Summary

#	Connection	×	Mark	Governing	Utilization
1	Base Plate	8	C1, C2, C3, C4, C5, C6, C7, C8	Plate on the grout / concrete (compression)	0.09
2	Base Plate	8	C9, C10, C11, C12, C13, C14, C15, C16	Plate on the grout / concrete (compression)	0.09
3	Base Plate	2	C17	No design force given: no check.	-
4	Corner Gusset	8	C9 / BR3, C10 / BR3, C11 / BR3, C12 / BR3, C13 / BR3, C14 / BR3, C15 / BR3, C16 / BR3	Rod thread in tension	0.52
5	Corner Gusset	8	C9 / BR3, C10 / BR3, C11 / BR3, C12 / BR3, C13 / BR3, C14 / BR3, C15 / BR3, C16 / BR3	Rod thread in tension	0.52
6	End Plate	2	B16 / C1, B17 / C2	Welds of the beam web	0.04
7	End Plate	2	B16 / C3, B17 / C4	Welds of the beam web	0.04
8	Fin Plate	6	B5 / C9, B5 / C10, B5 / C11, B5 / C12, B5 / C13, B5 / C14	Bearing in the beam web	0.23
9	Fin Plate	6	B5 / C11, B5 / C12, B5 / C13, B5 / C14, B5 / C15, B5 / C16	Bearing in the beam web	0.23
10	Fin Plate	2	B6 / C1, B6 / C3	Bearing in the beam web	0.22
11	Fin Plate	2	B6 / C2, B6 / C4	Bearing in the beam web	0.22
12	Fin Plate	2	B7 / B16	Bearing in the beam web	0.09
13	Fin Plate	2	B7 / B17	Bearing in the beam web	0.09
14	Fin Plate	1	B18 / B16	Bearing in the beam web	0.05
15	Fin Plate	1	B19 / B16	Bearing in the beam web	0.05
16	Portal Joint	4	B8 / B9, B10 / B11, B12 / B13, B14 / B15	Welds of the tension flange	0.42
17	Portal Joint	8	B8 / C9, B9 / C10, B10 / C11, B11 / C12, B12 / C13, B13 / C14, B14 / C15, B15 / C16	Welds of the tension flange	0.84

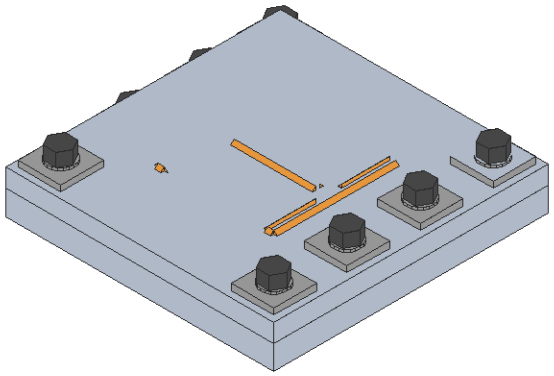
Forces from the analysis: the largest of each force at the member end (not concurrent).

Base Plate × 8

Mark: C1, C2, C3, C4, C5, C6, C7, C8
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Base Plate
Column	HEA 200
Plate	PL 450x440x30 S355
Material	S355
Anchors	8 x M24x620 8.8
AnchorCount	8
AnchorSize	M24
AnchorType	L bolt
Weld	a4 both
Grout	40.0
Weight	45.3



Parts of the connection

Design forces

V_Ed (kN)	**28.1 kN**
N_Ed compression (kN)	**160.0 kN**
N_Ed uplift (kN)	**35.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Plate on the grout / concrete (compression)	6.2.5	F_c,Rd = f_jd A_eff, f_jd = 2/3 α f_cd E_d = 160.0 R_d = 1696.7 kN	0.09
Anchor bolts in tension	Table 3.4	F_t,Rd = k_2 f_ub A_s / γ_M2 E_d = 4.4 R_d = 203.0 kN	0.02
Plate bending around the anchors (uplift)	6.2.6.11, Table 6.2	F_T,Rd = 2 M_pl,Rd / m (no prying) E_d = 35.0 R_d = 1624.3 kN	0.02
Welds of the column	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 35.0 R_d = 1133.6 kN	0.03
Shear: friction + anchor bolts	6.2.2	F_v,Rd = F_f,Rd + n F_vb,Rd, F_f,Rd = 0.2 N_c,Ed E_d = 28.1 R_d = 447.6 kN	0.06
Anchor bolts in shear + tension	Table 3.4	F_v,Ed / F_v,Rd + F_t,Ed / (1.4 F_t,Rd) ≤ 1 0.08 ≤ 1	0.08

