STATICKÝ VÝPOČET

NÁZOV STAVBY: Rekonštrukcia a prístavba strediska čistoty

MIESTO STAVBY: P.Č.: 475/91, 475/91, Bratislava - Rača

INVESTOR: Mestská časť – Bratislava - Rača

STUPEŇ DOKUMENT.: RP-rev.2

DÁTUM: 05/2021

VYPRACOVAL: Ing. Pavol Kohutiar

MERA KOHUTIAR s.r.o.
RYBNIČNÁ 40
831 06 BRATISLAVA
IČO: 50 913 522
DIČ: SK 212 052 9070
WWW.MERA-KOHUTIAR.SK

ZOZNAM

A. TECHNICKÁ SPRÁVA

A 1. Východiskové podklady:

Projekt architektúry – RB ARCHITECTS s.r.o..

A 2. Neoddeliteľná súčasť výpočtu:

Výkresová dokumentácia – Statika

A 3. Popis objektu:

Projektová dokumentácia časť statika rieši nosné konštrukcie oceľovej prístavby strediska čistoty – Bratislava Rača. Ide o samostatný prevádzkový objekt prístupný z verejnej komunikácie. Jedná sa jednopodlažný objekt obdĺžnikového pôdorysného tvaru – 13,9m x 7,125m s plochou strechou s výškou +3,6m nad +0,000. Objekt je vsadený do mierneho svahu.

Jednopodlažný objekt:

- Pôdorysná modulácia: 13,9m x 7,125m
- Výšková modulácia: 3,60m
- Dilatačné celky: 1 dilatačný celok
- Základová konštrukcia: železobetónové základové pätky
- Stuženie: diagonálne

VÝKOPY

Ak sa v základovej škáre výkopov objektu objaví nevhodná zemina, je nutné ju vyťažiť a nahradiť prostým betónom C12/15. Geologický prieskum pre daný objekt nebol vykonaný, v projekte sa uvažuje s únosnosťou $\mathbf{R_{dt} = 200}$ **kPa.** Pri výkopových prácach bude prizvaný statik a geológ k zhodnoteniu základových pomerov. Spätné zásypy sa zhutnia na minimálnu hodnotu $\mathbf{E_{def,2} = 80}$**MPa**, po jednotlivých vrstvách maximálnej hrúbky 150mm.

ZÁKLADY

Oceľová konštrukcia je založená na železobetónových základových pätkách 1000x1000mm, 1000x1500mm a 700x2000mm výšky 800mm C20/25, hĺbka základovej škáry je min.1,2m od terénu. Základová škára je vyrovnaná podkladným betónom min. hr.100mm C12/15. Základové pätky sú vzájomne prepojené základovým monolitickým pásom 400x2250mm z betónu C20/25. Pred betonážou základov je nutné osadiť všetky inžinierske siete a bleskozvod. Napojenie na existujúce základy sa upraví na mieste počas výkopových prác.

ZVISLÉ NOSNÉ KONŠTRUKCIE

Oceľová konštrukcia je navrhnutá ako tuhá rámová s horizontálnym strešným a vertikálnym stenovým stužením. Nosné stĺpy sú výšky 3,6m, stĺpy JAKL 150x5 a 150x8 z ocele S235 a sú votknuté do základových pätiek pomocou oceľovej platne hr.30mm a kotevných skrutiek 4xM30-mat.8.8, stĺpy JAKL 120x5 z ocele S235 a sú votknuté do základových pätiek pomocou oceľovej platne hr.20mm a kotevných skrutiek 4xM20-mat.8.8. V modulovej osi B1 je priehradový väzník na rozpon 13,8m, výšky 850mm, s horným a spodným pásom z profilov JAKL 150x5, zvislicami JAKL 120x60x4 a diagonálami JAKL 70x4, strešné väznice IPE 200 sú na rozpon 4,55m vo vzájomnej vzdialenosti 1,15m s konzolovým vyložením 3,0m a montážnym stykom 0,72m od osi B za účelom demontáže konzolového prestrešenia, väznice sú uložené z hora na priehradový väzník.

V modulovej osi 5,7,9 sú zvislé stužujúce priehradové väzníky na rozpon 4,55m s výškou 0,7m, diagonály a zvislice sú z JAKL 40x3, spodný a horný pás JAKL 80x4. Strešné stuženie je v rovine/osi strešných väzníc z profilov JAKL 40x3. Zvislé vertikálne stuženie je z profilov JAKL 80x4. Všetky oceľové prvky sú z ocele S235 a spojovací materiál 8.8. Nosný plech strešného plášťa je TR35/207-0,63mm. Opláštenie objektu je tvorené trapézovým plechom, pre ktorý sú navrhnuté oceľové paždíky U120 v modulovej osi A1 a UPE200 v modulovej osi 9, paždíky sú od seba vertikálne 1250mm.

Oceľová konštrukcia musí byť napojená na uzemňovací systém. Náterový systém a farebné riešenie podľa projektu architektúry

A 4. NORMY, PREDPISY, SMERNICE

- STN EN 1990 Základy navrhovania
- STN EN 1991 Zaťaženie konštrukcií
- STN EN 1992 Navrhovanie betónových konštrukcií
- STN EN 1993 Navrhovanie oceľových konštrukcií
- STN EN 1994 Navrhovanie spriahnutých oceľových a betónových konštrukcií
- STN EN 1995 Navrhovanie drevených konštrukcií
- STN EN 1996 Navrhovanie murovaných konštrukcií
- STN EN 1997 Geotechnické navrhovanie
- STN EN 1998 Navrhovanie konštrukcií na odolnosť proti zemetraseniu
- STN EN 1999 Navrhovanie hliníkových konštrukcií

A 5. POUŽITÁ LITERATÚRA:

- I.HARVAN: Nosné betónové konštrukcie pozemných stavieb, KASI 4, 2001
- HULLA,TURČEK: Zakladanie stavieb, Jaga 1998

- P.DUTKO a kol.: Drevené konštrukcie, Príklady

A 6. POUŽITÉ MATERIÁLY:

- Betón je triedy C12/15, C20/25
- Betonárska výstuž je použitá z materiálu B500B
- S 235
- Spojovací materiál 8.8

B. ANALÝZA ZAŤAŽENIA

SKLADBA STRECHY		HRÚBKA	q_n	γ_f	q_d
		/ mm /	/ kN/m² /	/ - /	/ kN/m² /
STÁLE ZAŤAŽENIE	FATRAFOL + GEOTEXTÍLIA	-	0,05	1,35	0,0675
	OSB DOSKA	25	0,20	1,35	0,270
	TRAPÉZOVÝ PLECH – 35/207	0,63	0,06	1,35	0,081
			Σ 0,31	**1,35**	**Σ 0,420**

Premenné zaťaženie strechy : 0,75kN/m² 1,50 1,12kN/m²

ZAŤAŽENIE SNEHOM:

- snehová oblasť II. s_k= 1,05 kN/m²,

$s_n = \mu_i * C_e * C_t * s_k = 0,8 * 1,0 * 1,0 * 1,05 = 0,84$ kN/m²

ZAŤAŽENIE VETROM:

- vetrová oblasť II. v_b = 26 m/s;
- kategória terénu IV z_o = 0,05 m; z_{min} = 2 m
- výška konštrukcie h = 3,6 m
- špičkový tlak vetra q_p= 0,49 kN/m²

C. STATICKÝ VÝPOČET

C.1 Návrh a posúdenie nosných prvkov – 3D model

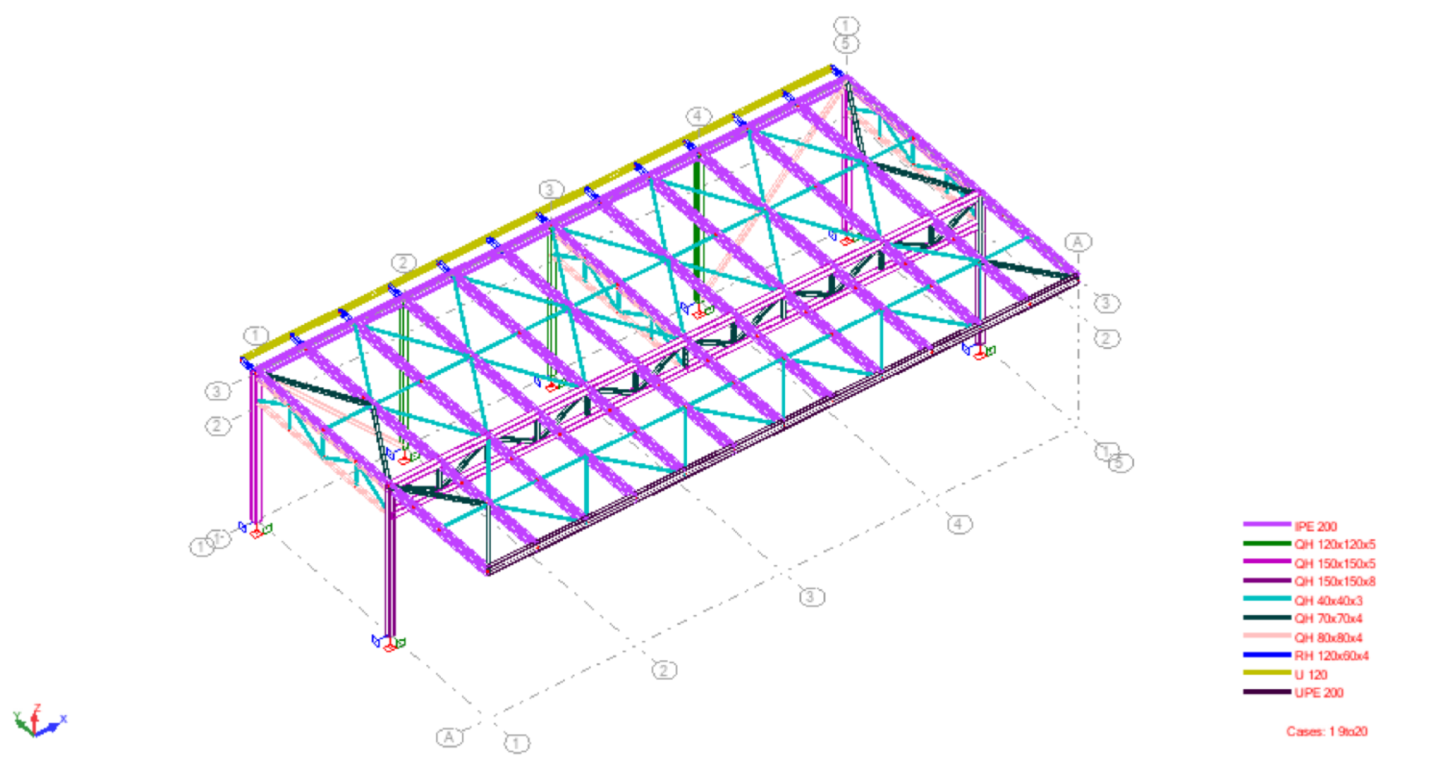
C.2 Návrh a posúdenie základov

V Novej Dedinke 05/2021 Ing.Pavol Kohutiar

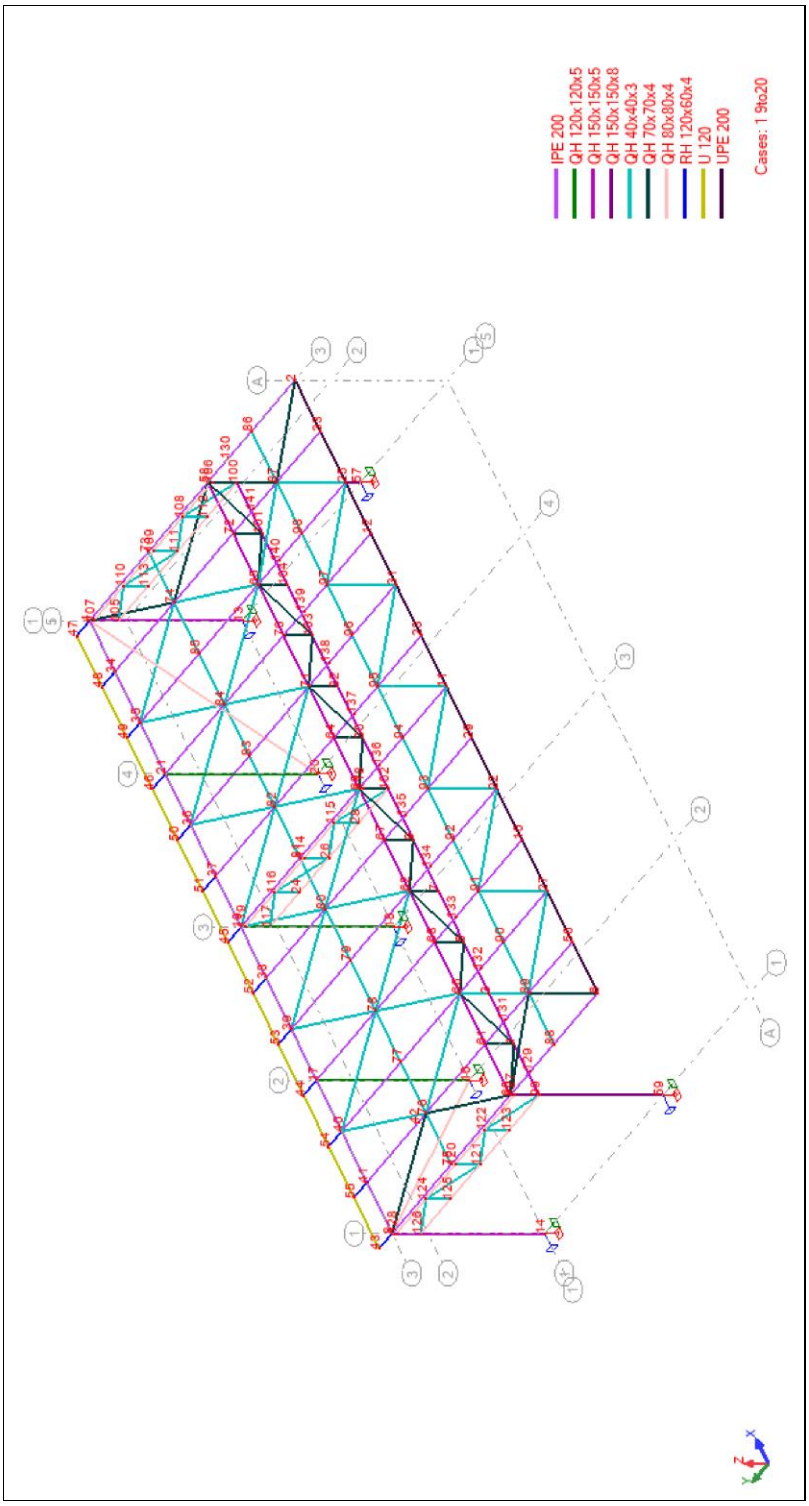
REKONŠTRUKCIA A PRÍSTAVBA STREDISKA ČISTENIA

Author : Ing. Pavol Kohutiar

3D Model


IPE 200
QH 120x120x5
QH 150x150x5
QH 150x150x8
QH 40x40x3
QH 70x70x4
QH 80x80x4
RH 120x60x4
U 120
UPE 200
Cases: 1 9to20

View - Nodes



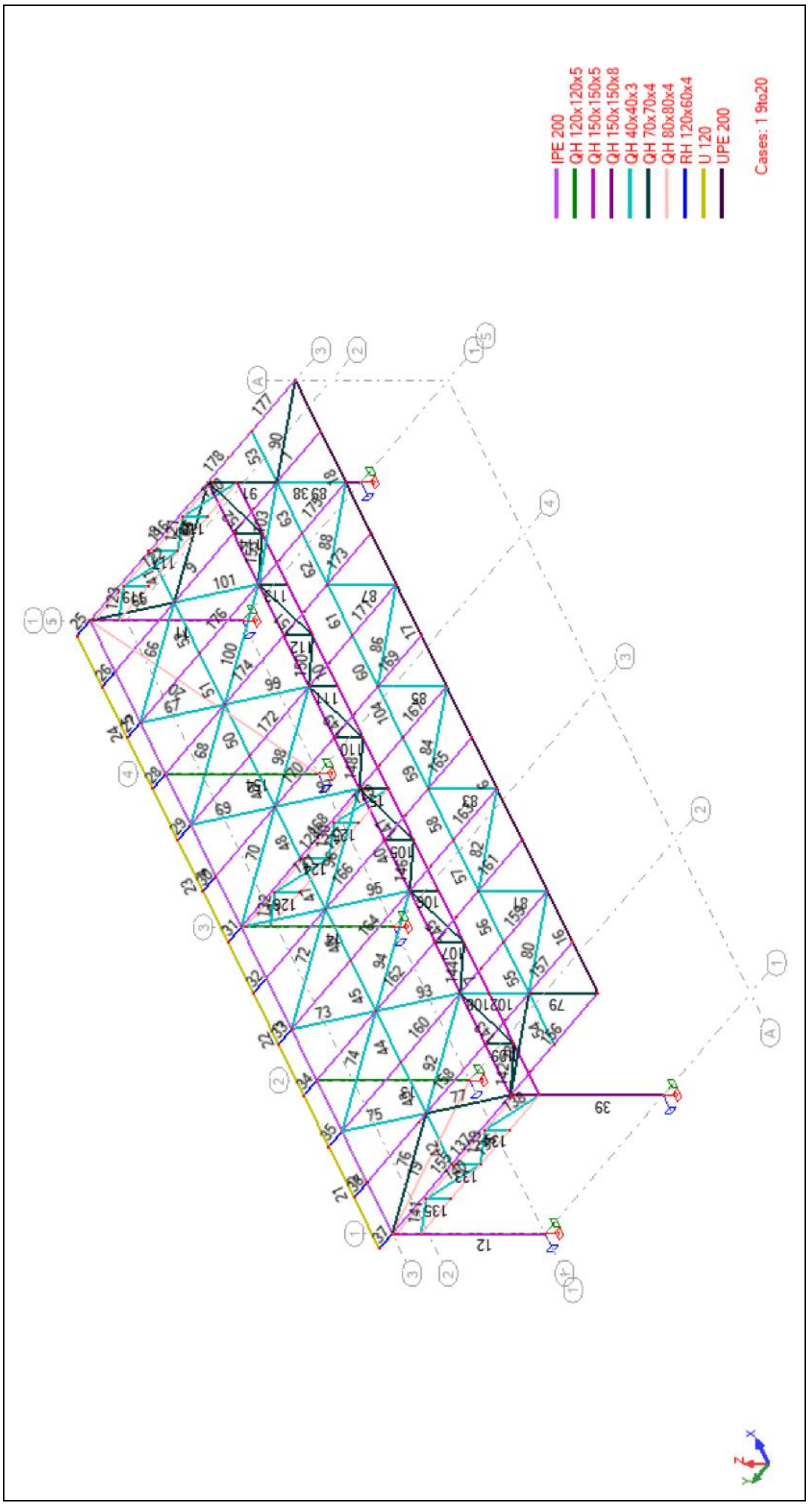
Data - Nodes

Node	X (m)	Y (m)	Z (m)	Support code	Support
1	1.15	3.03	2.92		
2	13.80	0.0	3.60		
3	2.30	3.03	2.92		
4	13.80	7.13	3.60		
5	3.45	3.03	2.92		
6	0.0	0.0	3.60		
7	4.60	3.03	2.92		
8	0.0	7.13	3.60		
9	5.75	3.03	2.92		
10	3.45	0.0	3.60		
11	6.90	0.0	3.60		
12	10.35	0.0	3.60		
13	13.80	7.13	0.0	xxxxxx	Fixed
14	0.0	7.13	0.0	xxxxxx	Fixed
16	3.45	7.13	0.0	xxxxxx	Fixed
17	3.45	7.13	3.60		
18	6.90	7.13	0.0	xxxxxx	Fixed
19	6.90	7.13	3.60		
20	10.35	7.13	0.0	xxxxxx	Fixed
21	10.35	7.13	3.60		
22	4.60	0.0	3.60		
23	8.05	0.0	3.60		
24	6.90	6.10	2.92		
25	11.50	0.0	3.60		
26	6.90	5.08	2.92		
27	2.30	0.0	3.60		
28	6.90	4.05	2.92		
29	5.75	0.0	3.60		
30	8.05	3.03	2.92		
31	9.20	0.0	3.60		
32	9.20	3.03	2.92		
33	12.65	0.0	3.60		
34	12.65	7.13	3.60		
35	11.50	7.13	3.60		
36	9.20	7.13	3.60		
37	8.05	7.13	3.60		
38	5.75	7.13	3.60		
39	4.60	7.13	3.60		
40	2.30	7.13	3.60		
41	1.15	7.13	3.60		
42	1.15	5.34	3.60		
43	0.0	7.58	3.60		
44	3.45	7.58	3.60		
45	6.90	7.58	3.60		
46	10.35	7.58	3.60		
47	13.80	7.58	3.60		
48	12.65	7.58	3.60		
49	11.50	7.58	3.60		
50	9.20	7.58	3.60		
51	8.05	7.58	3.60		
52	5.75	7.58	3.60		
53	4.60	7.58	3.60		
54	2.30	7.58	3.60		
55	1.15	7.58	3.60		

Node	X (m)	Y (m)	Z (m)	Support code	Support
56	1.15	0.0	3.60		
57	13.80	3.03	0.0	xxxxxx	Fixed
58	13.80	3.03	3.60		
59	0.0	3.03	0.0	xxxxxx	Fixed
60	0.0	3.03	3.60		
61	1.15	3.03	3.60		
62	4.60	3.03	3.60		
64	8.05	3.03	3.60		
65	11.50	3.03	3.60		
66	2.30	3.03	3.60		
67	5.75	3.03	3.60		
68	3.45	3.03	3.60		
69	6.90	3.03	3.60		
70	10.35	3.03	3.60		
71	9.20	3.03	3.60		
72	12.65	3.03	3.60		
73	13.80	5.08	3.60		
74	12.65	5.08	3.60		
75	0.0	5.08	3.60		
76	1.15	5.08	3.60		
77	2.30	5.08	3.60		
78	3.45	5.08	3.60		
79	4.60	5.08	3.60		
80	5.75	5.08	3.60		
81	6.90	5.08	3.60		
82	8.05	5.08	3.60		
83	9.20	5.08	3.60		
84	10.35	5.08	3.60		
85	11.50	5.08	3.60		
86	13.80	1.51	3.60		
87	12.65	1.51	3.60		
88	0.0	1.51	3.60		
89	1.15	1.51	3.60		
90	2.30	1.51	3.60		
91	3.45	1.51	3.60		
92	4.60	1.51	3.60		
93	5.75	1.51	3.60		
94	6.90	1.51	3.60		
95	8.05	1.51	3.60		
96	9.20	1.51	3.60		
97	10.35	1.51	3.60		
98	11.50	1.51	3.60		
99	0.0	3.03	2.92		
100	13.80	3.03	2.92		
101	12.65	3.03	2.92		
102	6.90	3.03	2.92		
103	10.35	3.03	2.92		
104	11.50	3.03	2.92		
105	13.80	7.13	2.92		
106	13.80	3.03	3.50		
107	13.80	7.13	3.50		
108	13.80	4.05	3.50		
109	13.80	5.08	3.50		
110	13.80	6.10	3.50		

Node	X (m)	Y (m)	Z (m)	Support code	Support
111	13.80	5.08	2.92		
112	13.80	4.05	2.92		
113	13.80	6.10	2.92		
114	6.90	5.08	3.50		
115	6.90	4.05	3.50		
116	6.90	6.10	3.50		
117	6.90	7.13	2.92		
118	6.90	3.03	3.50		
119	6.90	7.13	3.50		
120	0.0	5.08	3.50		
121	0.0	5.08	2.92		
122	0.0	4.05	3.50		
123	0.0	4.05	2.92		
124	0.0	6.10	3.50		
125	0.0	6.10	2.92		
126	0.0	7.13	2.92		
127	0.0	3.03	3.50		
128	0.0	7.13	3.50		
129	0.0	2.31	3.60		
130	13.80	2.31	3.60		
131	1.15	2.31	3.60		
132	2.30	2.31	3.60		
133	3.45	2.31	3.60		
134	4.60	2.31	3.60		
135	5.75	2.31	3.60		
136	6.90	2.31	3.60		
137	8.05	2.31	3.60		
138	9.20	2.31	3.60		
139	10.35	2.31	3.60		
140	11.50	2.31	3.60		
141	12.65	2.31	3.60		
73	13.80	5.08	3.60		

View - Elements



Data - Bars

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)	Type
1	33	141	IPE 200	S 235	2.31	0.0	IPE 200
2	8	17	IPE 200	S 235	3.45	0.0	IPE 200
3	17	19	IPE 200	S 235	3.45	0.0	IPE 200
4	19	21	IPE 200	S 235	3.45	0.0	IPE 200
5	21	4	IPE 200	S 235	3.45	0.0	IPE 200
6	10	11	UPE 200	S 235	3.45	0.0	IPE 200
7	99	102	QH 150x150x5	S 235	6.90	0.0	IPE 200
8	58	4	IPE 200	S 235	4.10	0.0	IPE 200
9	141	34	IPE 200	S 235	4.82	0.0	IPE 200
10	102	100	QH 150x150x5	S 235	6.90	0.0	IPE 200
11	13	4	QH 150x150x5	S 235	3.60	0.0	Stlp
12	14	8	QH 150x150x5	S 235	3.60	0.0	Stlp
13	16	17	QH 120x120x5	S 235	3.60	0.0	Stlp
14	18	19	QH 120x120x5	S 235	3.60	0.0	Stlp
15	102	69	QH 70x70x4	S 235	0.68	90.0	Simple bar
16	6	10	UPE 200	S 235	3.45	0.0	IPE 200
17	11	12	UPE 200	S 235	3.45	0.0	IPE 200
18	12	2	UPE 200	S 235	3.45	0.0	IPE 200
19	8	16	QH 80x80x4	S 235	4.99	0.0	Simple bar
20	4	20	QH 80x80x4	S 235	4.99	0.0	Simple bar
21	43	44	U 120	S 235	3.45	0.0	IPE 200
22	44	45	U 120	S 235	3.45	0.0	IPE 200
23	45	46	U 120	S 235	3.45	0.0	IPE 200
24	46	47	U 120	S 235	3.45	0.0	IPE 200
25	4	47	RH 120x60x4	S 235	0.45	0.0	IPE 200
26	34	48	RH 120x60x4	S 235	0.45	0.0	IPE 200
27	35	49	RH 120x60x4	S 235	0.45	0.0	IPE 200
28	21	46	RH 120x60x4	S 235	0.45	0.0	IPE 200
29	36	50	RH 120x60x4	S 235	0.45	0.0	IPE 200
30	37	51	RH 120x60x4	S 235	0.45	0.0	IPE 200
31	19	45	RH 120x60x4	S 235	0.45	0.0	IPE 200
32	38	52	RH 120x60x4	S 235	0.45	0.0	IPE 200
33	39	53	RH 120x60x4	S 235	0.45	0.0	IPE 200
34	17	44	RH 120x60x4	S 235	0.45	0.0	IPE 200
35	40	54	RH 120x60x4	S 235	0.45	0.0	IPE 200
36	41	55	RH 120x60x4	S 235	0.45	0.0	IPE 200
37	8	43	RH 120x60x4	S 235	0.45	0.0	IPE 200
38	57	58	QH 150x150x8	S 235	3.60	0.0	Stlp
39	59	60	QH 150x150x8	S 235	3.60	0.0	Stlp
40	60	58	QH 150x150x5	S 235	13.80	0.0	IPE 200
41	73	74	QH 40x40x3	S 235	1.15	0.0	Simple bar
42	75	76	QH 40x40x3	S 235	1.15	0.0	Simple bar
43	76	77	QH 40x40x3	S 235	1.15	0.0	Simple bar
44	77	78	QH 40x40x3	S 235	1.15	0.0	Simple bar
45	78	79	QH 40x40x3	S 235	1.15	0.0	Simple bar
46	79	80	QH 40x40x3	S 235	1.15	0.0	Simple bar
47	80	81	QH 40x40x3	S 235	1.15	0.0	Simple bar
48	81	82	QH 40x40x3	S 235	1.15	0.0	Simple bar
49	82	83	QH 40x40x3	S 235	1.15	0.0	Simple bar
50	83	84	QH 40x40x3	S 235	1.15	0.0	Simple bar
51	84	85	QH 40x40x3	S 235	1.15	0.0	Simple bar
52	85	74	QH 40x40x3	S 235	1.15	0.0	Simple bar
53	86	87	QH 40x40x3	S 235	1.15	0.0	Simple bar
54	88	89	QH 40x40x3	S 235	1.15	0.0	Simple bar

