Secondary Beams

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
1	(0,0,6)	(4,0,6)	4	0.05	0.05

Design Limit state:

Combo: 1.2D+1.4L

Md: 0.05 t.m

Vd: 0.05 ton

Service Limit State

Combo: LIVE

Span: 4 m

Load: 0 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 29.65 < 81.98 => Compact Web

c/tf= 4.56 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 129.1 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE270

fact= 0.03 t/cm^2 < Fb= 1.54 t/cm^2

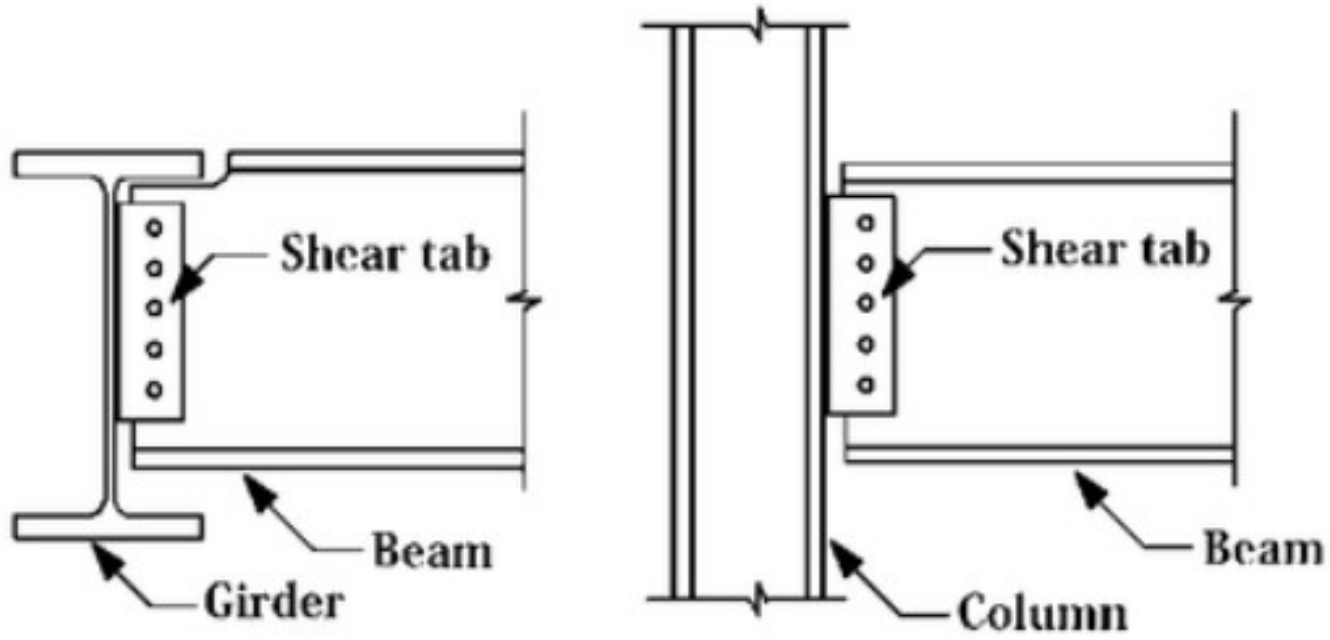
4-Check Shear Stress

qact= 0 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0 cm < dall= 1.33 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 0.05 ton

Rleast= 2.85 ton

N= 3 with Pitch= 63 mm & Full Layout: (31;63 63 31.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0 t/cm^2 & q = 0 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.01 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0 t/cm^2 & qmt = 0 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE270

Plate Layout => L = 189 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
13	(0,20,6)	(4,20,6)	4	2.05	2.05

2	(4,0,6)	(8,0,6)	4	2.05	2.05

Design Limit state:

Combo: 1.2D+1.4L

Md: 2.05 t.m

Vd: 2.05 ton

Service Limit State

Combo: LIVE

Span: 4 m

Load: -0.5 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 29.65 < 81.98 => Compact Web

c/tf= 4.56 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 129.1 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE270

