	8.94	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.50		Accepted	IS:800 11.6.2.5

Description	Parameter	Unit	Remark
Column E2	D ISMC 250		
Yield Stress of Plate (F_y)	36	ksi	
Base Plate Size	500 x 500	mm	
Base Plate Thickness	40	mm	38 Pass
Flange Width	9.84	inches	
Depth	7.74	mm	
m	10.79	inches	
Base Plate Dimension - N	4.72	inches	
n	5.91	inches	
Base Plate Dimension - B	19.685	inches	500 mm
Area of base plate - A1	19.685	inches	500 mm
Load Case	387.50	inches	
Load Combination	SW +DL+LL	SW + WX	SW+WZ
Fx (Ton)	2.51	-5.87	6.67 -1.53 2.58
Fy (Ton)	50.79	7.81	28.75 62.3 83.55
Fz (Ton)	-0.16	-0.06	0 4.19 -3.41
Resultant shear force	2.5	5.8	6.6 4.4 4.2

The diagram illustrates a base plate connection. A central square base plate of side length \$B\$ is shown. It is supported by four columns, each with a diameter \$D\$. The distance from the centerline of the plate to the face of the column is \$m\$, and the distance to the edge of the column is \$n\$. The total width of the assembly is \$0.80 \cdot b_f\$. A vertical load \$P\$ is applied to the top of the column. The plate has a thickness \$t_p\$.

Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		387.50								
Area of concrete A2		387.50								
Axial compressive load (Pa) - kips	111.94	17.21	63.37	137.31	184.14	71.85	152.43	48.25	273.21	
Compressive Strength of concrete- fc (kg/m ²)	2550000									
Compressive Strength of concrete (ksi)	3.63									
Required Base Plate Area (\$\varphi^2 P_u / 0.85 \times f_c\$) inches ²	90.775	13.959	51.384	111.347	149.326	58.265	123.608	39.123	221.550	
Base plate Breadth (N) in inches	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	
N considered	11	5	8	12	13	9	12	7	16	
Base plate length (B) in inches	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	
B considered	3	3	6	9	11	7	10	5	14	
	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	
Condition (0.85*fc*A1 * \$\varphi^2 A_2 / A_1\$) > Fy (Kips)	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	
	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	
Factor X	0.23	0.04	0.13	0.29	0.38	0.15	0.32	0.10	0.57	
\$\lambda\$	0.52	0.19	0.38	0.58	0.70	0.40	0.62	0.33	0.91	
\$\lambda_n'\$	0.52	0.19	0.38	0.58	0.70	0.40	0.62	0.33	0.91	
	1.33	0.49	0.97	1.50	1.79	1.04	1.59	0.84	2.35	
I	5.9055									
Base Plate Thickness (Inches)	0.97	0.38	0.73	1.07	1.24	0.77	1.13	0.63	1.51	
Base Plate Thickness (mm)	24.56	9.63	18.48	27.20	31.50	19.67	28.66	16.12	38.36	
Uplift Condition										
Yield Stress of Plate (F_y)	36									
v2 bf	13.92									
Gauge Distance (Centre to centre) mm	181.00									
Gauge Distance (Centre to centre) inches	7.13									

Allowable Stress Design			
Condition 1 (v2 bf < d)			
Plate thickness (inches)	1.397		0.828
Condition 1 (v2 bf > d)			
Plate thickness (inches)	1.375		0.815
Plate Thickness (inches)	1.375		0.815
Plate Thickness (mm)	34.93		20.70

Description	Parameter	Unit	Description	Parameter	Unit	Remarks
Bolt Considered M33						
Bolt material	IS 2062 E 250 A					
Minimum Embedment Length	396	mm				
Tensile Strength	410	N/mm ²				IS 2062
Yield Stress	250	N/mm ²				Table No 2
No of Bolts	8					
Major/Nominal Diameter	33	mm				
Pitch	35	mm				
Core Diameter	28.706	mm				
Shank Area of bolt	855.299	mm ²				
Stress Area	694	mm ²				
Root Area	635.70	mm ²				
Hole diameter	36	mm				
Edge distance (For Side N)	69	mm				
Minimum edge distance	54	mm				
Edge distance (For Side B)	69	mm				
Guage Distance between Holes (For Side "B")	181.0	mm				
Guage Distance between Holes (For Side "N")	181.0	mm				
Tensile stress in anchor rod						
Required tension in bolt	62.3	Tons				
Required tension per bolt	2.788	Tons				
Actual tensile stress per bolt	9.11	kg/mm ²	Accepted			IS:800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm ²				IS800 11.6.2.3
Nominal Tensile capacity per bolt	178835.16	N				
Design Strength due to yielding	178835.16	N	18.22	Tons		
Design Strength due to rupture at threaded section	204868.80	N	20.88	Tons		
Shear Stress in anchor rod						
Shear force In bolt	8.6	Tons				
Shear force per bolt	1.075	Tons				
Actual shear stress in bolt	1.26	kg/mm ²	Accepted			IS:800 11.6.2.1
Permissible Shear stress per bolt	10.76	kg/mm ²				IS:800 11.6.2.1
Nominal shear capacity of bolt	150479.6	N				IS:800 10.3.3
Bearing Stress of bolt on plate						
Actual Stress of bolt in bearing	0.81	kg/mm ²	Accepted			IS:800 11.6.2.2
Nominal bearing area of bolt on plate	1320.0	mm ²				
Permissible bearing stress of the bolt	62.67	kg/mm ²				IS:800 11.6.2.2
Nominal bearing strength of bolt	1353000.0	N				
Combined Shear and Tension						
Actual Shear stress in bolt	1.26	kg/mm ²				
Permissible Shear stress per bolt	10.76	kg/mm ²				
Actual tensile stress per bolt	9.11	kg/mm ²				
Permissible tensile stress per bolt	12.78	kg/mm ²				
Combined Shear and Tension	0.520923		Accepted			IS:800 11.6.2.5

Description	Parameter	Unit	Remark
Column E3	D ISMC 250		
Yield Stress of Plate (F_y)	36	ksi	
Base Plate Size	500 x 500	mm	
Base Plate Thickness	36	mm	34 Pass
Flange Width	250	mm	
	9.84	inches	
Depth	274	mm	
m	10.79	inches	
Base Plate Dimension - N	4.72	inches	
n	5.91	inches	
Base Plate Dimension - B	19.685	inches	500 mm
Area of base plate - A1	19.685	inches	500 mm
Load Case	8	SW +DL+LL	9 SW + WX 10 11 SW+WZ 12 13 SW-DL+LL+WX 14 SW-DL+LL+WX 15 SW-DL+LL+WZ 16 SW-DL+LL+WZ
Load Combination	SW +DL+LL	SW + WX	SW +W-X SW+WZ
Fx (Ton)	-2.52	-6.86	6.1 1.6 -2.69 -8.84 4.12 -0.38 -4.67
Fy (Ton)	60.52	31.54	11.16 26.84 47.82 81.83 39.13 23.45 98.12
Fz (Ton)	-0.05	0.04	-0.07 2.04 -1.38 0 -0.11 2 -1.41
Resultant shear force	2.5	6.8	6.1 2.5 3 8.8 4.1 2 4.8

The diagram illustrates a base plate connection. Key dimensions shown are: \$b_f\$ (plate width), \$d\$ (plate depth), \$m\$ (top flange weld length), \$n\$ (side weld length), and \$0.95d\$ (distance from column face to end of side weld).

Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		387.50								
Area of concrete A2		387.50								
Axial compressive load (Pa) - kips		133.39	69.51	24.60	59.16	105.40	180.35	86.24	51.68	216.26
Compressive Strength of concrete- f _c (kg/m ²)		2550000								
Compressive Strength of concrete (ksi)		3.63								
Required Base Plate Area [(P/P _a) / (0.85 * F _c)] inches ²		108.166	56.370	19.946	47.970	85.467	146.252	69.936	41.911	175.367
Delta		1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
Base plate Breadth (N) in inches		12	9	6	8	10	13	10	8	14
N Considered		19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Base Plate length (B) in inches		9	6	4	6	8	11	7	5	12
B considered		19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Condition (0.85*F _c *A1 *V42/A1)/2.50 > F _y (Kips)		477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9
		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Factor X		0.28	0.15	0.05	0.12	0.22	0.38	0.18	0.11	0.45
λ		0.57	0.40	0.23	0.36	0.50	0.69	0.45	0.34	0.77
$\lambda n'$		0.57	0.40	0.23	0.36	0.50	0.69	0.45	0.34	0.77
$\lambda n'$		1.47	1.02	0.59	0.94	1.28	1.77	1.15	0.87	1.99
I		5.9055								
Base Plate Thickness (Inches)		1.06	0.76	0.45	0.70	0.94	1.23	0.85	0.66	1.34
Base Plate Thickness (mm)		26.81	19.35	11.51	17.85	23.83	31.17	21.55	16.69	34.13
Uplift Condition										
Yield Stress of Plate (F _y)		36								
v2 bf		13.92 13.92								
Guage Distance (Centre to centre) mm		194.00 194.00								
Guage Distance (Centre to centre) inches		7.64 7.64								

Allowable Stress Design										
Condition 1 (v2 bf < d)										
Plate thickness (inches)		0.612 0.950								
Condition 1 (v2 bf > d)										
Plate thickness (inches)		0.603 0.934								
Plate Thickness (inches)		0.603 0.934								
Plate Thickness (mm)		15.30 23.73								