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)	Type
55	89	90	QH 40x40x3	S 235	1.15	0.0	Simple bar
56	90	91	QH 40x40x3	S 235	1.15	0.0	Simple bar
57	91	92	QH 40x40x3	S 235	1.15	0.0	Simple bar
58	92	93	QH 40x40x3	S 235	1.15	0.0	Simple bar
59	93	94	QH 40x40x3	S 235	1.15	0.0	Simple bar
60	95	96	QH 40x40x3	S 235	1.15	0.0	Simple bar
61	96	97	QH 40x40x3	S 235	1.15	0.0	Simple bar
62	97	98	QH 40x40x3	S 235	1.15	0.0	Simple bar
63	98	87	QH 40x40x3	S 235	1.15	0.0	Simple bar
64	58	74	QH 70x70x4	S 235	2.35	0.0	Simple bar
65	74	4	QH 70x70x4	S 235	2.35	0.0	Simple bar
66	74	35	QH 40x40x3	S 235	2.35	0.0	Simple bar
67	35	84	QH 40x40x3	S 235	2.35	0.0	Simple bar
68	84	36	QH 40x40x3	S 235	2.35	0.0	Simple bar
69	36	82	QH 40x40x3	S 235	2.35	0.0	Simple bar
70	82	19	QH 40x40x3	S 235	2.35	0.0	Simple bar
71	19	80	QH 40x40x3	S 235	2.35	0.0	Simple bar
72	80	39	QH 40x40x3	S 235	2.35	0.0	Simple bar
73	39	78	QH 40x40x3	S 235	2.35	0.0	Simple bar
74	78	40	QH 40x40x3	S 235	2.35	0.0	Simple bar
75	40	76	QH 40x40x3	S 235	2.35	0.0	Simple bar
76	76	8	QH 70x70x4	S 235	2.35	0.0	Simple bar
77	76	60	QH 70x70x4	S 235	2.35	0.0	Simple bar
78	60	89	QH 70x70x4	S 235	1.90	0.0	Simple bar
79	89	6	QH 70x70x4	S 235	1.90	0.0	Simple bar
80	89	27	QH 40x40x3	S 235	1.90	0.0	Simple bar
81	27	91	QH 40x40x3	S 235	1.90	0.0	Simple bar
82	91	22	QH 40x40x3	S 235	1.90	0.0	Simple bar
83	22	93	QH 40x40x3	S 235	1.90	0.0	Simple bar
84	93	11	QH 40x40x3	S 235	1.90	0.0	Simple bar
85	11	95	QH 40x40x3	S 235	1.90	0.0	Simple bar
86	95	31	QH 40x40x3	S 235	1.90	0.0	Simple bar
87	31	97	QH 40x40x3	S 235	1.90	0.0	Simple bar
88	97	25	QH 40x40x3	S 235	1.90	0.0	Simple bar
89	25	87	QH 40x40x3	S 235	1.90	0.0	Simple bar
90	87	2	QH 70x70x4	S 235	1.90	0.0	Simple bar
91	87	58	QH 70x70x4	S 235	1.90	0.0	Simple bar
92	76	66	QH 40x40x3	S 235	2.35	0.0	Simple bar
93	66	78	QH 40x40x3	S 235	2.35	0.0	Simple bar
94	78	62	QH 40x40x3	S 235	2.35	0.0	Simple bar
95	62	80	QH 40x40x3	S 235	2.35	0.0	Simple bar
96	80	69	QH 40x40x3	S 235	2.35	0.0	Simple bar
97	69	82	QH 40x40x3	S 235	2.35	0.0	Simple bar
98	82	71	QH 40x40x3	S 235	2.35	0.0	Simple bar
99	71	84	QH 40x40x3	S 235	2.35	0.0	Simple bar
100	84	65	QH 40x40x3	S 235	2.35	0.0	Simple bar
101	65	74	QH 40x40x3	S 235	2.35	0.0	Simple bar
102	89	66	QH 40x40x3	S 235	1.90	0.0	Simple bar
103	87	65	QH 40x40x3	S 235	1.90	0.0	Simple bar
104	95	94	QH 40x40x3	S 235	1.15	0.0	Simple bar
105	9	67	QH 70x70x4	S 235	0.68	90.0	Simple bar
106	7	62	QH 70x70x4	S 235	0.68	90.0	Simple bar
107	5	68	QH 70x70x4	S 235	0.68	90.0	Simple bar
108	3	66	QH 70x70x4	S 235	0.68	90.0	Simple bar

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)	Type
109	1	61	QH 70x70x4	S 235	0.68	90.0	Simple bar
110	30	64	QH 70x70x4	S 235	0.68	90.0	Simple bar
111	32	71	QH 70x70x4	S 235	0.68	90.0	Simple bar
112	103	70	QH 70x70x4	S 235	0.68	90.0	Simple bar
113	104	65	QH 70x70x4	S 235	0.68	90.0	Simple bar
114	101	72	QH 70x70x4	S 235	0.68	90.0	Simple bar
115	100	105	QH 80x80x4	S 235	4.10	0.0	IPE 200
116	106	107	QH 80x80x4	S 235	4.10	0.0	IPE 200
117	109	111	QH 40x40x3	S 235	0.58	0.0	Simple bar
118	108	112	QH 40x40x3	S 235	0.58	0.0	Simple bar
119	110	113	QH 40x40x3	S 235	0.58	0.0	Simple bar
120	100	108	QH 40x40x3	S 235	1.18	0.0	Simple bar
121	108	111	QH 40x40x3	S 235	1.18	0.0	Simple bar
122	111	110	QH 40x40x3	S 235	1.18	0.0	Simple bar
123	110	105	QH 40x40x3	S 235	1.18	0.0	Simple bar
124	114	26	QH 40x40x3	S 235	0.58	0.0	Simple bar
125	115	28	QH 40x40x3	S 235	0.58	0.0	Simple bar
126	116	24	QH 40x40x3	S 235	0.58	0.0	Simple bar
127	102	117	QH 80x80x4	S 235	4.10	0.0	IPE 200
128	118	119	QH 80x80x4	S 235	4.10	0.0	IPE 200
129	102	115	QH 40x40x3	S 235	1.18	0.0	Simple bar
130	115	26	QH 40x40x3	S 235	1.18	0.0	Simple bar
131	26	116	QH 40x40x3	S 235	1.18	0.0	Simple bar
132	116	117	QH 40x40x3	S 235	1.18	0.0	Simple bar
133	120	121	QH 40x40x3	S 235	0.58	0.0	Simple bar
134	122	123	QH 40x40x3	S 235	0.58	0.0	Simple bar
135	124	125	QH 40x40x3	S 235	0.58	0.0	Simple bar
136	99	126	QH 80x80x4	S 235	4.10	0.0	IPE 200
137	127	128	QH 80x80x4	S 235	4.10	0.0	IPE 200
138	99	122	QH 40x40x3	S 235	1.18	0.0	Simple bar
139	122	121	QH 40x40x3	S 235	1.18	0.0	Simple bar
140	121	124	QH 40x40x3	S 235	1.18	0.0	Simple bar
141	124	126	QH 40x40x3	S 235	1.18	0.0	Simple bar
142	60	1	QH 70x70x4	S 235	1.34	0.0	Simple bar
143	1	66	QH 70x70x4	S 235	1.34	0.0	Simple bar
144	66	5	QH 70x70x4	S 235	1.34	0.0	Simple bar
145	5	62	QH 70x70x4	S 235	1.34	0.0	Simple bar
146	62	9	QH 70x70x4	S 235	1.34	0.0	Simple bar
147	9	69	QH 70x70x4	S 235	1.34	0.0	Simple bar
148	69	30	QH 70x70x4	S 235	1.34	0.0	Simple bar
149	30	71	QH 70x70x4	S 235	1.34	0.0	Simple bar
150	71	103	QH 70x70x4	S 235	1.34	0.0	Simple bar
151	103	65	QH 70x70x4	S 235	1.34	0.0	Simple bar
152	101	58	QH 70x70x4	S 235	1.34	0.0	Simple bar
153	101	65	QH 70x70x4	S 235	1.34	0.0	Simple bar
154	20	21	QH 120x120x5	S 235	3.60	0.0	Stlp
155	8	129	IPE 200	S 235	4.82	0.0	IPE 200
156	129	6	IPE 200	S 235	2.31	0.0	IPE 200
157	56	131	IPE 200	S 235	2.31	0.0	IPE 200
158	131	41	IPE 200	S 235	4.82	0.0	IPE 200
159	27	132	IPE 200	S 235	2.31	0.0	IPE 200
160	132	40	IPE 200	S 235	4.82	0.0	IPE 200
161	10	133	IPE 200	S 235	2.31	0.0	IPE 200
162	133	17	IPE 200	S 235	4.82	0.0	IPE 200

Bar	Node 1	Node 2	Section	Material	Length (m)	Gamma (Deg)	Type
163	22	134	IPE 200	S 235	2.31	0.0	IPE 200
164	134	39	IPE 200	S 235	4.82	0.0	IPE 200
165	29	135	IPE 200	S 235	2.31	0.0	IPE 200
166	135	38	IPE 200	S 235	4.82	0.0	IPE 200
167	11	136	IPE 200	S 235	2.31	0.0	IPE 200
168	136	19	IPE 200	S 235	4.82	0.0	IPE 200
169	23	137	IPE 200	S 235	2.31	0.0	IPE 200
170	137	37	IPE 200	S 235	4.82	0.0	IPE 200
171	31	138	IPE 200	S 235	2.31	0.0	IPE 200
172	138	36	IPE 200	S 235	4.82	0.0	IPE 200
173	12	139	IPE 200	S 235	2.31	0.0	IPE 200
174	139	21	IPE 200	S 235	4.82	0.0	IPE 200
175	25	140	IPE 200	S 235	2.31	0.0	IPE 200
176	140	35	IPE 200	S 235	4.82	0.0	IPE 200
177	2	130	IPE 200	S 235	2.31	0.0	IPE 200
178	130	58	IPE 200	S 235	0.72	0.0	IPE 200

Data - Sections

Section name	Bar list	AX (mm2)	AY (mm2)	AZ (mm2)	IX (mm4)	IY (mm4)	IZ (mm4)
IPE 200	1to5 8 9 155to178	2850	1700	1120	70200	19400000	1420000
QH 40x40x3	41to63 66to75 80to8-9 92to104 117to126 129to135 138to141	434	240	240	151959	97800	97800
QH 150x150x5	7 10to12 40	2870	1500	1500	15243125	10020000	10020000
QH 120x120x5	13 14 154	2270	1200	1200	7604375	4980000	4980000
RH 120x60x4	25to37	1360	480	960	2010000	2490000	831000
U 120	21to24	1700	990	840	42800	3640000	432000
QH 150x150x8	38 39	4480	2400	2400	22906304	14910000	14910000
QH 70x70x4	15 64 65 76to79 90 91 105to114 142to1-53	1040	560	560	1149984	747000	747000
QH 80x80x4	19 20 115 116 127 128 136 137	1200	640	640	1755904	1140000	1140000
UPE 200	6 16to18	2900	1760	1200	88800	19090000	1870000

Data - Materials

	Material	E (MPa)	G (MPa)	NI	LX (1/°C)	RO (kN/m3)	Re (MPa)
1	S 235	210000.00	81000.00	0.30	0.00	77.01	235.00

Data - Supports

Support name	List of nodes	List of edges	List of objects	Support conditions
Fixed	13 14to20By2 57 59			UX UY UZ RX RY RZ

Loads - Cases

Case	Label	Case name	Nature	Analysis type
1	DL1	Vlastna vaha	Structural	Static - Linear
2	DL2	Stale zaťaženie	Non-structural	Static - Linear
3	DL21	Premenne zaťaženie	Category H	Static - Linear
4	DL211	Sneh	Snow H	Static - Linear
5	DL2111	Vietor +X	wind	Static - Linear
6	DL21111	Vietor -X	wind	Static - Linear
7	DL211111	Vietor +Y	wind	Static - Linear
8	DL2111111	Vietor -Y	wind	Static - Linear
9		ULS		Static - Linear
10		ULS+		Static - Linear
11		ULS-		Static - Linear
12		SLS		Static - Linear
13		SLS+		Static - Linear
14		SLS-		Static - Linear
15		SLS:CHR		Static - Linear
16		SLS:CHR+		Static - Linear
17		SLS:CHR-		Static - Linear
18		SLS:FRE		Static - Linear
19		SLS:FRE+		Static - Linear
20		SLS:FRE-		Static - Linear

Loads - Values

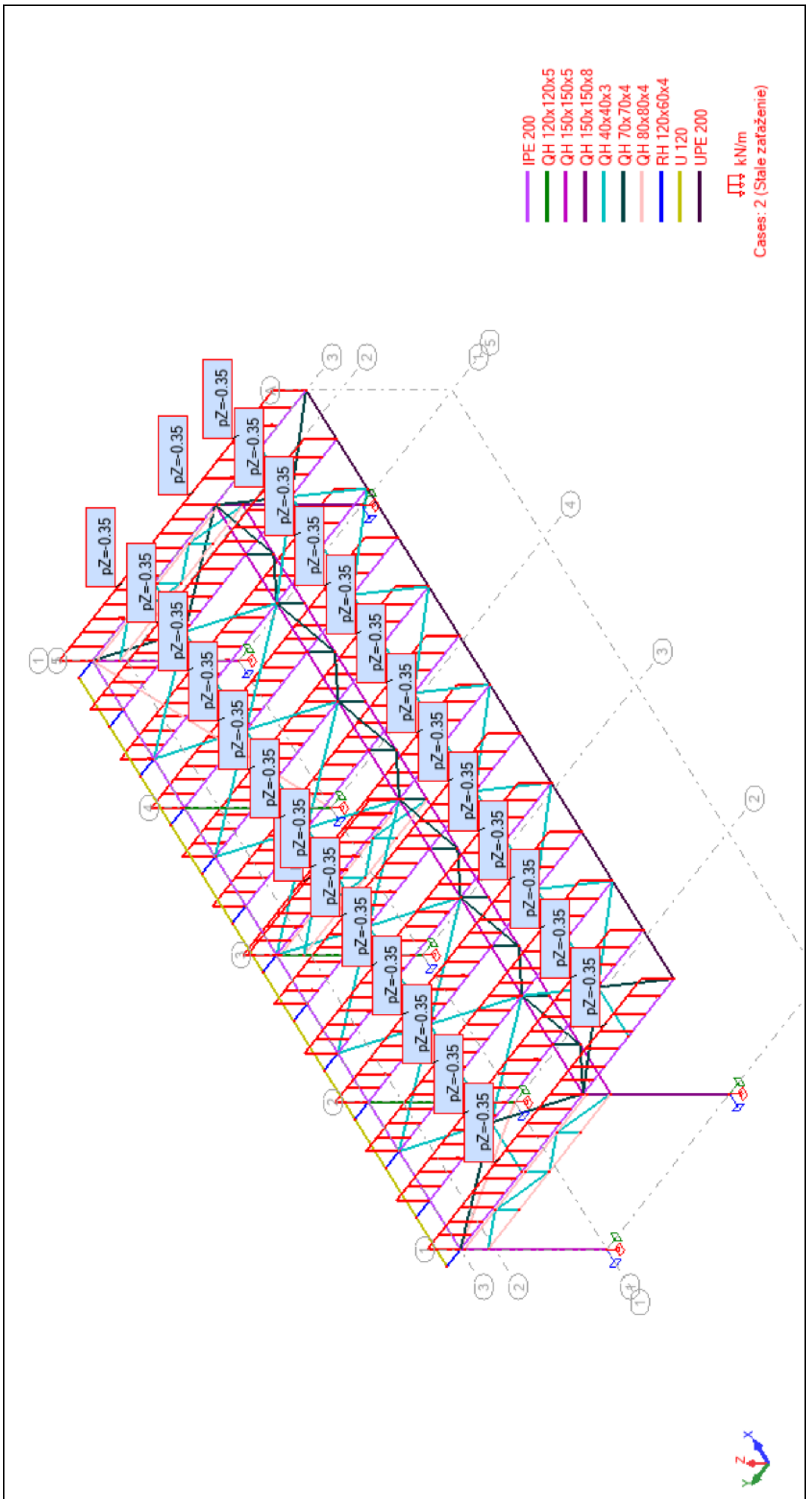
Case	Load type	List	Load values
1	self-weight	1to178	PZ Negative Factor=1.00
2	nodal force		FX=0.00(kN) FY=######(kN) FZ=0.00(kN) CX=######(kNm) CY=0.00(kNm) CZ=######(kNm) Alpha=0.0(Deg) Beta=0.0(Deg) Gamma=######(Deg)
2	nodal force		FX=0.0(kN) FY=0.0(kN) FZ=0.0(kN) Alpha=0.0(Deg) Beta=0.0(Deg) Gamma=0.0(Deg)
2	nodal force		FX=0.00(kN) FY=0.0(kN) FZ=0.0(kN) CZ=0.0(kNm) Alpha=0.0(Deg) Beta=0.0(Deg) Gamma=0.0(Deg)
2	uniform load	1 8 9 128 155to178	PZ=-0.35(kN/m)
3	uniform load	1 8 9 155to178	PZ=-0.85(kN/m)
4	uniform load	1 8 9 155to178	PZ=-1.00(kN/m)
5	uniform load	155 156	PX=1.00(kN/m)
5	uniform load	12 38 39	PX=0.25(kN/m)
5	uniform load	8 177 178	PX=0.60(kN/m)

Case	Load type	List	Load values
5	uniform load	1 8 9 155to178	PZ=0.35(kN/m)
5	uniform load	21to24	PY=0.60(kN/m)
5	uniform load		PY=-0.60(kN/m)
6	uniform load		PY=-0.60(kN/m)
6	uniform load	21to24	PY=0.60(kN/m)
6	uniform load	155 156	PX=-0.60(kN/m)
6	uniform load	8 177 178	PX=-1.00(kN/m)
6	uniform load	11 38 39	PX=-0.25(kN/m)
6	uniform load	1 8 9 155to178	PZ=0.35(kN/m)
7	uniform load	1 8 9 155to178	PZ=0.35(kN/m)
7	uniform load	21to24	PY=0.60(kN/m)
7	uniform load	8 177 178	PX=0.60(kN/m)
7	uniform load	155 156	PX=-0.60(kN/m)
7	uniform load	11 12 38 39	PY=0.25(kN/m)
8	uniform load	21to24	PY=-0.60(kN/m)
8	uniform load	1 8 9 155to178	PZ=0.35(kN/m)
8	uniform load	8 177 178	PX=0.60(kN/m)
8	uniform load	155 156	PX=-0.60(kN/m)
8	uniform load	11 12 38 39	PY=-0.25(kN/m)