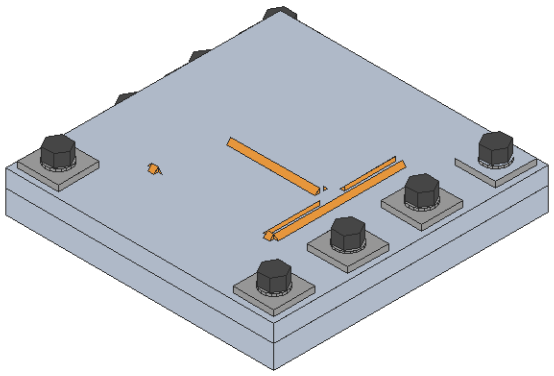
Result: 0.09 (Governing: Plate on the grout / concrete (compression)) OK

Base Plate × 8

Mark: C9, C10, C11, C12, C13, C14, C15, C16
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Base Plate
Column	HEA 220
Plate	PL 470x460x30 S355
Material	S355
Anchors	8 x M24x620 8.8
AnchorCount	8
AnchorSize	M24
AnchorType	L bolt
Weld	a5 both
Grout	40.0
Weight	49.6



Parts of the connection

Design forces

V_Ed (kN)	**28.1 kN**
N_Ed compression (kN)	**160.0 kN**
N_Ed uplift (kN)	**35.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Plate on the grout / concrete (compression)	6.2.5	F_c,Rd = f_jd A_eff, f_jd = 2/3 α f_cd E_d = 160.0 R_d = 1874.9 kN	0.09
Anchor bolts in tension	Table 3.4	F_t,Rd = k_2 f_ub A_s / γ_M2 E_d = 4.4 R_d = 203.0 kN	0.02
Plate bending around the anchors (uplift)	6.2.6.11, Table 6.2	F_T,Rd = 2 M_pl,Rd / m (no prying) E_d = 35.0 R_d = 1624.3 kN	0.02
Welds of the column	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 35.0 R_d = 1561.6 kN	0.02
Shear: friction + anchor bolts	6.2.2	F_v,Rd = F_f,Rd + n F_vb,Rd, F_f,Rd = 0.2 N_c,Ed E_d = 28.1 R_d = 447.6 kN	0.06
Anchor bolts in shear + tension	Table 3.4	F_v,Ed / F_v,Rd + F_t,Ed / (1.4 F_t,Rd) ≤ 1 0.08 ≤ 1	0.08

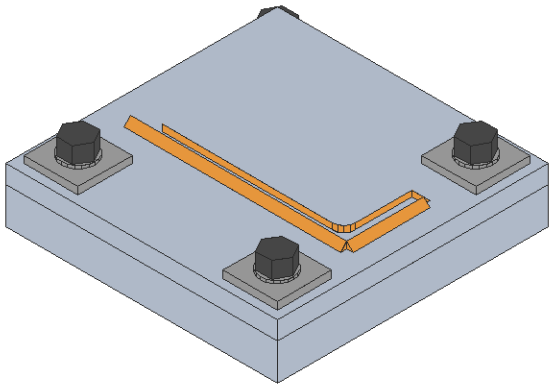
Result: 0.09 (Governing: Plate on the grout / concrete (compression)) OK

Base Plate × 2

Mark: C17
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Base Plate
Column	UPN 240
Plate	PL 300x300x20 S355
Material	S355
Anchors	4 x M20x600 8.8
AnchorCount	4
AnchorSize	M20
AnchorType	L bolt
Weld	a5 both
Grout	40.0
Weight	13.8