Description	Parameter	Unit	Description	Remarks
Bolt Considered M24				
Bolt material	IS 2062 E 250 A			
Minimum Embedment Length	288	mm		
Tensile Strength	410	N/mm ²		IS 2062
Yield Stress	250	N/mm ²		Table No 2
No of Bolts	8			
Major/Nominal Diameter	24	mm		
Pitch	3	mm		
Core Diameter	20.32	mm		
Shank Area of bolt	452.389	mm ²		
Stress Area	293	mm ²		
Root Area	317.31	mm ²		
Hole diameter	27	mm		
Edge distance (For Side N)	56	mm		
Minimum edge distance	40.5	mm		
Edge distance (For Side B)	56	mm		
Guage Distance between Holes (For Side "B")	194.0	mm		
Guage Distance between Holes (For Side "N")	194.0	mm		
Tensile stress in anchor rod				
Required tension in bolt	26.84	Tons		
Required tension per bolt	3.355	Tons		
Actual tensile stress per bolt	7.42	kg/mm ²	Accepted	IS:800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm ²		IS:800 11.6.2.3
Nominal Tensile capacity per bolt	94590.50	N		
Design Strength due to yielding	94590.50	N	9.64	Tons
Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons
Shear Stress in anchor rod				
Shear force In bolt	8.8	Tons		
Shear force per bolt	1.100	Tons		
Actual shear stress in bolt	2.43	kg/mm ²	Accepted	IS:800 11.6.2.1
Permissible Shear stress per bolt	10.15	kg/mm ²		IS:800 11.6.2.1
Nominal shear capacity of bolt	75111.3	N		IS:800 10.3.3
Bearing Stress of bolt on plate				
Actual Stress of bolt in bearing	1.27	kg/mm ²	Accepted	IS:800 11.6.2.2
Nominal bearing area of bolt on plate	864.0	mm ²		
Permissible bearing stress of the bolt	62.67	kg/mm ²		IS:800 11.6.2.2
Nominal bearing strength of bolt	885600.0	N		
Combined Shear and Tension				
Actual Shear stress in bolt	2.43	kg/mm ²		
Permissible Shear stress per bolt	10.15	kg/mm ²		
Actual tensile stress per bolt	7.42	kg/mm ²		
Permissible tensile stress per bolt	12.78	kg/mm ²		
Combined Shear and Tension	0.393917		Accepted	IS:800 11.6.2.5

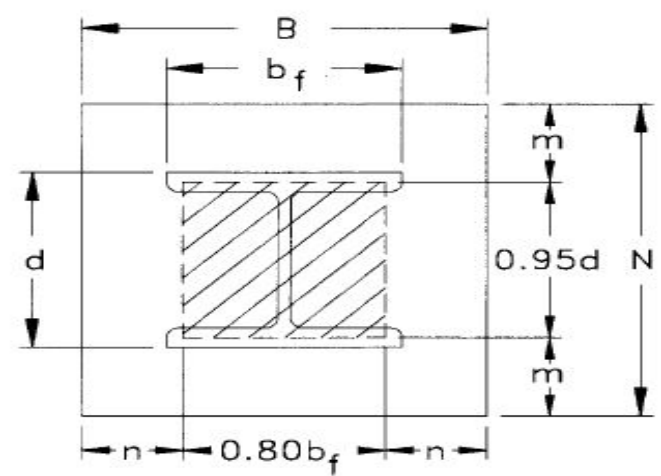
Description	Parameter	Unit	Remark
Column A4	D ISMB 250		
Yield Stress of Plate (F_y)	36	kSI	
Base Plate Size	500 x 500	mm	
Base Plate Thickness	16	mm	11 Pass
Flange Width	125	mm	
	4.92	inches	
Depth	750	mm	
m	9.84	inches	
n	5.17	inches	
Base Plate Dimension - N	19.685	inches	500 mm
n	7.87	inches	
Base Plate Dimension - B	19.685	inches	500 mm
Area of base plate - A1	387.50	inches	
Load Case	8		
Load Combination	SW +DL+LL SW + WX SW +W-X SW+WZ SW+W-Z	10 11 12 13 14 15 16	
Fx (Ton)	-0.01	-0.14	0.16 0 0.01 -0.16 0.14 -0.02 0
Fy (Ton)	5.6	0.77	0.48 1.21 0.05 5.75 5.46 6.19 5.03
Fz (Ton)	0	0	0 0.04 -0.04 0 0 0.04 -0.04
Resultant shear force	0	0.1	0.1 0 0 0.1 0 0 0

Allowable Stress Design									
Case 1 [Area of base plate = Area of concrete]									
Area of base plate A1					387.50				
Area of concrete A2					387.50				
Axial compressive load (Pa) - kips	12.34	1.70	1.06	2.67	0.11	12.67	12.03	13.64	11.09
Compressive Strength of concrete- fc (kg/m ²)	2550000								
Compressive strength of concrete (ksi)	3.63								
Required Base Plate area [(Ppa / 0.85 *fc) inches ²	10.009	1.376	0.858	2.163	0.089	10.277	9.758	11.063	8.990
Delta	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71
Base plate Breadth (N) in inches	6	4	4	4	3	6	6	6	6
N Considered	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Base Plate length (B) in inches	2	0	0	1	0	2	2	2	2
B considered	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Condition (0.85*fc*A1 >A2(A1)/2.50)> Fy (Kips)	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE	477.9 TRUE
Factor X	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.03	0.02
λ	0.15	0.06	0.04	0.07	0.01	0.15	0.15	0.16	0.14
λn¹	0.15	0.06	0.04	0.07	0.01	0.15	0.15	0.16	0.14
λn²	0.27	0.10	0.08	0.12	0.02	0.27	0.26	0.28	0.25
I	7.8740								
Base Plate Thickness (inches)	0.43	0.16	0.13	0.20	0.04	0.43	0.42	0.45	0.41
Base Plate Thickness (mm)	10.87	4.03	3.18	5.05	1.03	11.02	10.74	11.43	10.30
Uplift Condition									
Yield Stress of Plate (fy)	v2 bf				36				
Gauge Distance (Centre to centre) mm					6.96				
Gauge Distance (Centre to centre) inches					194.00				
					7.64				

Allowable Stress Design									
Condition 1 (v2 bf < d)									
Plate thickness (inches)					0.058				
Condition 1 (v2 bf > d)									
Plate thickness (inches)					0.056				
Plate Thickness (inches)					0.058				
Plate Thickness (mm)					1.47				

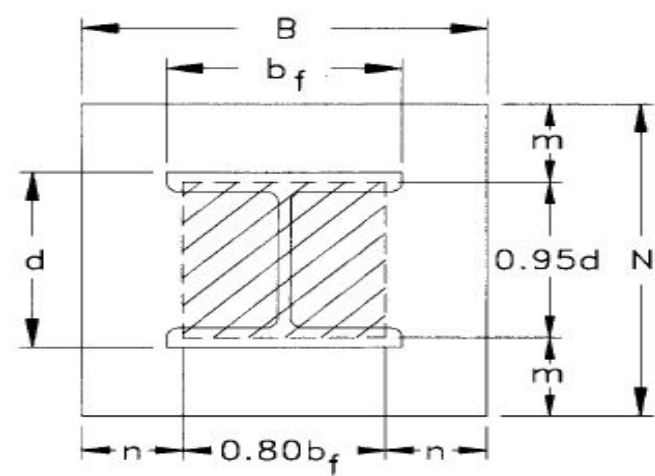
Description	Parameter	Unit		Remarks
Bolt Considered M24				
Bolt material	IS 2062 E 250 A			
Minimum Embedment Length	288	mm		
Tensile Strength	410	N/mm ²		IS 2062 Table No 2
Yield Stress	230	N/mm ²		
No of Bolts	4			
Major/Nominal Diameter	20	mm		
Pitch	3	mm		
Core Diameter	20.32	mm		
Shank Area of bolt	452.389	mm ²		
Stress Area	353	mm ²		
Root Area	317.31	mm ²		
Hole diameter	27	mm		
Edge distance (For Side N)	56	mm		
Minimum edge distance	40.5	mm		
Edge distance (For Side B)	56	mm		
Guage Distance between Holes (For Side "B")	194.0	mm		
Guage Distance between Holes (For Side "N")	194.0	mm		
Tensile stress in anchor rod				
Required tension in bolt	0.05	Tons		
Required tension per bolt	0.013	Tons		
Actual tensile stress per bolt	0.03	kg/mm ²	Accepted	IS:800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
Nominal Tensile capacity per bolt	94590.50	N		
Design Strength due to yielding	94590.50	N	9.64	Tons
Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons
Shear Stress in anchor rod				
Shear force in bolt	0.1	Tons		
Shear force per bolt	0.025	Tons		
Actual shear stress in bolt	0.06	kg/mm ²	Accepted	IS:800 11.6.2.1
Permissible shear stress per bolt	10.15	kg/mm ²		IS:800 11.6.2.1
Nominal shear capacity of bolt	75111.3	N		IS:800 10.3.3
Bearing Stress of bolt on plate				
Actual Stress of bolt in bearing	0.07	kg/mm ²	Accepted	IS:800 11.6.2.2
Nominal bearing area of bolt on plate	384.0	mm ²		
Permissible bearing stress of the bolt	62.67	kg/mm ²		IS:800 11.6.2.2
Nominal bearing strength of bolt	39360.0	N		
Combined Shear and Tension				
Actual Shear stress in bolt	0.06	kg/mm ²		
Permissible Shear stress per bolt	10.15	kg/mm ²		
Actual tensile stress per bolt	0.03	kg/mm ²		
Permissible tensile stress per bolt	12.78	kg/mm ²		
Combined Shear and Tension	0.00034		Accepted	IS:800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column AS	D ISM8 250			
	Yield Stress of Plate (F _y)	36	ksi		
	Base Plate Size	500 x 500	mm		
	Base Plate Thickness	16	mm	10	Pass
	Flange Width	125	mm		
	Depth	4.92	inches		
		150	mm		
		9.84	inches		
	m	5.17	inches		
	Base Plate Dimension - N	19.685	inches	500	mm
	n	7.87	inches		
	Base Plate Dimension - B	19.685	inches	500	mm
	Area of base plate - A1	387.50	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW +WX	SW +W-X	SW+WZ
	F _x (Ton)	0.13	-0.01	0.11	0
	F _y (Ton)	3.28	0.68	0.3	1.77
	F _z (Ton)	0.01	0	0	-0.03
	Resultant shear force	0.1	0	0.1	0
	Allowable Stress Design				
	Case 1 (Area of base plate = Area of concrete)				
	Area of base plate A1	387.50			
	Area of concrete A2	387.50			
	Axial compressive load (Pa) - kips	7.23	1.50	0.66	3.90
	Compressive Strength of concrete- f _c (kg/m ²)	2550000			
	Compressive Strength of concrete (ksi)	3.63			
	Required Base Plate area I (Q*Pa / 0.85 *f _c) inches ²	5.862	1.215	0.536	3.163
	Delta	2.71	2.71	2.71	2.71
	Base plate Breadth (N) in inches	5	4	5	5
	N Considered	19.69	19.69	19.69	19.69
	Base Plate length (B) in inches	1	0	0	1
	B considered	19.69	19.69	19.69	19.69
	Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > F _y (Kips)	477.9	477.9	477.9	477.9
		TRUE	TRUE	TRUE	TRUE
	Factor X	0.01	0.00	0.01	0.00
	λ	0.12	0.05	0.04	0.09
	λn'	0.12	0.05	0.04	0.09
		0.20	0.09	0.06	0.15
	I	7.8740			
	Base Plate Thickness (inches)	0.33	0.15	0.10	0.24
	Base Plate Thickness (mm)	8.32	3.79	2.52	6.11
	Uplift Condition				
	Yield Stress of Plate (F _y)				36
	v2 bf				6.96
	Guage Distance (Centre to centre) mm				194.00
	Guage Distance (Centre to centre) inches				7.64
	Allowable Stress Design				
	Condition 1 (v2 bf < d)				
	Plate thickness (inches)			0.214	
	Condition 1 (v2 bf > d)				
	Plate thickness (inches)			0.208	
	Plate Thickness (inches)			0.214	
	Plate Thickness (mm)			5.49	