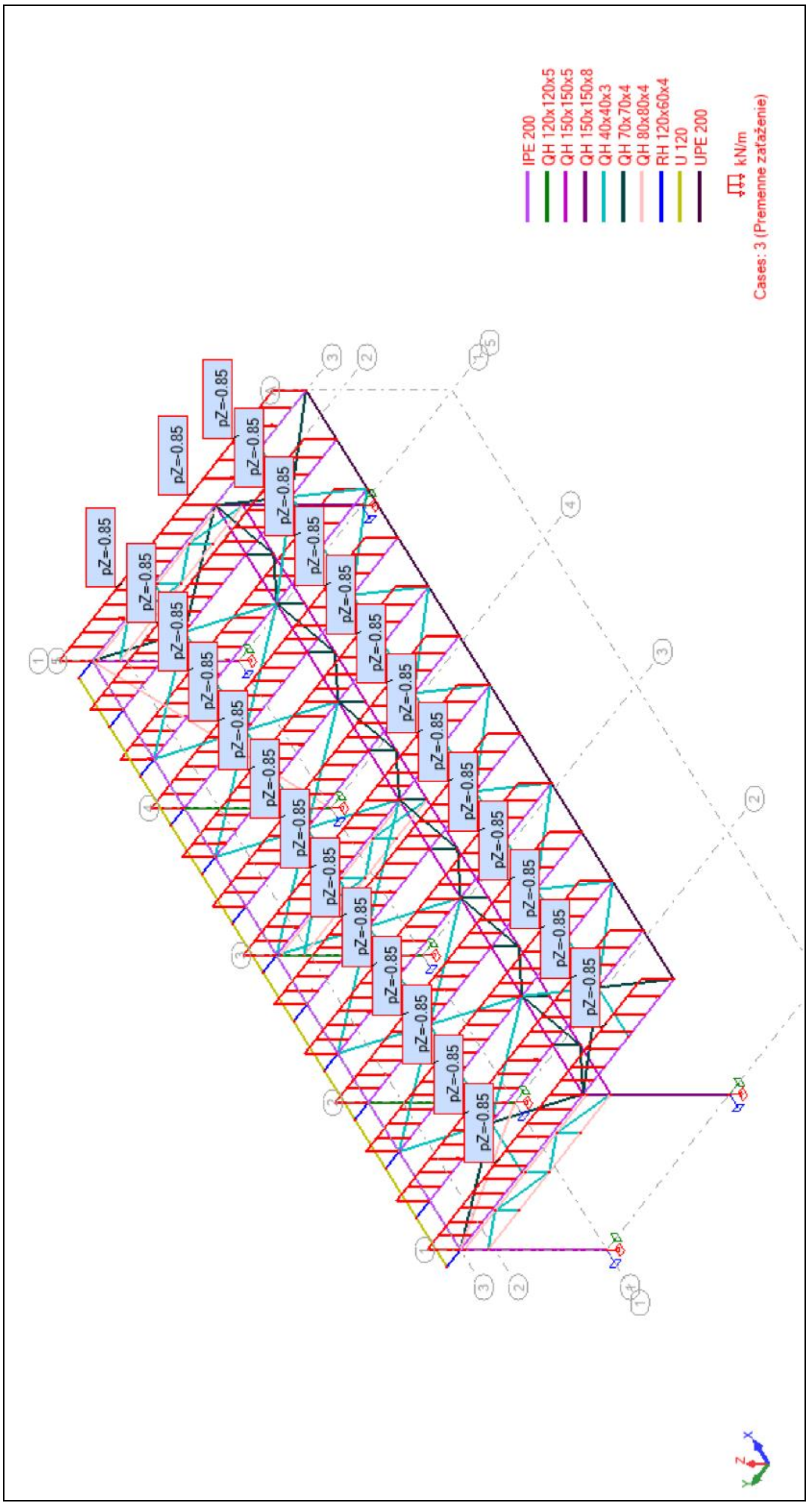
Combinations

Combinations	Name	Analysis type	Combi-nation type	Case nature	Definition

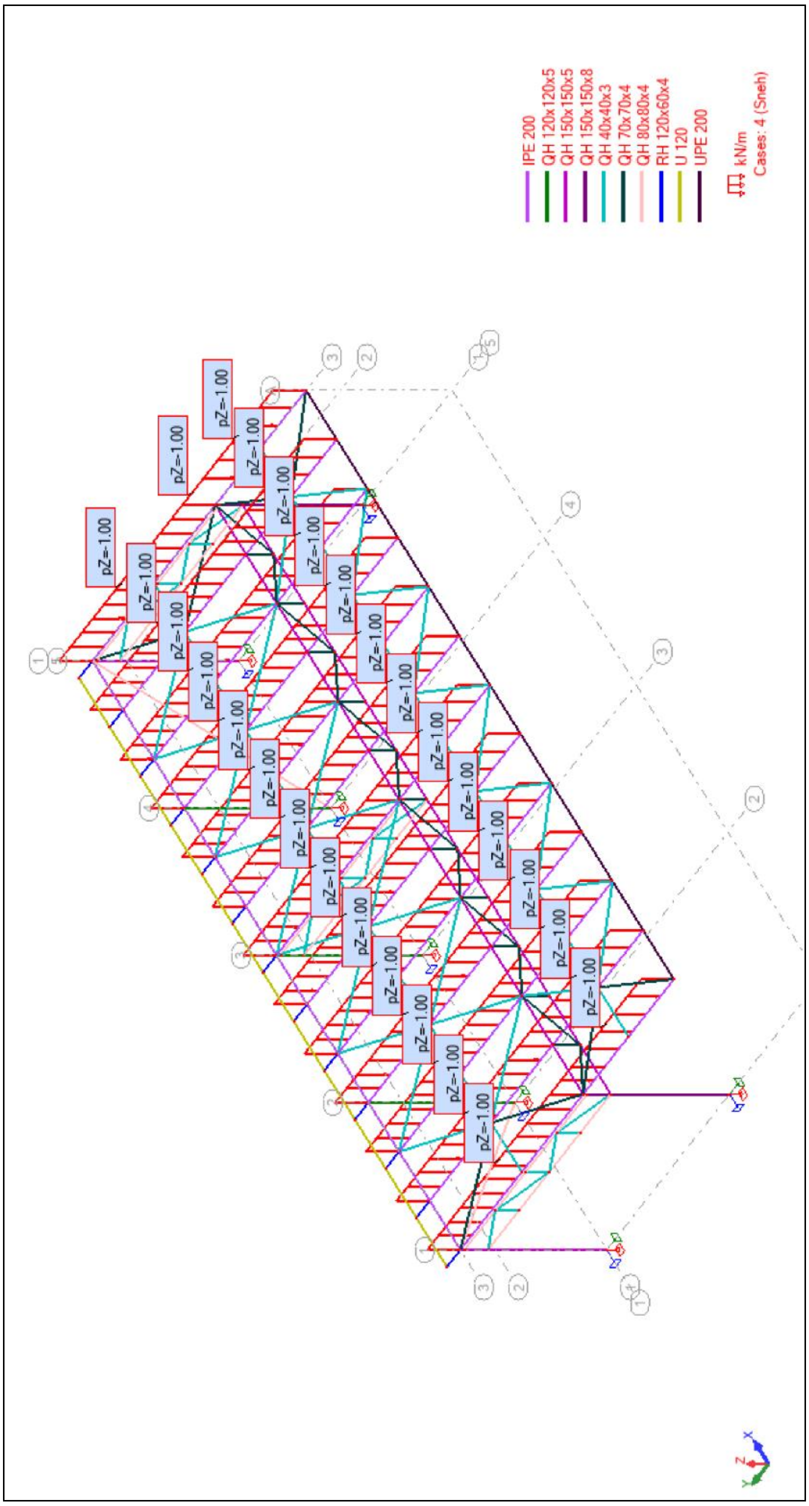
View - Cases: 2 (Stale zaťaženie) 1



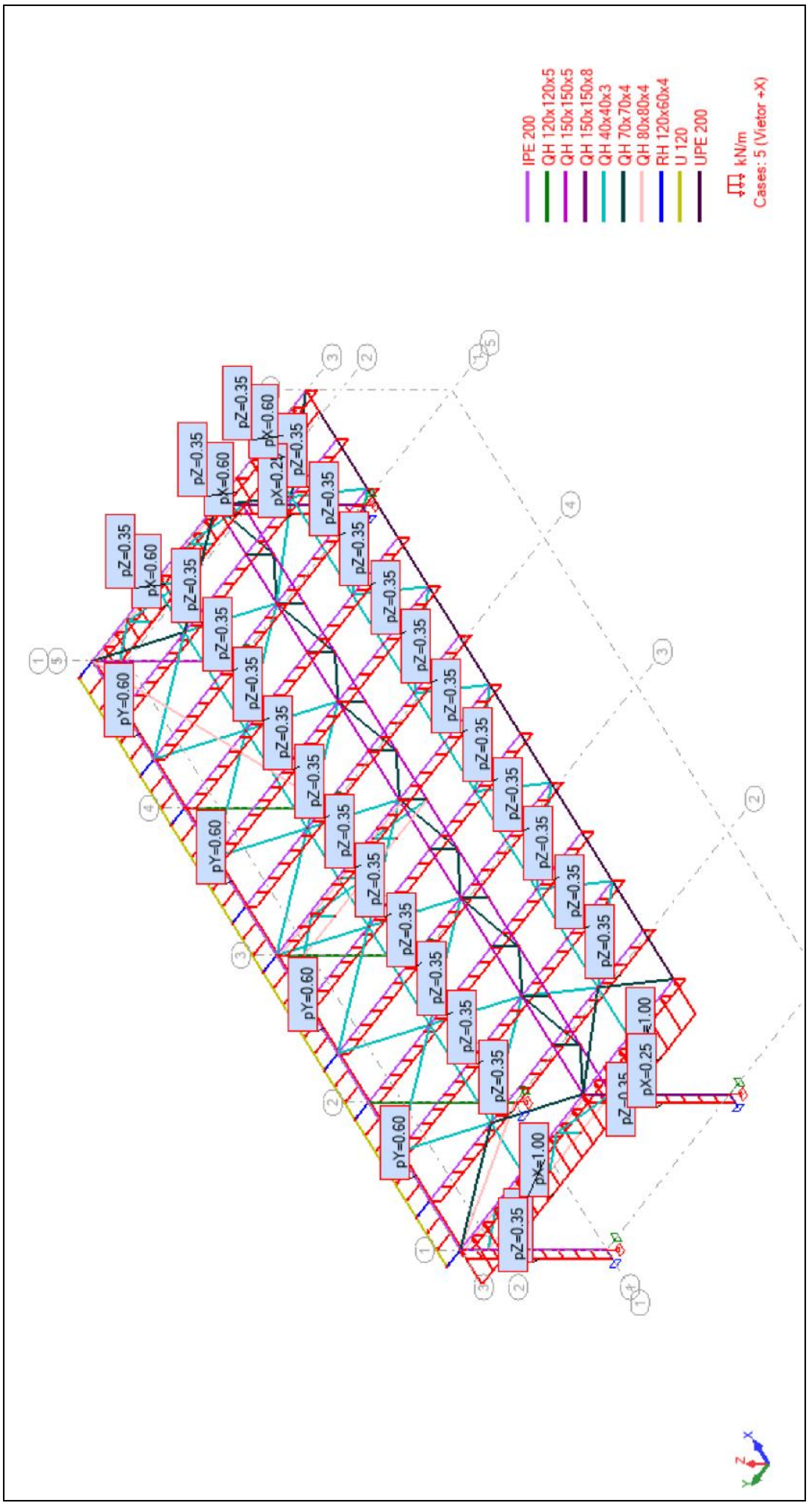
View - Cases: 3 (Premenne zaťaženie) 1



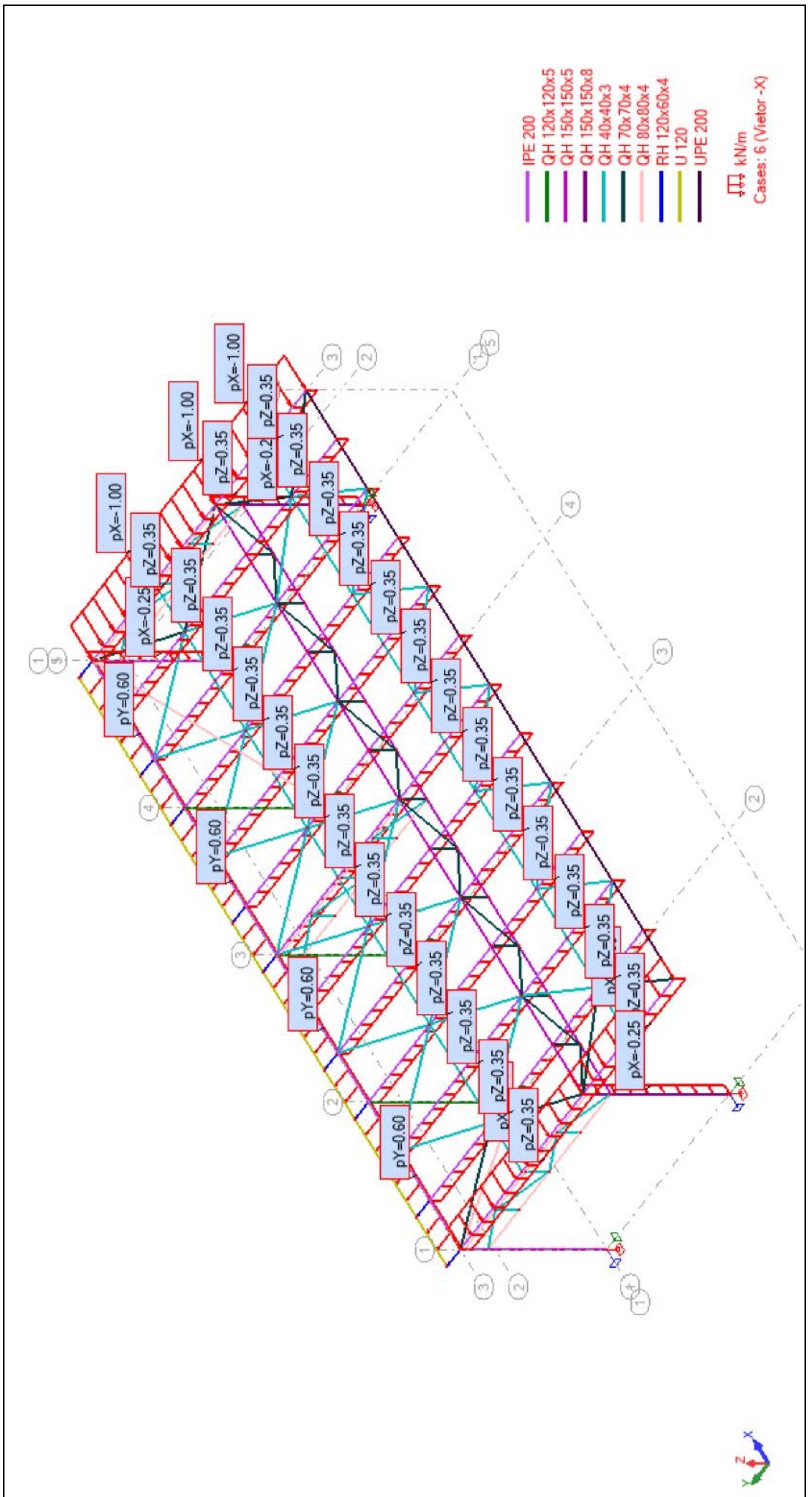
View - Cases: 4 (Sneh) 1



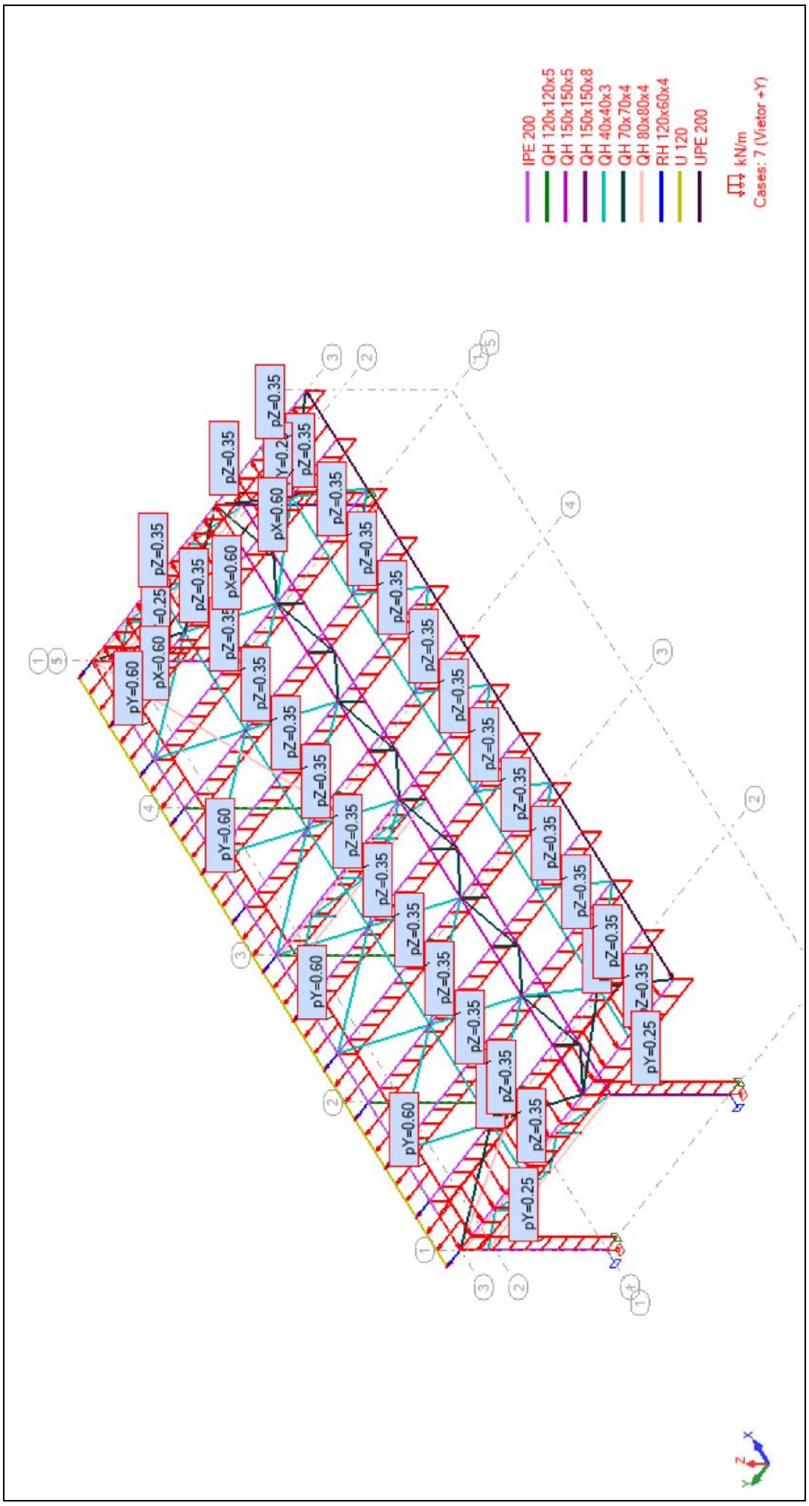
View - Cases: 5 (Vietor +X) 1



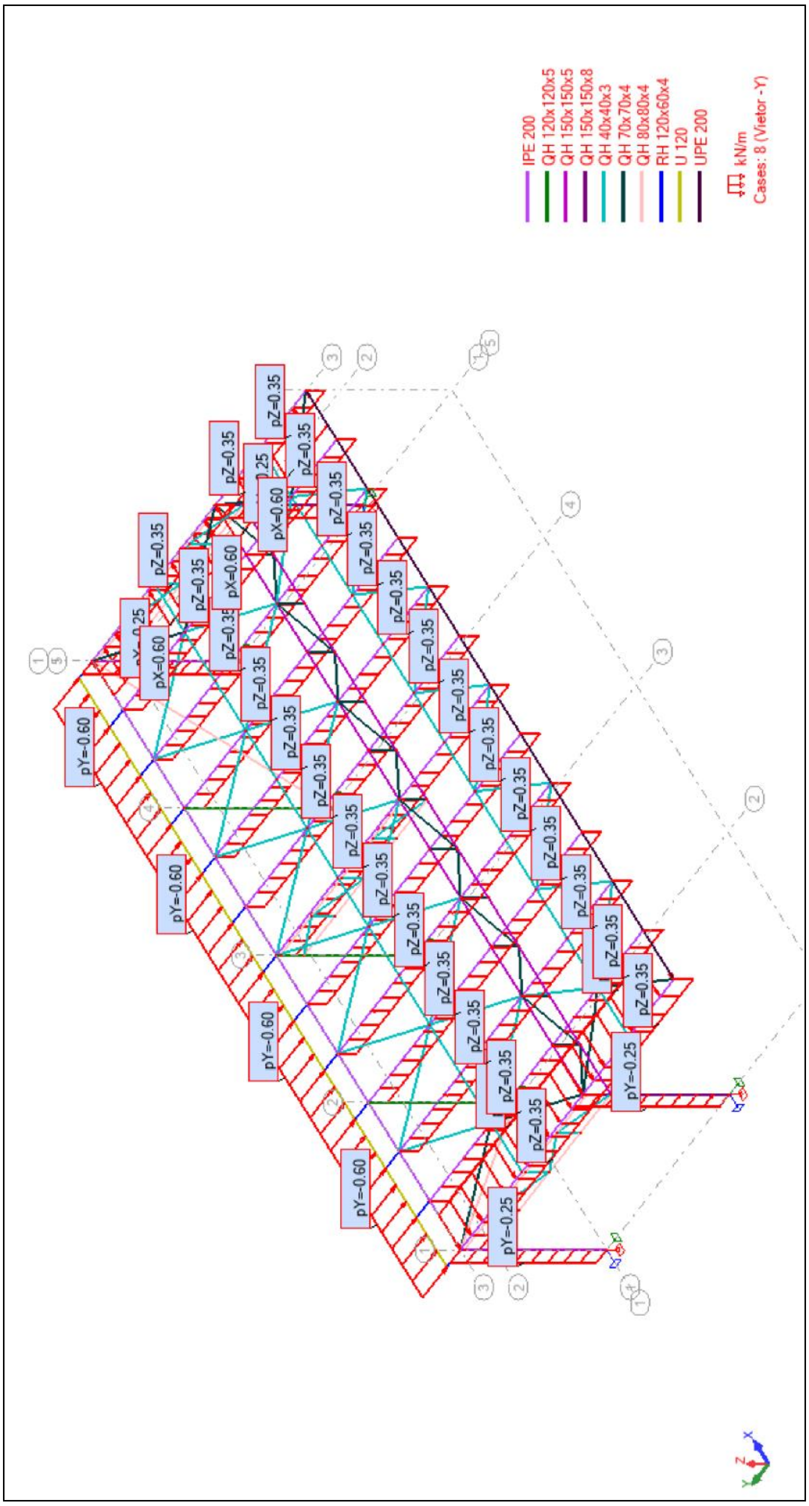
View - Cases: 6 (Vietor -X) 1



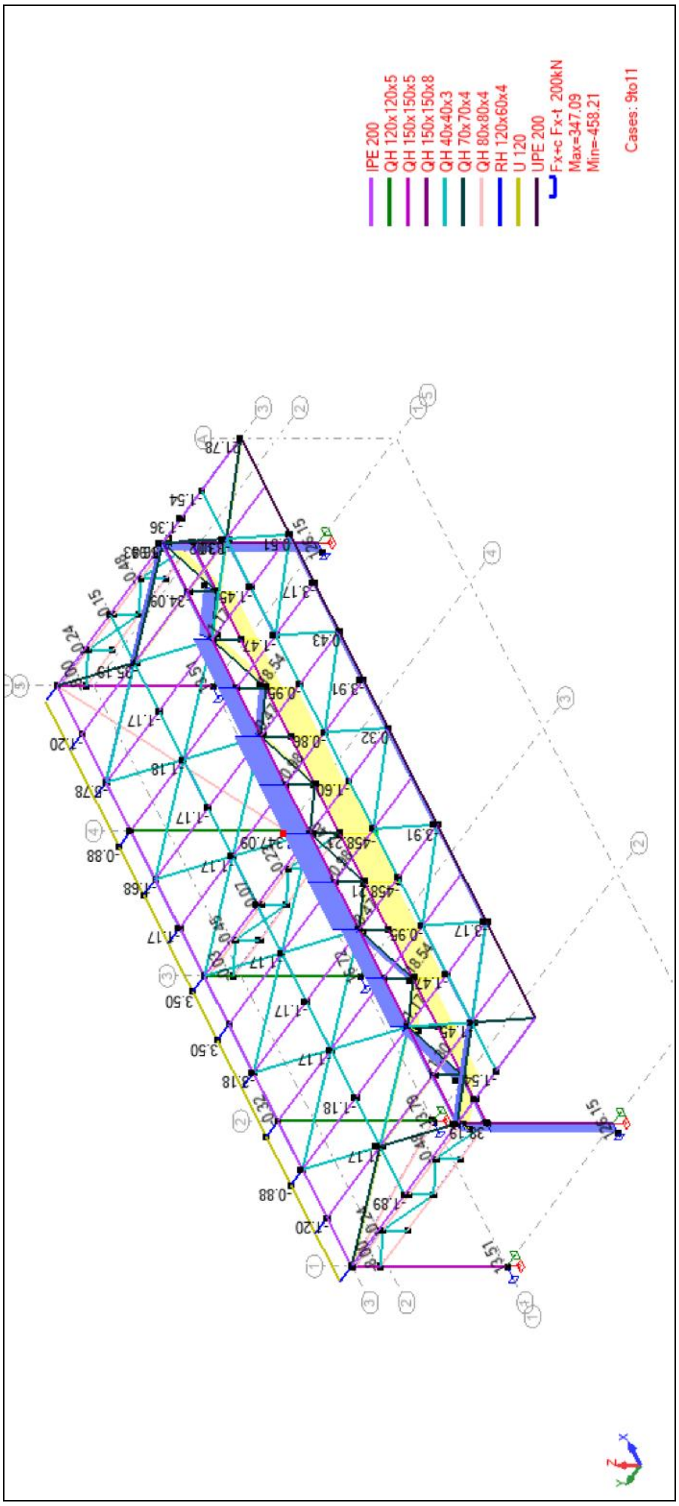
View - Cases: 7 (Vietor +Y) 1



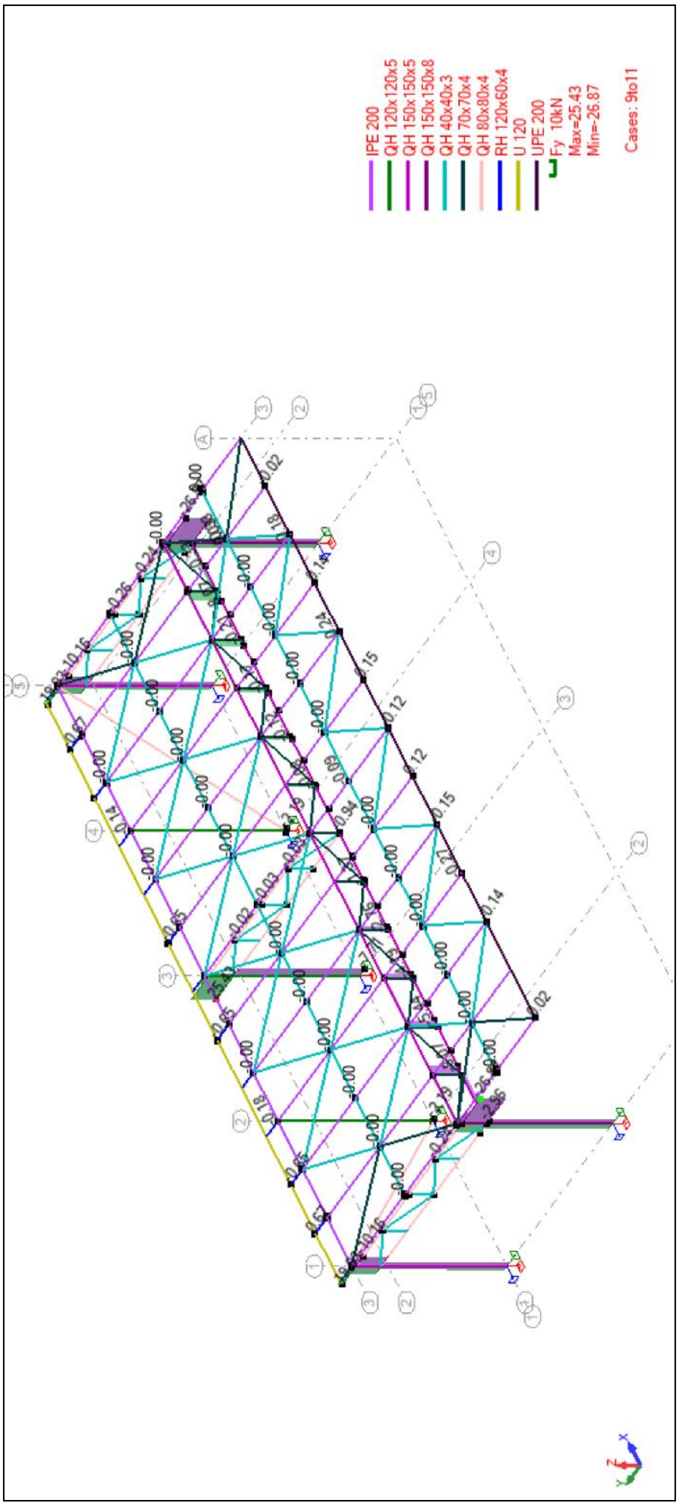
View - Cases: 8 (Vietor -Y) 1



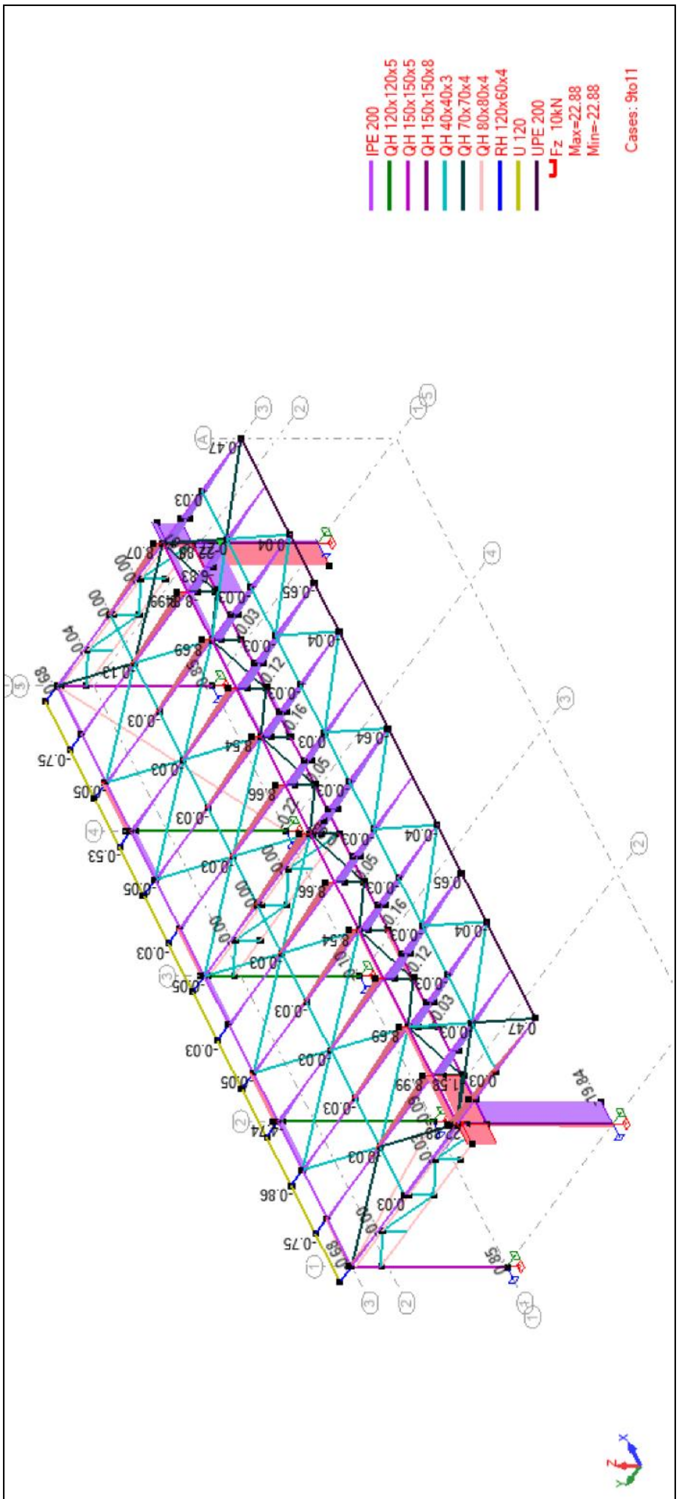
View - FX; Cases: 9to11 1



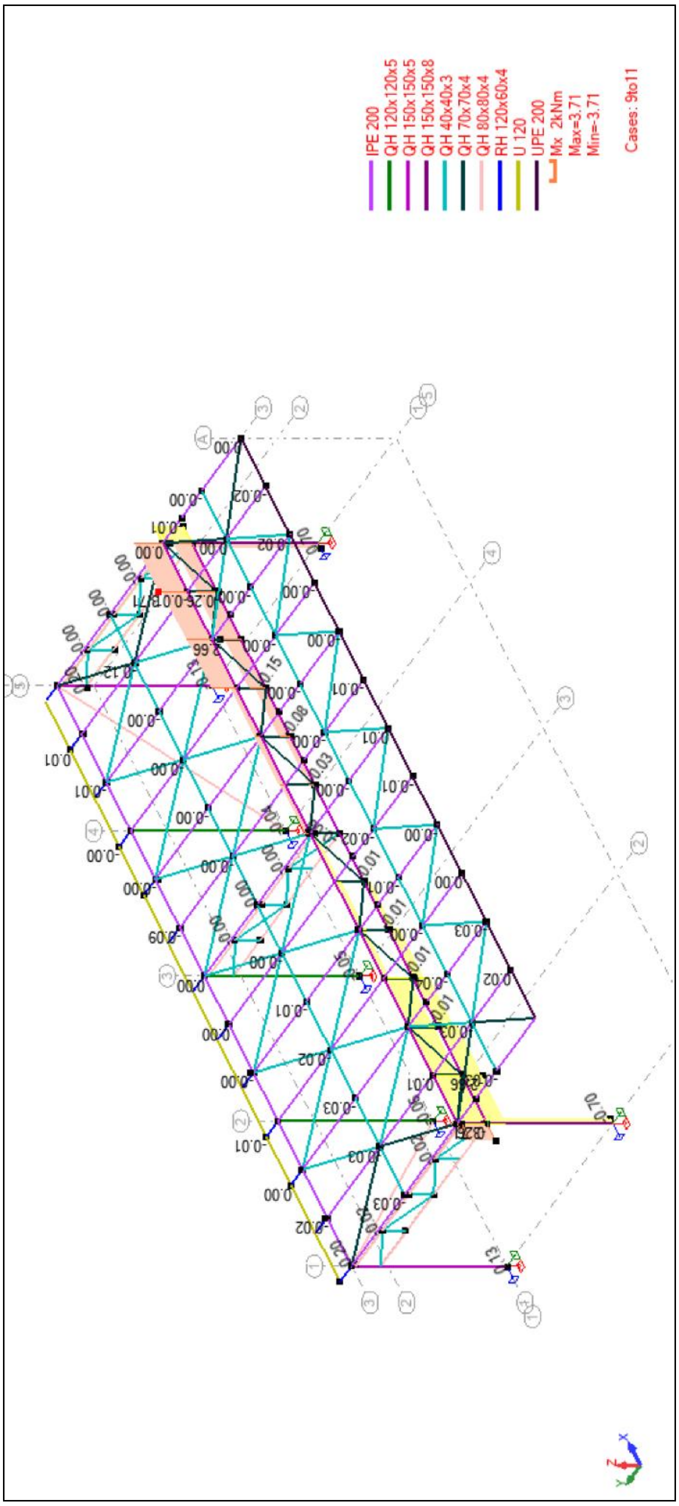
View - FY; Cases: 9to11 1



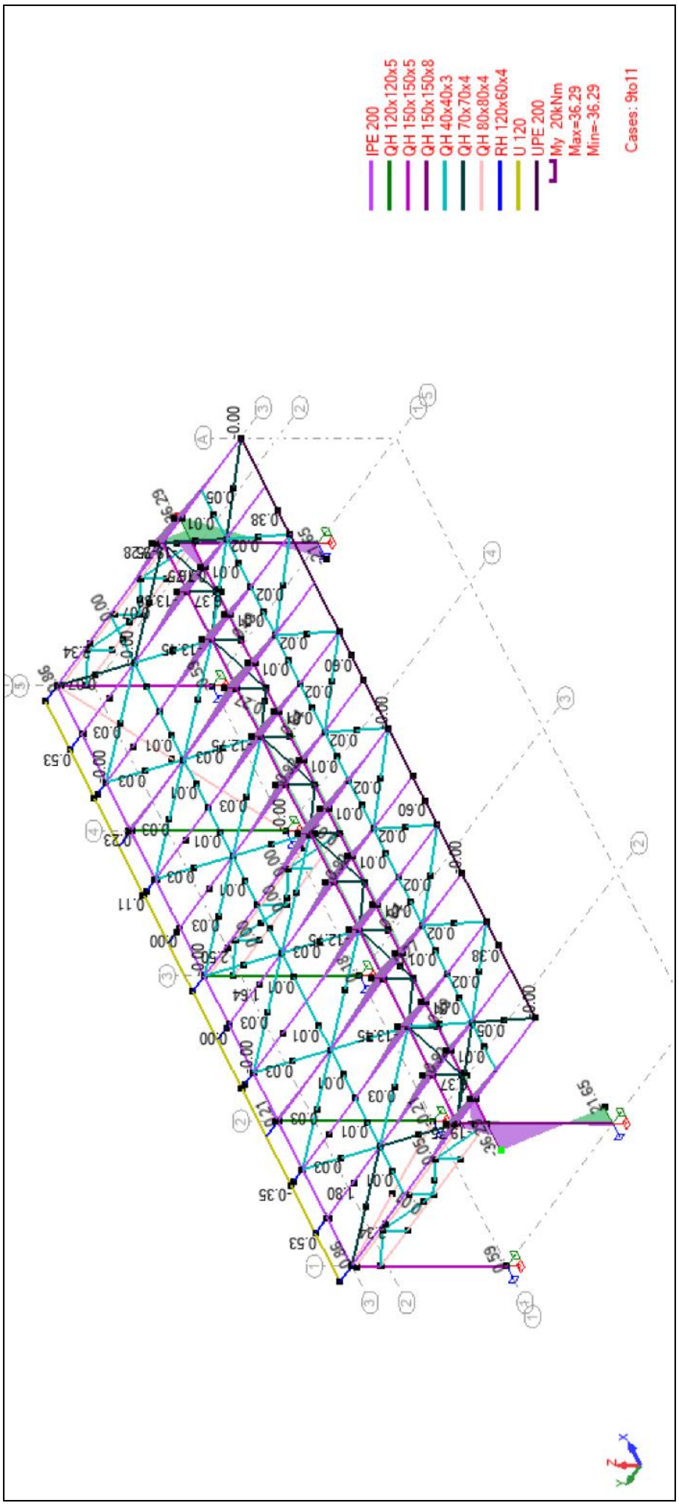
View - FZ; Cases: 9to11 1



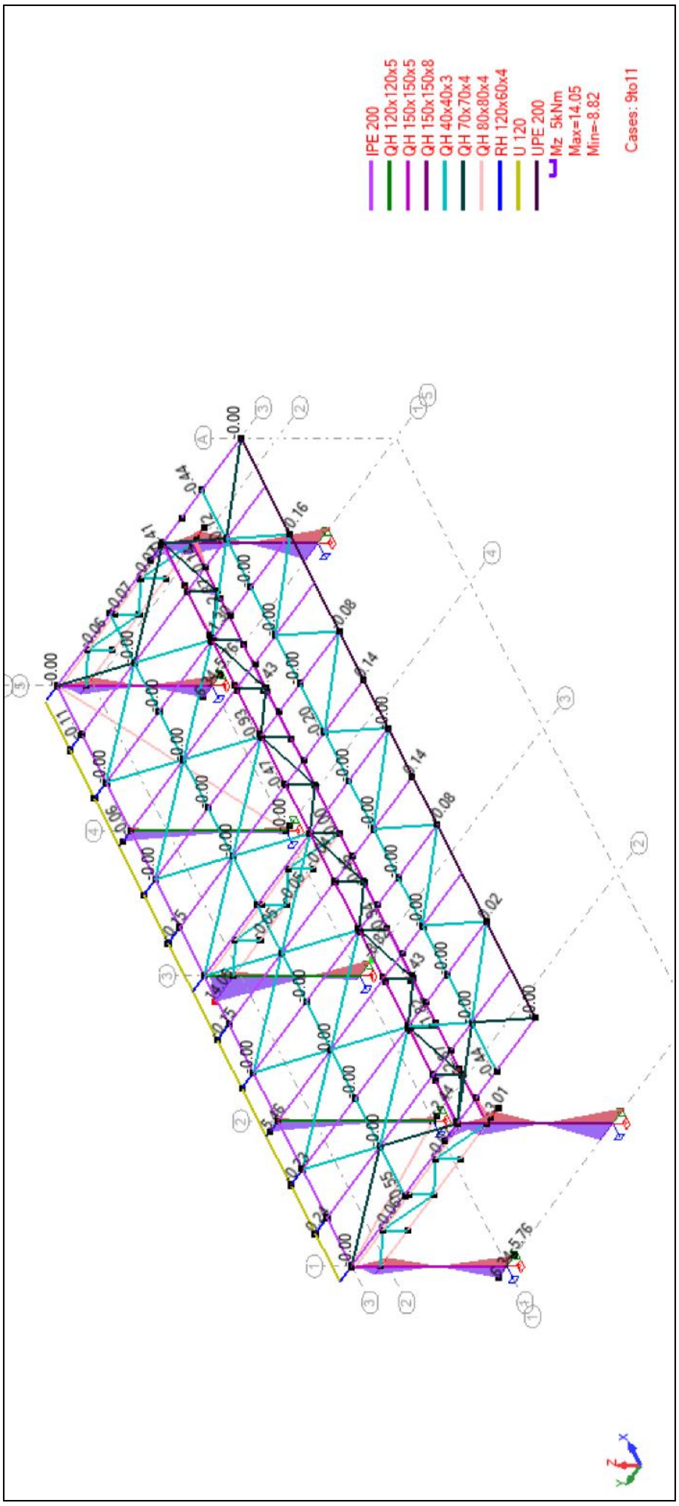
View - MX; Cases: 9to11 1



View - MY; Cases: 9to11 1



View - MZ; Cases: 9to11 1



Member Forces ULS: envelope

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
1 / MAX	4.06	0.05	0.79	0.00	0.88	0.14
Node	141	141	141	33	141	141
Case	5	6	5	8	5	ULS/1
1 / MIN	-33.02	-0.33	-6.83	-0.02	-7.75	-0.12
Node	141	141	141	33	141	33
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1
2 / MAX	23.12	0.31	2.57	0.00	0.43	0.22
Node	17	8	8	17	17	8
Case	ULS/1	ULS/3	ULS/1	6	8	ULS/3
2 / MIN	-4.72	-0.20	-4.74	-0.01	-3.58	-0.15
Node	8	8	17	8	17	8
Case	ULS/70	ULS/74	ULS/1	ULS/1	ULS/1	ULS/74
3 / MAX	25.88	0.08	4.60	0.00	0.43	0.04
Node	19	19	17	17	17	17
Case	ULS/1	ULS/3	ULS/1	8	5	ULS/9
3 / MIN	-4.99	-0.06	-3.64	-0.02	-3.45	-0.03
Node	19	17	19	17	17	17
Case	7	ULS/72	ULS/1	ULS/1	ULS/1	ULS/72
4 / MAX	25.88	0.06	3.64	0.02	0.43	0.04
Node	19	21	19	21	21	21
Case	ULS/1	ULS/70	ULS/1	ULS/1	6	ULS/9
4 / MIN	-4.99	-0.08	-4.60	-0.00	-3.45	-0.03
Node	19	19	21	21	21	21
Case	7	ULS/5	ULS/1	8	ULS/1	ULS/70
5 / MAX	23.12	0.20	4.74	0.01	0.43	0.22
Node	21	4	21	4	21	4
Case	ULS/1	ULS/74	ULS/1	ULS/1	8	ULS/5
5 / MIN	-4.72	-0.31	-2.57	-0.00	-3.58	-0.15
Node	4	4	4	21	21	4
Case	ULS/72	ULS/5	ULS/1	5	ULS/1	ULS/74
6 / MAX	49.04	0.12	0.65	0.00	0.00	0.00
Node	11	11	10	10	11	11
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/9	ULS/54
6 / MIN	-7.33	-0.02	-0.64	-0.01	-0.00	-0.00
Node	11	11	11	11	11	11
Case	8	8	ULS/1	ULS/1	ULS/74	ULS/81
7 / MAX	53.75	0.94	22.88	0.43	5.74	0.39
Node	102	102	99	99	102	99
Case	7	ULS/1	ULS/1	8	ULS/1	8
7 / MIN	-458.21	-2.96	-3.15	-2.53	-19.75	-3.01
Node	102	99	99	99	99	99
Case	ULS/1	ULS/1	5	ULS/1	ULS/1	ULS/1
8 / MAX	11.08	1.53	8.07	0.00	1.53	0.41
Node	4	4	58	58	58	58
Case	ULS/1	ULS/72	ULS/1	7	5	ULS/51
8 / MIN	-2.34	-1.55	-3.41	-0.01	-9.28	-0.54
Node	58	58	4	4	58	58
Case	8	ULS/72	ULS/1	ULS/1	ULS/1	ULS/72
9 / MAX	4.06	0.05	0.79	0.00	0.88	0.14
Node	141	141	141	141	141	141
Case	5	6	5	8	5	ULS/1
9 / MIN	-33.02	-0.33	-6.83	-0.01	-7.75	-0.11
Node	141	141	141	141	141	34
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	ULS/5

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
10 / MAX	53.75	2.96	3.15	2.53	5.74	0.39
Node	102	100	100	100	102	100
Case	7	ULS/1	6	ULS/1	ULS/1	8
10 / MIN	-458.21	-0.94	-22.88	-0.43	-19.75	-3.01
Node	102	102	100	100	100	100
Case	ULS/1	ULS/1	ULS/1	8	ULS/1	ULS/1
11 / MAX	13.51	19.93	0.68	0.20	0.73	6.34
Node	13	4	4	4	13	13
Case	ULS/54	ULS/1	ULS/47	ULS/47	ULS/72	ULS/9
11 / MIN	-7.54	-5.77	-0.85	-0.13	-0.59	-5.76
Node	4	4	13	13	13	13
Case	ULS/72	5	ULS/72	ULS/70	ULS/3	ULS/70
12 / MAX	13.51	19.93	0.85	0.13	0.59	6.34
Node	14	8	14	14	14	14
Case	ULS/56	ULS/1	ULS/70	ULS/72	ULS/5	ULS/9
12 / MIN	-7.54	-5.77	-0.68	-0.20	-0.73	-5.76
Node	8	8	8	8	14	14
Case	ULS/70	6	ULS/45	ULS/45	ULS/70	ULS/72
13 / MAX	13.79	0.85	0.12	0.04	0.21	5.46
Node	16	16	16	16	17	17
Case	ULS/1	ULS/76	ULS/45	ULS/72	ULS/45	ULS/5
13 / MIN	-1.67	-2.19	-0.09	-0.06	-0.21	-2.44
Node	16	16	16	16	16	16
Case	8	ULS/5	ULS/72	ULS/45	ULS/45	ULS/5
14 / MAX	16.72	8.04	0.10	0.05	0.18	2.38
Node	18	19	18	18	18	18
Case	ULS/1	ULS/1	ULS/45	ULS/72	ULS/72	8
14 / MIN	-1.96	-7.71	-0.10	-0.05	-0.18	-8.82
Node	18	18	18	18	18	18
Case	8	ULS/7	ULS/72	ULS/45	ULS/45	ULS/7
15 / MAX	6.18	0.04	13.84	0.00	2.22	0.02
Node	102	102	69	69	69	69
Case	ULS/1	ULS/70	ULS/1	ULS/56	ULS/1	ULS/47
15 / MIN	-1.30	-0.04	-2.46	-0.00	-0.30	-0.02
Node	69	102	69	102	69	69
Case	ULS/76	ULS/47	8	ULS/61	8	ULS/70
16 / MAX	38.77	0.02	0.47	0.00	0.00	0.00
Node	10	6	6	10	10	10
Case	ULS/1	ULS/5	ULS/1	8	ULS/63	7
16 / MIN	-5.85	-0.14	-0.41	-0.03	-0.00	-0.00
Node	10	10	10	10	10	10
Case	8	ULS/1	ULS/1	ULS/1	ULS/15	ULS/1
17 / MAX	49.04	0.02	0.64	0.01	0.00	0.00
Node	11	11	11	11	12	12
Case	ULS/1	8	ULS/1	ULS/1	ULS/23	ULS/12
17 / MIN	-7.33	-0.12	-0.65	-0.00	-0.00	-0.00
Node	11	11	12	12	12	12
Case	8	ULS/1	ULS/1	ULS/1	ULS/58	ULS/64
18 / MAX	38.77	0.14	0.41	0.03	0.00	0.00
Node	12	12	12	12	2	2
Case	ULS/1	ULS/1	ULS/1	ULS/1	4	ULS/74
18 / MIN	-5.85	-0.02	-0.47	-0.00	-0.00	-0.00
Node	12	2	2	12	2	2
Case	8	ULS/3	ULS/1	8	ULS/8	ULS/47

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
19 / MAX	14.26	0.00	0.22	0.01	0.00	0.00
Node	16	8	8	8	16	16
Case	ULS/45	ULS/52	ULS/1	ULS/5	ULS/1	ULS/63
19 / MIN	-10.59	-0.00	-0.22	-0.01	-0.00	-0.00
Node	8	8	16	8	16	16
Case	ULS/72	ULS/63	ULS/1	ULS/70	ULS/54	ULS/52
20 / MAX	14.26	0.00	0.22	0.01	0.00	0.00
Node	20	4	4	4	20	20
Case	ULS/47	ULS/57	ULS/1	ULS/72	ULS/60	ULS/64
20 / MIN	-10.59	-0.00	-0.22	-0.01	-0.00	-0.00
Node	4	4	20	4	20	20
Case	ULS/70	ULS/64	ULS/1	ULS/3	ULS/77	ULS/57
21 / MAX	3.15	0.42	0.29	0.00	0.00	0.00
Node	44	43	43	44	44	44
Case	ULS/1	ULS/51	ULS/1	6	ULS/58	ULS/45
21 / MIN	-0.88	-0.41	-0.20	-0.01	-0.00	-0.00
Node	44	43	44	43	44	44
Case	5	ULS/74	ULS/60	ULS/1	ULS/1	ULS/76
22 / MAX	3.50	0.41	0.17	0.00	0.00	0.00
Node	45	45	44	44	45	45
Case	ULS/1	ULS/45	ULS/60	8	2	2
22 / MIN	-0.88	-0.41	-0.44	-0.01	-0.00	-0.00
Node	44	44	44	44	45	45
Case	5	ULS/72	ULS/23	ULS/1	ULS/16	ULS/12
23 / MAX	3.50	0.41	0.44	0.01	0.00	0.00
Node	45	46	46	46	46	46
Case	ULS/1	ULS/70	ULS/23	ULS/1	ULS/60	ULS/87
23 / MIN	-0.88	-0.41	-0.17	-0.00	-0.00	-0.00
Node	46	45	46	46	46	46
Case	6	ULS/47	ULS/60	8	ULS/80	ULS/13
24 / MAX	3.15	0.41	0.20	0.01	0.00	0.00
Node	46	47	46	47	47	47
Case	ULS/1	ULS/74	ULS/60	ULS/1	ULS/76	ULS/11
24 / MIN	-0.88	-0.42	-0.29	-0.00	-0.00	-0.00
Node	46	47	47	46	47	47
Case	6	ULS/51	ULS/1	5	ULS/7	ULS/67
25 / MAX	0.42	0.60	0.36	0.0	0.02	0.27
Node	4	4	4	4	4	4
Case	ULS/51	ULS/9	ULS/1	1	5	ULS/9
25 / MIN	-0.41	-0.52	-0.05	0.0	-0.14	-0.23
Node	4	4	4	4	4	4
Case	ULS/74	ULS/72	5	1	ULS/1	ULS/72
26 / MAX	1.29	1.45	0.27	0.04	0.33	0.40
Node	34	34	34	34	34	34
Case	ULS/51	ULS/1	ULS/54	8	ULS/23	ULS/1
26 / MIN	-1.20	-0.29	-0.75	-0.31	-0.11	-0.25
Node	34	34	48	34	34	48
Case	ULS/74	7	ULS/23	ULS/1	ULS/54	ULS/1
27 / MAX	1.16	1.22	1.16	0.04	0.08	0.33
Node	35	35	35	35	35	35
Case	ULS/76	ULS/1	ULS/1	5	8	ULS/1
27 / MIN	-1.28	-0.37	-0.18	-0.18	-0.51	-0.23
Node	35	35	35	35	35	49
Case	ULS/45	ULS/74	8	ULS/1	ULS/1	ULS/9

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
28 / MAX	0.79	0.18	0.43	0.0	0.23	0.08
Node	21	21	21	21	21	21
Case	ULS/76	ULS/1	ULS/60	1	ULS/25	ULS/1
28 / MIN	-0.80	-0.14	-0.53	0.0	-0.18	-0.06
Node	21	21	46	21	21	21
Case	ULS/45	ULS/70	ULS/25	1	ULS/60	ULS/70
29 / MAX	1.16	0.21	1.00	0.05	0.08	0.05
Node	36	36	36	36	36	36
Case	ULS/76	ULS/47	ULS/3	8	8	ULS/5
29 / MIN	-1.19	-0.12	-0.17	-0.33	-0.44	-0.06
Node	36	36	36	36	36	50