Parts of the connection

Design forces

V_Ed (kN)	**28.1 kN**
N_Ed compression (kN)	**160.0 kN**
N_Ed uplift (kN)	**35.0 kN**

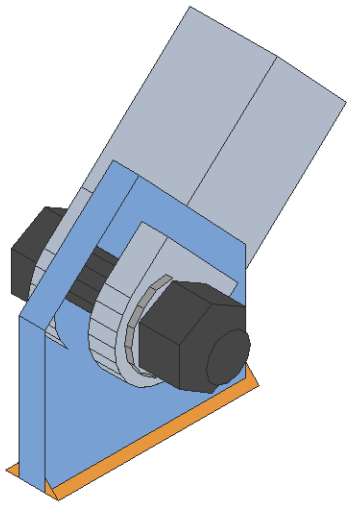
No design force given: no check.

Corner Gusset × 8

Mark: C9 / BR3, C10 / BR3, C11 / BR3, C12 / BR3, C13 / BR3, C14 / BR3, C15 / BR3, C16 / BR3
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Gusset Plate
Column	IPE 300 / RD 20
Plate	PL 90x103x12 S355
Anchors	1 x M20x70 8.8
Weld	a6 both sides
Weight	0.7



Parts of the connection

Design forces

N_Ed tension (kN)	**45.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Rod thread in tension	Table 3.4	F_t,Rd = k_2 f_ub A_s / γ_M2 E_d = 45.0 R_d = 86.4 kN	0.52
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 45.0 R_d = 188.0 kN	0.24
Bearing in the gusset	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 45.0 R_d = 124.7 kN	0.36
Gusset (Whitmore width)	EN 1993-1-1 6.2.3 (Whitmore width)	N_Rd = b_w t f_y / γ_M0 E_d = 45.0 R_d = 196.0 kN	0.23
Welds of the gusset	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 45.0 R_d = 272.1 kN	0.17

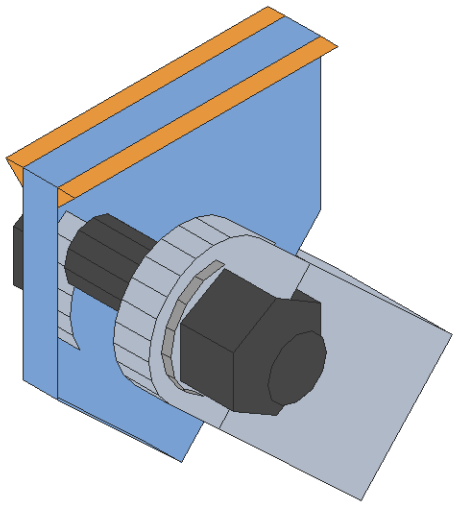
Result: 0.52 (Governing: Rod thread in tension) OK

Corner Gusset × 8

Mark: C9 / BR3, C10 / BR3, C11 / BR3, C12 / BR3, C13 / BR3, C14 / BR3, C15 / BR3, C16 / BR3
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Gusset Plate
Column	IPE 300 / RD 20
Plate	PL 90x103x12 S355
Anchors	1 x M20x70 8.8
Weld	a6 both sides
Weight	0.7



Parts of the connection

Design forces

N_Ed tension (kN)	**45.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Rod thread in tension	Table 3.4	F_t,Rd = k_2 f_ub A_s / γ_M2 E_d = 45.0 R_d = 86.4 kN	0.52
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 45.0 R_d = 188.0 kN	0.24
Bearing in the gusset	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 45.0 R_d = 124.7 kN	0.36
Gusset (Whitmore width)	EN 1993-1-1 6.2.3 (Whitmore width)	N_Rd = b_w t f_y / γ_M0 E_d = 45.0 R_d = 196.0 kN	0.23
Welds of the gusset	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 45.0 R_d = 272.1 kN	0.17