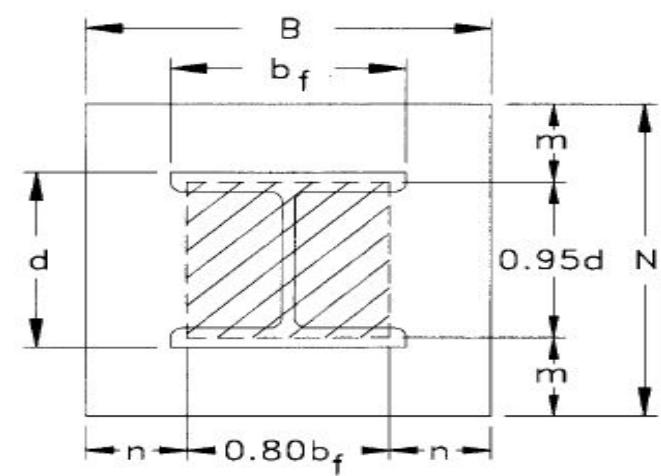
	Description	Parameter	Unit		Remarks
	Bolt Considered M24				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	288	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	4			
	Major/Nominal Diameter	24	mm		
	Pitch	3	mm		
	Core Diameter	20.32	mm		
	Shank Area of bolt	452.389	mm ²		
	Stress Area	353	mm ²		
	Root Area	317.31	mm ²		
	Hole diameter	27	mm		
	Edge distance (For Side N)	56	mm		
	Minimum edge distance	40.5	mm		
	Edge distance (For Side B)	56	mm		
	Guage Distance between Holes (For Side "B")	194	mm		
	Guage Distance between Holes (For Side "N")	194	mm		
	Tensile stress in anchor rod				
	Required tension in bolt	0.68	Tons		
	Required tension per bolt	0.170	Tons		
	Actual tensile stress per bolt	0.38	kg/mm ²	Accepted	IS-800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	94590.50	N		
	Design Strength due to yielding	94590.50	N	9.64	Tons
	Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons
	Shear Stress in anchor rod				
	Shear force In bolt	0.2	Tons		
	Shear force per bolt	0.05	Tons		
	Actual shear stress in bolt	0.11	kg/mm ²	Accepted	IS-800 11.6.2.1
	Permissible Shear stress per bolt	10.15	kg/mm ²		IS800 11.6.2.1
	Nominal shear capacity of bolt	75111.3	N		IS-800 10.3.3
	Bearing Stress of bolt on plate				
	Actual Stress of bolt in bearing	0.13	kg/mm ²	Accepted	IS-800 11.6.2.2
	Nominal bearing area of bolt on plate	384.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS-800 11.6.2.2
	Nominal bearing strength of bolt	393600.0	N		
	Combined Shear and Tension				
	Actual Shear stress in bolt	0.11	kg/mm ²		
	Permissible Shear stress per bolt	10.15	kg/mm ²		
	Actual tensile stress per bolt	0.38	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.00		Accepted	IS-800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column B1	D ISM8 250			
	Yield Stress of Plate (F _y)	36	ksi		
	Base Plate Size	600 x 600	mm		
	Base Plate Thickness	32	mm	29	Pass
	Flange Width	390	mm		
	Depth	15.35	inches		
		270	mm		
		10.63	inches		
	m	6.76	inches		
	Base Plate Dimension - N	23.622	inches	600	mm
	n	5.67	inches		
	Base Plate Dimension - B	23.622	inches	600	mm
	Area of base plate - A1	558.00	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW +W-X	SW +W-Z	SW+DL+LL+W-X
	F _x (Ton)	0.05	-0.25	-0.47	0.02
	F _y (Ton)	56.52	13.74	31.22	21.05
	F _z (Ton)	2.63	0.11	0.2	4.59
	Resultant shear force	2.6	0.2	0.5	4.5
				5	2.5
					2.7
					7
					2.6
	Allowable Stress Design				
	Case 1 (Area of base plate = Area of concrete)				
	Area of base plate A1			558.00	
	Area of concrete A2			558.00	
	Axial compressive load (Pa) - kips	124.57	30.28	68.81	46.39
	Compressive Strength of concrete- f _c (kg/m ²)				2550000
	Compressive Strength of concrete (ksi)				3.63
	Required Base Plate area (Q*Pa / 0.85 *f _c) inches ²	101.016	24.557	55.799	37.622
	Delta	-1.09	-1.09	-1.09	-1.09
	Base plate Breadth (N) in inches	9	4	6	5
	N Considered	23.62	23.62	23.62	23.62
	Base Plate length (B) in inches	11	6	9	7
	B considered	23.62	23.62	23.62	23.62
	Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > F _y (Kips)	688.1	688.1	688.1	688.1
		TRUE	TRUE	TRUE	TRUE
	Factor X	0.18	0.04	0.10	0.07
	λ	0.44	0.21	0.32	0.26
	λn'	0.44	0.21	0.32	0.26
		1.40	0.67	1.02	0.83
					0.33
					1.06
					1.69
					1.56
					1.23
					6.7618
	Base Plate Thickness (inches)	0.97	0.48	0.72	0.59
	Base Plate Thickness (mm)	24.72	12.19	18.37	15.08
					6.02
					19.15
					29.21
					27.26
					21.89
	Uplift Condition				
	Yield Stress of Plate (F _y)		36		36
	v2 bf		21.71		21.71
	Guage Distance (Centre to centre) mm		240.00		240.00
	Guage Distance (Centre to centre) inches		9.45		9.45
	Allowable Stress Design				
	Condition 1 (v2 bf < d)		0.605		0.749
	Plate thickness (inches)				
	Condition 1 (v2 bf > d)				
	Plate thickness (inches)		0.538		0.666
	Plate Thickness (inches)		0.538		0.666
	Plate Thickness (mm)		13.66		16.90



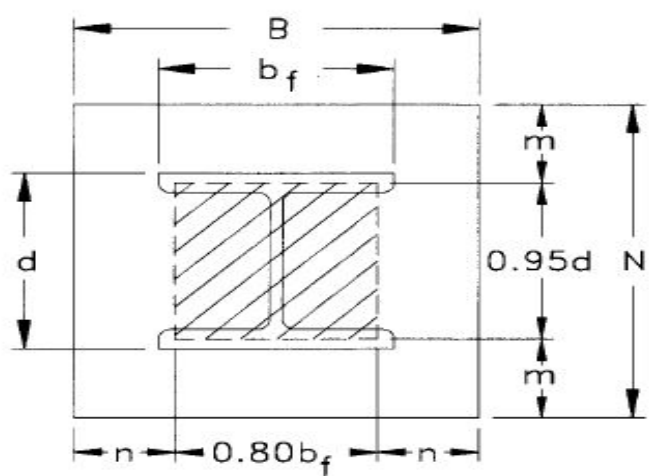
	Description	Parameter	Unit		Remarks
	Bolt Considered M27				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	324	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	27	mm		
	Pitch	3	mm		
	Core Diameter	23.32	mm		
	Shank Area of bolt	572.555	mm ²		
	Stress Area	459	mm ²		
	Root Area	419.10	mm ²		
	Hole diameter	30	mm		
	Edge distance (For Side N)	60	mm		
	Minimum edge distance	45	mm		
	Edge distance (For Side B)	60	mm		
	Guage Distance between Holes (For Side "B")	240	mm		
	Guage Distance between Holes (For Side "N")	240	mm		
	Tensile stress in anchor rod				
	Required tension in bolt	13.74	Tons		
	Required tension per bolt	1.718	Tons		
	Actual tensile stress per bolt	3.00	kg/mm ²	Accepted	IS-800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	119716.10	N		
	Design Strength due to yielding	119716.10	N	12.20	Tons
	Design Strength due to rupture at threaded section	135496.80	N	13.81	Tons
	Shear Stress in anchor rod				
	Shear force In bolt	7	Tons		
	Shear force per bolt	0.875	Tons		
	Actual shear stress in bolt	1.53	kg/mm ²	Accepted	IS-800 11.6.2.1
	Permissible Shear stress per bolt	10.59	kg/mm ²		IS-800 11.6.2.1
	Nominal shear capacity of bolt	99205.8	N		IS-800 10.3.3
	Bearing Stress of bolt on plate				
	Actual Stress of bolt in bearing	1.01	kg/mm ²	Accepted	IS-800 11.6.2.2
	Nominal bearing area of bolt on plate	864.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS-800 11.6.2.2
	Nominal bearing strength of bolt	885600.0	N		
	Combined Shear and Tension				
	Actual Shear stress in bolt	1.53	kg/mm ²		
	Permissible Shear stress per bolt	10.59	kg/mm ²		
	Actual tensile stress per bolt	3.00	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.08		Accepted	IS-800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column B2	D ISM8 350			
	Yield Stress of Plate (F _y)	36	ksi		
	Base Plate Size	600 x 600	mm		
	Base Plate Thickness	36	mm	32	Pass
	Flange Width	440	mm		
	Depth	17.32	inches		
		30.2	mm		
		15.04	inches		
	m	4.67	inches		
	Base Plate Dimension - N	23.622	inches	600	mm
	n	4.88	inches		
	Base Plate Dimension - B	23.622	inches	600	mm
	Area of base plate - A1	558.00	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW + WX	SW +W-X	SW+WZ
	F _x (Ton)	1.09	-5.07	5	0.28
	F _y (Ton)	145.08	15.63	28.98	17.11
	F _z (Ton)	0.15	0.09	-0.15	13.5
	Resultant shear force	1.1	5	5	13.5
				13.7	4.1
					5.9
					13.7
					13.5
	Allowable Stress Design				
	Case 1 (Area of base plate = Area of concrete)				
	Area of base plate A1			558.00	
	Area of concrete A2			558.00	
	Axial compressive load (Pa) - kips	319.76	34.45	63.87	37.71
	Compressive Strength of concrete- f _c (kg/m ²)			134.97	305.06
	Compressive Strength of concrete (ksi)			2550000	334.46
	Required Base Plate area (Q*Pa / 0.85 *fc) inches ²				232.87
	Delta	259.297	27.935	51.795	30.580
	Base plate Breadth (N) in inches	0.21	0.21	0.21	0.21
	N Considered	16	5	7	5
	Base Plate length (B) in inches	23.62	23.62	23.62	23.62
	B considered	16	5	7	5
	Condition (0.85*fc*A1 *VAZ/A1)/Z.50) > Fy (Kips)	688.1	688.1	688.1	688.1
		TRUE	TRUE	TRUE	TRUE
	Factor X	0.46	0.05	0.09	0.05
	λ	0.78	0.23	0.31	0.24
	λn'	0.78	0.23	0.31	0.24
		3.17	0.91	1.26	0.96
					1.88
					3.07
					3.27
					2.58
					3.76
					4.8819
	Base Plate Thickness (inches)	1.13	0.37	0.50	0.39
	Base Plate Thickness (mm)	28.59	9.38	12.78	9.82
					18.58
					27.93
					29.24
					24.40
					32.20
	Uplift Condition				
	Yield Stress of Plate (F _y)			36	
	v2 bf			24.50	
	Guage Distance (Centre to centre) mm			240.00	
	Guage Distance (Centre to centre) inches			9.45	
	Allowable Stress Design				
	Condition 1 (v2 bf < d)			0.636	
	Plate thickness (inches)				
	Condition 1 (v2 bf > d)			0.600	
	Plate thickness (inches)				
	Plate Thickness (inches)			0.600	
	Plate Thickness (mm)			15.25	