Case	ULS/45	ULS/70	8	ULS/1	ULS/3	ULS/47
30 / MAX	1.16	0.15	0.33	0.01	0.02	0.07
Node	37	37	37	37	37	51
Case	ULS/51	ULS/51	ULS/60	8	4	ULS/70
30 / MIN	-1.17	-0.30	-0.06	-0.09	-0.13	-0.06
Node	37	37	37	37	37	37
Case	ULS/72	ULS/70	4	ULS/1	ULS/60	ULS/70
31 / MAX	0.79	0.12	0.28	0.0	0.00	0.05
Node	19	19	19	19	19	19
Case	ULS/76	ULS/72	ULS/58	1	4	ULS/72
31 / MIN	-0.80	-0.12	-0.00	0.0	-0.11	-0.05
Node	19	19	19	19	19	19
Case	ULS/45	ULS/45	4	1	ULS/50	ULS/45
32 / MAX	1.16	0.30	0.33	0.09	0.02	0.06
Node	38	38	38	38	38	38
Case	ULS/51	ULS/72	ULS/60	ULS/1	4	ULS/72
32 / MIN	-1.17	-0.15	-0.06	-0.01	-0.13	-0.07
Node	38	38	38	38	38	52
Case	ULS/70	ULS/51	4	8	ULS/60	ULS/72
33 / MAX	1.16	0.12	1.00	0.33	0.08	0.06
Node	39	39	39	39	39	53
Case	ULS/76	ULS/72	ULS/5	ULS/1	8	ULS/45
33 / MIN	-1.19	-0.21	-0.17	-0.05	-0.44	-0.05
Node	39	39	39	39	39	39
Case	ULS/47	ULS/45	8	8	ULS/5	ULS/3
34 / MAX	0.79	0.14	0.43	0.00	0.23	0.06
Node	17	17	17	17	17	17
Case	ULS/76	ULS/72	ULS/60	ULS/6	ULS/27	ULS/72
34 / MIN	-0.80	-0.18	-0.53	-0.00	-0.18	-0.08
Node	17	17	44	17	17	17
Case	ULS/47	ULS/1	ULS/27	8	ULS/60	ULS/1
35 / MAX	1.16	0.37	1.16	0.18	0.08	0.23
Node	40	40	40	40	40	54
Case	ULS/76	ULS/74	ULS/1	ULS/1	8	ULS/9
35 / MIN	-1.28	-1.22	-0.18	-0.04	-0.51	-0.33
Node	40	40	40	40	40	40
Case	ULS/47	ULS/1	8	6	ULS/1	ULS/1
36 / MAX	1.29	0.29	0.27	0.31	0.33	0.25
Node	41	41	41	41	41	55
Case	ULS/51	7	ULS/56	ULS/1	ULS/23	ULS/1
36 / MIN	-1.20	-1.45	-0.75	-0.04	-0.11	-0.40
Node	41	41	55	41	41	41
Case	ULS/74	ULS/1	ULS/23	8	ULS/56	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
37 / MAX	0.42	0.52	0.36	0.0	0.02	0.23
Node	8	8	8	8	8	8
Case	ULS/51	ULS/70	ULS/1	1	6	ULS/70
37 / MIN	-0.41	-0.60	-0.05	0.0	-0.14	-0.27
Node	8	8	8	8	8	8
Case	ULS/74	ULS/9	6	1	ULS/1	ULS/9
38 / MAX	126.15	5.73	19.84	0.70	4.84	9.10
Node	57	57	57	57	57	58
Case	ULS/1	ULS/51	ULS/1	ULS/5	6	ULS/1
38 / MIN	-16.75	-12.07	-18.32	-2.27	-21.65	-8.36
Node	57	58	58	58	57	57
Case	5	ULS/3	ULS/1	ULS/1	ULS/1	ULS/70
39 / MAX	126.15	5.73	18.32	2.27	21.65	9.10
Node	59	59	60	60	59	60
Case	ULS/1	ULS/51	ULS/1	ULS/1	ULS/1	ULS/1
39 / MIN	-16.75	-12.07	-19.84	-0.70	-4.84	-8.36
Node	59	60	59	59	59	59
Case	6	ULS/5	ULS/1	ULS/3	5	ULS/72
40 / MAX	35.88	1.79	6.13	3.71	0.73	1.81
Node	60	60	60	58	60	58
Case	ULS/3	ULS/1	ULS/1	ULS/1	6	ULS/1
40 / MIN	-7.85	-1.79	-6.13	-3.71	-4.88	-0.35
Node	60	58	58	60	60	58
Case	6	ULS/1	ULS/1	ULS/1	ULS/1	6
41 / MAX	3.14	0.00	0.03	0.03	0.00	0.00
Node	73	73	73	73	74	74
Case	ULS/47	ULS/17	ULS/1	ULS/1	ULS/59	ULS/78
41 / MIN	-1.89	-0.00	-0.03	-0.00	-0.00	-0.00
Node	73	73	74	73	74	74
Case	ULS/74	ULS/78	ULS/1	5	ULS/5	ULS/17
42 / MAX	3.14	0.00	0.03	0.00	0.00	0.00
Node	75	75	75	75	76	76
Case	ULS/45	7	ULS/1	6	ULS/1	ULS/1
42 / MIN	-1.89	-0.00	-0.03	-0.03	-0.00	-0.00
Node	75	75	76	75	76	76
Case	ULS/74	ULS/1	ULS/11	ULS/1	ULS/54	ULS/74
43 / MAX	13.86	0.00	0.03	0.00	0.00	0.00
Node	76	76	76	76	77	77
Case	ULS/1	ULS/76	ULS/1	7	ULS/55	ULS/80
43 / MIN	-2.11	-0.00	-0.03	-0.03	-0.00	-0.00
Node	76	76	77	76	77	77
Case	7	ULS/80	ULS/1	ULS/1	ULS/10	ULS/76
44 / MAX	14.07	0.00	0.03	0.00	0.00	0.00
Node	77	77	77	77	78	78
Case	ULS/1	6	ULS/1	8	ULS/5	ULS/3
44 / MIN	-2.13	-0.00	-0.03	-0.03	-0.00	0.0
Node	77	77	78	77	78	77
Case	7	ULS/3	ULS/59	ULS/1	ULS/59	1
45 / MAX	19.67	0.00	0.03	0.00	0.00	0.00
Node	78	78	78	78	79	79
Case	ULS/1	ULS/22	ULS/1	7	ULS/3	ULS/27
45 / MIN	-2.66	-0.00	-0.03	-0.02	0.0	-0.00
Node	78	78	79	78	78	79
Case	7	ULS/27	ULS/11	ULS/1	1	ULS/22

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
46 / MAX	19.82	0.00	0.03	0.00	0.0	0.00
Node	79	79	79	79	79	80
Case	ULS/1	ULS/92	ULS/1	5	1	ULS/6
46 / MIN	-2.68	-0.00	-0.03	-0.01	-0.00	-0.00
Node	79	79	80	79	80	80
Case	7	ULS/6	ULS/1	ULS/1	ULS/45	ULS/92
47 / MAX	23.22	0.0	0.03	0.00	0.00	0.00
Node	80	80	80	80	81	81
Case	ULS/1	1	ULS/1	5	ULS/56	ULS/80
47 / MIN	-3.03	-0.00	-0.03	-0.00	-0.00	0.0
Node	80	80	81	80	81	80
Case	7	ULS/80	ULS/77	ULS/1	ULS/9	1
48 / MAX	23.22	0.00	0.03	0.00	0.00	0.00
Node	81	81	81	81	82	82
Case	ULS/1	ULS/77	ULS/11	ULS/1	ULS/46	ULS/62
48 / MIN	-3.03	-0.00	-0.03	-0.00	-0.00	-0.00
Node	81	81	82	81	82	82
Case	7	5	ULS/1	6	ULS/1	ULS/77
49 / MAX	19.82	0.00	0.03	0.01	0.00	0.00
Node	82	82	82	82	83	83
Case	ULS/1	ULS/89	ULS/1	ULS/1	ULS/54	ULS/54
49 / MIN	-2.68	-0.00	-0.03	-0.00	-0.00	-0.00
Node	82	82	83	82	83	83
Case	7	ULS/54	ULS/77	6	ULS/81	ULS/89
50 / MAX	19.67	0.00	0.03	0.02	0.00	0.00
Node	83	83	83	83	84	84
Case	ULS/1	ULS/82	ULS/11	ULS/1	ULS/46	ULS/4
50 / MIN	-2.66	-0.00	-0.03	-0.00	-0.00	-0.00
Node	83	83	84	83	84	84
Case	7	ULS/4	ULS/9	7	ULS/20	ULS/82
51 / MAX	14.07	0.00	0.03	0.03	0.00	0.00
Node	84	84	84	84	85	85
Case	ULS/1	ULS/50	ULS/1	ULS/1	ULS/1	ULS/93
51 / MIN	-2.13	-0.00	-0.03	-0.00	-0.00	-0.00
Node	84	84	85	84	85	85
Case	7	ULS/93	ULS/11	8	ULS/46	ULS/50
52 / MAX	13.86	0.0	0.03	0.03	0.00	0.00
Node	85	85	85	85	74	74
Case	ULS/1	3	ULS/1	ULS/1	ULS/7	ULS/45
52 / MIN	-2.11	-0.00	-0.03	-0.00	0.0	0.0
Node	85	85	74	85	85	85
Case	7	ULS/45	ULS/1	7	1	1
53 / MAX	2.85	0.00	0.03	0.03	0.00	0.0
Node	86	86	86	86	87	86
Case	ULS/47	ULS/9	ULS/78	ULS/1	ULS/78	1
53 / MIN	-1.54	-0.00	-0.03	-0.00	-0.00	-0.00
Node	86	86	87	86	87	87
Case	ULS/76	6	ULS/13	8	ULS/21	ULS/9
54 / MAX	2.85	0.00	0.03	0.00	0.0	0.00
Node	88	88	88	88	88	89
Case	ULS/45	ULS/3	ULS/54	8	1	ULS/76
54 / MIN	-1.54	-0.00	-0.03	-0.03	-0.00	-0.00
Node	88	88	89	88	89	89
Case	ULS/76	8	ULS/1	ULS/1	ULS/81	ULS/3

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
55 / MAX	27.83	0.00	0.03	0.00	0.00	0.00
Node	89	89	89	89	90	90
Case	ULS/1	ULS/77	ULS/2	8	ULS/17	ULS/76
55 / MIN	-3.65	-0.00	-0.03	-0.03	-0.00	-0.00
Node	89	89	90	89	90	90
Case	8	ULS/76	ULS/77	ULS/1	ULS/78	ULS/77
56 / MAX	28.77	0.00	0.03	0.00	0.00	0.00
Node	90	90	90	90	91	91
Case	ULS/1	ULS/77	ULS/46	8	ULS/68	ULS/60
56 / MIN	-3.75	-0.00	-0.03	-0.04	-0.00	-0.00
Node	90	90	91	90	91	91
Case	8	ULS/60	ULS/1	ULS/1	ULS/1	ULS/77
57 / MAX	13.27	0.00	0.03	0.00	0.00	0.00
Node	91	91	91	91	92	92
Case	ULS/1	8	ULS/45	ULS/3	ULS/85	ULS/1
57 / MIN	-1.91	-0.00	-0.03	-0.00	-0.00	-0.00
Node	91	91	92	91	92	92
Case	7	ULS/1	ULS/2	8	ULS/24	ULS/75
58 / MAX	14.16	0.00	0.03	0.00	0.00	0.00
Node	92	92	92	92	93	93
Case	ULS/1	ULS/88	ULS/82	7	ULS/82	ULS/17
58 / MIN	-2.00	-0.00	-0.03	-0.01	-0.00	-0.00
Node	92	92	93	92	93	93
Case	7	ULS/17	ULS/46	ULS/1	ULS/46	ULS/88
59 / MAX	10.48	0.00	0.03	0.00	0.00	0.00
Node	93	93	93	93	94	94
Case	ULS/1	ULS/26	ULS/5	7	ULS/5	ULS/86
59 / MIN	-1.58	-0.00	-0.03	-0.02	-0.00	-0.00
Node	93	93	94	93	94	94
Case	7	ULS/86	ULS/45	ULS/1	ULS/46	ULS/26
60 / MAX	14.16	0.00	0.03	0.01	0.00	0.00
Node	95	95	95	95	96	96
Case	ULS/1	ULS/93	ULS/53	ULS/1	ULS/57	ULS/10
60 / MIN	-2.00	-0.00	-0.03	-0.00	-0.00	-0.00
Node	95	95	96	95	96	96
Case	7	ULS/10	ULS/1	7	ULS/1	ULS/93
61 / MAX	13.27	0.00	0.03	0.00	0.0	0.00
Node	96	96	96	96	96	97
Case	ULS/1	ULS/23	ULS/53	8	1	ULS/47
61 / MIN	-1.91	-0.00	-0.03	-0.00	-0.00	-0.00
Node	96	96	97	96	97	97
Case	7	ULS/47	ULS/1	ULS/5	ULS/1	ULS/23
62 / MAX	28.77	0.00	0.03	0.04	0.00	0.00
Node	97	97	97	97	98	98
Case	ULS/1	ULS/10	ULS/46	ULS/1	ULS/62	ULS/94
62 / MIN	-3.75	-0.00	-0.03	-0.00	-0.00	-0.00
Node	97	97	98	97	98	98
Case	8	ULS/94	ULS/82	8	ULS/86	ULS/10
63 / MAX	27.83	0.00	0.03	0.03	0.00	0.00
Node	98	98	98	98	87	87
Case	ULS/1	ULS/42	ULS/2	ULS/1	ULS/54	ULS/11
63 / MIN	-3.65	-0.00	-0.03	-0.00	-0.00	-0.00
Node	98	98	87	98	87	87
Case	8	ULS/11	ULS/1	8	ULS/77	ULS/42