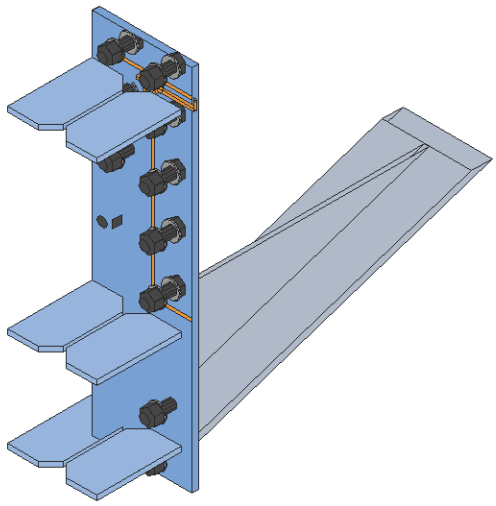
Result: 0.52 (Governing: Rod thread in tension) OK

End Plate × 2

Mark: B16 / C1, B17 / C2
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	End Plate
Column	IPE 400 / HEA 200
Plate	PL 200x740x15 S355
Anchors	14 x M20x55 8.8
Weld	a6 all around
Weight	39.2



Parts of the connection

Design forces

V_Ed (kN)	**48.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 48.0 R_d = 1316.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 3.4 R_d = 155.9 kN	0.02
Bearing in the support	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 3.4 R_d = 196.0 kN	0.02
Welds of the beam web	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 48.0 R_d = 1125.6 kN	0.04
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 48.0 R_d = 3582.8 kN	0.01

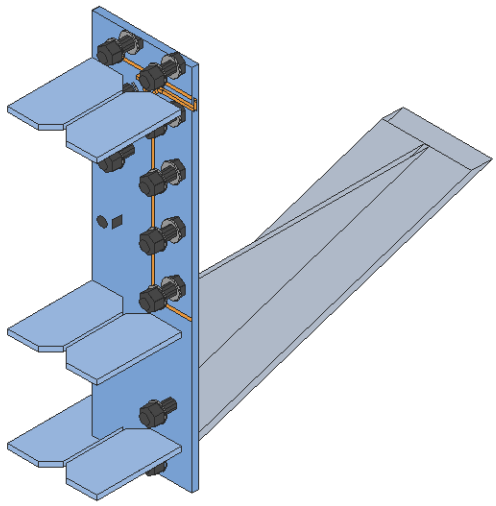
Result: 0.04 (Governing: Welds of the beam web) OK

End Plate × 2

Mark: B16 / C3, B17 / C4
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	End Plate
Column	IPE 400 / HEA 200
Plate	PL 200x740x15 S355
Anchors	14 x M20x55 8.8
Weld	a6 all around
Weight	39.2



Parts of the connection

Design forces

V_Ed (kN)	**48.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 48.0 R_d = 1316.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 3.4 R_d = 155.9 kN	0.02
Bearing in the support	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 3.4 R_d = 196.0 kN	0.02
Welds of the beam web	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 48.0 R_d = 1125.6 kN	0.04
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 48.0 R_d = 3582.8 kN	0.01

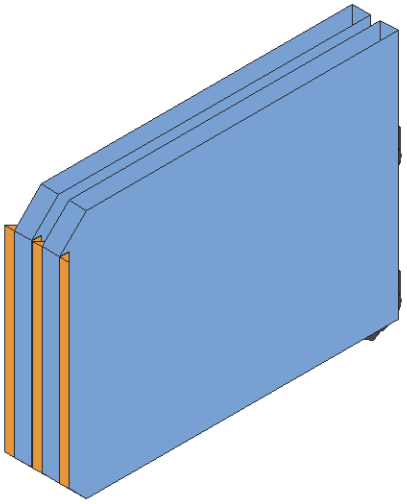
Result: 0.04 (Governing: Welds of the beam web) OK

Fin Plate × 6

Mark: B5 / C9, B5 / C10, B5 / C11, B5 / C12, B5 / C13, B5 / C14
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / HEA 220
Plate	2 x PL 190x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	4.1



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 20.4 R_d = 188.0 kN	0.11
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 20.4 R_d = 207.9 kN	0.10
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 20.4 R_d = 89.0 kN	0.23
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Plate bending	EN 1993-1-1 6.2.5	M_Rd = W f_y / γ_M0 E_d = 1.4 R_d = 23.2 kNm	0.06
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