	Description	Parameter	Unit		Remarks
	Bolt Considered M27				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	324	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	27	mm		
	Pitch	3	mm		
	Core Diameter	23.32	mm		
	Shank Area of bolt	572.555	mm ²		
	Stress Area	459	mm ²		
	Root Area	419.10	mm ²		
	Hole diameter	30	mm		
	Edge distance (For Side N)	60	mm		
	Minimum edge distance	45	mm		
	Edge distance (For Side B)	60	mm		
	Guage Distance between Holes (For Side "B")	240	mm		
	Guage Distance between Holes (For Side "N")	240	mm		
	Tensile stress in anchor rod				
	Required tension in bolt	17.11	Tons		
	Required tension per bolt	2.139	Tons		
	Actual tensile stress per bolt	3.74	kg/mm ²	Accepted	IS:800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	119716.10	N		
	Design Strength due to yielding	119716.10	N	12.20	Tons
	Design Strength due to rupture at threaded section	135496.80	N	13.81	Tons
	Shear Stress in anchor rod				
	Shear force in bolt	13.7	Tons		
	Shear force per bolt	1.7125	Tons		
	Actual shear stress in bolt	2.99	kg/mm ²	Accepted	IS:800 11.6.2.1
	Permissible Shear stress per bolt	10.59	kg/mm ²		IS:800 11.6.2.1
	Nominal shear capacity of bolt	99205.8	N		IS:800 10.3.3
	Bearing Stress of bolt on plate				
	Actual Stress of bolt in bearing	1.76	kg/mm ²	Accepted	IS:800 11.6.2.2
	Nominal bearing area of bolt on plate	972.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS:800 11.6.2.2
	Nominal bearing strength of bolt	996300.0	N		
	Combined Shear and Tension				
	Actual Shear stress in bolt	2.99	kg/mm ²		
	Permissible Shear stress per bolt	10.59	kg/mm ²		
	Actual tensile stress per bolt	3.74	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.17		Accepted	IS:800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column D2	D ISMB 350			
	Yield Stress of Plate (F _y)	35	ksi		
	Base Plate Size	600 x 600	mm		
	Base Plate Thickness	35	mm	33	Pass
	Flange Width	440	mm		
	Depth	17.32	inches		
		302	mm		
		15.04	inches		
	m	4.67	inches		
	Base Plate Dimension - N	23.622	inches	600	mm
	n	4.88	inches		
	Base Plate Dimension - B	23.622	inches	600	mm
	Area of base plate - A1	558.00	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW + WX	SW +W-X	SW+WZ
	F _x (Ton)	1.05	-5.67	5.6	0.1
	F _y (Ton)	148.67	15.26	28.33	61.58
	F _z (Ton)	-0.03	-0.16	0.22	13.63
	Resultant shear force	1	5.6	5.6	13.6



Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		558.00								
Area of concrete A2		558.00								
Axial compressive load (Pa) - kips		327.67	33.63	64.64	135.72	38.48	312.15	343.16	414.24	240.06
Compressive Strength of concrete- f _c (kg/m ²)		2550000								
Compressive Strength of concrete (ksi)		3.63								
Required Base Plate area (l ² *Pa / 0.85 *f _c) inches ²		265.713	27.274	52.421	110.060	31.206	253.131	278.278	335.917	194.669
Delta		0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Base plate Breadth (N) in inches		17	5	7	11	6	16	17	19	14
N Considered		23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62
Base Plate length (B) in inches		16	5	7	10	5	16	16	18	14
B considered		23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62
Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > F _y (Kips)		688.1	688.1	688.1	688.1	688.1	688.1	688.1	688.1	688.1
		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Factor X		0.47	0.05	0.09	0.20	0.06	0.45	0.50	0.60	0.35
λ		0.80	0.22	0.31	0.47	0.24	0.77	0.82	0.95	0.65
λn'		3.22	0.90	1.26	1.89	0.97	3.11	3.33	3.82	2.63
l		4.8819								

Base Plate Thickness (inches)	1.14	0.37	0.51	0.73	0.39	1.11	1.17	1.28	0.98	
Base Plate Thickness (mm)	28.94	9.27	12.86	18.63	9.92	28.25	29.62	32.54	24.77	32.54
Uplift Condition										
Yield Stress of Plate (F _y)					36					
v ₂ of					24.50					
Guage Distance (Centre to centre) mm					240.00					
Guage Distance (Centre to centre) inches					9.45					

Allowable Stress Design										
Condition 1 (v ₂ bf < d)					0.642					
Plate thickness (inches)										
Condition 1 (v ₂ bf > d)										
Plate thickness (inches)					0.606					
Plate Thickness (inches)					0.606					
Plate Thickness (mm)					15.40					

	Description	Parameter	Unit		Remarks
	Bolt Considered M27				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	324	mm		
	Tensile Strength	410	N/mm ²		IS 2062 Table No 2
	Yield Stress	230	N/mm ²		
	No of Bolts	8			
	Major/Nominal Diameter	27	mm		
	Pitch	3	mm		
	Core Diameter	23.32	mm		
	Shank Area of bolt	572.555	mm ²		
	Stress Area	485	mm ²		
	Root Area	419.10	mm ²		
	Hole diameter	30	mm		
	Edge distance (For Side B)	60	mm		
	Minimum edge distance	45	mm		
	Edge distance (For Side B)	60	mm		
	Guage Distance between Holes (For Side "B")	240	mm		
	Guage Distance between Holes (For Side "N")	240	mm		

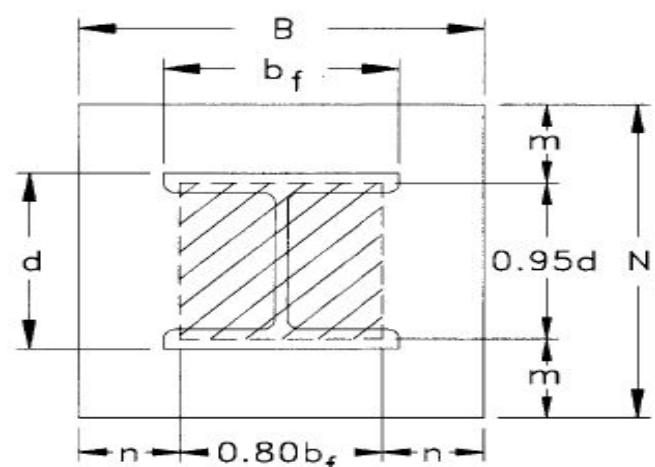
Tensile stress in anchor rod					
Required tension in bolt	17.46	Tons			
Required tension per bolt	2.183	Tons			
Actual tensile stress per bolt	3.81	kg/mm ²	Accepted		IS-800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm ²			IS800 11.6.2.3
Nominal Tensile capacity per bolt	119716.10	N			
Design Strength due to yielding	119716.10	N	12.20	Tons	
Design Strength due to rupture at threaded section	135496.80	N	13.81	Tons	

Shear Stress in anchor rod					
Shear force in bolt	13.6	Tons			
Shear force per bolt	1.7	Tons			
Actual shear stress in bolt	2.97	kg/mm ²	Accepted		IS-800 11.6.2.1
Permissible Shear stress per bolt	10.59	kg/mm ²			IS-800 11.6.2.1
Nominal shear capacity of bolt	99205.8	N			IS-800 10.3.3

Bearing Stress of bolt on plate					
Actual Stress of bolt in bearing	1.75	kg/mm ²	Accepted		IS-800 11.6.2.2
Nominal bearing area of bolt on plate	972.0	mm ²			
Permissible bearing stress of the bolt	62.67	kg/mm ²			IS-800 11.6.2.2
Nominal bearing strength of bolt	996300.0	N			