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
64 / MAX	56.43	0.00	0.13	0.02	0.00	0.00
Node	58	58	58	58	74	74
Case	ULS/1	ULS/49	ULS/1	7	ULS/46	ULS/45
64 / MIN	-8.00	-0.00	-0.13	-0.13	0.0	-0.00
Node	58	58	74	58	58	74
Case	5	ULS/45	ULS/77	ULS/1	1	ULS/49
65 / MAX	6.82	0.00	0.13	0.01	0.00	0.00
Node	74	74	74	74	4	4
Case	5	ULS/1	ULS/1	7	ULS/45	ULS/76
65 / MIN	-35.19	-0.00	-0.13	-0.12	0.0	-0.00
Node	74	74	4	74	74	4
Case	ULS/1	ULS/76	ULS/1	ULS/1	1	ULS/1
66 / MAX	22.74	0.00	0.05	0.00	0.00	0.00
Node	74	74	74	74	35	35
Case	ULS/1	ULS/85	ULS/1	5	ULS/16	ULS/24
66 / MIN	-4.32	-0.00	-0.05	-0.02	-0.00	-0.00
Node	74	74	35	74	35	35
Case	5	ULS/24	ULS/1	ULS/1	ULS/11	ULS/85
67 / MAX	2.79	0.00	0.05	0.00	0.00	0.00
Node	35	35	35	35	84	84
Case	ULS/70	ULS/48	ULS/1	7	ULS/14	ULS/78
67 / MIN	-5.78	-0.00	-0.05	-0.01	-0.00	-0.00
Node	35	35	84	35	84	84
Case	ULS/5	ULS/78	ULS/1	ULS/1	ULS/11	ULS/48
68 / MAX	7.85	0.00	0.05	0.00	0.00	0.0
Node	84	84	84	84	36	84
Case	ULS/1	ULS/77	ULS/1	8	ULS/1	1
68 / MIN	-3.18	-0.00	-0.05	-0.01	0.0	-0.00
Node	84	84	36	84	84	36
Case	ULS/70	8	ULS/1	ULS/1	1	ULS/77
69 / MAX	2.77	0.00	0.05	0.00	0.00	0.00
Node	36	36	36	36	82	82
Case	ULS/45	7	ULS/1	ULS/72	ULS/80	ULS/3
69 / MIN	-1.68	-0.00	-0.05	-0.00	-0.00	-0.00
Node	36	36	82	36	82	82
Case	ULS/72	ULS/3	ULS/1	ULS/1	ULS/15	ULS/65
70 / MAX	5.59	0.00	0.05	0.00	0.00	0.00
Node	82	82	82	82	19	19
Case	ULS/5	ULS/1	ULS/1	6	ULS/57	ULS/66
70 / MIN	-2.25	-0.00	-0.05	-0.00	-0.00	-0.00
Node	82	82	19	82	19	19
Case	ULS/70	7	ULS/1	ULS/1	ULS/1	ULS/1
71 / MAX	5.59	0.00	0.05	0.00	0.00	0.00
Node	19	19	19	19	80	80
Case	ULS/3	ULS/56	ULS/1	ULS/1	ULS/1	ULS/3
71 / MIN	-2.25	-0.00	-0.05	-0.00	0.0	-0.00
Node	19	19	80	19	19	80
Case	ULS/72	ULS/3	ULS/1	5	1	ULS/56
72 / MAX	2.77	0.00	0.05	0.00	0.00	0.00
Node	80	80	80	80	39	39
Case	ULS/47	ULS/1	ULS/1	ULS/1	ULS/59	ULS/74
72 / MIN	-1.68	-0.00	-0.05	-0.00	-0.00	-0.00
Node	80	80	39	80	39	39
Case	ULS/70	7	ULS/1	ULS/70	ULS/1	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
73 / MAX	7.85	0.00	0.05	0.01	0.00	0.00
Node	39	39	39	39	78	78
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/51	ULS/73
73 / MIN	-3.18	-0.00	-0.05	-0.00	-0.00	-0.00
Node	39	39	78	39	78	78
Case	ULS/72	7	ULS/1	8	ULS/18	ULS/1
74 / MAX	2.79	0.00	0.05	0.01	0.00	0.00
Node	78	78	78	78	40	40
Case	ULS/72	ULS/5	ULS/1	ULS/1	ULS/49	ULS/70
74 / MIN	-5.78	-0.00	-0.05	-0.00	-0.00	-0.00
Node	78	78	40	78	40	40
Case	ULS/3	ULS/70	ULS/1	7	ULS/16	ULS/5
75 / MAX	22.74	0.00	0.05	0.02	0.00	0.00
Node	40	40	40	40	76	76
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/6	ULS/46
75 / MIN	-4.32	-0.00	-0.05	-0.00	-0.00	-0.00
Node	40	40	76	40	76	76
Case	6	ULS/46	ULS/1	6	ULS/83	ULS/1
76 / MAX	6.82	0.00	0.13	0.12	0.00	0.00
Node	76	76	76	76	8	8
Case	6	ULS/63	ULS/1	ULS/1	ULS/47	ULS/12
76 / MIN	-35.19	-0.00	-0.13	-0.01	0.0	-0.00
Node	76	76	8	76	76	8
Case	ULS/1	ULS/12	ULS/1	7	1	ULS/63
77 / MAX	56.43	0.00	0.13	0.13	0.00	0.00
Node	76	76	76	76	60	60
Case	ULS/1	ULS/48	ULS/77	ULS/1	ULS/77	ULS/12
77 / MIN	-8.00	-0.00	-0.13	-0.02	0.0	-0.00
Node	76	76	60	76	76	60
Case	6	ULS/12	ULS/2	7	1	ULS/48
78 / MAX	65.07	0.00	0.10	0.00	0.0	0.00
Node	60	60	60	60	60	89
Case	ULS/1	7	ULS/54	7	1	ULS/1
78 / MIN	-7.93	-0.00	-0.10	-0.02	-0.00	-0.00
Node	60	60	89	60	89	89
Case	5	ULS/1	ULS/1	ULS/1	ULS/77	ULS/74
79 / MAX	3.79	0.00	0.10	0.00	0.00	0.00
Node	89	89	89	89	6	6
Case	8	ULS/1	ULS/1	8	ULS/1	ULS/56
79 / MIN	-27.39	-0.00	-0.10	-0.01	-0.00	-0.00
Node	89	89	6	89	6	6
Case	ULS/1	ULS/56	ULS/46	ULS/1	ULS/74	ULS/1
80 / MAX	22.22	0.00	0.04	0.01	0.00	0.00
Node	89	89	89	89	27	27
Case	ULS/1	3	ULS/1	ULS/1	ULS/3	ULS/51
80 / MIN	-3.22	-0.00	-0.04	-0.00	-0.00	-0.00
Node	89	89	27	89	27	27
Case	8	ULS/51	ULS/11	8	ULS/51	ULS/34
81 / MAX	2.11	0.00	0.04	0.03	0.0	0.00
Node	27	27	27	27	27	91
Case	8	ULS/6	ULS/1	ULS/1	1	ULS/96
81 / MIN	-15.02	-0.00	-0.04	-0.00	-0.00	-0.00
Node	27	27	91	27	91	91
Case	ULS/1	ULS/96	ULS/77	8	ULS/77	ULS/6

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
82 / MAX	12.38	0.00	0.04	0.00	0.00	0.00
Node	91	91	91	91	22	22
Case	ULS/1	ULS/54	ULS/11	8	ULS/60	ULS/31
82 / MIN	-1.79	-0.00	-0.04	-0.02	-0.00	-0.00
Node	91	91	22	91	22	22
Case	8	ULS/31	ULS/1	ULS/1	ULS/7	ULS/54
83 / MAX	0.80	0.00	0.04	0.01	0.00	0.00
Node	22	22	22	22	93	93
Case	5	ULS/15	ULS/1	ULS/1	ULS/77	ULS/80
83 / MIN	-5.67	-0.00	-0.04	-0.00	-0.00	-0.00
Node	22	22	93	22	93	93
Case	ULS/1	ULS/80	ULS/1	7	ULS/48	ULS/15
84 / MAX	1.31	0.00	0.04	0.00	0.00	0.00
Node	93	93	93	93	11	11
Case	ULS/5	ULS/70	ULS/1	7	ULS/1	ULS/77
84 / MIN	-0.61	-0.00	-0.04	-0.03	-0.00	-0.00
Node	93	93	11	93	11	11
Case	ULS/70	ULS/77	ULS/11	ULS/1	ULS/56	ULS/70
85 / MAX	1.31	0.00	0.04	0.03	0.00	0.00
Node	11	11	11	11	95	95
Case	ULS/3	ULS/8	ULS/1	ULS/1	ULS/59	ULS/96
85 / MIN	-0.61	-0.00	-0.04	-0.00	-0.00	-0.00
Node	11	11	95	11	95	95
Case	ULS/72	ULS/96	ULS/1	7	ULS/5	ULS/8
86 / MAX	0.80	0.00	0.04	0.00	0.00	0.00
Node	95	95	95	95	31	31
Case	6	ULS/3	ULS/11	7	ULS/56	ULS/56
86 / MIN	-5.67	-0.00	-0.04	-0.01	-0.00	-0.00
Node	95	95	31	95	31	31
Case	ULS/1	ULS/56	ULS/1	ULS/1	ULS/1	ULS/3
87 / MAX	12.38	0.00	0.04	0.02	0.00	0.00
Node	31	31	31	31	97	97
Case	ULS/1	ULS/3	ULS/1	ULS/1	ULS/80	ULS/50
87 / MIN	-1.79	-0.00	-0.04	-0.00	-0.00	-0.00
Node	31	31	97	31	97	97
Case	8	ULS/50	ULS/1	8	ULS/60	ULS/3
88 / MAX	2.11	0.00	0.04	0.00	0.00	0.00
Node	97	97	97	97	25	25
Case	8	ULS/43	ULS/77	8	ULS/1	ULS/49
88 / MIN	-15.02	-0.00	-0.04	-0.03	-0.00	-0.00
Node	97	97	25	97	25	25
Case	ULS/1	ULS/49	ULS/1	ULS/1	ULS/52	ULS/43
89 / MAX	22.22	0.00	0.04	0.00	0.00	0.00
Node	25	25	25	25	87	87
Case	ULS/1	ULS/2	ULS/1	8	ULS/85	ULS/82
89 / MIN	-3.22	-0.00	-0.04	-0.01	-0.00	-0.00
Node	25	25	87	25	87	87
Case	8	ULS/82	ULS/1	ULS/1	ULS/46	ULS/2
90 / MAX	3.79	0.00	0.10	0.01	0.00	0.00
Node	87	87	87	87	2	2
Case	8	ULS/70	ULS/1	ULS/1	ULS/1	ULS/5
90 / MIN	-27.39	-0.00	-0.10	-0.00	0.0	-0.00
Node	87	87	2	87	87	2
Case	ULS/1	ULS/5	ULS/53	8	1	ULS/70

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
91 / MAX	65.07	0.00	0.10	0.02	0.00	0.00
Node	87	87	87	87	58	58
Case	ULS/1	ULS/51	ULS/11	ULS/1	ULS/11	ULS/71
91 / MIN	-7.93	-0.00	-0.10	-0.00	-0.00	-0.00
Node	87	87	58	87	58	58
Case	6	6	ULS/20	7	ULS/20	ULS/51
92 / MAX	4.42	0.00	0.05	0.00	0.0	0.00
Node	76	76	76	76	76	66
Case	6	ULS/18	ULS/1	ULS/1	1	ULS/52
92 / MIN	-29.03	-0.00	-0.05	-0.00	-0.00	-0.00
Node	76	76	66	76	66	66
Case	ULS/1	ULS/52	ULS/1	7	ULS/51	ULS/18
93 / MAX	17.99	0.00	0.05	0.02	0.00	0.00
Node	66	66	66	66	78	78
Case	ULS/1	ULS/54	ULS/1	ULS/1	ULS/51	ULS/23
93 / MIN	-3.86	-0.00	-0.05	-0.00	-0.00	-0.00
Node	66	66	78	66	78	78
Case	6	ULS/23	ULS/1	7	ULS/55	ULS/54
94 / MAX	2.59	0.00	0.05	0.00	0.00	0.00
Node	78	78	78	78	62	62
Case	ULS/72	ULS/7	ULS/1	6	ULS/53	ULS/75
94 / MIN	-6.66	-0.00	-0.05	-0.00	-0.00	-0.00
Node	78	78	62	78	62	62
Case	ULS/1	ULS/75	ULS/1	ULS/1	ULS/1	ULS/7
95 / MAX	12.80	0.00	0.05	0.02	0.00	0.00
Node	62	62	62	62	80	80
Case	ULS/1	ULS/46	ULS/1	ULS/1	ULS/3	ULS/29
95 / MIN	-2.93	-0.00	-0.05	-0.00	-0.00	-0.00
Node	62	62	80	62	80	80
Case	6	ULS/29	ULS/1	7	ULS/55	ULS/46
96 / MAX	2.96	0.00	0.05	0.00	0.00	0.00
Node	80	80	80	80	69	69
Case	ULS/5	ULS/28	ULS/1	6	ULS/53	ULS/59
96 / MIN	-1.78	-0.00	-0.05	-0.01	-0.00	-0.00
Node	80	80	69	80	69	69
Case	ULS/70	ULS/59	ULS/1	ULS/1	ULS/1	ULS/28
97 / MAX	2.96	0.00	0.05	0.01	0.00	0.00
Node	69	69	69	69	82	82
Case	ULS/3	ULS/45	ULS/1	ULS/1	ULS/80	ULS/12
97 / MIN	-1.78	-0.00	-0.05	-0.00	-0.00	-0.00
Node	69	69	82	69	82	82
Case	ULS/72	ULS/12	ULS/1	5	ULS/52	ULS/45
98 / MAX	12.80	0.00	0.05	0.00	0.00	0.00
Node	82	82	82	82	71	71
Case	ULS/1	ULS/61	ULS/1	7	ULS/79	ULS/20
98 / MIN	-2.93	-0.00	-0.05	-0.02	-0.00	-0.00
Node	82	82	71	82	71	71
Case	5	ULS/20	ULS/1	ULS/1	ULS/15	ULS/61
99 / MAX	2.59	0.00	0.05	0.00	0.00	0.00
Node	71	71	71	71	84	84
Case	ULS/70	ULS/65	ULS/1	ULS/1	ULS/57	ULS/59
99 / MIN	-6.66	-0.00	-0.05	-0.00	-0.00	-0.00
Node	71	71	84	71	84	84
Case	ULS/1	ULS/59	ULS/1	5	ULS/1	ULS/65

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
100 / MAX	17.99	0.00	0.05	0.00	0.0	0.00
Node	84	84	84	84	84	65
Case	ULS/1	ULS/54	ULS/1	7	1	ULS/5
100 / MIN	-3.86	-0.00	-0.05	-0.02	-0.00	-0.00
Node	84	84	65	84	65	65
Case	5	ULS/5	ULS/1	ULS/1	ULS/5	ULS/54
101 / MAX	4.42	0.00	0.05	0.00	0.00	0.00
Node	65	65	65	65	74	74
Case	5	ULS/46	ULS/1	7	ULS/3	ULS/77
101 / MIN	-29.03	-0.00	-0.05	-0.00	-0.00	-0.00
Node	65	65	74	65	74	74
Case	ULS/1	ULS/77	ULS/1	ULS/1	ULS/55	ULS/46
102 / MAX	3.99	0.00	0.04	0.02	0.00	0.0
Node	89	89	89	89	66	89
Case	5	ULS/49	ULS/1	ULS/1	ULS/11	1
102 / MIN	-28.66	0.0	-0.04	-0.00	-0.00	-0.00
Node	89	89	66	89	66	66
Case	ULS/1	1	ULS/1	8	ULS/20	ULS/49
103 / MAX	3.99	0.00	0.04	0.00	0.00	0.00
Node	87	87	87	87	65	65
Case	6	ULS/2	ULS/1	8	ULS/54	ULS/92
103 / MIN	-28.66	-0.00	-0.04	-0.02	-0.00	-0.00
Node	87	87	65	87	65	65
Case	ULS/1	4	ULS/1	ULS/1	ULS/1	ULS/2
104 / MAX	10.48	0.00	0.03	0.02	0.00	0.00
Node	95	95	95	95	94	94
Case	ULS/1	ULS/6	ULS/84	ULS/1	ULS/84	ULS/95
104 / MIN	-1.58	-0.00	-0.03	-0.00	-0.00	-0.00
Node	95	95	94	95	94	94
Case	7	ULS/95	ULS/46	7	ULS/46	ULS/6
105 / MAX	18.20	0.19	0.95	0.03	0.92	0.47
Node	9	9	9	9	67	67
Case	ULS/1	5	ULS/1	ULS/1	ULS/1	ULS/1
105 / MIN	-2.17	-1.37	-0.11	-0.01	-0.10	-0.46
Node	9	9	9	9	67	9
Case	5	ULS/1	8	ULS/70	8	ULS/1
106 / MAX	3.18	0.35	0.03	0.08	0.64	0.93
Node	7	7	7	7	7	62
Case	ULS/1	5	ULS/74	ULS/1	ULS/1	ULS/1
106 / MIN	-0.47	-2.76	-0.16	-0.01	-0.08	-0.94
Node	62	7	7	7	7	7
Case	ULS/70	ULS/1	ULS/1	5	8	ULS/1
107 / MAX	18.54	0.52	1.37	0.15	1.19	1.43
Node	5	5	5	5	68	68
Case	ULS/1	5	ULS/1	ULS/1	ULS/1	ULS/1
107 / MIN	-2.34	-4.19	-0.21	-0.02	-0.18	-1.42
Node	5	5	5	5	68	5
Case	6	ULS/1	8	8	8	ULS/1
108 / MAX	0.16	0.66	0.05	0.22	0.49	1.87
Node	3	3	3	3	3	66
Case	5	5	ULS/54	ULS/1	ULS/1	ULS/1
108 / MIN	-1.17	-5.44	-0.03	-0.03	-0.08	-1.82
Node	66	3	3	3	66	3
Case	ULS/1	ULS/1	ULS/63	8	8	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
109 / MAX	16.70	0.97	1.68	0.27	0.92	2.61
Node	1	1	1	1	61	61
Case	ULS/1	5	ULS/1	ULS/1	ULS/1	ULS/1
109 / MIN	-2.29	-8.07	-0.24	-0.03	-0.24	-2.87
Node	1	1	1	1	1	1
Case	5	ULS/1	6	8	ULS/9	ULS/1
110 / MAX	18.20	1.37	0.95	0.01	0.92	0.46
Node	30	30	30	30	64	30
Case	ULS/1	ULS/1	ULS/1	ULS/72	ULS/1	ULS/1
110 / MIN	-2.17	-0.19	-0.11	-0.03	-0.10	-0.47
Node	30	30	30	30	64	64
Case	6	6	8	ULS/1	8	ULS/1
111 / MAX	3.18	2.76	0.03	0.01	0.64	0.94
Node	32	32	32	32	32	32
Case	ULS/1	ULS/1	ULS/74	6	ULS/1	ULS/1
111 / MIN	-0.47	-0.35	-0.16	-0.08	-0.08	-0.93
Node	71	32	32	32	32	71
Case	ULS/72	6	ULS/1	ULS/1	8	ULS/1
112 / MAX	18.54	4.19	1.37	0.02	1.19	1.42
Node	103	103	103	103	70	103
Case	ULS/1	ULS/1	ULS/1	8	ULS/1	ULS/1
112 / MIN	-2.34	-0.52	-0.21	-0.15	-0.18	-1.43
Node	103	103	103	103	70	70
Case	5	6	8	ULS/1	8	ULS/1
113 / MAX	0.16	5.44	0.05	0.03	0.49	1.82
Node	104	104	104	104	104	104
Case	6	ULS/1	ULS/56	8	ULS/1	ULS/1
113 / MIN	-1.17	-0.66	-0.03	-0.22	-0.08	-1.87
Node	65	104	104	104	65	65
Case	ULS/1	6	ULS/61	ULS/1	8	ULS/1
114 / MAX	16.70	8.07	1.68	0.03	0.92	2.87
Node	101	101	101	101	72	101
Case	ULS/1	ULS/1	ULS/1	8	ULS/1	ULS/1
114 / MIN	-2.29	-0.97	-0.24	-0.27	-0.24	-2.61
Node	101	101	101	101	101	72
Case	6	6	5	ULS/1	ULS/9	ULS/1
115 / MAX	21.19	0.00	0.08	0.03	0.00	0.00
Node	100	100	100	105	105	105
Case	ULS/9	ULS/7	ULS/54	7	ULS/9	ULS/77
115 / MIN	-9.27	-0.01	-0.06	-0.26	-0.00	-0.00
Node	100	105	105	105	105	105
Case	ULS/70	ULS/1	ULS/60	ULS/1	ULS/70	ULS/74
116 / MAX	29.84	0.12	0.09	0.04	0.00	0.00
Node	107	106	106	106	107	107
Case	ULS/9	ULS/1	ULS/54	6	ULS/23	ULS/56
116 / MIN	-17.91	-0.02	-0.07	-0.34	-0.00	-0.00
Node	106	106	107	106	107	107
Case	ULS/9	6	ULS/60	ULS/1	ULS/54	ULS/51
117 / MAX	0.15	0.15	0.01	0.02	0.00	0.07
Node	111	109	109	109	109	111
Case	ULS/54	ULS/70	ULS/1	ULS/1	6	ULS/9
117 / MIN	-0.15	-0.26	-0.00	-0.00	-0.02	-0.07
Node	109	109	109	109	109	109
Case	ULS/23	ULS/9	6	7	ULS/1	ULS/9

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
118 / MAX	0.11	0.13	0.03	0.02	0.01	0.07
Node	108	108	108	108	108	112
Case	5	ULS/70	ULS/1	ULS/1	6	ULS/9
118 / MIN	-0.48	-0.24	-0.00	-0.00	-0.05	-0.07
Node	108	108	108	108	108	108
Case	ULS/9	ULS/9	5	7	ULS/1	ULS/9
119 / MAX	0.03	0.14	0.01	0.02	0.00	0.06
Node	110	110	110	110	110	113
Case	8	ULS/70	7	ULS/1	ULS/5	ULS/9
119 / MIN	-0.24	-0.21	-0.04	-0.00	-0.02	-0.06
Node	110	110	110	110	113	110
Case	ULS/45	ULS/9	ULS/1	7	ULS/1	ULS/9
120 / MAX	15.11	0.02	0.07	0.00	0.04	0.08
Node	100	100	100	100	100	108
Case	ULS/9	6	ULS/9	5	ULS/70	ULS/1
120 / MIN	-7.24	-0.15	-0.07	-0.01	-0.05	-0.10
Node	108	100	108	100	100	100
Case	ULS/70	ULS/1	ULS/54	ULS/5	ULS/9	ULS/1
121 / MAX	7.38	0.00	0.03	0.00	0.00	0.01
Node	111	108	108	108	111	108
Case	ULS/70	6	ULS/3	6	5	6
121 / MIN	-13.11	-0.02	-0.03	-0.02	-0.01	-0.05
Node	108	108	111	108	108	108
Case	ULS/9	ULS/1	ULS/60	ULS/1	ULS/1	ULS/1
122 / MAX	13.39	0.00	0.03	0.00	0.01	0.03
Node	111	111	111	111	111	110
Case	ULS/9	7	ULS/54	5	ULS/31	ULS/1
122 / MIN	-7.97	-0.01	-0.04	-0.01	-0.01	-0.00
Node	110	111	110	111	110	110
Case	ULS/70	ULS/1	ULS/9	ULS/1	ULS/9	7
123 / MAX	8.69	0.01	0.09	0.00	0.05	0.02
Node	105	110	110	110	105	105
Case	ULS/70	7	ULS/9	7	ULS/9	ULS/1
123 / MIN	-12.54	-0.07	-0.08	-0.02	-0.05	-0.06
Node	110	110	105	110	105	110
Case	ULS/9	ULS/1	ULS/54	ULS/1	ULS/70	ULS/1
124 / MAX	0.56	0.16	0.00	0.00	0.00	0.05
Node	26	114	114	114	26	114
Case	ULS/52	ULS/1	ULS/72	ULS/45	ULS/72	ULS/1
124 / MIN	-0.07	-0.03	-0.00	-0.00	-0.00	-0.05
Node	114	114	114	114	26	26
Case	ULS/34	8	ULS/45	ULS/72	ULS/45	ULS/1
125 / MAX	0.01	0.13	0.00	0.00	0.00	0.04
Node	115	115	115	115	115	115
Case	8	ULS/1	ULS/46	ULS/45	ULS/72	ULS/1
125 / MIN	-0.23	-0.03	-0.00	-0.00	-0.00	-0.04
Node	115	115	115	115	115	28
Case	ULS/12	ULS/76	ULS/71	ULS/72	ULS/45	ULS/1
126 / MAX	0.06	0.19	0.00	0.00	0.00	0.06
Node	116	116	116	116	24	116
Case	8	ULS/1	ULS/72	ULS/45	ULS/72	ULS/1
126 / MIN	-0.45	-0.03	-0.00	-0.00	-0.00	-0.05
Node	116	116	116	116	24	24
Case	ULS/1	8	ULS/45	ULS/72	ULS/45	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
127 / MAX	23.23	0.00	0.07	0.01	0.00	0.00
Node	117	117	102	117	117	117
Case	ULS/1	ULS/45	ULS/52	ULS/72	8	ULS/45
127 / MIN	-5.06	-0.00	-0.07	-0.01	-0.00	-0.00
Node	117	117	117	117	117	117
Case	8	ULS/72	ULS/60	ULS/45	ULS/1	ULS/72
128 / MAX	12.89	0.00	0.26	0.00	0.00	0.00
Node	118	119	118	118	119	119
Case	ULS/1	ULS/45	ULS/52	ULS/72	ULS/1	ULS/45
128 / MIN	-17.54	-0.00	-0.25	-0.00	-0.00	-0.00
Node	119	119	119	118	119	119
Case	ULS/7	ULS/72	ULS/52	ULS/45	8	ULS/72
129 / MAX	2.40	0.00	0.03	0.00	0.07	0.00
Node	102	102	102	102	102	102
Case	ULS/68	ULS/72	ULS/60	ULS/72	ULS/1	ULS/72
129 / MIN	-6.03	-0.00	-0.12	-0.00	-0.04	-0.00
Node	115	102	115	102	115	102
Case	ULS/12	ULS/45	ULS/1	ULS/45	ULS/1	ULS/45
130 / MAX	8.20	0.00	0.04	0.00	0.00	0.00
Node	26	115	115	115	26	26
Case	ULS/1	ULS/70	ULS/1	ULS/72	ULS/23	ULS/47
130 / MIN	-1.88	-0.00	-0.02	-0.00	-0.01	-0.00
Node	115	115	26	115	115	26
Case	8	ULS/47	ULS/60	ULS/45	ULS/1	ULS/70
131 / MAX	1.74	0.00	0.02	0.00	0.00	0.00
Node	26	26	26	26	26	26
Case	8	ULS/70	ULS/58	ULS/61	8	ULS/45
131 / MIN	-8.90	-0.00	-0.02	-0.00	-0.01	-0.00
Node	116	26	116	26	116	26
Case	ULS/1	ULS/47	ULS/51	ULS/56	ULS/12	ULS/72
132 / MAX	11.49	0.01	0.05	0.00	0.08	0.00
Node	117	116	116	116	116	117
Case	ULS/1	ULS/72	ULS/76	ULS/72	ULS/1	ULS/45
132 / MIN	-1.89	-0.01	-0.25	-0.00	-0.19	-0.00
Node	116	116	117	116	117	117
Case	8	ULS/45	ULS/1	ULS/45	ULS/1	ULS/72
133 / MAX	0.15	0.15	0.00	0.00	0.02	0.07
Node	121	120	120	120	120	121
Case	ULS/56	ULS/72	5	7	ULS/1	ULS/9
133 / MIN	-0.15	-0.26	-0.01	-0.02	-0.00	-0.07
Node	120	120	120	120	120	120
Case	ULS/23	ULS/9	ULS/1	ULS/1	5	ULS/9
134 / MAX	0.11	0.13	0.00	0.00	0.05	0.07
Node	122	122	122	122	122	123
Case	6	ULS/72	6	7	ULS/1	ULS/9
134 / MIN	-0.48	-0.24	-0.03	-0.02	-0.01	-0.07
Node	122	122	122	122	122	122
Case	ULS/9	ULS/9	ULS/1	ULS/1	5	ULS/9
135 / MAX	0.03	0.14	0.04	0.00	0.02	0.06
Node	124	124	124	124	125	125
Case	8	ULS/72	ULS/1	7	ULS/1	ULS/9
135 / MIN	-0.24	-0.21	-0.01	-0.02	-0.00	-0.06
Node	124	124	124	124	124	124
Case	ULS/47	ULS/9	7	ULS/1	ULS/3	ULS/9