fact= 1.06 t/cm^2 < Fb= 1.54 t/cm^2

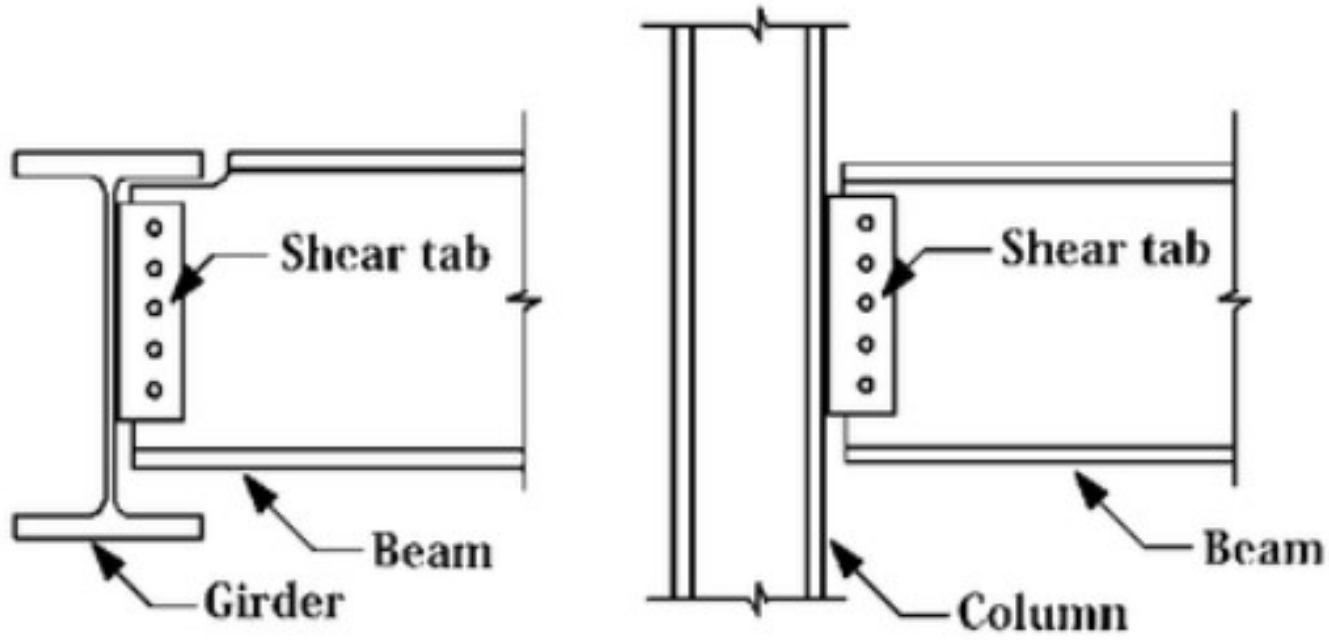
4-Check Shear Stress

qact= 0.18 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.41 cm < dall= 1.33 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 2.05 ton

Rleast= 2.85 ton

N= 3 with Pitch= 63 mm & Full Layout: (31;63 63 31.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.14 t/cm^2 & q = 0.09 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.22 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.09 t/cm^2 & qmt = 0.14 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.17 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.17 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE270

Plate Layout => L = 189 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
15	(6,8,6)	(6,12,6)	4	4.05	4.05

12	(0,18,6)	(4,18,6)	4	4.05	4.05
11	(0,16,6)	(4,16,6)	4	4.05	4.05
10	(0,14,6)	(4,14,6)	4	4.05	4.05
9	(0,12,6)	(4,12,6)	4	4.05	4.05
8	(0,10,6)	(4,10,6)	4	4.05	4.05
7	(0,8,6)	(4,8,6)	4	4.05	4.05
6	(4,6,6)	(8,6,6)	4	4.05	4.05
5	(0,6,6)	(4,6,6)	4	4.05	4.05
4	(4,4,6)	(8,4,6)	4	4.05	4.05
3	(4,2,6)	(8,2,6)	4	4.05	4.05

Design Limit state:

Combo: 1.2D+1.4L

Md: 4.05 t.m

Vd: 4.05 ton

Service Limit State

Combo: LIVE

Span: 4 m

Load: -1 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 32.39 < 81.98 => Compact Web

c/tf= 4.81 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 154.92 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE270