Combined Shear and Tension					
Actual Shear stress in bolt	2.97	kg/mm ²			
Permissible Shear stress per bolt	10.59	kg/mm ²			
Actual tensile stress per bolt	3.81	kg/mm ²			
Permissible tensile stress per bolt	12.78	kg/mm ²			
Combined Shear and Tension	0.17		Accepted		IS-800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column B3	D ISMB 350			
	Yield Stress of Plate (F _y)	35	ksi		
	Base Plate Size	600 x 600	mm		
	Base Plate Thickness	35	mm	31	Pass
	Flange Width	440	mm		
	Depth	17.32	inches		
		302	mm		
	Depth	15.04	inches		
	m	4.67	inches		
	Base Plate Dimension - N	23.622	inches	600	mm
	n	4.88	inches		
	Base Plate Dimension - B	23.622	inches	600	mm
	Area of base plate - A1	558.00	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW + WX	SW +W-X	SW+WZ
	F _x (Ton)	0.8	-7.2	6.65	0.11
	F _y (Ton)	152.18	3.01	36.66	9.98
	F _z (Ton)	0.35	-0.11	0.16	7.43
	Resultant shear force	0.8	7.2	6.6	7.4



Allowable Stress Design									
Case 1 (Area of base plate = Area of concrete)									
Area of base plate A1									
Area of concrete A2									
558.00									
558.00									
Axial compressive load - kips (Pa)									
335.40									
Compressive Strength of concrete- f _c (kg/m ²)									
2550000									
Compressive Strength of concrete (ksi)									
3.63									
Required Base Plate area (L ² Pa / 0.85 *f _c) inches ²									
271.987									
Delta									
0.21									
Base plate Breadth (N) in inches									
17									
N Considered									
23.62									
Base Plate length (B) in inches									
16									
B considered									
23.62									
Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > F _y (Kips)									
688.1									
TRUE									
Factor X									
0.49									
λ									
0.81									
λn'									
3.27									
I									
4.8819									
Base Plate Thickness (inches)									
1.15									
Base Plate Thickness (mm)									
29.28									
Uplift Condition									
Yield Stress of Plate (F _y)									
v ₂ of									
Guage Distance (Centre to centre) mm									
Guage Distance (Centre to centre) inches									

Allowable Stress Design									
Condition 1 (v ₂ bf < d)									
Plate thickness (inches)									
Condition 1 (v ₂ bf > d)									
Plate thickness (inches)									
Plate Thickness (inches)									
Plate Thickness (mm)									

	Description	Parameter	Unit		Remarks
	Bolt Considered M27				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	324	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	27	mm		
	Pitch	3	mm		
	Core Diameter	23.32	mm		
	Shank Area of bolt	572.555	mm ²		
	Stress Area	485	mm ²		
	Root Area	419.10	mm ²		
	Hole diameter	30	mm		
	Edge distance (For Side b ₁)	60	mm		
	Minimum edge distance	45	mm		
	Edge distance (For Side B)	60	mm		
	Guage Distance between Holes (For Side "B")	240	mm		
	Guage Distance between Holes (For Side "N")	240	mm		

Tensile stress in anchor rod				
Required tension in bolt	9.98	Tons		
Required tension per bolt	1.248	Tons		
Actual tensile stress per bolt	2.18	kg/mm ²	Accepted	IS-800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
Nominal Tensile capacity per bolt	119716.10	N		
Design Strength due to yielding	119716.10	N	12.20	Tons
Design Strength due to rupture at threaded section	135496.80	N	13.81	Tons

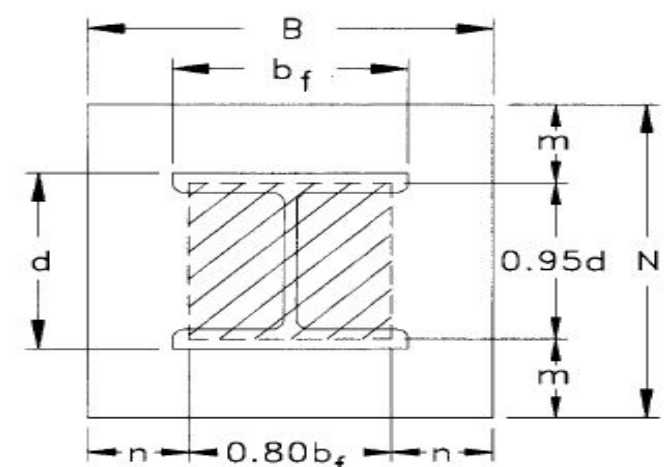
Shear Stress in anchor rod				
Shear force in bolt	7.8	Tons		
Shear force per bolt	0.975	Tons		
Actual shear stress in bolt	1.70	kg/mm ²	Accepted	IS-800 11.6.2.1
Permissible Shear stress per bolt	10.59	kg/mm ²		IS-800 11.6.2.1
Nominal shear capacity of bolt	99205.8	N		IS-800 10.3.3

Bearing Stress of bolt on plate				
Actual Stress of bolt in bearing	1.00	kg/mm ²	Accepted	IS-800 11.6.2.2
Nominal bearing area of bolt on plate	972.0	mm ²		
Permissible bearing stress of the bolt	62.67	kg/mm ²		IS-800 11.6.2.2
Nominal bearing strength of bolt	996300.0	N		

Combined Shear and Tension				
Actual Shear stress in bolt	1.70	kg/mm ²		
Permissible Shear stress per bolt	10.59	kg/mm ²		
Actual tensile stress per bolt	2.18	kg/mm ²		
Permissible tensile stress per bolt	12.78	kg/mm ²		
Combined Shear and Tension	0.05		Accepted	IS-800 11.6.2.5

30.89

	Description	Parameter	Unit	Remark	
	Column D3	D ISMB 350			
	Yield Stress of Plate (F _y)	35	ksi		
	Base Plate Size	600 x 600	mm		
	Base Plate Thickness	35	mm	31	Pass
	Flange Width	440	mm		
	Depth	17.32	inches		
		302	mm		
		15.04	inches		
	m	4.67	inches		
	Base Plate Dimension - N	23.622	inches	600	mm
	n	4.88	inches		
	Base Plate Dimension - B	23.622	inches	600	mm
	Area of base plate - A1	558.00	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL+LL	SW + WX	SW +W-X	SW+WZ
	F _x (Ton)	0.74	-7.95	7.42	-0.39
	F _y (Ton)	153.86	2.89	36.71	28.8
	F _z (Ton)	-0.44	0.1	-0.16	7.48
	Resultant shear force	0.8	7.9	7.4	7.5



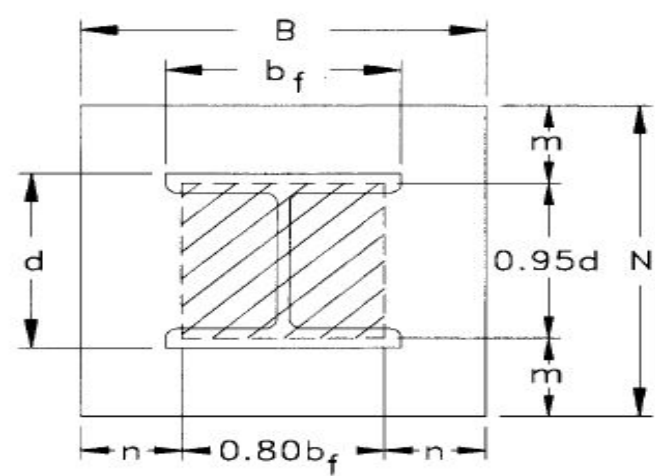
Allowable Stress Design									
Case 1 (Area of base plate = Area of concrete)									
Area of base plate A1									
Area of concrete A2									
558.00									
558.00									
Axial compressive load - kips (Pa)									
339.11									
Compressive Strength of concrete- f _c (kg/m ²)									
2550000									
Compressive Strength of concrete (ksi)									
3.63									
Required Base Plate area (f _y Pa / 0.85 *f _c) inches ²									
274.989									
Delta									
0.21									
Base plate Breadth (N) in inches									
17									
N Considered									
23.62									
Base Plate length (B) in inches									
16									
B considered									
23.62									
Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > F _y (Kips)									
688.1									
TRUE									
Factor X									
0.49									
λ									
0.82									
λn'									
3.30									
I									
4.8819									
Base Plate Thickness (inches)									
1.16									
Base Plate Thickness (mm)									
29.44									
Uplift Condition									
Yield Stress of Plate (F _y)									
v ₂ of									
Guage Distance (Centre to centre) mm									
Guage Distance (Centre to centre) inches									

Allowable Stress Design									
Condition 1 (v ₂ bf < d)									
Plate thickness (inches)									
Condition 1 (v ₂ bf > d)									
Plate thickness (inches)									
Plate Thickness (inches)									
Plate Thickness (mm)									

	Description	Parameter	Unit		Remarks
	Bolt Considered M27				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	324	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	27	mm		
	Pitch	3	mm		
	Core Diameter	23.32	mm		
	Shank Area of bolt	572.555	mm ²		
	Stress Area	485	mm ²		
	Root Area	419.10	mm ²		
	Hole diameter	30	mm		
	Edge distance (For Side B)	60	mm		
	Minimum edge distance	45	mm		
	Edge distance (For Side B)	60	mm		
	Guage Distance between Holes (For Side "B")	240	mm		
	Guage Distance between Holes (For Side "N")	240	mm		
Tensile stress in anchor rod					
	Required tension in bolt	28.8	Tons		
	Required tension per bolt	3.600	Tons		
	Actual tensile stress per bolt	6.29	kg/mm ²	Accepted	IS-800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	119716.10	N		
	Design Strength due to yielding	119716.10	N	12.20	Tons
	Design Strength due to rupture at threaded section	135496.80	N	13.81	Tons
Shear Stress in anchor rod					
	Shear force in bolt	8.3	Tons		
	Shear force per bolt	1.0375	Tons		
	Actual shear stress in bolt	1.81	kg/mm ²	Accepted	IS-800 11.6.2.1
	Permissible Shear stress per bolt	10.59	kg/mm ²		IS-800 11.6.2.1
	Nominal shear capacity of bolt	99205.8	N		IS-800 10.3.3
Bearing Stress of bolt on plate					
	Actual Stress of bolt in bearing	1.07	kg/mm ²	Accepted	IS-800 11.6.2.2
	Nominal bearing area of bolt on plate	972.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS-800 11.6.2.2
	Nominal bearing strength of bolt	996300.0	N		
Combined Shear and Tension					
	Actual Shear stress in bolt	1.81	kg/mm ²		
	Permissible Shear stress per bolt	10.59	kg/mm ²		
	Actual tensile stress per bolt	6.29	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.27		Accepted	IS-800 11.6.2.5