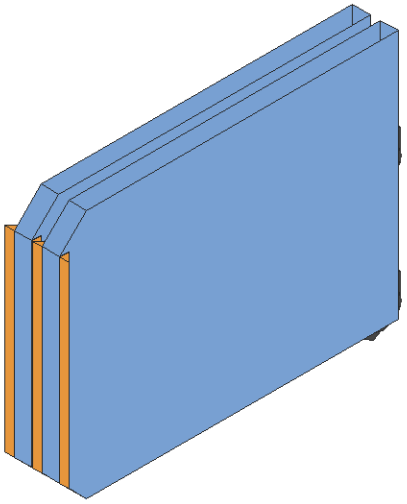
Result: 0.23 (Governing: Bearing in the beam web) OK

Fin Plate × 6

Mark: B5 / C11, B5 / C12, B5 / C13, B5 / C14, B5 / C15, B5 / C16
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / HEA 220
Plate	2 x PL 190x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	4.1



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 20.4 R_d = 188.0 kN	0.11
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 20.4 R_d = 207.9 kN	0.10
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 20.4 R_d = 89.0 kN	0.23
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Plate bending	EN 1993-1-1 6.2.5	M_Rd = W f_y / γ_M0 E_d = 1.4 R_d = 23.2 kNm	0.06
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

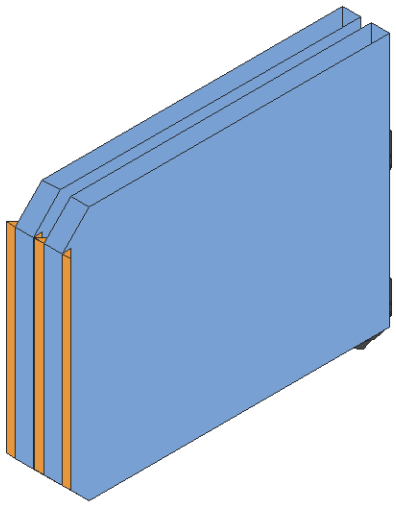
Result: 0.23 (Governing: Bearing in the beam web) OK

Fin Plate × 2

Mark: B6 / C1, B6 / C3
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / HEA 200
Plate	2 x PL 180x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	3.8



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 19.2 R_d = 188.0 kN	0.10
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 19.2 R_d = 207.9 kN	0.09
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 19.2 R_d = 89.0 kN	0.22
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Plate bending	EN 1993-1-1 6.2.5	M_Rd = W f_y / γ_M0 E_d = 1.3 R_d = 23.2 kNm	0.06
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

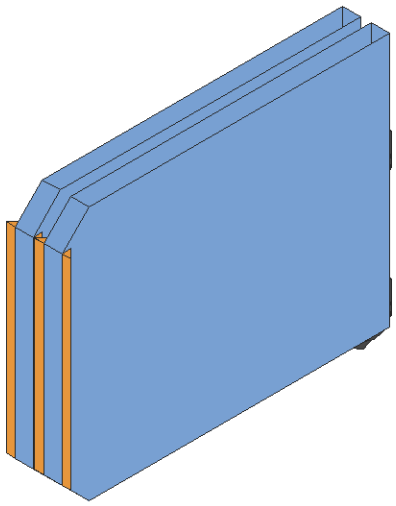
Result: 0.22 (Governing: Bearing in the beam web) OK

Fin Plate × 2

Mark: B6 / C2, B6 / C4
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / HEA 200
Plate	2 x PL 180x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	3.8



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 19.2 R_d = 188.0 kN	0.10
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 19.2 R_d = 207.9 kN	0.09
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 19.2 R_d = 89.0 kN	0.22
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Plate bending	EN 1993-1-1 6.2.5	M_Rd = W f_y / γ_M0 E_d = 1.3 R_d = 23.2 kNm	0.06
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

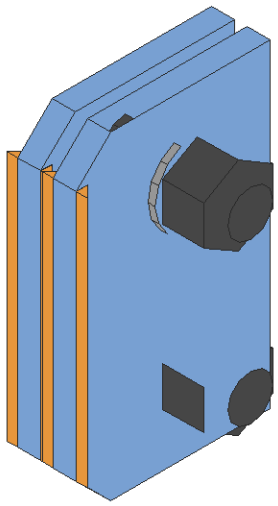
Result: 0.22 (Governing: Bearing in the beam web) OK