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
136 / MAX	21.19	0.01	0.08	0.26	0.00	0.00
Node	99	126	99	126	126	126
Case	ULS/9	ULS/1	ULS/56	ULS/1	ULS/9	8
136 / MIN	-9.27	-0.00	-0.06	-0.03	-0.00	-0.00
Node	99	99	126	126	126	126
Case	ULS/72	ULS/7	ULS/60	7	ULS/74	ULS/1
137 / MAX	29.84	0.02	0.09	0.34	0.00	0.00
Node	128	127	127	127	128	128
Case	ULS/9	5	ULS/56	ULS/1	ULS/1	ULS/80
137 / MIN	-17.91	-0.12	-0.07	-0.04	-0.00	-0.00
Node	127	127	128	127	128	128
Case	ULS/9	ULS/1	ULS/60	5	ULS/56	ULS/70
138 / MAX	15.11	0.15	0.07	0.01	0.04	0.10
Node	99	99	99	99	99	99
Case	ULS/9	ULS/1	ULS/9	ULS/3	ULS/72	ULS/1
138 / MIN	-7.24	-0.02	-0.07	-0.00	-0.05	-0.08
Node	122	99	122	99	99	122
Case	ULS/72	5	ULS/56	6	ULS/9	ULS/1
139 / MAX	7.38	0.02	0.03	0.02	0.00	0.05
Node	121	122	122	122	121	122
Case	ULS/72	ULS/1	ULS/5	ULS/1	6	ULS/1
139 / MIN	-13.11	-0.00	-0.03	-0.00	-0.01	-0.01
Node	122	122	121	122	122	122
Case	ULS/9	5	ULS/60	5	ULS/1	5
140 / MAX	13.39	0.01	0.03	0.01	0.01	0.00
Node	121	121	121	121	121	124
Case	ULS/9	ULS/1	ULS/56	ULS/1	ULS/31	7
140 / MIN	-7.97	-0.00	-0.04	-0.00	-0.01	-0.03
Node	124	121	124	121	124	124
Case	ULS/72	7	ULS/9	6	ULS/9	ULS/1
141 / MAX	8.69	0.07	0.09	0.02	0.05	0.06
Node	126	124	124	124	126	124
Case	ULS/72	ULS/1	ULS/9	ULS/1	ULS/9	ULS/1
141 / MIN	-12.54	-0.01	-0.08	-0.00	-0.05	-0.02
Node	124	124	126	124	126	126
Case	ULS/9	7	ULS/56	7	ULS/72	ULS/1
142 / MAX	16.50	0.28	0.10	0.02	0.11	0.06
Node	60	60	60	60	60	1
Case	5	ULS/1	ULS/70	ULS/72	ULS/5	6
142 / MIN	-141.23	-0.03	-0.48	-0.07	-0.45	-0.46
Node	60	60	1	60	1	1
Case	ULS/1	5	ULS/1	ULS/9	ULS/1	ULS/1
143 / MAX	150.26	0.03	0.07	0.04	0.47	0.51
Node	1	1	1	1	1	66
Case	ULS/1	6	ULS/70	8	ULS/1	ULS/1
143 / MIN	-18.07	-0.10	-0.50	-0.22	-0.12	-0.07
Node	1	1	66	1	66	66
Case	5	ULS/1	ULS/1	ULS/1	ULS/1	8
144 / MAX	14.48	0.03	0.06	0.05	0.38	0.04
Node	66	66	66	66	66	5
Case	5	5	ULS/54	ULS/5	ULS/1	ULS/7
144 / MIN	-117.73	-0.23	-0.36	-0.01	-0.05	-0.26
Node	66	66	5	66	66	66
Case	ULS/1	ULS/1	ULS/1	8	5	ULS/1

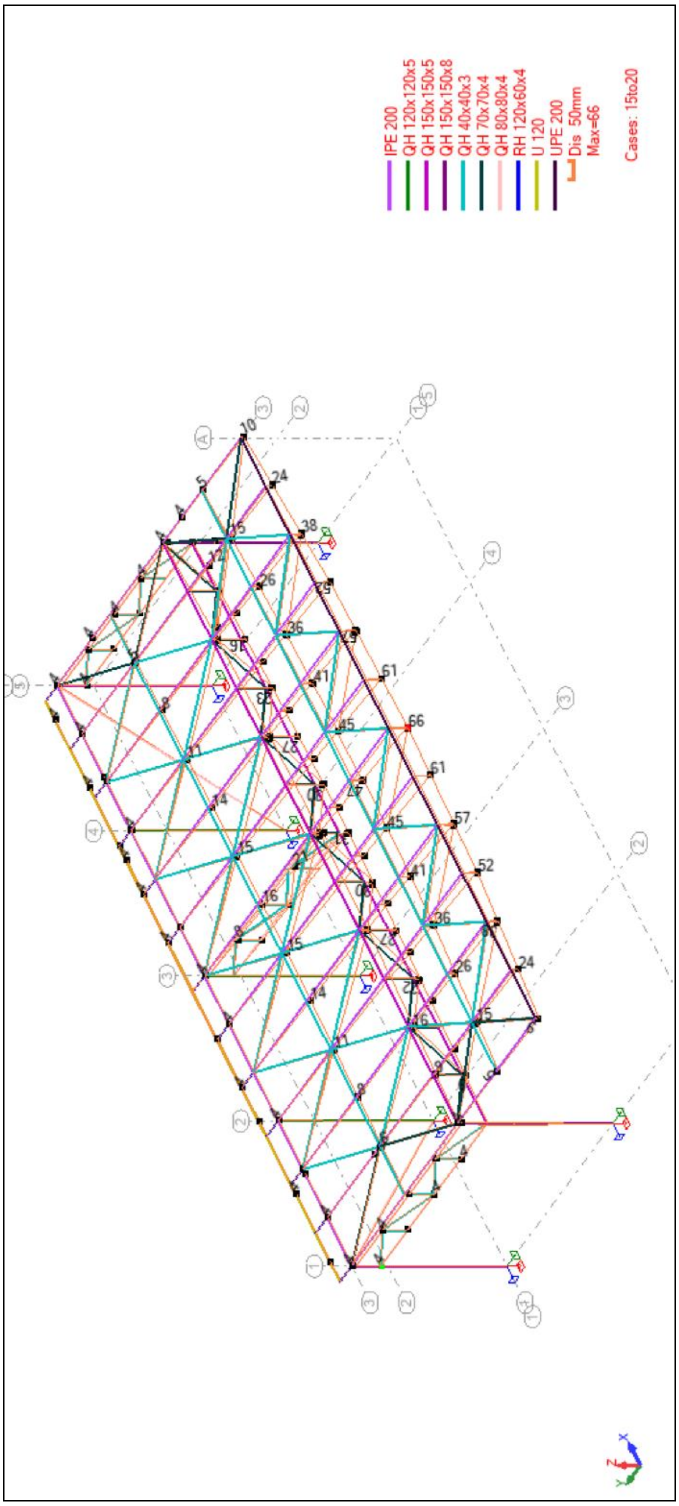
Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
145 / MAX	77.18	0.13	0.06	0.03	0.26	0.43
Node	5	5	5	5	5	5
Case	ULS/1	ULS/1	ULS/58	8	ULS/1	ULS/1
145 / MIN	-9.47	-0.02	-0.09	-0.19	-0.03	-0.06
Node	5	5	62	5	5	5
Case	5	8	ULS/1	ULS/1	7	8
146 / MAX	6.93	0.02	0.06	0.11	0.39	0.14
Node	62	62	62	62	62	9
Case	5	ULS/74	ULS/54	ULS/1	ULS/1	ULS/1
146 / MIN	-52.99	-0.07	-0.24	-0.01	-0.05	-0.02
Node	62	62	9	62	62	9
Case	ULS/1	ULS/1	ULS/1	8	5	8
147 / MAX	11.43	0.02	0.15	0.02	0.35	0.30
Node	9	9	9	9	69	69
Case	ULS/1	5	ULS/1	5	ULS/1	ULS/1
147 / MIN	-1.98	-0.14	-0.06	-0.18	-0.04	-0.04
Node	9	9	69	9	69	69
Case	5	ULS/1	ULS/56	ULS/1	6	5
148 / MAX	11.43	0.14	0.06	0.18	0.35	0.30
Node	30	69	69	69	69	69
Case	ULS/1	ULS/1	ULS/54	ULS/1	ULS/1	ULS/1
148 / MIN	-1.98	-0.02	-0.15	-0.02	-0.04	-0.04
Node	69	69	30	69	69	69
Case	6	6	ULS/1	6	5	6
149 / MAX	6.93	0.07	0.24	0.01	0.39	0.14
Node	30	30	30	30	71	30
Case	6	ULS/1	ULS/1	8	ULS/1	ULS/1
149 / MIN	-52.99	-0.02	-0.06	-0.11	-0.05	-0.02
Node	71	30	71	30	71	30
Case	ULS/1	ULS/74	ULS/56	ULS/1	6	8
150 / MAX	77.18	0.02	0.09	0.19	0.26	0.43
Node	103	71	71	71	103	103
Case	ULS/1	8	ULS/1	ULS/1	ULS/1	ULS/1
150 / MIN	-9.47	-0.13	-0.06	-0.03	-0.03	-0.06
Node	71	71	103	71	103	103
Case	6	ULS/1	ULS/58	8	7	8
151 / MAX	14.48	0.23	0.36	0.01	0.38	0.04
Node	103	103	103	103	65	103
Case	6	ULS/1	ULS/1	8	ULS/1	ULS/7
151 / MIN	-117.73	-0.03	-0.06	-0.05	-0.05	-0.26
Node	65	103	65	103	65	65
Case	ULS/1	6	ULS/56	ULS/3	6	ULS/1
152 / MAX	16.50	0.03	0.48	0.07	0.11	0.06
Node	101	101	101	101	58	101
Case	6	6	ULS/1	ULS/9	ULS/3	5
152 / MIN	-141.23	-0.28	-0.10	-0.02	-0.45	-0.46
Node	58	101	58	101	101	101
Case	ULS/1	ULS/1	ULS/72	ULS/70	ULS/1	ULS/1
153 / MAX	150.26	0.10	0.07	0.22	0.47	0.07
Node	101	101	101	101	101	65
Case	ULS/1	ULS/1	ULS/72	ULS/1	ULS/1	8
153 / MIN	-18.07	-0.03	-0.50	-0.04	-0.12	-0.51
Node	101	101	65	101	65	65
Case	6	5	ULS/1	8	ULS/1	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
154 / MAX	13.79	0.85	0.09	0.06	0.21	5.46
Node	20	20	20	20	20	21
Case	ULS/1	ULS/76	ULS/70	ULS/47	ULS/47	ULS/3
154 / MIN	-1.67	-2.19	-0.12	-0.04	-0.21	-2.44
Node	20	20	20	20	21	20
Case	8	ULS/3	ULS/47	ULS/70	ULS/47	ULS/3
155 / MAX	21.78	0.92	7.04	0.01	1.00	0.31
Node	129	8	129	8	129	8
Case	ULS/1	ULS/47	ULS/1	ULS/1	7	ULS/72
155 / MIN	-3.01	-1.53	-0.84	-0.00	-8.83	-0.52
Node	129	8	129	8	129	8
Case	8	ULS/70	7	7	ULS/1	ULS/45
156 / MAX	21.78	0.92	7.04	0.01	1.00	0.30
Node	129	6	129	129	129	129
Case	ULS/1	ULS/70	ULS/1	ULS/1	7	ULS/3
156 / MIN	-3.01	-0.62	-0.84	-0.00	-8.83	-0.08
Node	129	6	129	6	129	129
Case	8	ULS/47	7	8	ULS/1	ULS/76
157 / MAX	4.06	0.33	0.79	0.02	0.88	0.12
Node	131	131	131	56	131	56
Case	6	ULS/1	6	ULS/1	6	ULS/1
157 / MIN	-33.02	-0.05	-6.83	-0.00	-7.75	-0.14
Node	131	131	131	56	131	131
Case	ULS/1	5	ULS/1	8	ULS/1	ULS/1
158 / MAX	4.06	0.33	0.79	0.01	0.88	0.11
Node	131	131	131	131	131	41
Case	6	ULS/1	6	ULS/1	6	ULS/3
158 / MIN	-33.02	-0.05	-6.83	-0.00	-7.75	-0.14
Node	131	131	131	131	131	131
Case	ULS/1	5	ULS/1	8	ULS/1	ULS/1
159 / MAX	0.88	0.76	0.80	0.02	0.91	0.08
Node	27	132	132	132	132	27
Case	8	ULS/1	8	ULS/1	8	ULS/3
159 / MIN	-5.64	-0.18	-6.69	-0.00	-7.91	-0.25
Node	132	27	132	132	132	132
Case	ULS/1	ULS/1	ULS/1	8	ULS/1	ULS/1
160 / MAX	2.46	0.76	0.80	0.02	0.91	0.06
Node	40	132	132	132	132	40
Case	8	ULS/1	8	ULS/1	8	ULS/3
160 / MIN	-15.83	-0.11	-6.69	-0.00	-7.91	-0.25
Node	40	132	132	132	132	132
Case	ULS/1	5	ULS/1	8	ULS/1	ULS/1
161 / MAX	0.31	0.81	0.90	0.01	1.14	0.03
Node	133	133	133	133	133	133
Case	6	ULS/1	6	ULS/1	6	5
161 / MIN	-2.31	-0.27	-7.64	-0.00	-9.93	-0.23
Node	133	10	133	133	133	133
Case	ULS/1	ULS/1	ULS/1	7	ULS/1	ULS/1
162 / MAX	1.92	0.81	0.90	0.01	1.34	0.03
Node	17	133	133	17	17	133
Case	ULS/1	ULS/1	6	ULS/1	8	5
162 / MIN	-2.31	-0.13	-7.64	-0.00	-9.93	-0.23
Node	133	133	133	17	133	133
Case	ULS/1	5	ULS/1	5	ULS/1	ULS/1

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
163 / MAX	0.78	0.65	0.77	0.00	0.84	0.03
Node	22	134	134	134	134	134
Case	8	ULS/1	8	ULS/1	8	5
163 / MIN	-5.13	-0.24	-6.46	-0.00	-7.38	-0.17
Node	22	22	134	134	134	134
Case	ULS/1	ULS/5	ULS/1	7	ULS/1	ULS/1
164 / MAX	1.36	0.65	0.77	0.01	0.84	0.03
Node	39	134	134	39	134	134
Case	8	ULS/1	8	ULS/1	8	5
164 / MIN	-8.00	-0.12	-6.46	-0.00	-7.38	-0.17
Node	39	134	134	39	134	134
Case	ULS/1	5	ULS/1	5	ULS/1	ULS/1
165 / MAX	0.60	0.35	0.75	0.01	0.81	0.02
Node	135	135	135	29	135	135
Case	8	ULS/5	8	ULS/1	8	5
165 / MIN	-3.86	-0.15	-6.45	-0.00	-7.28	-0.08
Node	135	29	135	29	135	135
Case	ULS/1	ULS/5	ULS/1	7	ULS/1	ULS/5
166 / MAX	1.18	0.35	0.75	0.00	0.81	0.02
Node	38	135	135	38	135	135
Case	ULS/51	ULS/5	8	ULS/1	8	5
166 / MIN	-3.86	-0.10	-6.45	-0.00	-7.28	-0.08
Node	135	135	135	38	135	135
Case	ULS/1	ULS/70	ULS/1	5	ULS/1	ULS/5
167 / MAX	0.37	0.09	0.93	0.00	1.20	0.02
Node	11	136	136	136	136	136
Case	7	ULS/72	7	ULS/47	7	ULS/45
167 / MIN	-1.60	-0.09	-7.86	-0.00	-10.53	-0.02
Node	136	136	136	136	136	136
Case	ULS/1	ULS/45	ULS/1	ULS/70	ULS/1	ULS/72
168 / MAX	2.44	0.09	0.93	0.00	1.59	0.02
Node	19	136	136	19	19	136
Case	8	ULS/72	7	ULS/72	ULS/1	ULS/45
168 / MIN	-16.86	-0.09	-7.86	-0.00	-10.53	-0.02
Node	19	136	136	19	136	136
Case	ULS/1	ULS/45	ULS/1	ULS/45	ULS/1	ULS/72
169 / MAX	0.60	0.15	0.75	0.00	0.81	0.08
Node	137	23	137	23	137	137
Case	8	ULS/3	8	7	8	ULS/3
169 / MIN	-3.86	-0.35	-6.45	-0.01	-7.28	-0.02
Node	137	137	137	23	137	137
Case	ULS/1	ULS/3	ULS/1	ULS/1	ULS/1	6
170 / MAX	1.18	0.10	0.75	0.00	0.81	0.08
Node	37	137	137	37	137	137
Case	ULS/51	ULS/72	8	6	8	ULS/3
170 / MIN	-3.86	-0.35	-6.45	-0.00	-7.28	-0.02
Node	137	137	137	37	137	137
Case	ULS/1	ULS/3	ULS/1	ULS/1	ULS/1	6
171 / MAX	0.78	0.24	0.77	0.00	0.84	0.17
Node	31	31	138	138	138	138
Case	8	ULS/3	8	7	8	ULS/1
171 / MIN	-5.13	-0.65	-6.46	-0.00	-7.38	-0.03
Node	138	138	138	138	138	138
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	6

Bar	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
172 / MAX	1.36	0.12	0.77	0.00	0.84	0.17
Node	36	138	138	36	138	138
Case	8	6	8	6	8	ULS/1
172 / MIN	-8.00	-0.65	-6.46	-0.01	-7.38	-0.03
Node	36	138	138	36	138	138
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	6
173 / MAX	0.31	0.27	0.90	0.00	1.14	0.23
Node	139	12	139	139	139	139
Case	5	ULS/1	5	7	5	ULS/1
173 / MIN	-2.31	-0.81	-7.64	-0.01	-9.93	-0.03
Node	139	139	139	139	139	139
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	6
174 / MAX	1.92	0.13	0.90	0.00	1.34	0.23
Node	21	139	139	21	21	139
Case	ULS/1	6	5	6	8	ULS/1
174 / MIN	-2.31	-0.81	-7.64	-0.01	-9.93	-0.03
Node	139	139	139	21	139	139
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	6
175 / MAX	0.88	0.18	0.80	0.00	0.91	0.25
Node	25	25	140	140	140	140
Case	8	ULS/1	8	8	8	ULS/1
175 / MIN	-5.64	-0.76	-6.69	-0.02	-7.91	-0.08
Node	140	140	140	25	140	25
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	ULS/5
176 / MAX	2.46	0.11	0.80	0.00	0.91	0.25
Node	35	140	140	140	140	140
Case	8	6	8	8	8	ULS/1
176 / MIN	-15.83	-0.76	-6.69	-0.02	-7.91	-0.06
Node	35	140	140	140	140	35
Case	ULS/1	ULS/1	ULS/1	ULS/1	ULS/1	ULS/5
177 / MAX	21.78	0.62	0.84	0.00	1.00	0.30
Node	2	2	130	2	130	130
Case	ULS/1	ULS/45	7	8	7	ULS/5
177 / MIN	-3.01	-0.92	-7.04	-0.01	-8.83	-0.08
Node	130	2	130	130	130	130
Case	8	ULS/72	ULS/1	ULS/1	ULS/1	ULS/76
178 / MAX	21.78	1.13	1.09	0.00	1.69	0.76
Node	130	58	58	130	58	58
Case	ULS/1	ULS/72	7	8	7	ULS/3
178 / MIN	-3.01	-0.98	-9.05	-0.01	-14.62	-0.31
Node	130	58	58	130	58	58
Case	8	ULS/3	ULS/1	ULS/1	ULS/1	ULS/72

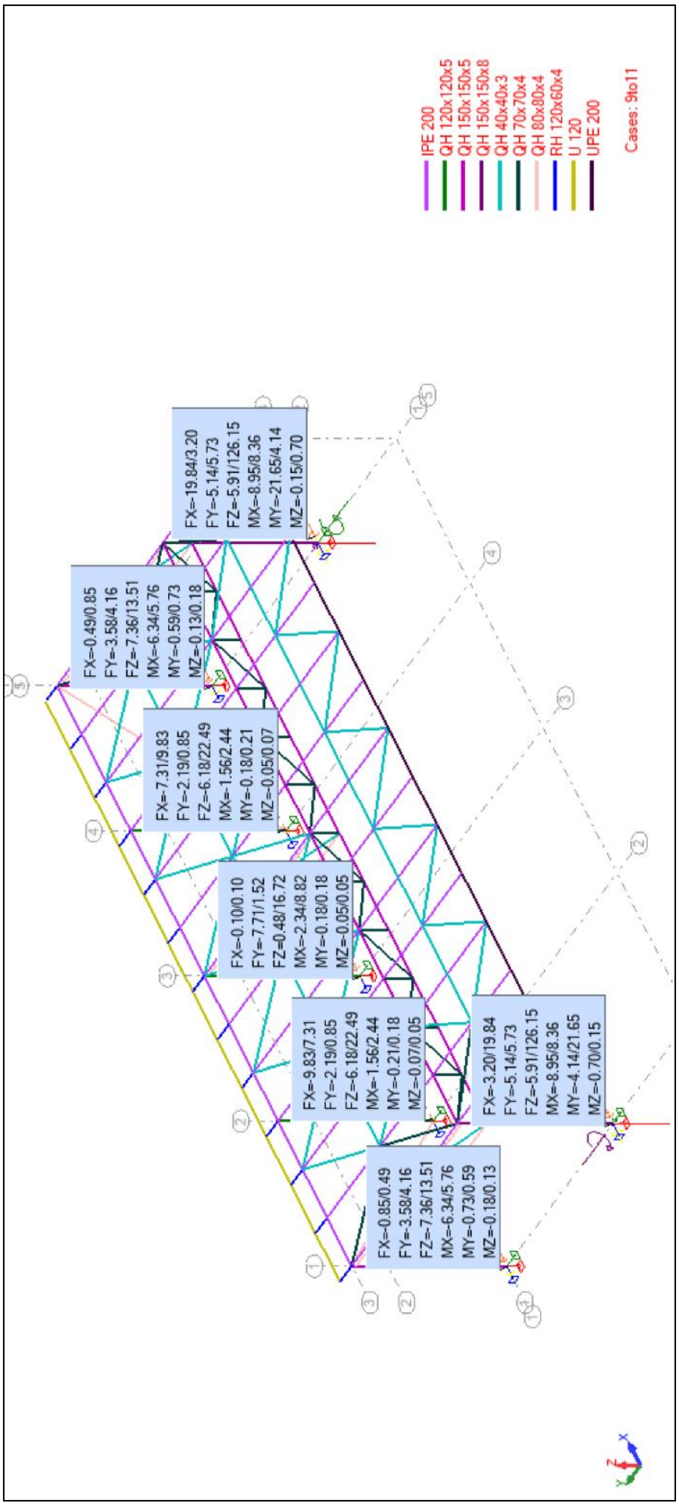
View - Exact deformation(s); Cases: 15to20 1



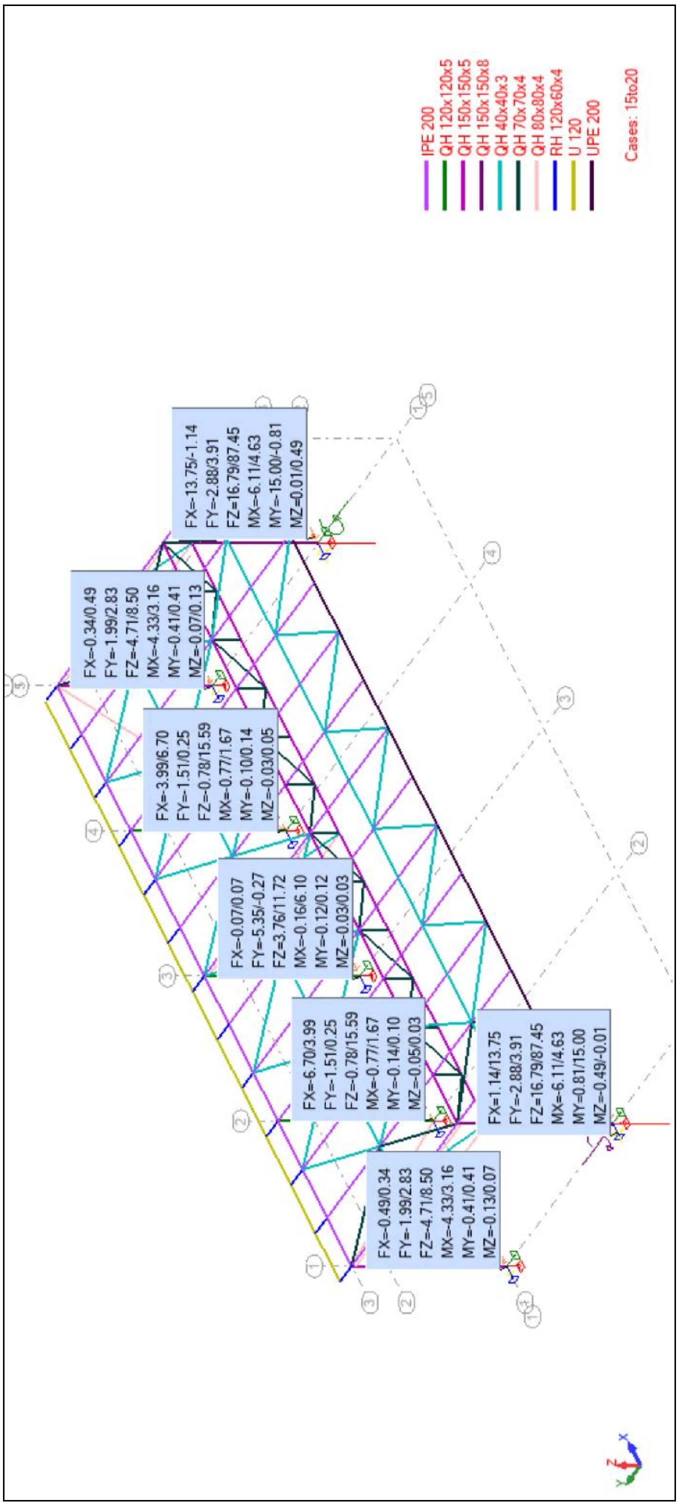
Displacements SLS: global extremes

	UX (mm)	UY (mm)	UZ (mm)	RX (Rad)	RY (Rad)	RZ (Rad)
MAX	3	4	11	0.012	0.012	0.001
Node	101	102	11	11	56	1
Case	SLS/3	SLS/7	7	SLS/1	SLS/1	SLS/3
MIN	-3	-4	-66	-0.002	-0.012	-0.001
Node	1	27	11	11	33	101
Case	SLS/5	SLS/9	SLS/1	7	SLS/1	SLS/5