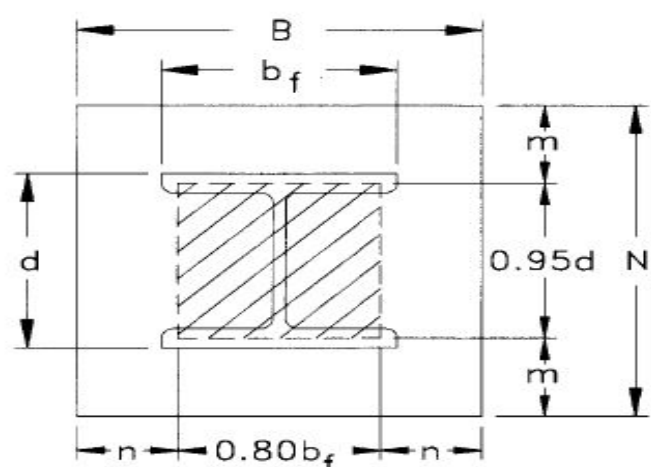
	Description	Parameter	Unit	Remark						
	Column D4	D ISMB 400								
	Yield Stress of Plate (F _y)	36	ksi							
	Base Plate Size	600 x 600	mm							
	Base Plate Thickness	36	mm	34	Pass					
	Flange Width	440	mm							
		17.32	inches							
	Depth	409	mm							
		16.54	inches							
	m	3.96	inches							
	Base Plate Dimension - N	23.622	inches	600	mm					
	n	4.88	inches							
	Base Plate Dimension - B	23.622	inches	600	mm					
	Area of base plate - A1	558.00	inches							
	Load Case	8	9	10	11	12	13	14	15	16
	Load Combination	SW +DL +LL	SW + WX	SW +W-X	SW+WZ	SW+W-Z	SW+DL+LL+WX	SW+DL+LL+W-X	SW+DL+LL+WZ	SW+DL+LL+W-Z
	P _x (Ton)	0.44	-6.96	7.17	-0.2	0.3	-6.58	7.56	0.19	0.69
	P _y (Ton)	136.43	48.35	14.46	45.84	80.04	167.66	104.84	73.47	199.34
	P _z (Ton)	-3.88	-0.33	-0.2	16.29	-15.63	-3.94	-3.82	12.68	19.24
	Resultant shear force	3.9	6.9	7.1	16.2	15.6	7.6	8.4	12.6	19.2

Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		558.00								
Area of concrete A2		558.00								
Axial compressive load - kips (Pa)		300.69	106.56	31.87	101.03	176.41	369.52	231.07	161.93	439.35
Compressive Strength of concrete- f _c (kg/m ²)		2550000								
Compressive Strength of concrete (ksi)		3.63								
Required Base Plate area (Q*Pa / 0.85 *f _c) inches ²		243.837	86.414	25.844	81.928	143.053	299.654	187.377	131.311	356.274
Delta		0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Base plate Breadth (N) in inches		17	10	6	10	13	18	15	12	20
N Considered		23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62
Base Plate length (B) in inches		15	8	4	8	11	16	13	11	18
B considered		23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62	23.62
Condition (0.85*f _c *A1 *VAZ/A1)/2.50) > P _y (Kips)		688.1	688.1	688.1	688.1	688.1	688.1	688.1	688.1	688.1
		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Factor X		0.44	0.15	0.05	0.15	0.26	0.54	0.34	0.24	0.64
λ		0.76	0.41	0.22	0.40	0.54	0.87	0.64	0.52	1.00
λn'		0.76	0.41	0.22	0.40	0.54	0.87	0.64	0.52	1.00
λn'		3.19	1.73	0.92	1.69	2.30	3.69	2.70	2.19	4.22
I		4.8819								
Base Plate Thickness (inches)		1.09	0.65	0.36	0.63	0.84	1.21	0.96	0.80	1.32
Base Plate Thickness (mm)		27.73	16.51	9.03	16.07	21.24	30.74	24.30	20.35	33.51
Uplift Condition										
Yield Stress of Plate (F _y)		36								
v2 bf		24.50								
Gauge Distance (Centre to centre) mm		231.00								
Gauge Distance (Centre to centre) inches		9.09								
Allowable Stress Design										
Condition 1 (v2 bf < d)										
Plate thickness (inches)		1.021								
Condition 1 (v2 bf > d)										
Plate thickness (inches)		0.983								
Plate Thickness (inches)		0.983								
Plate Thickness (mm)		24.97								



	Description	Parameter	Unit		Remarks
	Bolt Considered M33				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	396	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	8			
	Major/Nominal Diameter	33	mm		
	Pitch	3	mm		
	Core Diameter	28.706	mm		
	Shank Area of bolt	855.299	mm ²		
	Stress Area	604	mm ²		
	Root Area	665.08	mm ²		
	Hole diameter	36	mm		
	Edge distance (For Side N)	69	mm		
	Minimum edge distance	54	mm		
	Edge distance (For Side B)	69	mm		
	Gauge Distance between Holes (For Side "B")	231	mm		
	Gauge Distance between Holes (For Side "N")	231	mm		
	Tensile stress in anchor rod				
	Required tension in bolt	45.84	Tons		
	Required tension per bolt	5.730	Tons		
	Actual tensile stress per bolt	6.70	kg/mm ²	Accepted	IS:800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	178835.16	N		
	Design Strength due to yielding	178835.16	N	18.22	Tons
	Design Strength due to rupture at threaded section	204868.80	N	20.88	Tons
	Shear Stress in anchor rod				
	Shear force in bolt	19.2	Tons		
	Shear force per bolt	2.4	Tons		
	Actual shear stress in bolt	2.81	kg/mm ²	Accepted	IS:800 11.6.2.1
	Permissible Shear stress per bolt	11.25	kg/mm ²		IS:800 11.6.2.1
	Nominal shear capacity of bolt	157434.2	N		IS:800 10.3.3
	Bearing Stress of bolt on plate				
	Actual Stress of bolt in bearing	2.02	kg/mm ²	Accepted	IS:800 11.6.2.2
	Nominal bearing area of bolt on plate	1188.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS:800 11.6.2.2
	Nominal bearing strength of bolt	1217700.0	N		
	Combined Shear and Tension				
	Actual Shear stress in bolt	2.81	kg/mm ²		
	Permissible Shear stress per bolt	11.25	kg/mm ²		
	Actual tensile stress per bolt	6.70	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.34		Accepted	IS:800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column BS	UC 305 x 305 x 18			
	Base Plate Size	500 X 500			
	Base Plate Thickness (mm)	32	mm	27	Pass
	Yield Stress of Plate (F _y)	36	ksi		
	Flange Width	307	mm		
	Depth	12.09	inches		
		311	mm		
		12.36	inches		
	m	3.97	inches		
	Base Plate Dimension - N	19.685	inches	500	mm
	n	5.01	inches		
	Base Plate Dimension - B	19.685	inches	500	mm
	Area of base plate - A1	387.50	inches		
	Load Case	8	9	10	11
	Load Combination	SW + WL + LL	SW + WX	SW + W-X	SW + WZ
	P _x (Ton)	0.28	-6.88	6.81	0.06
	P _y (Ton)	70.49	18.43	3.61	15.96
	P _z (Ton)	0.42	0.2	0.16	4.65
	Resultant shear force	0.5	6.8	6.8	4.6
				5.5	6.5
					7.1
					4.8
					5.2
Allowable Stress Design					
Case 1 (Area of base plate = Area of concrete)					
	Area of base plate A1			387.50	
	Area of concrete A2			387.50	
	Axial compressive load - kips (Pa)	155.36	40.62	7.96	35.18
	Compressive Strength of concrete- f _c (kg/m ²)			2.42	179.45
	Compressive Strength of concrete (ksi)				130.87
	Required Base Plate area (Q ² Pa / 0.85 *f _c) inches ²				174.01
	Delta				136.41
	Base plate Breadth (N) in inches				
	N Considered				
	Base Plate length (B) in inches				
	B considered				
	Condition (0.85*f _c *A1 *VAZ/A1)/Z.50) > F _y (Kips)				
	Factor X				
	λ				
	λn'				
	l				
	Base Plate Thickness (inches)				
	Base Plate Thickness (mm)				
	Uplift Condition				
	Yield Stress of Plate (F _y)				
	v2 bf				
	Guage Distance (Centre to centre) mm				
	Guage Distance (Centre to centre) inches				
Allowable Stress Design					
	Condition 1 (v2 bf < d)				
	Plate thickness (inches)				
	Condition 1 (v2 bf > d)				
	Plate thickness (inches)				
	Plate Thickness (inches)				
	Plate Thickness (mm)				



	Description	Parameter	Unit		Remarks
	Bolt Considered M24				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	288	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	6			
	Major/Nominal Diameter	24	mm		
	Pitch	3	mm		
	Core Diameter	20.32	mm		
	Shank Area of bolt	452.389	mm ²		
	Stress Area	293	mm ²		
	Root Area	317.31	mm ²		
	Hole diameter	27	mm		
	Edge distance (For Side N)	56	mm		
	Minimum edge distance	40.5	mm		
	Edge distance (For Side B)	56	mm		
	Guage Distance between Holes (For Side "B")	194	mm		
	Guage Distance between Holes (For Side "N")	388	mm		
Tensile stress in anchor rod					
	Required tension in bolt	3.61	Tons		
	Required tension per bolt	0.602	Tons		
	Actual tensile stress per bolt	1.33	kg/mm ²	Accepted	IS-800 11.6.2.3
	Permissible tensile stress per bolt	12.78	kg/mm ²		IS800 11.6.2.3
	Nominal Tensile capacity per bolt	94590.50	N		
	Design Strength due to yielding	94590.50	N	9.64	Tons
	Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons
Shear Stress in anchor rod					
	Shear force in bolt	7.1	Tons		
	Shear force per bolt	1.18	Tons		
	Actual shear stress in bolt	2.62	kg/mm ²	Accepted	IS-800 11.6.2.1
	Permissible Shear stress per bolt	10.15	kg/mm ²		IS-800 11.6.2.1
	Nominal shear capacity of bolt	75111.3	N		IS-800 10.3.3
Bearing Stress of bolt on plate					
	Actual Stress of bolt in bearing	1.54	kg/mm ²	Accepted	IS-800 11.6.2.2
	Nominal bearing area of bolt on plate	768.0	mm ²		
	Permissible bearing stress of the bolt	62.67	kg/mm ²		IS-800 11.6.2.2
	Nominal bearing strength of bolt	787200.0	N		
Combined Shear and Tension					
	Actual Shear stress in bolt	2.62	kg/mm ²		
	Permissible Shear stress per bolt	10.15	kg/mm ²		
	Actual tensile stress per bolt	1.33	kg/mm ²		
	Permissible tensile stress per bolt	12.78	kg/mm ²		
	Combined Shear and Tension	0.08		Accepted	IS-800 11.6.2.5