fact= 1.25 t/cm^2 < Fb= 1.54 t/cm^2

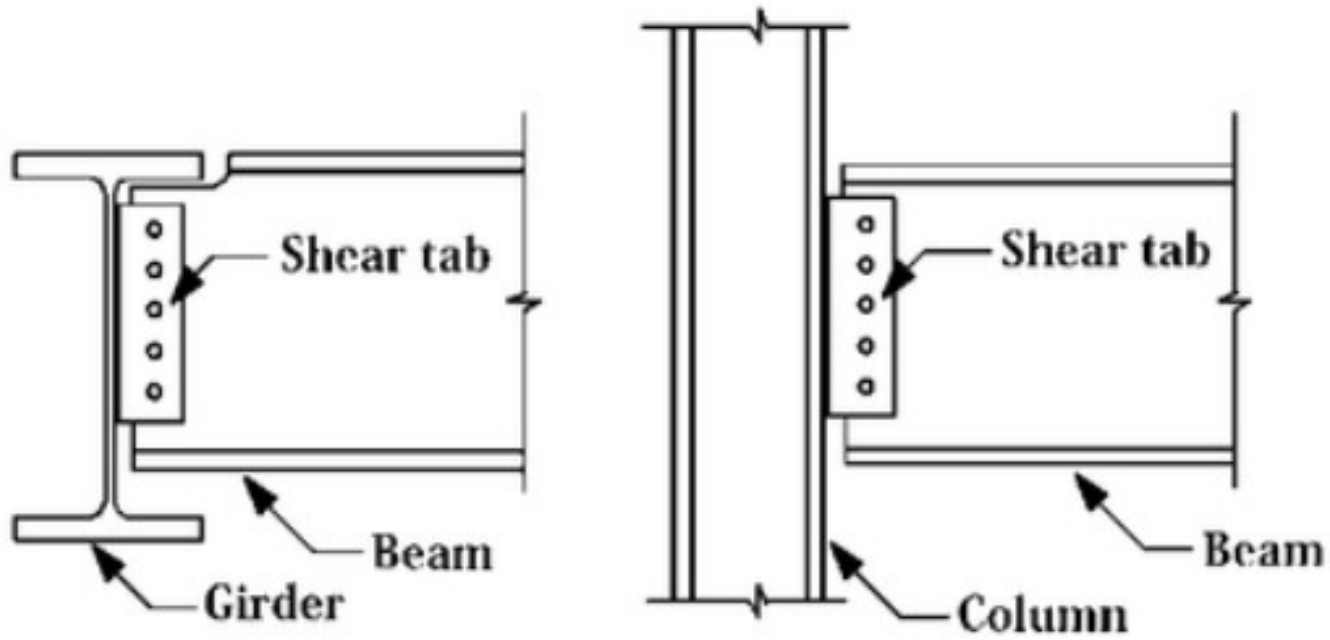
4-Check Shear Stress

qact= 0.27 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.41 cm < dall= 1.33 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 4.05 ton

Rleast= 2.85 ton

N= 3 with Pitch= 63 mm & Full Layout: (31;63 63 31.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.28 t/cm^2 & q = 0.18 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.43 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.18 t/cm^2 & qmt = 0.28 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.34 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.34 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE270

Plate Layout => L = 189 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
14	(6,14,6)	(6,20,6)	6	9.19	6.13

Design Limit state:

Combo: 1.2D+1.4L

Md: 9.19 t.m

Vd: 6.13 ton

Service Limit State

Combo: LIVE

Span: 6 m

Load: -1 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 37.87 < 81.98 => Compact Web

c/tf= 5.64 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 206.56 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE330