View - Reaction forces(kN);Reaction moments(kN*m); Cases: 9to11 1



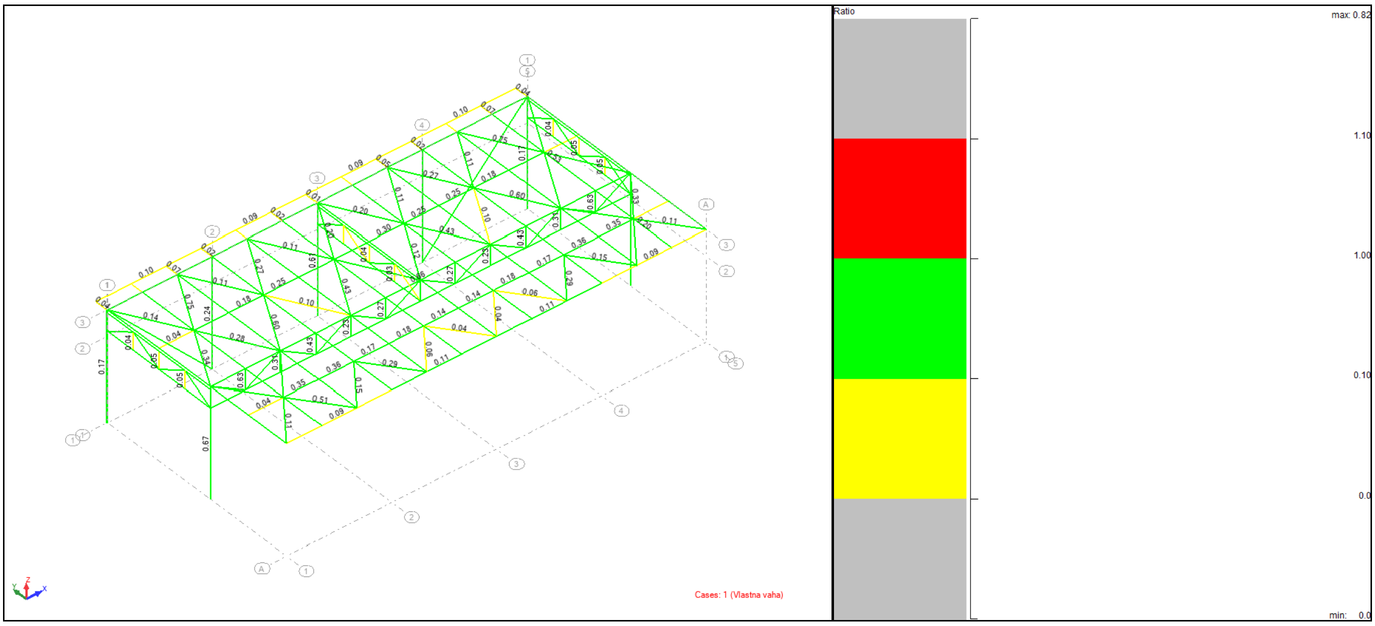
View - Reaction forces(kN);Reaction moments(kN*m); Cases: 15to20 1



Reactions ULS: global extremes

	FX (kN)	FY (kN)	FZ (kN)	MX (kNm)	MY (kNm)	MZ (kNm)
MAX	19.84	5.73	126.15	8.82	21.65	0.70
Node	59	59	59	18	59	57
Case	ULS/1	ULS/51	ULS/1	ULS/7	ULS/1	ULS/5
MIN	-19.84	-7.71	-16.75	-8.95	-21.65	-0.70
Node	57	18	59	59	57	59
Case	ULS/1	ULS/7	6	ULS/9	ULS/1	ULS/3

Maps for Bars:2 - Ratio



Member Verification

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 1 **POINT:** 3 **COORDINATE:** x = 0.66 L = 1.51 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.07 kN	My,Ed = -3.26 kN*m	Mz,Ed = -0.12 kN*m	Vy,Ed = 0.00 kN
Nc,Rd = 669.75 kN	My,Ed,max = -7.75 kN*m	Mz,Ed,max = -0.12 kN*m	Vy,T,Rd = 264.24 kN
Nb,Rd = 516.66 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -4.27 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.40 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.31 m	Lam_y = 0.30	Lz = 2.31 m	Lam_z = 0.72
Lcr,y = 2.31 m	Xy = 0.98	Lcr,z = 1.51 m	Xz = 0.77
Lamy = 27.94	kyy = 1.00	Lamz = 67.76	kyz = 0.78

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.06 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 27.94 < Lambda,max = 210.00 Lambda,z = 67.76 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.19 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 2 **POINT:** 3 **COORDINATE:** x = 1.00 L = 3.45 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 23.12 kN	My,Ed = -3.58 kN*m	Mz,Ed = -0.03 kN*m	Vy,Ed = 0.03 kN
Nc,Rd = 669.75 kN	My,Ed,max = -3.58 kN*m	Mz,Ed,max = -0.38 kN*m	Vy,T,Rd = 265.44 kN
Nb,Rd = 577.35 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -4.74 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.96 kN
	Mb,Rd = 32.17 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 38.92 kN*m	Curve,LT - b	XLT = 0.61
Lcr,low=3.45 m	Lam_LT = 1.16	fi,LT = 1.13	XLT,mod = 0.62

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.55
Lcr,y = 3.45 m	Xy = 0.94	Lcr,z = 1.15 m	Xz = 0.86
Lamy = 41.82	kyy = 1.02	Lamz = 51.52	kyz = 0.78

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.07 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 41.82 < Lambda,max = 210.00 Lambda,z = 51.52 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.11 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 3 **POINT:** 3 **COORDINATE:** x = 1.00 L = 3.45 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 25.88 kN	My,Ed = -2.70 kN*m	Mz,Ed = -0.02 kN*m	Vy,Ed = 0.06 kN
Nc,Rd = 669.75 kN	My,Ed,max = -3.45 kN*m	Mz,Ed,max = 0.05 kN*m	Vy,T,Rd = 265.54 kN
Nb,Rd = 577.35 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -3.64 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.01 kN
	Mb,Rd = 32.17 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 38.92 kN*m	Curve,LT - b	XLT = 0.61
Lcr,low=3.45 m	Lam_LT = 1.16	fi,LT = 1.13	XLT,mod = 0.62

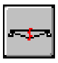
BUCKLING PARAMETERS:

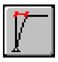
About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.55
Lcr,y = 3.45 m	Xy = 0.94	Lcr,z = 1.15 m	Xz = 0.86
Lamy = 41.82	kyy = 1.02	Lamz = 51.52	kyz = 0.77

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.04 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))

Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 41.82 < Lambda,max = 210.00 Lambda,z = 51.52 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.11 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.15 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS


Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50


Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

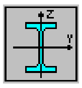
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 4 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

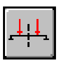
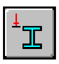
MATERIAL:
S 235 (S 235) fy = 235.00 MPa


SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 25.88 kN	My,Ed = -2.70 kN*m	Mz,Ed = -0.02 kN*m	Vy,Ed = -0.06 kN
Nc,Rd = 669.75 kN	My,Ed,max = -3.45 kN*m	Mz,Ed,max = 0.05 kN*m	Vy,T,Rd = 265.54 kN
Nb,Rd = 577.35 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = 3.64 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.01 kN
	Mb,Rd = 32.17 kN*m		Tt,Ed = 0.00 kN*m
			Class of section = 1



LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 38.92 kN*m	Curve,LT - b	XLT = 0.61

Lcr,low=3.45 m Lam_LT = 1.16 fi,LT = 1.13 XLT,mod = 0.62

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.55
Lcr,y = 3.45 m	Xy = 0.94	Lcr,z = 1.15 m	Xz = 0.86
Lamy = 41.82	kyy = 1.02	Lamz = 51.52	kyz = 0.77

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.04 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 41.82 < Lambda,max = 210.00 Lambda,z = 51.52 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.11 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.15 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 5 **POINT:** 3 **COORDINATE:** x = 1.00 L = 3.45 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4

tf=9 mm Wply=221000 mm3 Wplz=44600 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.93 kN	My,Ed = -0.48 kN*m	Mz,Ed = 0.18 kN*m	Vy,Ed = -0.27 kN
Nc,Rd = 669.75 kN	My,Ed,max = -3.58 kN*m	Mz,Ed,max = 0.37 kN*m	Vy,T,Rd = 264.81 kN
Nb,Rd = 577.35 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -2.57 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.66 kN
	Mb,Rd = 32.17 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 38.92 kN*m	Curve,LT - b	XLT = 0.61
Lcr,low=3.45 m	Lam_LT = 1.16	fi,LT = 1.13	XLT,mod = 0.62

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.55
Lcr,y = 3.45 m	Xy = 0.94	Lcr,z = 1.15 m	Xz = 0.86
Lamy = 41.82	kyy = 1.01	Lamz = 51.52	kyz = 0.78

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.02 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 41.82 < Lambda,max = 210.00 Lambda,z = 51.52 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.11 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.16 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.12 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 6 **POINT:** 1 **COORDINATE:** x = 0.67 L = 2.30 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: UPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=1964 mm2	Az=1327 mm2	Ax=2900 mm2
tw=6 mm	Iy=19090000 mm4	Iz=1870000 mm4	Ix=88800 mm4
tf=11 mm	Wply=204000 mm3	Wplz=62200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 49.04 kN	My,Ed = 0.54 kN*m	Mz,Ed = 0.14 kN*m	Vy,Ed = 0.12 kN
Nc,Rd = 681.50 kN	My,Ed,max = 0.60 kN*m	Mz,Ed,max = 0.14 kN*m	Vy,T,Rd = 265.13 kN
Nb,Rd = 581.24 kN	My,c,Rd = 47.94 kN*m	Mz,c,Rd = 14.62 kN*m	Vz,Ed = -0.30 kN
	MN,y,Rd = 47.69 kN*m	MN,z,Rd = 14.54 kN*m	Vz,T,Rd = 179.55 kN
	Mb,Rd = 27.63 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 48.03 kN*m	Curve,LT - d	XLT = 0.56
Lcr,upp=3.45 m	Lam_LT = 1.00	fi,LT = 1.10	XLT,mod = 0.58

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.48
Lcr,y = 3.45 m	Xy = 0.87	Lcr,z = 1.15 m	Xz = 0.85
Lamy = 42.52	kyy = 1.04	Lamz = 45.29	kyz = 0.70

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 42.52 < Lambda,max = 210.00 Lambda,z = 45.29 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 7 **POINT:** 3 **COORDINATE:** x = 1.00 L = 6.90 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 150x150x5

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=1435 mm2	Az=1435 mm2	Ax=2870 mm2
tw=5 mm	Iy=10020000 mm4	Iz=10020000 mm4	Ix=15243125 mm4
tf=5 mm	Wply=156000 mm3	Wplz=156000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -458.21 kN	My,Ed = 5.74 kN*m	Mz,Ed = -0.14 kN*m	Vy,Ed = 0.94 kN
Nt,Rd = 674.45 kN	My,pl,Rd = 36.66 kN*m	Mz,pl,Rd = 36.66 kN*m	Vy,T,Rd = 193.50 kN
	My,c,Rd = 36.66 kN*m	Mz,c,Rd = 36.66 kN*m	Vz,Ed = 1.63 kN
	MN,y,Rd = 15.44 kN*m	MN,z,Rd = 15.44 kN*m	Vz,T,Rd = 193.50 kN
			Tt,Ed = -0.18 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.68 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.37 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 3.47 + (Mz,Ed/MN,z,Rd)^3.47 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 1 mm < uy max = L/200.00 = 35 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 7 mm < uz max = L/200.00 = 35 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 8 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.08 kN	My,Ed = -9.28 kN*m	Mz,Ed = 0.21 kN*m	Vy,Ed = 0.14 kN
Nc,Rd = 669.75 kN	My,Ed,max = -9.28 kN*m	Mz,Ed,max = 0.21 kN*m	Vy,T,Rd = 264.74 kN
Nb,Rd = 409.28 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = 8.07 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.63 kN
	Mb,Rd = 28.58 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 32.32 kN*m	Curve,LT - b	XLT = 0.54
Lcr,low=4.10 m	Lam_LT = 1.27	fi,LT = 1.25	XLT,mod = 0.55

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.10 m	Lam_y = 0.53	Lz = 4.10 m	Lam_z = 0.98
Lcr,y = 4.10 m	Xy = 0.91	Lcr,z = 2.05 m	Xz = 0.61
Lamy = 49.69	kyy = 1.02	Lamz = 91.84	kyz = 1.16

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.02 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.18 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.05 < 1.00 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.69 < Lambda,max = 210.00 Lambda,z = 91.84 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.32 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.37 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.22 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 9 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -33.02 kN	My,Ed = -13.39 kN*m	Mz,Ed = 0.37 kN*m	Vy,Ed = -0.33 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.63 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.84 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.58 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.05 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.26 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.10 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.53 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 1 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

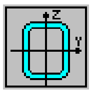
CODE GROUP:
MEMBER: 10 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 150x150x5

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=1435 mm2	Az=1435 mm2	Ax=2870 mm2
tw=5 mm	Iy=10020000 mm4	Iz=10020000 mm4	Ix=15243125 mm4
tf=5 mm	Wply=156000 mm3	Wplz=156000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -458.21 kN	My,Ed = 5.74 kN*m	Mz,Ed = -0.14 kN*m	Vy,Ed = -0.94 kN
Nt,Rd = 674.45 kN	My,pl,Rd = 36.66 kN*m	Mz,pl,Rd = 36.66 kN*m	Vy,T,Rd = 193.50 kN
	My,c,Rd = 36.66 kN*m	Mz,c,Rd = 36.66 kN*m	Vz,Ed = -1.63 kN
	MN,y,Rd = 15.44 kN*m	MN,z,Rd = 15.44 kN*m	Vz,T,Rd = 193.50 kN

Tt,Ed = 0.18 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.68 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.37 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 3.47 + (Mz,Ed/MN,z,Rd)^3.47 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 1 mm < uy max = L/200.00 = 35 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 7 mm < uz max = L/200.00 = 35 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 11 Column_11 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:

Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 150x150x5

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=1435 mm2	Az=1435 mm2	Ax=2870 mm2
tw=5 mm	Iy=10020000 mm4	Iz=10020000 mm4	Ix=15243125 mm4
tf=5 mm	Wply=156000 mm3	Wplz=156000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.78 kN	My,Ed = -0.41 kN*m	Mz,Ed = 6.34 kN*m	Vy,Ed = 4.06 kN
Nt,Rd = 674.45 kN	My,pl,Rd = 36.66 kN*m	Mz,pl,Rd = 36.66 kN*m	Vy,T,Rd = 194.45 kN
	My,c,Rd = 36.66 kN*m	Mz,c,Rd = 36.66 kN*m	Vz,Ed = 0.41 kN
	MN,y,Rd = 36.66 kN*m	MN,z,Rd = 36.66 kN*m	Vz,T,Rd = 194.45 kN
			Tt,Ed = 0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.17 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.05 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):

vx = 0 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /14/ 1*1.00 + 2*1.00 + 4*0.50 + 6*1.00
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 12 Column_12 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

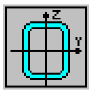
---

LOADS:

Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 150x150x5

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=1435 mm2	Az=1435 mm2	Ax=2870 mm2

tw=5 mm	Iy=10020000 mm4	Iz=10020000 mm4	Ix=15243125 mm4
tf=5 mm	Wply=156000 mm3	Wplz=156000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.78 kN	My,Ed = 0.41 kN*m	Mz,Ed = 6.34 kN*m	Vy,Ed = 4.06 kN
Nt,Rd = 674.45 kN	My,pl,Rd = 36.66 kN*m	Mz,pl,Rd = 36.66 kN*m	Vy,T,Rd = 194.45 kN
	My,c,Rd = 36.66 kN*m	Mz,c,Rd = 36.66 kN*m	Vz,Ed = -0.41 kN
	MN,y,Rd = 36.66 kN*m	MN,z,Rd = 36.66 kN*m	Vz,T,Rd = 194.45 kN
			Tt,Ed = -0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.17 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.05 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):

vx = 0 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 13 Column_13 **POINT:** 3 **COORDINATE:** x = 1.00 L = 3.60 m

---

LOADS:

Governing Load Case: 9 ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 120x120x5

h=120 mm	gM0=1.00	gM1=1.00	
b=120 mm	Ay=1135 mm2	Az=1135 mm2	Ax=2270 mm2
tw=5 mm	Iy=4980000 mm4	Iz=4980000 mm4	Ix=7604375 mm4
tf=5 mm	Wply=97600 mm3	Wplz=97600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.92 kN	My,Ed = 0.01 kN*m	Mz,Ed = 5.46 kN*m	Vy,Ed = -2.19 kN
Nc,Rd = 533.45 kN	My,Ed,max = 0.02 kN*m	Mz,Ed,max = 5.46 kN*m	Vy,T,Rd = 153.98 kN
Nb,Rd = 418.76 kN	My,c,Rd = 22.94 kN*m	Mz,c,Rd = 22.94 kN*m	Vz,Ed = -0.00 kN
	MN,y,Rd = 22.94 kN*m	MN,z,Rd = 22.94 kN*m	Vz,T,Rd = 153.98 kN
			Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.60 m	Lam_y = 0.82	Lz = 3.60 m	Lam_z = 0.82
Lcr,y = 3.60 m	Xy = 0.79	Lcr,z = 3.60 m	Xz = 0.79
Lamy = 76.86	kzy = 0.55	Lamz = 76.86	kzz = 0.70

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.02 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.24 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.09 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.86 < Lambda,max = 210.00 Lambda,z = 76.86 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):

vx = 0 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 14 Column_14 **POINT:** 3 **COORDINATE:** x = 0.81 L = 2.92 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 120x120x5

h=120 mm	gM0=1.00	gM1=1.00	
b=120 mm	Ay=1135 mm2	Az=1135 mm2	Ax=2270 mm2
tw=5 mm	Iy=4980000 mm4	Iz=4980000 mm4	Ix=7604375 mm4
tf=5 mm	Wply=97600 mm3	Wplz=97600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 16.03 kN	Mz,Ed = 14.05 kN*m	Vy,Ed = -7.68 kN
Nc,Rd = 533.45 kN	Mz,Ed,max = 14.05 kN*m	Vy,c,Rd = 153.99 kN
Nb,Rd = 460.94 kN	Mz,c,Rd = 22.94 kN*m	
	MN,z,Rd = 22.94 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.60 m	Lam_y = 0.66	Lz = 3.60 m	Lam_z = 0.66
Lcr,y = 2.92 m	Xy = 0.86	Lcr,z = 2.92 m	Xz = 0.86
Lamy = 62.34	kyz = 0.40	Lamz = 62.34	kzz = 0.66

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
Mz,Ed/Mz,c,Rd = 0.61 < 1.00 (6.2.5.(1))
Mz,Ed/MN,z,Rd = 0.61 < 1.00 (6.2.9.1.(2))
Vy,Ed/Vy,c,Rd = 0.05 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 62.34 < Lambda,max = 210.00 Lambda,z = 62.34 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.28 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.44 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):
vx = 0 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 15 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 6.18 kN	My,Ed = 0.28 kN*m	
Nc,Rd = 244.40 kN	My,Ed,max = 2.22 kN*m	
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Vz,Ed = 0.95 kN
	MN,y,Rd = 5.99 kN*m	Vz,c,Rd = 70.55 kN
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kyy = 0.99	Lamz = 25.37	kzy = 0.60

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.05 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.01 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.39 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 16 **POINT:** 1 **COORDINATE:** x = 0.67 L = 2.30 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: UPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=1964 mm2	Az=1327 mm2	Ax=2900 mm2
tw=6 mm	Iy=19090000 mm4	Iz=1870000 mm4	Ix=88800 mm4
tf=11 mm	Wply=204000 mm3	Wplz=62200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 38.77 kN	My,Ed = 0.28 kN*m	Mz,Ed = -0.16 kN*m	Vy,Ed = -0.14 kN
Nc,Rd = 681.50 kN	My,Ed,max = 0.38 kN*m	Mz,Ed,max = -0.16 kN*m	Vy,T,Rd = 264.02 kN
Nb,Rd = 581.24 kN	My,c,Rd = 47.94 kN*m	Mz,c,Rd = 14.62 kN*m	Vz,Ed = -0.07 kN
	MN,y,Rd = 47.78 kN*m	MN,z,Rd = 14.57 kN*m	Vz,T,Rd = 179.14 kN
	Mb,Rd = 27.63 kN*m		Tt,Ed = -0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 48.03 kN*m	Curve,LT - d	XLT = 0.56
Lcr,upp=3.45 m	Lam_LT = 1.00	fi,LT = 1.10	XLT,mod = 0.58

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.48
Lcr,y = 3.45 m	Xy = 0.87	Lcr,z = 1.15 m	Xz = 0.85
Lamy = 42.52	kyy = 1.03	Lamz = 45.29	kyz = 0.70

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.06 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 42.52 < Lambda,max = 210.00 Lambda,z = 45.29 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.08 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS
Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 17 **POINT:** 3 **COORDINATE:** x = 0.67 L = 2.30 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: UPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=1964 mm2	Az=1327 mm2	Ax=2900 mm2
tw=6 mm	Iy=19090000 mm4	Iz=1870000 mm4	Ix=88800 mm4
tf=11 mm	Wply=204000 mm3	Wplz=62200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 49.18 kN	My,Ed = 0.55 kN*m	Mz,Ed = -0.06 kN*m	Vy,Ed = 0.15 kN
Nc,Rd = 681.50 kN	My,Ed,max = 0.60 kN*m	Mz,Ed,max = 0.14 kN*m	Vy,T,Rd = 266.00 kN
Nb,Rd = 581.24 kN	My,c,Rd = 47.94 kN*m	Mz,c,Rd = 14.62 kN*m	Vz,Ed = -0.18 kN
	MN,y,Rd = 47.69 kN*m	MN,z,Rd = 14.54 kN*m	Vz,T,Rd = 179.87 kN
	Mb,Rd = 27.63 kN*m		Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 48.03 kN*m	Curve,LT - d	XLT = 0.56
Lcr,upp=3.45 m	Lam_LT = 1.00	fi,LT = 1.10	XLT,mod = 0.58

BUCKLING PARAMETERS:

About y axis: | About z axis:

Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.48
Lcr,y = 3.45 m	Xy = 0.87	Lcr,z = 1.15 m	Xz = 0.85
Lamy = 42.52	kyy = 1.04	Lamz = 45.29	kyz = 0.70

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 42.52 < Lambda,max = 210.00 Lambda,z = 45.29 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 18 **POINT:** 3 **COORDINATE:** x = 0.33 L = 1.15 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: UPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=1964 mm2	Az=1327 mm2	Ax=2900 mm2
tw=6 mm	Iy=19090000 mm4	Iz=1870000 mm4	Ix=88800 mm4
tf=11 mm	Wply=204000 mm3	Wplz=62200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 38.77 kN	My,Ed = 0.28 kN*m	Mz,Ed = -0.16 kN*m	Vy,Ed = 0.14 kN
Nc,Rd = 681.50 kN	My,Ed,max = 0.38 kN*m	Mz,Ed,max = -0.16 kN*m	Vy,T,Rd = 264.02 kN
Nb,Rd = 581.24 kN	My,c,Rd = 47.94 kN*m	Mz,c,Rd = 14.62 kN*m	Vz,Ed = 0.07 kN
	MN,y,Rd = 47.78 kN*m	MN,z,Rd = 14.57 kN*m	Vz,T,Rd = 179.14 kN
	Mb,Rd = 27.63 kN*m		Tt,Ed = 0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 48.03 kN*m	Curve,LT - d	XLT = 0.56
Lcr,upp=3.45 m	Lam_LT = 1.00	fi,LT = 1.10	XLT,mod = 0.58

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 3.45 m	Lam_y = 0.45	Lz = 3.45 m	Lam_z = 0.48
Lcr,y = 3.45 m	Xy = 0.87	Lcr,z = 1.15 m	Xz = 0.85
Lamy = 42.52	kyy = 1.03	Lamz = 45.29	kyz = 0.70

VERIFICATION FORMULAS:

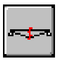
Section strength check:

N,Ed/Nc,Rd = 0.06 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

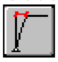
Lambda,y = 42.52 < Lambda,max = 210.00 Lambda,z = 45.29 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.08 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS



Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50



Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

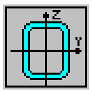
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 19 Simple bar_19 **POINT:** 2 **COORDINATE:** x = 0.50 L = 2.49 m

---

LOADS:
Governing Load Case: 9 ULS /45/ 1*1.35 + 2*1.35 + 4*0.75 + 5*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.04 kN	My,Ed = 0.27 kN*m
Nc,Rd = 282.00 kN	My,Ed,max = 0.27 kN*m

Nb,Rd = 82.47 kN My,c,Rd = 7.99 kN*m
MN,y,Rd = 7.99 kN*m
Tt,Ed = -0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 4.99 m	Lam_y = 1.72	Lz = 4.99 m	Lam_z = 1.72
Lcr,y = 4.99 m	Xy = 0.29	Lcr,z = 4.99 m	Xz = 0.29
Lamy = 161.77	kyy = 1.10	Lamz = 161.77	kzy = 0.74

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.03 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 161.77 < Lambda,max = 210.00 Lambda,z = 161.77 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.21 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 20 Simple bar_20 **POINT:** 2 **COORDINATE:** x = 0.50 L = 2.49 m

---

LOADS:
Governing Load Case: 9 ULS /47/ 1*1.35 + 2*1.35 + 4*0.75 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.04 kN My,Ed = 0.27 kN*m
Nc,Rd = 282.00 kN My,Ed,max = 0.27 kN*m
Nb,Rd = 82.47 kN My,c,Rd = 7.99 kN*m
MN,y,Rd = 7.99 kN*m
Tt,Ed = 0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.99 m	Lam_y = 1.72	Lz = 4.99 m	Lam_z = 1.72
Lcr,y = 4.99 m	Xy = 0.29	Lcr,z = 4.99 m	Xz = 0.29
Lamy = 161.77	kyy = 1.10	Lamz = 161.77	kzy = 0.74

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.03 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 161.77 < Lambda,max = 210.00 Lambda,z = 161.77 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.21 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 21 **POINT:** 1 **COORDINATE:** x = 0.33 L = 1.15 m

LOADS:

Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: U 120

h=120 mm	gM0=1.00	gM1=1.00	
b=55 mm	Ay=1112 mm2	Az=854 mm2	Ax=1700 mm2
tw=7 mm	Iy=3640000 mm4	Iz=432000 mm4	Ix=42800 mm4
tf=9 mm	Wply=66300 mm3	Wplz=21200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 1.85 kN	My,Ed = 0.49 kN*m	Mz,Ed = 0.24 kN*m	Vy,Ed = 0.62 kN
Nc,Rd = 399.50 kN	My,Ed,max = 0.49 kN*m	Mz,Ed,max = 0.24 kN*m	Vy,T,Rd = 150.38 kN
Nb,Rd = 266.06 kN	My,c,Rd = 15.58 kN*m	Mz,c,Rd = 4.98 kN*m	Vz,Ed = -0.56 kN
	MN,y,Rd = 15.58 kN*m	MN,z,Rd = 4.98 kN*m	Vz,T,Rd = 115.57 kN
	Mb,Rd = 9.29 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 16.65 kN*m	Curve,LT - d	XLT = 0.58

Lcr,upp=3.45 m	Lam_LT = 0.97	fi,LT = 1.07	XLT,mod = 0.60

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.79	Lz = 3.45 m	Lam_z = 0.77
Lcr,y = 3.45 m	Xy = 0.67	Lcr,z = 1.15 m	Xz = 0.68
Lamy = 74.56	kyy = 1.00	Lamz = 72.14	kyz = 0.74

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.08 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 74.56 < Lambda,max = 210.00   Lambda,z = 72.14 < Lambda,max = 210.00   STABLE
My,Ed,max/Mb,Rd = 0.05 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.08 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm   Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm   Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 22   **POINT:** 1   **COORDINATE:** x = 0.33 L = 1.15 m

---

LOADS:
Governing Load Case: 9 ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa

SECTION PARAMETERS: U 120

h=120 mm	gM0=1.00	gM1=1.00	
b=55 mm	Ay=1112 mm2	Az=854 mm2	Ax=1700 mm2
tw=7 mm	Iy=3640000 mm4	Iz=432000 mm4	Ix=42800 mm4

tf=9 mm Wply=66300 mm3 Wplz=21200 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.98 kN	My,Ed = -0.31 kN*m	Mz,Ed = -0.07 kN*m	Vy,Ed = -0.33 kN
Nc,Rd = 399.50 kN	My,Ed,max = -0.62 kN*m	Mz,Ed,max = -0.08 kN*m	Vy,T,Rd = 150.48 kN
Nb,Rd = 266.06 kN	My,c,Rd = 15.58 kN*m	Mz,c,Rd = 4.98 kN*m	Vz,Ed = 0.29 kN
	MN,y,Rd = 15.58 kN*m	MN,z,Rd = 4.98 kN*m	Vz,T,Rd = 115.63 kN
	Mb,Rd = 9.29 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 16.65 kN*m	Curve,LT - d	XLT = 0.58
Lcr,low=3.45 m	Lam_LT = 0.97	fi,LT = 1.07	XLT,mod = 0.60