Description	Parameter	Unit	Remark
Column D5	UC 305 x 305 x 18		
Base Plate Size	500 X 500		
Base Plate Thickness	32	mm	26.00 Pass
Tensile Stress of Plate (f_t)	36	N/mm ²	
	307	N/mm ²	
Flange Width	12.09	inches	
	314	mm	
Depth	12.36	inches	
m	3.97	inches	
Base Plate Dimension - N	19.685	inches	500 mm
n	5.01	inches	
Base Plate Dimension - b	19.685	inches	500 mm
Area of base plate - A1	387.50	inches	
Load Case	8	9	10 11
Load Combination	SW + DL + LL	SW + WX	SW + W-X SW+WZ
Fx (Ton)	0.37	-6.35	6.11 -0.17
Fy (Ton)	67.9	17.67	3.1 2.42 17.18
Fz (Ton)	-0.44	-0.19	-0.18 4.96 -4.06
Resultant shear force	0.5	6.3	6.1 4.9 4 5.7 6.5

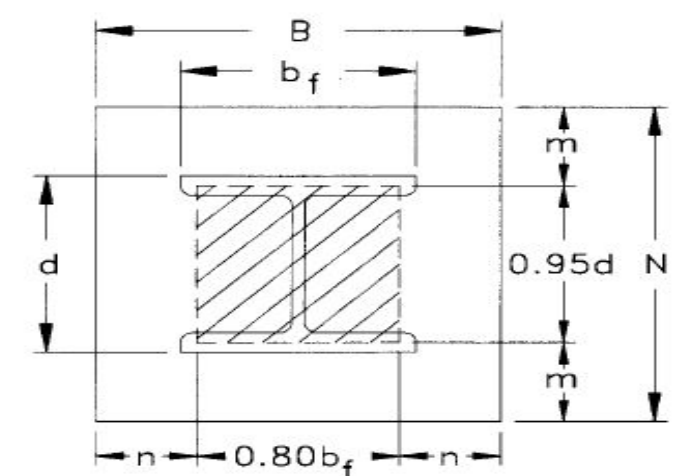
The diagram illustrates a square base plate of side length \$B\$ supporting a column of width \$b_f\$. The plate thickness is denoted by \$d\$. The distance from the column face to the edge of the plate is \$m\$, and the distance from the column face to the centerline of the plate is \$n\$. The dimension \$0.8D_{bf}\$ indicates the effective depth of the plate under load.

Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		387' 500775								
Area of concrete A2		387' 500775								
Axial compressive load - kips (Pa)	149.65	38.94	6.83	5.33	37.86	172.35	126.58	128.07	171.27	
Compressive Strength of concrete- f _c (kg/m ²)	2550000									
Compressive Strength of concrete (ksi)	3.63									
Required Base Plate Area (2*Pa / 0.85 * f _c) inches ²	121.356	31.581	5.541	4.325	30.705	139.764	102.643	103.858	138.889	
Delta	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	
Base plate Breadth (N) in inches	12	7	3	3	7	13	11	11	13	
N Considered	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	
Base Plate length (B) in inches	10	5	2	1	5	11	9	9	11	
B considered	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	
Condition (0.85 * f _c * A1 * *A2/A1) / (2.50) > F _y (Kips)	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	
	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	
Factor X	0.31	0.08	0.01	0.01	0.08	0.36	0.26	0.27	0.36	
λ	0.61	0.29	0.12	0.11	0.29	0.67	0.55	0.56	0.66	
λn*	1.87	0.89	0.37	0.32	0.88	2.04	1.69	1.71	2.03	
l	5.0079									
Base Plate Thickness (inches)	0.95	0.48	0.20	0.18	0.48	1.02	0.87	0.88	1.01	
Base Plate Thickness (mm)	24.08	12.28	5.14	4.55	12.11	25.84	22.14	22.27	25.76	
Uplift Condition										
Yield Stress of Plate (F _y)			36	36						
v2 bf			17.09	17.09						
Guage Distance (Centre to centre) mm			388.00	194.00						
Guage Distance (Centre to centre) inches			15.28	7.64						

Allowable Stress Design									
	Condition 1 ($v_2 \leq d$)								
	Plate thickness (inches)		0.412	0.257					
	Condition 1 ($v_2 \leq d$)								
	Plate thickness (inches)		0.401	0.251					
	Plate Thickness (inches)		0.401	0.251					
	Plate Thickness (mm)		10.19	6.37					

Description	Parameter	Unit	Design	Remarks
Bolt Considered M24				
Bolt material	IS 2062 E 250 A			
Minimum Embedment Length	288			
Tensile Strength	410	N/mm ²		IS 2062
Yield Stress	230	N/mm ²		Table No 2
No of Bolts	5			
Major/Nominal Diameter	24			
Pitch	3	mm		
Shank Area of bolt	452.389	mm ²		
Stress Area	353	mm ²		
Root Area	317.31	mm ²		
Hole diameter	27			
Edge distance (For Side N)	56	mm		
Minimum edge distance	40.5	mm		
Edge distance (For Side B)	56	mm		
Guage Distance between Holes (For Side "B")	194	mm		
Guage Distance between Holes (For Side "N")	388	mm		
Tensile stress in anchor rod				
Required tension in bolt	3.1	Tons		
Required tension per bolt	0.517			
Actual tensile stress per bolt	1.14	kg/mm²	Accepted	IS:800 11.6.2.3
Permissible tensile stress per bolt	12.78	kg/mm²		IS800 11.6.2.3
Nominal Tensile capacity per bolt	94590.50	N		
Design Strength due to yielding of gross section	94590.50	N	9.64	Tons
Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons
Shear Stress in anchor rod				
Shear force in bolt	6.5	Tons		
Shear force per bolt	1.08	Tons		
Actual shear stress in bolt	2.39	kg/mm²	Accepted	IS:800 11.6.2.1
Permissible Shear stress per bolt	10.15	kg/mm²		IS:800 11.6.2.1
Nominal shear capacity of bolt	75111.3	N		IS:800 10.3.3
Bearing Stress of bolt on plate				
Actual Stress of bolt in bearing	1.41	kg/mm²	Accepted	IS:800 11.6.2.2
Nominal bearing area of bolt on plate	768.0	mm ²		
Permissible bearing stress of the bolt	62.67	kg/mm²		IS:800 11.6.2.2
Nominal bearing strength of bolt	787200.0	N		
Combined Shear and Tension				
Actual Shear Stress in bolt	2.39	kg/mm ²		
Permissible Shear stress per bolt	10.15	kg/mm ²		
Actual tensile stress per bolt	1.14	kg/mm ²		
Permissible tensile stress per bolt	12.78	kg/mm ²		
Combined Shear and Tension	0.06		Accepted	IS:800 11.6.2.5

	Description	Parameter	Unit	Remark	
	Column B6				
	Base Plate Size	UC 254 x 254 x 107 500 x 500			
	Base Plate Thickness	32	mm	29	Pass
	Yield Stress of Plate (F _y)	36	ksi		
	Flange Width	259	mm		
	Depth	10.20	inches		
		267	mm		
		10.51	inches		
	m	4.85	inches		
	Base Plate Dimension - N	19.685	inches	500	mm
	n	5.76	inches		
	Base Plate Dimension - B	19.685	inches	500	mm
	Area of base plate - A1	387.50	inches		
	Load Case	8	9	10	11
	Load Combination	SW + DL + LL	SW + WX	SW + W-X	SW + WZ
	F _x (Ton)	0	0.2	-0.18	-0.01
	F _y (Ton)	59.4	7.92	6.87	22.12
	F _z (Ton)	0.35	0.18	0.17	6.11
	Resultant Shear Force (Tons)	0.3	0.2	0.2	6.1



Allowable Stress Design										
Case 1 (Area of base plate = Area of concrete)										
Area of base plate A1		387.50								
Area of concrete A2		387.50								
Axial compressive load - kips (Pa)		130.92	17.46	15.14	48.75	16.00	132.02	129.71	163.29	98.54
Compressive Strength of concrete- f _c (kg/m ²)		2550000								
Compressive Strength of concrete (ksi)		3.63								
Required Base Plate area (l ² *Pa / 0.85 *f _c) inches ²		106.16	14.16	12.28	39.53	12.98	107.06	105.18	132.42	79.91
Delta		0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Base plate Breadth (N) in inches		11	5	4	7	5	11	11	12	10
N Considered		19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Base Plate length (B) in inches		9	3	3	5	3	10	9	11	8
B considered		19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69	19.69
Condition (0.85*f _c *A1 *VA2/A1)/2.50) > F _y (Kips)		477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.9	477.85
		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Factor X		0.27	0.04	0.03	0.10	0.03	0.28	0.27	0.34	0.21
Condition check for λ		0.57	0.19	0.18	0.33	0.18	0.57	0.56	0.65	0.48
λn'		1.46	0.50	0.46	0.85	0.48	1.47	1.45	1.67	1.24
I		5.7638								
Base Plate Thickness (inches)		1.02	0.37	0.35	0.62	0.36	1.02	1.02	1.14	0.89
Base Plate Thickness (mm)		25.92	9.46	8.81	15.82	9.06	26.03	25.80	28.95	22.49
Uplift Condition										
Yield Stress of Plate (F _y)						36				
v2 of						14.42				
Guage Distance (Centre to centre) mm						194.00				
Guage Distance (Centre to centre) inches						7.64				