fact= 1.29 t/cm^2 < Fb= 1.54 t/cm^2

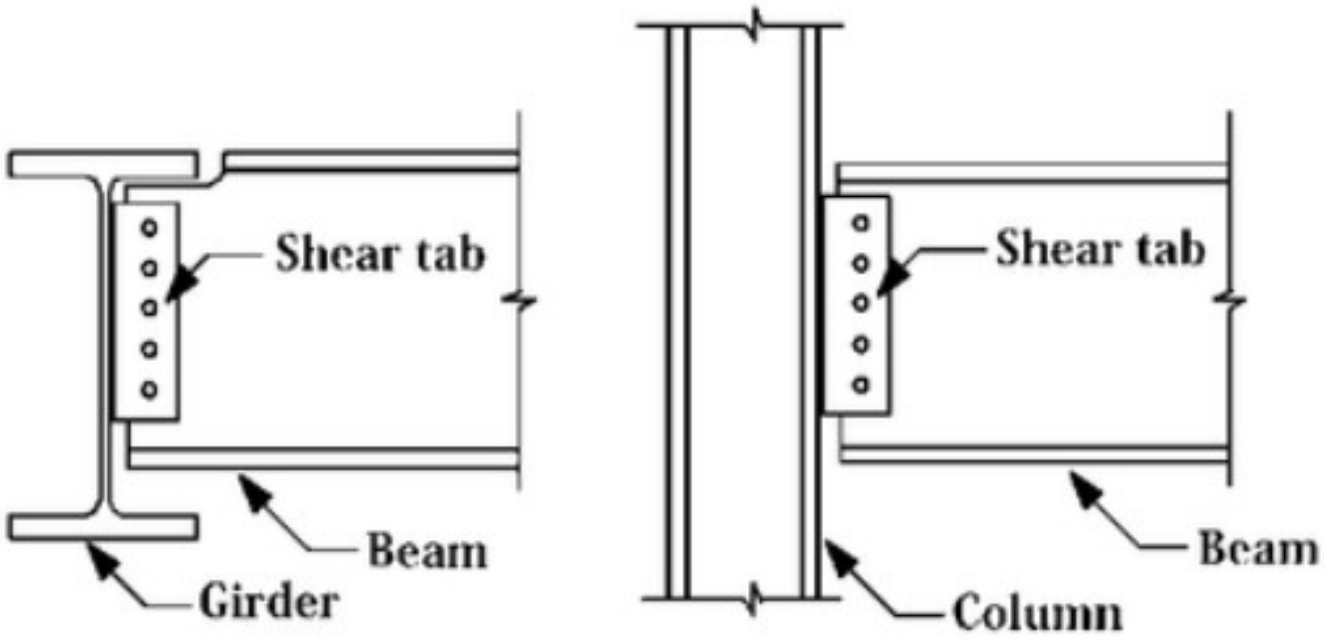
4-Check Shear Stress

qact= 0.25 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.68 cm < dall= 2 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 6.13 ton

Rleast= 3.24 ton

N= 3 with Pitch= 77 mm & Full Layout: (38;77 77 38.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.29 t/cm^2 & q = 0.23 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.49 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.23 t/cm^2 & qmt = 0.29 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.37 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.35 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE330

Plate Layout => L = 231 mm & tp = 10 mm & Sw = 6 mm

Main Beams

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
5	(0,0,6)	(0,6,6)	6	0.19	0.13

Design Limit state:

Combo: 1.2D+1.4L

Md: 0.19 t.m

Vd: 0.13 ton

Service Limit State

Combo: LIVE

Span: 6 m

Load: 0 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 34.73 < 81.98 => Compact Web

c/tf= 5.3 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 174.28 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE270

fact= 0.05 t/cm^2 < Fb= 1.54 t/cm^2

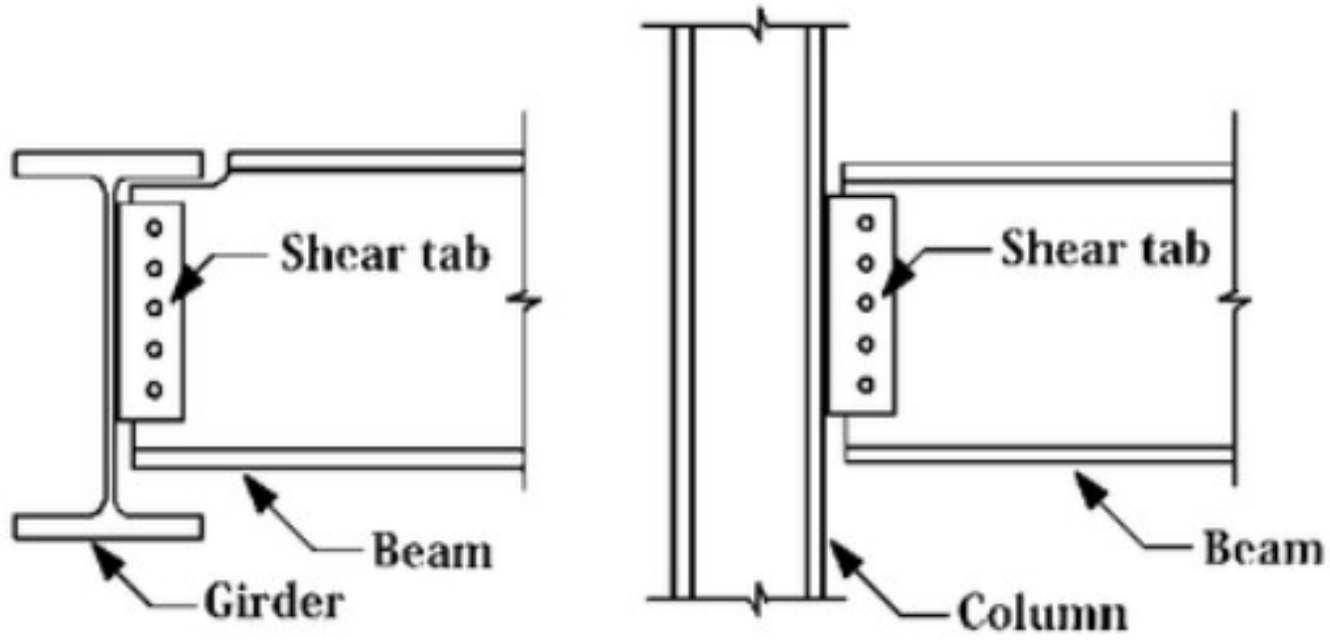
4-Check Shear Stress

qact= 0.01 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0 cm < dall= 2 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 0.13 ton