Fin Plate × 2

Mark: B7 / B16
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / IPE 400
Plate	2 x PL 85x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	1.7



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 7.8 R_d = 188.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 207.9 kN	0.04
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 89.0 kN	0.09
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

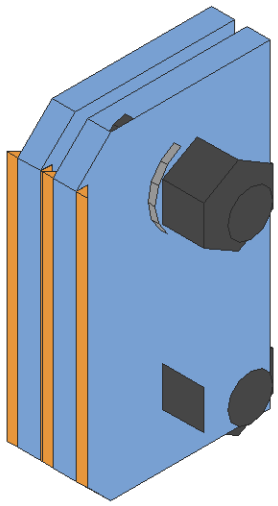
Result: 0.09 (Governing: Bearing in the beam web) OK

Fin Plate × 2

Mark: B7 / B17
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	IPE 200 / IPE 400
Plate	2 x PL 85x140x10 S355
Anchors	2 x M20x55 8.8
Weld	a5 both sides
Weight	1.7



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 7.8 R_d = 188.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 207.9 kN	0.04
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 89.0 kN	0.09
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

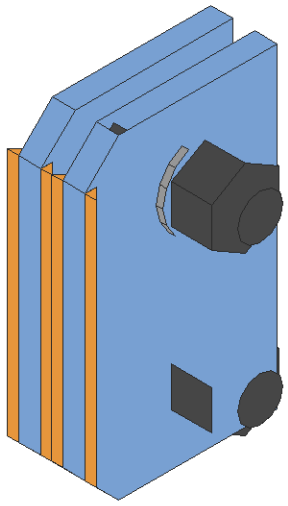
Result: 0.09 (Governing: Bearing in the beam web) OK

Fin Plate B18 / B16

Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	UPN 240 / IPE 400
Plate	2 x PL 85x140x10 S355
Anchors	2 x M20x60 8.8
Weld	a5 both sides
Weight	1.7



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 7.8 R_d = 188.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 207.9 kN	0.04
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 150.9 kN	0.05
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

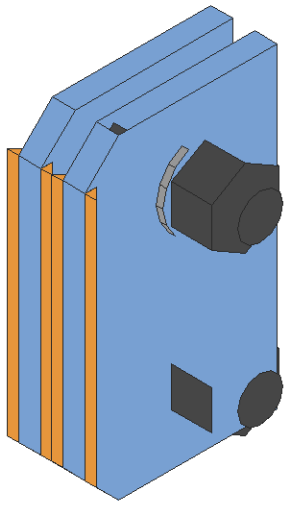
Result: 0.05 (Governing: Bearing in the beam web) OK

Fin Plate B19 / B16

Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Fin Plate
Column	UPN 240 / IPE 400
Plate	2 x PL 85x140x10 S355
Anchors	2 x M20x60 8.8
Weld	a5 both sides
Weight	1.7



Parts of the connection

Design forces

V_Ed (kN)	**9.0 kN**
N_Ed tension (kN)	**6.0 kN**

Resistance checks

Check	Clause	Formula	Utilization
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 7.8 R_d = 188.0 kN	0.04
Bearing in the plate	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 207.9 kN	0.04
Bearing in the beam web	Table 3.4	F_b,Rd = k_1 α_b f_u d t / γ_M2 E_d = 7.8 R_d = 150.9 kN	0.05
Plate shear (gross)	EN 1993-1-1 6.2.6	V_pl,Rd = A_v f_y / (√3 γ_M0) E_d = 9.0 R_d = 451.9 kN	0.02
Plate shear (net)	EN 1993-1-1 6.2.6	V_Rd = A_v,net f_u / (√3 γ_M2) E_d = 9.0 R_d = 434.5 kN	0.02
Block tearing	3.10.2	V_eff,Rd = f_u A_nt / γ_M2 + f_y A_nv / (√3 γ_M0) E_d = 9.0 R_d = 389.2 kN	0.02
Welds on the support	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 9.0 R_d = 553.2 kN	0.02