Allowable Stress Design										
Condition 1 (v2 bf < d)						0.485				
Plate thickness (inches)										
Condition 1 (v2 bf > d)										
Plate thickness (inches)						0.473				
Plate Thickness (inches)						0.473				
Plate Thickness (mm)						12.02				

	Description	Parameter	Unit		Remarks
	Bolt Considered M24				
	Bolt material	IS 2062 E 250 A			
	Minimum Embedment Length	288	mm		
	Tensile Strength	410	N/mm ²		IS 2062
	Yield Stress	230	N/mm ²		Table No 2
	No of Bolts	6			
	Major/Nominal Diameter	24	mm		
	Pitch	3	mm		
	Core Diameter	20	mm		
	Shank Area of bolt	452.389	mm ²		
	Stress Area	353	mm ²		
	Root Area	317.31	mm ²		
	Hole diameter	27	mm		
	Edge distance (For Side N)	56	mm		
	Minimum edge distance	40.5	mm		
	Edge distance (For Side B)	56	mm		
	Guage Distance between Holes (For Side "B")	194	mm		
	Guage Distance between Holes (For Side "N")	388	mm		

Tensile stress in anchor rod					
Required tension in bolt	7.26	Tons			
Required tension per bolt	1.210	Tons			
Actual tensile stress per bolt	2.67	kg/mm ²	Accepted		IS:800 11.6.2.3

Permissible tensile stress per bolt	12.78	kg/mm ²			IS800 11.6.2.3
Nominal Tensile capacity per bolt	94590.50	N			
Design Strength due to yielding of gross section	94590.50	N	9.64	Tons	
Design Strength due to rupture at threaded section	104205.60	N	10.62	Tons	

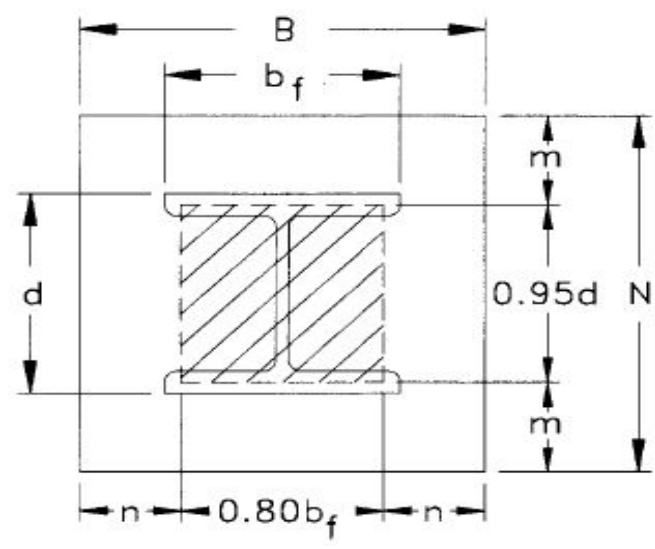
Shear Stress in anchor rod					
Shear force in bolt	7.1	Tons			
Shear force per bolt	1.183	Tons			
Actual shear stress in bolt	2.62	kg/mm ²	Accepted		IS:800 11.6.2.1
Permissible Shear stress per bolt	10.15	kg/mm ²			IS:800 11.6.2.1
Nominal shear capacity of bolt	75111.3	N			IS:800 10.3.3

Bearing Stress of bolt on plate					
Actual Stress of bolt in bearing	1.54	kg/mm ²	Accepted		IS:800 11.6.2.2
Nominal bearing area of bolt on plate	768.0	mm ²			
Permissible bearing stress of the bolt	62.67	kg/mm ²			IS:800 11.6.2.2
Nominal bearing strength of bolt	787200.0	N			

Combined Shear and Tension					
Actual Shear stress in bolt	2.62	kg/mm ²			
Permissible Shear stress per bolt	10.15	kg/mm ²			
Actual tensile stress per bolt	2.67	kg/mm ²			
Permissible tensile stress per bolt	12.78	kg/mm ²			
Combined Shear and Tension	0.11		Accepted		IS:800 11.6.2.5

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Sr No	Description	Parameter	Unit	Remark	
	Column D6	UC 254 x 254 x 107	9		
	Base Plate Size	500 x 500			
	Base Plate Thickness	32	mm	30	Pass
	Yield Stress of Plate (F _y)	36	ksi		
		259	mm		
	Flange Width	10.20	inches		
		10.51	inches		
	Depth	267	mm		
		10.51	inches		
	m	4.85	inches		
	Base Plate Dimension - N	19.685	inches	500	mm
	n	5.76	inches		
	Base Plate Dimension - B	19.685	inches	500	mm
	Area of base plate - A1	387.50	inches		
	Load Case	8	9	10	11
	Load Combination	SW +DL +LL	SW +WX	SW +WZ	SW +WZ
	Fx (Ton)	-0.07	0.19	-0.17	0.01
	Fy (Ton)	60.54	7.93	6.87	7.39
	Fz (Ton)	-0.35	-0.18	-0.18	7.15
	Resultant Shear Force (Tons)	0.3	0.2	0.2	7.1
				6.1	0.3
					0.4
					6.9
					6.2
	Allowable Stress Design				
	Case 1 (Area of base plate = Area of concrete)				
	Area of base plate A1				387.50
	Area of concrete A2				387.50
	Axial compressive load - kips (Pa)	133.43	17.48	15.14	16.07
	Compressive Strength of concrete- f _c (kg/m ²)				48.75
	Compressive Strength of concrete - f _c (ksi)				259000
	Required Base Plate area (A*Pa / 0.85 *f _c) inches ²				3.63
	Delta	108.20	14.17	12.28	13.03
	Base plate Breadth (N) in inches	0.91	0.91	0.91	0.91
	N Considered	11	5	4	5
	Base Plate length (B) in inches	20	20	20	20
	B considered	10	3	3	3
		20	20	20	20
	Condition (0.85*f _c *A1 *VA2/A1)/(2.50) > Fy (Kips)	477.9	477.9	477.9	477.9
		TRUE	TRUE	TRUE	TRUE
	Factor X	0.28	0.04	0.03	0.10
	λ	0.57	0.19	0.18	0.33
	λn'	0.57	0.19	0.18	0.33
		1.48	0.50	0.46	0.85
					1.49
					1.47
					1.26
					1.69
					5.7638
	Base Plate Thickness (inches)	1.03	0.37	0.35	0.36
	Base Plate Thickness (mm)	26.17	9.47	8.81	9.08
					15.82
					26.27
					26.05
					22.76
					29.17
	Uplift Condition				
	Yield Stress of Plate (F _y)				36
	V2 bf				14.42
	Guage Distance (Centre to centre) mm				194.50
	Guage Distance (Centre to centre) inches				7.66
	Allowable Stress Design				
	Condition 1 (V2 bf < d)				
	Plate thickness (inches)				0.487
	Condition 1 (V2 bf > d)				
	Plate thickness (inches)				0.475
	Plate Thickness (inches)				0.475
	Plate Thickness (mm)				12.07



Sr No	Description	Paramter	Unit	Remark
1	Hole diameter	27	mm	
2	No of bolts in X Direction	3		
3	No of bolts in Z Direction	3		
4	Edge distance (Along X Direction)	56.0	mm	Condition satisfied
5	Minimum edge distance	40.5	mm	As per IS:800
6	Edge distance (Along Z Direction)	56	mm	
7	Distance between Hole centre & beam (For Z Direction)	65	mm	
8	Distance between Hole centre & top plate (For X Direction)	61	mm	

Description	Parameter	Unit	Remarks
Bolt Considered M24			
Bolt material	IS 2062 E 250 A		
Minimum Embedment Length	288	mm	
Tensile Strength	410	N/mm ²	IS 2062
Yield Stress	230	N/mm ²	Table No 2
No of Bolts	6		
Major/Nominal Diameter	24	mm	
Pitch	3	mm	
Core Diameter	20.32	mm	
Shank Area of bolt	452.389	mm ²	
Stress Area	353.00	mm ²	
Root Area	317.31	mm ²	
Hole diameter	27	mm	
Edge distance (For Side N)	56.0	mm	Condition Satisfied
Minimum edge distance	40.5	mm	As per IS:800 10.2.4.2
Edge distance (For Side B)	56	mm	Condition Satisfied
Guage Distance between Holes (For Side "B")	195	mm	Need To check
Guage Distance between Holes (For Side "N")	388	mm	
Tensile Stress in Anchor Rod			
Required tension in bolt	7.29	Tons	
Required tension per bolt	1.215	Tons	
Actual tensile stress per bolt	2.69	kg/mm ²	Accepted
Permissible tensile stress per bolt	12.78	kg/mm ²	IS:800 11.6.2.3
Nominal Tensile capacity per bolt	94590.50	N	
Design Strength due to yielding of gross section	94590.50	N	9.64 Tons
Design Strength due to rupture at threaded section	104205.60	N	10.62 Tons
Shear stress in anchor rod			
Shear force in bolt	7.1	Tons	
Shear force per bolt	1.18	Tons	
Actual shear stress in bolt	2.62	kg/mm ²	Accepted
Permissible Shear stress per bolt	10.15	kg/mm ²	IS:800 11.6.2.1
Nominal shear capacity of bolt	75111.3	N	IS:800 10.3.3
Bearing Stress of bolt on plate			
Actual Stress of bolt in bearing	1.54	kg/mm ²	Accepted
Nominal bearing area of bolt on plate	768.0	mm ²	
Permissible bearing stress of the bolt	62.67	kg/mm ²	IS:800 11.6.2.2
Nominal bearing strength of bolt	787200.0	N	
Combined Shear and Tension			
Actual Shear stress in bolt	2.62	kg/mm ²	
Permissible Shear stress per bolt	10.15	kg/mm ²	
Actual tensile stress per bolt	2.69	kg/mm ²	
Permissible tensile stress per bolt	12.78	kg/mm ²	
Combined Shear and Tension	0.11		Accepted
			IS:800 11.6.2.5