Rleast= 2.85 ton

N= 3 with Pitch= 63 mm & Full Layout: (31;63 63 31.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.01 t/cm^2 & q = 0.01 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.01 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.01 t/cm^2 & qmt = 0.01 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.01 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.01 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE270

Plate Layout => L = 189 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
13	(8,14,6)	(8,20,6)	6	4.69	3.13

2	(4,8,6)	(8,8,6)	4	6.11	4.08
1	(4,12,6)	(8,12,6)	4	6.11	4.08
3	(4,20,6)	(8,20,6)	4	6.18	3.12

Design Limit state:

Combo: 1.2D+1.4L

Md: 6.18 t.m

Vd: 3.12 ton

Service Limit State

Combo: LIVE

Span: 6 m

Load: -0.5 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 34.73 < 81.98 => Compact Web

c/tf= 5.3 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 174.28 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE270

fact= 1.44 t/cm^2 < Fb= 1.54 t/cm^2

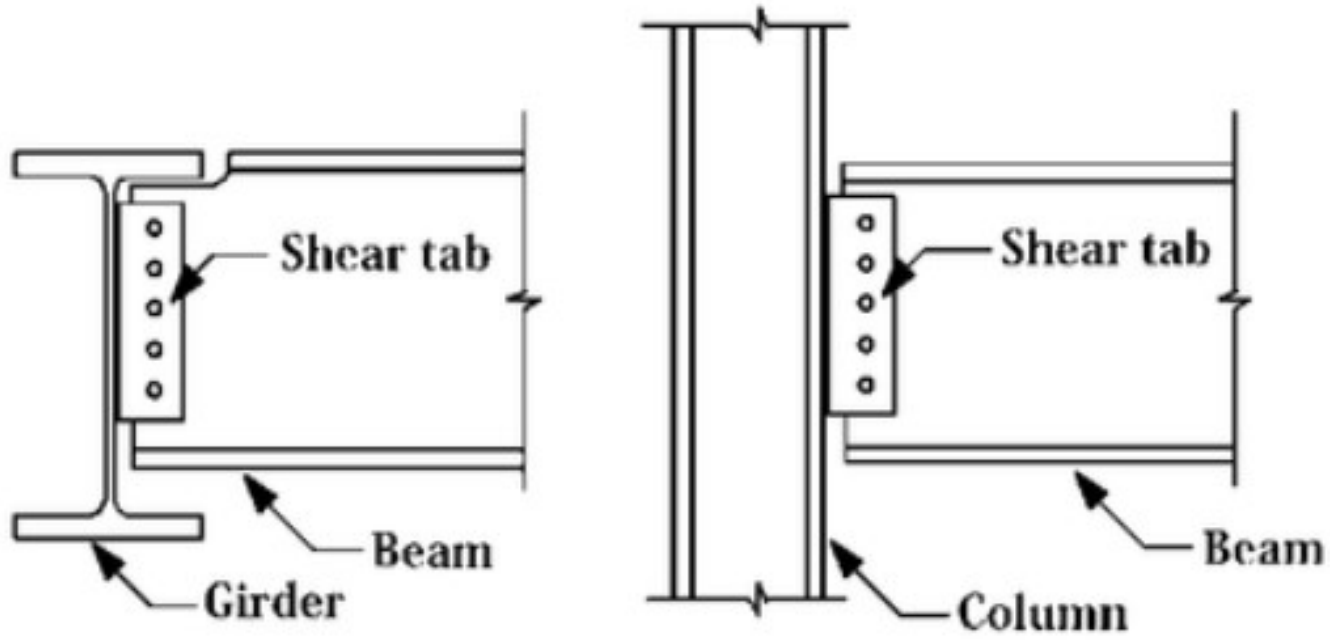
4-Check Shear Stress

qact= 0.18 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.69 cm < dall= 2 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 3.12 ton

Rleast= 2.85 ton

N= 3 with Pitch= 63 mm & Full Layout: (31;63 63 31.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.22 t/cm^2 & q = 0.14 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.33 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.14 t/cm^2 & qmt = 0.22 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.26 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.26 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE270

Plate Layout => L = 189 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
11	(8,0,6)	(8,6,6)	6	8.3	4.18