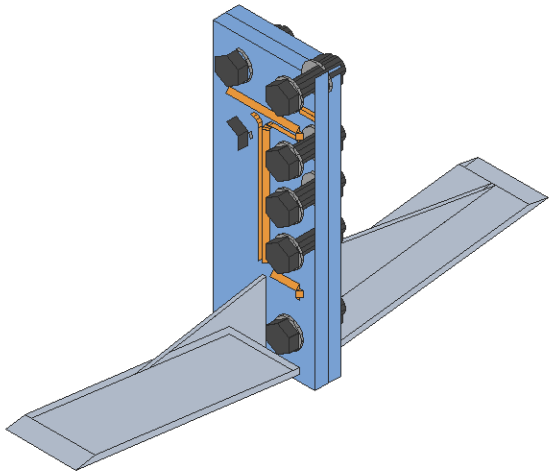
Result: 0.05 (Governing: Bearing in the beam web) OK

Portal Joint × 4

Mark: B8 / B9, B10 / B11, B12 / B13, B14 / B15
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Apex
Column	IPE 220
Plate	2 x PL 160x423x20 S355
Anchors	10 x M24x80 10.9
Weld	a6 all around
Weight	27.2



Parts of the connection

Design forces

V_Ed (kN)	**48.0 kN**
M_Ed (kNm)	**30.0 kNm**

Resistance checks

Check	Clause	Formula	Utilization
Joint moment M_j,Rd (component method)	6.2.7.2	M_j,Rd = Σ h_r F_tr,Rd E_d = 30.0 R_d = 177.2 kNm	0.17
Welds of the tension flange	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 140.2 R_d = 331.9 kN	0.42
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 48.0 R_d = 1007.2 kN	0.05
Welds of the beam web	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 48.0 R_d = 617.7 kN	0.08

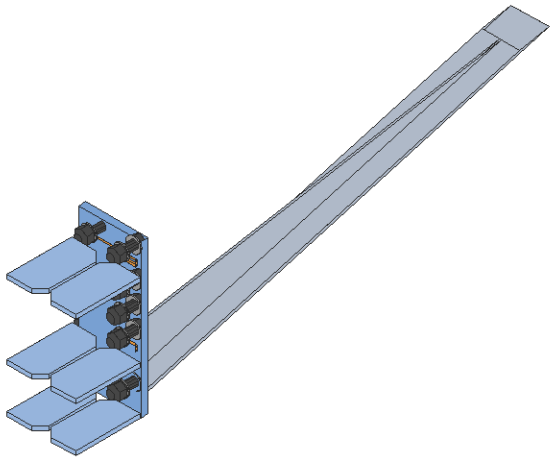
Result: 0.42 (Governing: Welds of the tension flange) OK

Portal Joint × 8

Mark: B8 / C9, B9 / C10, B10 / C11, B11 / C12, B12 / C13, B13 / C14, B14 / C15, B15 / C16
Design code: EN 1993-1-8, annex EN (γ_M0 1.00, γ_M1 1.00, γ_M2 1.25), anchors EN 1992-4

Connection data

Type	Knee
Column	IPE 220 / HEA 220
Plate	PL 180x443x20 S355
Anchors	10 x M24x70 10.9
Weld	a6 all around
Weight	35.2



Parts of the connection

Design forces

V_Ed (kN)	**48.0 kN**
M_Ed (kNm)	**60.0 kNm**

Resistance checks

Check	Clause	Formula	Utilization
Joint moment M_j,Rd (component method)	6.2.7.2	M_j,Rd = Σ h_r F_tr,Rd E_d = 60.0 R_d = 139.7 kNm	0.43
Welds of the tension flange	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 280.3 R_d = 331.9 kN	0.84
Bolt shear	Table 3.4	F_v,Rd = α_v f_ub A / γ_M2 E_d = 48.0 R_d = 1007.2 kN	0.05
Welds of the beam web	4.5.3.3	F_w,Rd = a f_u / (√3 β_w γ_M2) E_d = 48.0 R_d = 617.7 kN	0.08

Result: 0.84 (Governing: Welds of the tension flange) OK