8	(4,0,6)	(4,6,6)	6	8.3	4.18
7	(0,14,6)	(0,20,6)	6	8.3	4.18
4	(4,14,6)	(8,14,6)	4	10.18	7.12

Design Limit state:

Combo: 1.2D+1.4L

Md: 10.18 t.m

Vd: 7.12 ton

Service Limit State

Combo: LIVE

Span: 6 m

Load: -0.67 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 37.87 < 81.98 => Compact Web

c/tf= 5.64 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 206.56 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE330

fact= 1.43 t/cm^2 < Fb= 1.54 t/cm^2

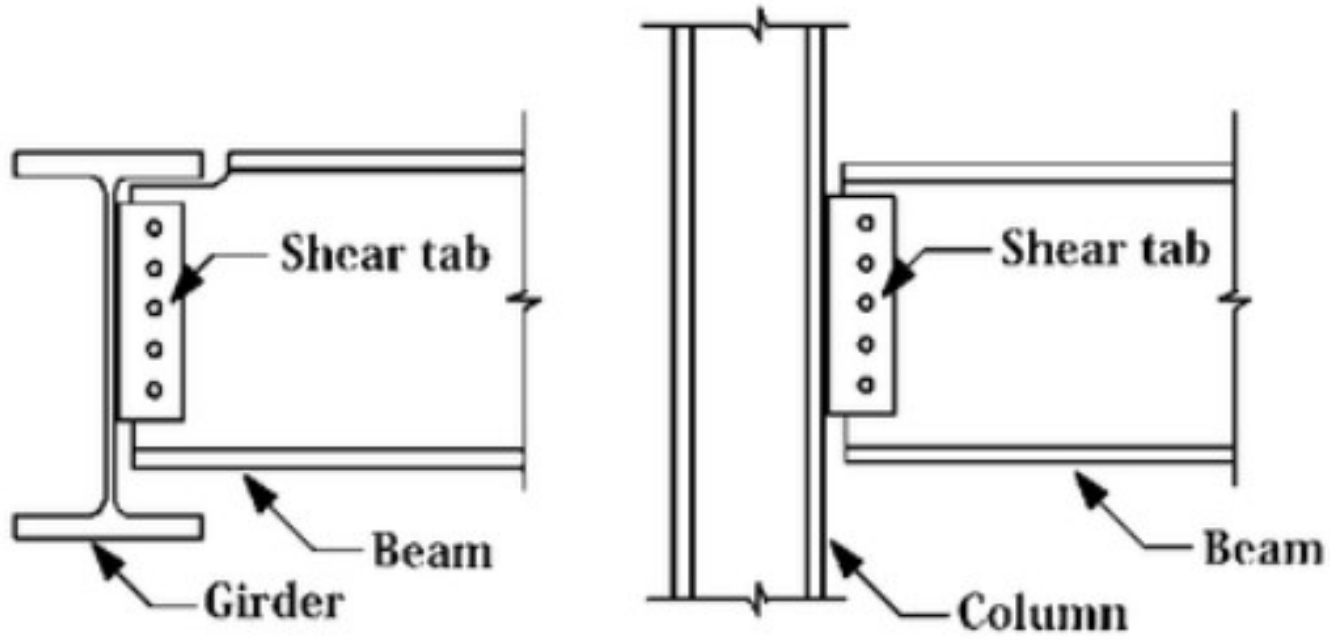
4-Check Shear Stress

qact= 0.29 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.46 cm < dall= 2 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 7.12 ton

Rleast= 3.24 ton

N= 3 with Pitch= 77 mm & Full Layout: (38;77 77 38.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.33 t/cm^2 & q = 0.26 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.57 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.26 t/cm^2 & qmt = 0.33 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.43 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.4 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE330

Plate Layout => L = 231 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
12	(8,6,6)	(8,14,6)	8	12.51	6.25

10	(4,14,6)	(4,20,6)	6	12.8	7.18
6	(0,6,6)	(0,14,6)	8	16.56	6.25

Design Limit state:

Combo: 1.2D+1.4L

Md: 16.56 t.m

Vd: 6.25 ton

Service Limit State

Combo: LIVE

Span: 8 m

Load: -0.75 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 40.24 < 81.98 => Compact Web

c/tf= 5.35 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 232.38 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE400

fact= 1.43 t/cm^2 < Fb= 1.54 t/cm^2

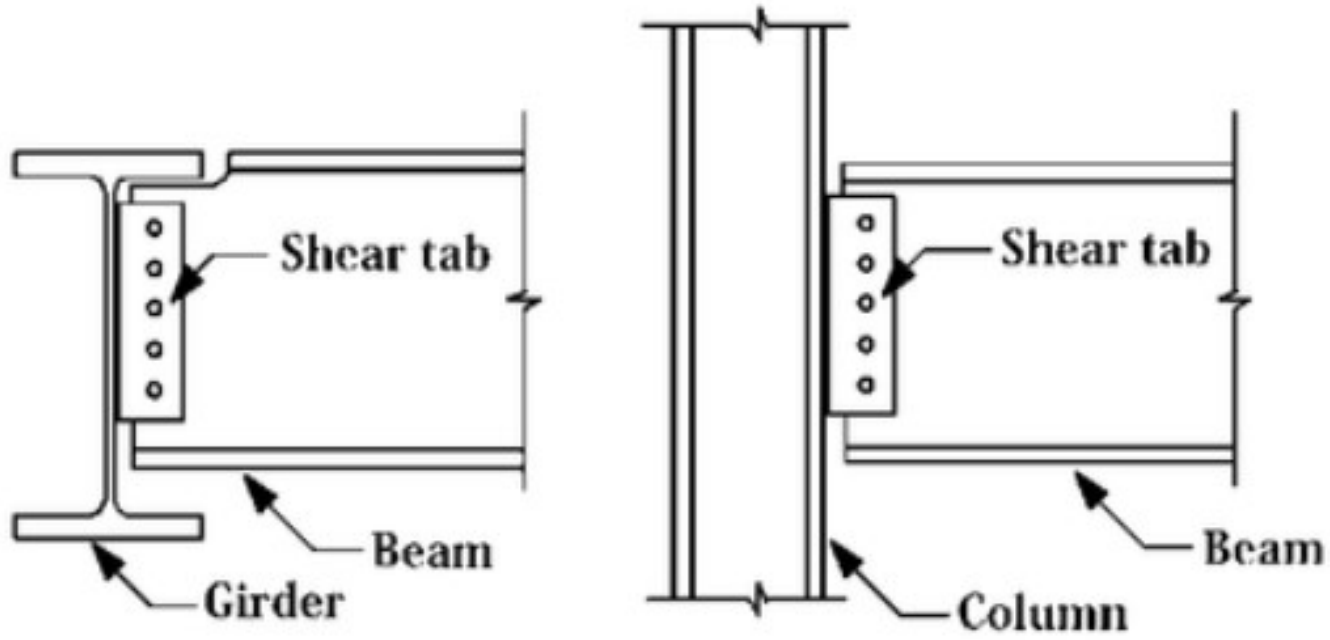
4-Check Shear Stress

qact= 0.18 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.82 cm < dall= 2.67 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 6.25 ton

Rleast= 3.72 ton

N= 3 with Pitch= 93 mm & Full Layout: (46;93 93 47.5)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.2 t/cm^2 & q = 0.19 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.38 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.19 t/cm^2 & qmt = 0.2 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.28 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.24 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE400

Plate Layout => L = 280 mm & tp = 10 mm & Sw = 6 mm

Beam ID	Start Point	End Point	Span (m)	Mmax (t.m)	Vmax (ton)
9	(4,6,6)	(4,14,6)	8	28.72	12.33

Design Limit state:

Combo: 1.2D+1.4L

Md: 28.72 t.m

Vd: 12.33 ton

Service Limit State

Combo: LIVE

Span: 8 m

Load: -1.5 t/m'

Design Checks

1-Check Local Buckling

dw/tw= 42.75 < 81.98 => Compact Web

c/tf= 4.94 < 10.91 => Compact Flange

2-Check Lateral Torsional Buckling

Luact= 0 m < Lumax= 258.2 m => Supported (No LTB)

3-Check Bending Stress

Section: IPE500

fact= 1.49 t/cm^2 < Fb= 1.54 t/cm^2

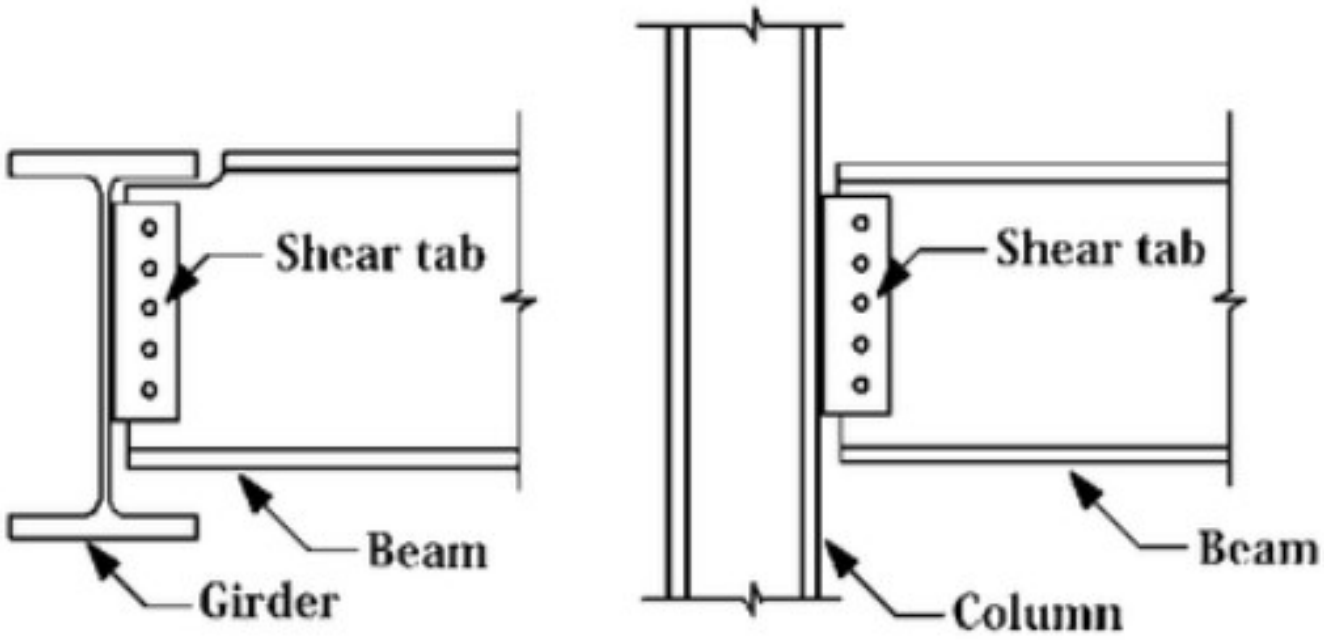
4-Check Shear Stress

qact= 0.24 t/cm^2 < qall= 0.84 t/cm^2

5-Check Deflection

dact= 0.79 cm < dall= 2.67 cm

Group Connection Design (Simple Shear Plate Connection)



1-Bolts Design

Bolts: M20 of Grade 8.8

Vd= 12.33 ton

Rleast= 4.41 ton

N= 3 with Pitch= 116 mm & Full Layout: (58;116 116 60)

2-Stresses Induced in Fillet Weld Lines at Plane(1-1)

f = 0.25 t/cm^2 & q = 0.29 t/cm^2 => feq = (f^2 + 3q^2)^0.5 = 0.57 t/cm^2 < 1.1 * 0.2Fu = 0.79 t/cm^2 => OK

3-Stresses Induced in Fillet Weld Lines at Plane(2-2)

q = 0.29 t/cm^2 & qmt = 0.25 t/cm^2 => qres = (q^2 + qmt^2)^0.5 = 0.39 t/cm^2 < 0.2Fu = 0.72 t/cm^2 => OK

4-Check Thickness of Plate

f = (6*Vd*e)/(tp*L^2) = 0.3 t/cm^2 < 0.72*Fy = 1.73 t/cm^2 => OK IPE500

Plate Layout => L = 350 mm & tp = 10 mm & Sw = 6 mm

Columns

Column ID	Start Point	End Point	Height (m)	Nmax (ton)
7	(4,14,0)	(4,14,6)	6	-30.99
6	(4,6,0)	(4,6,6)	6	-24.93
11	(8,14,0)	(8,14,6)	6	-16.81
3	(0,14,0)	(0,14,6)	6	-14.8
10	(8,6,0)	(8,6,6)	6	-14.8
8	(4,20,0)	(4,20,6)	6	-12.66
2	(0,6,0)	(0,6,6)	6	-10.74
5	(4,0,0)	(4,0,6)	6	-6.6
12	(8,20,0)	(8,20,6)	6	-6.55
4	(0,20,0)	(0,20,6)	6	-6.54
9	(8,0,0)	(8,0,6)	6	-6.54
1	(0,0,0)	(0,0,6)	6	-0.49

Design Limit state:

Combo: 1.2D+1.4L

Nd: -30.99 ton

1-Check Local Buckling

dw/tw= 36.23 < 37.44 => Compact Web

c/tf= 5.68 < 10.91 => Compact Flange

2-Check Normal Stress

Section: IPE300

lambda = 179.1 > 100

fc= 0.58 t/cm^2 < Fc= 0.23 t/cm^2