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 3.45 m	Lam_y = 0.79	Lz = 3.45 m	Lam_z = 0.77
Lcr,y = 3.45 m	Xy = 0.67	Lcr,z = 1.15 m	Xz = 0.68
Lamy = 74.56	kyy = 1.00	Lamz = 72.14	kyz = 0.75

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 74.56 < Lambda,max = 210.00 Lambda,z = 72.14 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.07 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 23 **POINT:** 1 **COORDINATE:** x = 0.67 L = 2.30 m

LOADS:

Governing Load Case: 9 ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: U 120

h=120 mm	gM0=1.00	gM1=1.00	
b=55 mm	Ay=1112 mm2	Az=854 mm2	Ax=1700 mm2
tw=7 mm	Iy=3640000 mm4	Iz=432000 mm4	Ix=42800 mm4
tf=9 mm	Wply=66300 mm3	Wplz=21200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.95 kN	My,Ed = -0.62 kN*m	Mz,Ed = -0.08 kN*m	Vy,Ed = -0.38 kN
Nc,Rd = 399.50 kN	My,Ed,max = -0.62 kN*m	Mz,Ed,max = -0.08 kN*m	Vy,T,Rd = 150.07 kN
Nb,Rd = 266.06 kN	My,c,Rd = 15.58 kN*m	Mz,c,Rd = 4.98 kN*m	Vz,Ed = 0.64 kN
	MN,y,Rd = 15.58 kN*m	MN,z,Rd = 4.98 kN*m	Vz,T,Rd = 115.39 kN
	Mb,Rd = 9.29 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 16.65 kN*m	Curve,LT - d	XLT = 0.58
Lcr,low=3.45 m	Lam_LT = 0.97	fi,LT = 1.07	XLT,mod = 0.60

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.79	Lz = 3.45 m	Lam_z = 0.77
Lcr,y = 3.45 m	Xy = 0.67	Lcr,z = 1.15 m	Xz = 0.68
Lamy = 74.56	kyy = 1.00	Lamz = 72.14	kyz = 0.75

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.06 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 74.56 < Lambda,max = 210.00 Lambda,z = 72.14 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.07 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /14/ 1*1.00 + 2*1.00 + 4*0.50 + 6*1.00
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 24 **POINT:** 3 **COORDINATE:** x = 0.67 L = 2.30 m

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: U 120

h=120 mm	gM0=1.00	gM1=1.00	
b=55 mm	Ay=1112 mm2	Az=854 mm2	Ax=1700 mm2
tw=7 mm	Iy=3640000 mm4	Iz=432000 mm4	Ix=42800 mm4
tf=9 mm	Wply=66300 mm3	Wplz=21200 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 1.85 kN	My,Ed = 0.49 kN*m	Mz,Ed = 0.24 kN*m	Vy,Ed = -0.62 kN
Nc,Rd = 399.50 kN	My,Ed,max = 0.49 kN*m	Mz,Ed,max = 0.24 kN*m	Vy,T,Rd = 150.38 kN
Nb,Rd = 266.06 kN	My,c,Rd = 15.58 kN*m	Mz,c,Rd = 4.98 kN*m	Vz,Ed = 0.56 kN
	MN,y,Rd = 15.58 kN*m	MN,z,Rd = 4.98 kN*m	Vz,T,Rd = 115.57 kN
	Mb,Rd = 9.29 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 16.65 kN*m	Curve,LT - d	XLT = 0.58
Lcr,upp=3.45 m	Lam_LT = 0.97	fi,LT = 1.07	XLT,mod = 0.60

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.45 m	Lam_y = 0.79	Lz = 3.45 m	Lam_z = 0.77
Lcr,y = 3.45 m	Xy = 0.67	Lcr,z = 1.15 m	Xz = 0.68
Lamy = 74.56	kyy = 1.00	Lamz = 72.14	kyz = 0.74

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.08 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 74.56 < Lambda,max = 210.00 Lambda,z = 72.14 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.05 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.08 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 17 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 25 IPE 200_25 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.28 kN	My,Ed = -0.14 kN*m	Mz,Ed = 0.27 kN*m	Vy,Ed = 0.60 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.14 kN*m	Mz,Ed,max = 0.27 kN*m	Vy,c,Rd = 61.51 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.35 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,c,Rd = 123.01 kN
	Mb,Rd = 12.20 kN*m		
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 0.45 m Lam_y = 0.11 Lz = 0.45 m Lam_z = 0.19

Lcr,y = 0.45 m Xy = 1.00 Lcr,z = 0.45 m Xz = 1.00
Lamy = 10.52 kzy = 0.63 Lamz = 18.20 kzz = 1.00

VERIFICATION FORMULAS:

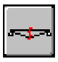
Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.01 < 1.00 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Global stability check of member:

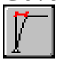
Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.03 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS



Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50



Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 26 IPE 200_26 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

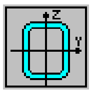
----

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.28 kN	My,Ed = 0.32 kN*m	Mz,Ed = 0.40 kN*m	Vy,Ed = 1.45 kN
Nc,Rd = 319.60 kN	My,Ed,max = 0.32 kN*m	Mz,Ed,max = 0.40 kN*m	Vy,T,Rd = 58.77 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = -0.68 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 117.54 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = -0.31 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00 Mcr = 1084.27 kN*m Curve,LT - d XLT = 1.00
Lcr,upp=0.45 m Lam_LT = 0.11 fi,LT = 0.39 XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:
Ly = 0.45 m Lam_y = 0.11
Lcr,y = 0.45 m Xy = 1.00
Lamy = 10.52 kzy = 0.63

About z axis:
Lz = 0.45 m Lam_z = 0.19
Lcr,z = 0.45 m Xz = 1.00
Lamz = 18.20 kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.03 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.07 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 27 IPE 200_27 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.41 kN	My,Ed = -0.44 kN*m	Mz,Ed = 0.32 kN*m	Vy,Ed = 1.21 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.44 kN*m	Mz,Ed,max = 0.32 kN*m	Vy,T,Rd = 59.97 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 1.00 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 119.93 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = -0.18 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kzy = 0.63	Lamz = 18.20	kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.04 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.07 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 28 IPE 200_28 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /25/ 1*1.00 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.49 kN	My,Ed = 0.23 kN*m	Mz,Ed = 0.03 kN*m	Vy,Ed = 0.07 kN
Nt,Rd = 319.60 kN	My,pl,Rd = 12.20 kN*m	Mz,pl,Rd = 7.45 kN*m	Vy,c,Rd = 61.51 kN
	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = -0.49 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,c,Rd = 123.01 kN
	Mb,Rd = 12.20 kN*m		
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,upp=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Global stability check of member:
My,Ed/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 29 IPE 200_29 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.00 kN	My,Ed = -0.43 kN*m	Mz,Ed = 0.03 kN*m	Vy,Ed = 0.11 kN
Nt,Rd = 319.60 kN	My,pl,Rd = 12.20 kN*m	Mz,pl,Rd = 7.45 kN*m	Vy,T,Rd = 58.63 kN
	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.98 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 117.26 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = -0.33 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.04 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /13/ 1*1.00 + 2*1.00 + 5*1.00
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 30 IPE 200_30 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /60/ 1*1.35 + 8*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 1.15 kN	My,Ed = -0.13 kN*m	Mz,Ed = 0.01 kN*m	Vy,Ed = 0.12 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.13 kN*m	Mz,Ed,max = -0.04 kN*m	Vy,T,Rd = 61.44 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.33 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 122.88 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kyy = 1.00	Lamz = 18.20	kyz = 0.57

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))

Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.02 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.02 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /14/ 1*1.00 + 2*1.00 + 4*0.50 + 6*1.00
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /19/ 1*1.00 + 2*1.00 + 8*1.00

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 31 IPE 200_31 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /60/ 1*1.35 + 8*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.79 kN	My,Ed = -0.11 kN*m	
Nc,Rd = 319.60 kN	My,Ed,max = -0.11 kN*m	
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Vz,Ed = 0.27 kN
	MN,y,Rd = 12.20 kN*m	Vz,c,Rd = 123.01 kN
	Mb,Rd = 12.20 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:
z = 1.00 Mcr = 1084.27 kN*m Curve,LT - d XLT = 1.00

Lcr,low=0.45 m Lam_LT = 0.11 fi,LT = 0.39 XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kyy = 1.00	Lamz = 18.20	kzy = 0.63

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Global stability check of member:

Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.01 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.01 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /16/ 1*1.00 + 2*1.00 + 4*0.50 + 7*1.00

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 32 IPE 200_32 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /60/ 1*1.35 + 8*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 1.15 kN	My,Ed = -0.13 kN*m	Mz,Ed = -0.01 kN*m	Vy,Ed = -0.12 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.13 kN*m	Mz,Ed,max = 0.04 kN*m	Vy,T,Rd = 61.44 kN

Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.33 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 122.88 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kyy = 1.00	Lamz = 18.20	kyz = 0.57

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 10.52 < Lambda,max = 210.00   Lambda,z = 18.20 < Lambda,max = 210.00   STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.02 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.02 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm   Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
uz = 0 mm < uz max = L/200.00 = 2 mm   Verified
Governing Load Case: 15 SLS:CHR /19/ 1*1.00 + 2*1.00 + 8*1.00

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 33 IPE 200_33   **POINT:** 1   **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.00 kN	My,Ed = -0.43 kN*m	Mz,Ed = -0.03 kN*m	Vy,Ed = -0.11 kN
Nt,Rd = 319.60 kN	My,pl,Rd = 12.20 kN*m	Mz,pl,Rd = 7.45 kN*m	Vy,T,Rd = 58.63 kN
	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.98 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 117.26 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = 0.33 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.04 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /15/ 1*1.00 + 2*1.00 + 6*1.00
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 34 IPE 200_34 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /27/ 1*1.00 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.49 kN	My,Ed = 0.23 kN*m	Mz,Ed = -0.03 kN*m	Vy,Ed = -0.07 kN
Nt,Rd = 319.60 kN	My,pl,Rd = 12.20 kN*m	Mz,pl,Rd = 7.45 kN*m	Vy,c,Rd = 61.51 kN
	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = -0.49 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,c,Rd = 123.01 kN
	Mb,Rd = 12.20 kN*m		
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,upp=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Global stability check of member:
My,Ed/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 35 IPE 200_35 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.41 kN	My,Ed = -0.44 kN*m	Mz,Ed = -0.32 kN*m	Vy,Ed = -1.21 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.44 kN*m	Mz,Ed,max = -0.32 kN*m	Vy,T,Rd = 59.97 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 1.00 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 119.93 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = 0.18 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kzy = 0.63	Lamz = 18.20	kzz = 1.00

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.04 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.07 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

uz = 0 mm < uz max = L/200.00 = 2 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*

ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 36 IPE 200_36 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

----

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.28 kN	My,Ed = 0.32 kN*m	Mz,Ed = -0.40 kN*m	Vy,Ed = -1.45 kN
Nc,Rd = 319.60 kN	My,Ed,max = 0.32 kN*m	Mz,Ed,max = -0.40 kN*m	Vy,T,Rd = 58.77 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = -0.68 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,T,Rd = 117.54 kN
	Mb,Rd = 12.20 kN*m		Tt,Ed = 0.31 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,upp=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kzy = 0.63	Lamz = 18.20	kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.03 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.06 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.07 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

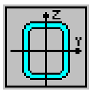
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 37 IPE 200_37 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: RH 120x60x4

h=120 mm	gM0=1.00	gM1=1.00	
b=60 mm	Ay=453 mm2	Az=907 mm2	Ax=1360 mm2
tw=4 mm	Iy=2490000 mm4	Iz=831000 mm4	Ix=2010000 mm4
tf=4 mm	Wply=51900 mm3	Wplz=31700 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.28 kN	My,Ed = -0.14 kN*m	Mz,Ed = -0.27 kN*m	Vy,Ed = -0.60 kN
Nc,Rd = 319.60 kN	My,Ed,max = -0.14 kN*m	Mz,Ed,max = -0.27 kN*m	Vy,c,Rd = 61.51 kN
Nb,Rd = 319.60 kN	My,c,Rd = 12.20 kN*m	Mz,c,Rd = 7.45 kN*m	Vz,Ed = 0.35 kN
	MN,y,Rd = 12.20 kN*m	MN,z,Rd = 7.45 kN*m	Vz,c,Rd = 123.01 kN
	Mb,Rd = 12.20 kN*m		
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 1084.27 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=0.45 m	Lam_LT = 0.11	fi,LT = 0.39	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.45 m	Lam_y = 0.11	Lz = 0.45 m	Lam_z = 0.19
Lcr,y = 0.45 m	Xy = 1.00	Lcr,z = 0.45 m	Xz = 1.00
Lamy = 10.52	kzy = 0.63	Lamz = 18.20	kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,c,Rd = 0.01 < 1.00 (6.2.6.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Global stability check of member:

Lambda,y = 10.52 < Lambda,max = 210.00 Lambda,z = 18.20 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.01 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.03 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60
uz = 0 mm < uz max = L/200.00 = 2 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 38 Column_38 **POINT:** 1 **COORDINATE:** x = 0.81 L = 2.92 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 150x150x8

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=2240 mm2	Az=2240 mm2	Ax=4480 mm2

tw=8 mm Iy=14910000 mm4 Iz=14910000 mm4 Ix=22906304 mm4
tf=8 mm Wply=237000 mm3 Wplz=237000 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = 95.33 kN	My,Ed = 16.69 kN*m	Mz,Ed = -6.51 kN*m	Vy,Ed = -24.97 kN
Nc,Rd = 1052.80 kN	My,Ed,max = 36.29 kN*m	Mz,Ed,max = 7.98 kN*m	Vy,T,Rd = 288.17 kN
Nb,Rd = 1052.80 kN	My,c,Rd = 55.70 kN*m	Mz,c,Rd = 55.70 kN*m	Vz,Ed = -18.20 kN
	MN,y,Rd = 55.70 kN*m	MN,z,Rd = 55.70 kN*m	Vz,T,Rd = 288.17 kN
			Tt,Ed = -2.27 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.60 m	Lam_y = 0.11	Lz = 3.60 m	Lam_z = 0.11
Lcr,y = 0.58 m	Xy = 1.00	Lcr,z = 0.58 m	Xz = 1.00
Lamy = 10.05	kyy = 0.80	Lamz = 10.05	kyz = 0.40

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.09 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.30 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.12 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.68 + (Mz,Ed/MN,z,Rd)^1.68 = 0.16 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.09 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.06 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 10.05 < Lambda,max = 210.00 Lambda,z = 10.05 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.67 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.50 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):
vx = 2 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 39 Column_39 **POINT:** 1 **COORDINATE:** x = 0.81 L = 2.92 m

---

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 150x150x8

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=2240 mm2	Az=2240 mm2	Ax=4480 mm2
tw=8 mm	Iy=14910000 mm4	Iz=14910000 mm4	Ix=22906304 mm4
tf=8 mm	Wply=237000 mm3	Wplz=237000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 95.33 kN My,Ed = -16.69 kN*m Mz,Ed = -6.51 kN*m Vy,Ed = -24.97 kN
Nc,Rd = 1052.80 kN My,Ed,max = -36.29 kN*m Mz,Ed,max = 7.98 kN*m Vy,T,Rd = 288.17 kN
Nb,Rd = 1052.80 kN My,c,Rd = 55.70 kN*m Mz,c,Rd = 55.70 kN*m Vz,Ed = 18.20 kN
MN,y,Rd = 55.70 kN*m MN,z,Rd = 55.70 kN*m Vz,T,Rd = 288.17 kN
Tt,Ed = 2.27 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.60 m	Lam_y = 0.11	Lz = 3.60 m	Lam_z = 0.11
Lcr,y = 0.58 m	Xy = 1.00	Lcr,z = 0.58 m	Xz = 1.00
Lamy = 10.05	kyy = 0.80	Lamz = 10.05	kyz = 0.40

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.09 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.30 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.12 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.68 + (Mz,Ed/MN,z,Rd)^1.68 = 0.16 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.09 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.06 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 10.05 < Lambda,max = 210.00 Lambda,z = 10.05 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.67 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.50 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM): *Not analyzed*

Displacements (GLOBAL SYSTEM):
vx = 2 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 40 IPE 200_40 **POINT:** 3 **COORDINATE:** x = 0.50 L = 6.90 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 150x150x5

h=150 mm	gM0=1.00	gM1=1.00	
b=150 mm	Ay=1435 mm2	Az=1435 mm2	Ax=2870 mm2
tw=5 mm	Iy=10020000 mm4	Iz=10020000 mm4	Ix=15243125 mm4
tf=5 mm	Wply=156000 mm3	Wplz=156000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 347.09 kN	My,Ed = 5.32 kN*m	Mz,Ed = -0.76 kN*m	Vy,Ed = 1.39 kN
Nc,Rd = 674.45 kN	My,Ed,max = 5.32 kN*m	Mz,Ed,max = 1.03 kN*m	Vy,T,Rd = 190.13 kN
Nb,Rd = 673.38 kN	My,c,Rd = 36.66 kN*m	Mz,c,Rd = 36.66 kN*m	Vz,Ed = 0.86 kN
	MN,y,Rd = 23.37 kN*m	MN,z,Rd = 23.37 kN*m	Vz,T,Rd = 190.13 kN
	Mb,Rd = 36.66 kN*m		Tt,Ed = -0.67 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 410.88 kN*m	Curve,LT - d	XLT = 1.00
Lcr,upp=13.80 m	Lam_LT = 0.30	fi,LT = 0.49	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 13.80 m	Lam_y = 0.21	Lz = 13.80 m	Lam_z = 0.21
Lcr,y = 1.15 m	Xy = 1.00	Lcr,z = 1.15 m	Xz = 1.00
Lamy = 19.46	kyy = 0.90	Lamz = 19.46	kyz = 0.53

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.51 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.23 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.37 + (Mz,Ed/MN,z,Rd)^2.37 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 19.46 < Lambda,max = 210.00 Lambda,z = 19.46 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.15 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.66 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.62 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 69 mm Verified

Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60

uz = 31 mm < uz max = L/200.00 = 69 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 41 Simple bar_41 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /47/ 1*1.35 + 2*1.35 + 4*0.75 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 3.14 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.02	Lamz = 76.61	kzy = 0.62

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

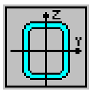
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 42 Simple bar_42 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /45/ 1*1.35 + 2*1.35 + 4*0.75 + 5*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 3.14 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.02	Lamz = 76.61	kzy = 0.62

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 43 Simple bar_43 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.86 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.03 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 44 Simple bar_44 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.07 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = -0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 45 Simple bar_45 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 19.67 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.11	Lamz = 76.61	kzy = 0.71

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.19 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 46 Simple bar_46 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 19.82 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.12	Lamz = 76.61	kzy = 0.72

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.19 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 47 Simple bar_47 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 23.22 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.14	Lamz = 76.61	kzy = 0.74

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.23 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.30 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 48 Simple bar_48 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 23.22 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.14	Lamz = 76.61	kzy = 0.74

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.23 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.30 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 49 Simple bar_49 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 19.82 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.12	Lamz = 76.61	kzy = 0.72

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.19 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 50 Simple bar_50 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 19.67 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.11	Lamz = 76.61	kzy = 0.71

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.19 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 51 Simple bar_51 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.07 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.03 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 52 Simple bar_52 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4

tf=3 mm Wply=5970 mm3 Wplz=5970 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.86 kN My,Ed = 0.01 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.01 kN*m
Nb,Rd = 80.22 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = 0.03 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 53 Simple bar_53 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /47/ 1*1.35 + 2*1.35 + 4*0.75 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.85 kN My,Ed = 0.01 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.01 kN*m
Nb,Rd = 80.22 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = 0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.02	Lamz = 76.61	kzy = 0.61

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 54 Simple bar_54 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /45/ 1*1.35 + 2*1.35 + 4*0.75 + 5*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.85 kN My,Ed = 0.01 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.01 kN*m
Nb,Rd = 80.22 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m

Tt,Ed = -0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.02	Lamz = 76.61	kzy = 0.61

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 55 Simple bar_55 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 27.83 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.31 kN*m	
		Tt,Ed = -0.03 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.17	Lamz = 76.61	kzy = 0.77

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.27 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.35 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.35 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 56 Simple bar_56 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 28.77 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.30 kN*m		
			Tt,Ed = -0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.18	Lamz = 76.61	kzy = 0.78

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.28 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.36 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.36 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 57 Simple bar_57 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.27 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.07	Lamz = 76.61	kzy = 0.67

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.17 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.17 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 58 Simple bar_58 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.16 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 59 Simple bar_59 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 10.48 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.06	Lamz = 76.61	kzy = 0.66

VERIFICATION FORMULAS:
Section strength check:

N,Ed/Nc,Rd = 0.10 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00   Lambda,z = 76.61 < Lambda,max = 210.00   STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 60 Simple bar_60   **POINT:** 2   **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 14.16 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.08	Lamz = 76.61	kzy = 0.68

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.14 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 61 Simple bar_61 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.27 kN	My,Ed = 0.01 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m	
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.07	Lamz = 76.61	kzy = 0.67

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.17 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.17 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 62 Simple bar_62 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.57 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 28.77 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.30 kN*m		
			Tt,Ed = 0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.18	Lamz = 76.61	kzy = 0.78

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.28 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.36 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.36 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 63 Simple bar_63 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 27.83 kN	My,Ed = 0.01 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.01 kN*m		
Nb,Rd = 80.22 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.31 kN*m		
			Tt,Ed = 0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.17	Lamz = 76.61	kzy = 0.77

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.27 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.61 < Lambda,max = 210.00 Lambda,z = 76.61 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.35 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.35 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 64 Simple bar_64 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 56.43 kN	My,Ed = 0.07 kN*m	
Nc,Rd = 244.40 kN	My,Ed,max = 0.07 kN*m	
Nb,Rd = 173.83 kN	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.99 kN*m	
		Tt,Ed = -0.13 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 0.93	Lz = 2.35 m	Lam_z = 0.93
Lcr,y = 2.35 m	Xy = 0.71	Lcr,z = 2.35 m	Xz = 0.71
Lamy = 87.70	kyy = 1.20	Lamz = 87.70	kzy = 0.82

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.23 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 87.70 < Lambda,max = 210.00 Lambda,z = 87.70 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.34 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

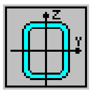
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 65 Simple bar_65 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -35.19 kN	My,Ed = 0.07 kN*m	
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	
	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.99 kN*m	
		Tt,Ed = -0.12 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.14 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 66 Simple bar_66 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 22.74 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.54	Lamz = 156.58	kzy = 1.54

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.22 < 1.00   (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00   (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00   (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00   (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00   (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00   Lambda,z = 156.58 < Lambda,max = 210.00   STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.75 < 1.00   (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.75 < 1.00   (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 67 Simple bar_67   **POINT:** 2   **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /70/ 1*1.00 + 5*1.50

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.79 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.67

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 68 Simple bar_68 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00

b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 7.85 kN My,Ed = 0.03 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.03 kN*m
Nb,Rd = 31.61 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = -0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.15	Lamz = 156.58	kzy = 0.82

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 69 Simple bar_69 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /45/ 1*1.35 + 2*1.35 + 4*0.75 + 5*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.77 kN My,Ed = 0.03 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.03 kN*m
Nb,Rd = 31.61 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = -0.00 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.67

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 70 Simple bar_70 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 5.59 kN My,Ed = 0.03 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.03 kN*m
Nb,Rd = 31.61 kN My,c,Rd = 1.40 kN*m

MN,y,Rd = 1.40 kN*m

Tt,Ed = -0.00 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.11	Lamz = 156.58	kzy = 0.75

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 71 Simple bar_71 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 5.59 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.11	Lamz = 156.58	kzy = 0.75

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

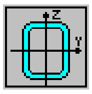
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 72 Simple bar_72 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /47/ 1*1.35 + 2*1.35 + 4*0.75 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.77 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m Lam_y = 1.67 Lz = 2.35 m Lam_z = 1.67
Lcr,y = 2.35 m Xy = 0.31 Lcr,z = 2.35 m Xz = 0.31
Lamy = 156.58 kyy = 1.05 Lamz = 156.58 kzy = 0.67

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 73 Simple bar_73 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 7.85 kN My,Ed = 0.03 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.03 kN*m
Nb,Rd = 31.61 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = 0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m Lam_y = 1.67 Lz = 2.35 m Lam_z = 1.67
Lcr,y = 2.35 m Xy = 0.31 Lcr,z = 2.35 m Xz = 0.31

Lamy = 156.58 kyy = 1.15 Lamz = 156.58 kzy = 0.82

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 74 Simple bar_74 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:

Governing Load Case: 9 ULS /72/ 1*1.00 + 6*1.50

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.79 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.67

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

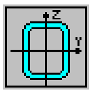
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 75 Simple bar_75 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

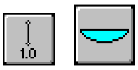
h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

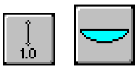
N,Ed = 22.74 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:



About y axis:



About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.54	Lamz = 156.58	kzy = 1.54

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.22 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.75 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.75 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

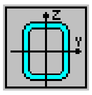
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 76 Simple bar_76 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -35.19 kN	My,Ed = 0.07 kN*m		
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m		
	My,c,Rd = 5.99 kN*m		
	MN,y,Rd = 5.99 kN*m		
			Tt,Ed = 0.12 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.14 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 77 Simple bar_77 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 56.43 kN	My,Ed = 0.07 kN*m	
Nc,Rd = 244.40 kN	My,Ed,max = 0.07 kN*m	
Nb,Rd = 173.83 kN	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.99 kN*m	
		Tt,Ed = 0.13 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 0.93	Lz = 2.35 m	Lam_z = 0.93
Lcr,y = 2.35 m	Xy = 0.71	Lcr,z = 2.35 m	Xz = 0.71
Lamy = 87.70	kyy = 1.20	Lamz = 87.70	kzy = 0.82

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.23 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 87.70 < Lambda,max = 210.00 Lambda,z = 87.70 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.34 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 78 Simple bar_78 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 65.07 kN	My,Ed = 0.05 kN*m	
Nc,Rd = 244.40 kN	My,Ed,max = 0.05 kN*m	
Nb,Rd = 200.52 kN	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.72 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 0.75	Lz = 1.90 m	Lam_z = 0.75
Lcr,y = 1.90 m	Xy = 0.82	Lcr,z = 1.90 m	Xz = 0.82
Lamy = 70.90	kyy = 1.14	Lamz = 70.90	kzy = 0.74

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.27 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 70.90 < Lambda,max = 210.00 Lambda,z = 70.90 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

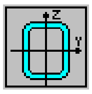
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 79 Simple bar_79 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -27.39 kN	My,Ed = 0.05 kN*m	
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	
	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.99 kN*m	
		Tt,Ed = -0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:

About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.11 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 80 Simple bar_80 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 22.22 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.38	Lamz = 126.57	kzy = 1.16

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.22 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.51 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.51 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 81 Simple bar_81 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -15.02 kN	My,Ed = 0.02 kN*m	
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	
	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.03 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.15 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

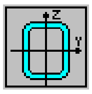
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 82 Simple bar_82 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 12.38 kN	My,Ed = 0.02 kN*m
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m

MN,y,Rd = 1.40 kN*m

Tt,Ed = -0.02 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.19	Lamz = 126.57	kzy = 0.84

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.12 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 83 Simple bar_83 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.67 kN	My,Ed = 0.02 kN*m
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m
	My,c,Rd = 1.40 kN*m
	MN,y,Rd = 1.40 kN*m

Tt,Ed = 0.01 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.06 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

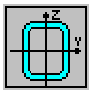
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 84 Simple bar_84 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

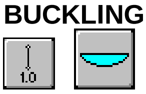
h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

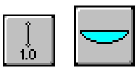
N,Ed = 1.31 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:



About y axis:



About z axis:

Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.02	Lamz = 126.57	kzy = 0.62

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

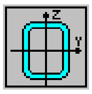
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 85 Simple bar_85 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 1.31 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.02	Lamz = 126.57	kzy = 0.62

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))

My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

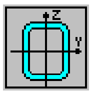
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 86 Simple bar_86 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.67 kN	My,Ed = 0.02 kN*m		
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m		
	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.06 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 87 Simple bar_87 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 12.38 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.19	Lamz = 126.57	kzy = 0.84

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.12 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

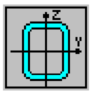
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 88 Simple bar_88 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -15.02 kN	My,Ed = 0.02 kN*m	
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	
	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.03 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.15 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 89 Simple bar_89 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 22.22 kN	My,Ed = 0.02 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m		
Nb,Rd = 45.32 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 1.35	Lz = 1.90 m	Lam_z = 1.35
Lcr,y = 1.90 m	Xy = 0.44	Lcr,z = 1.90 m	Xz = 0.44
Lamy = 126.57	kyy = 1.38	Lamz = 126.57	kzy = 1.16

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.22 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 126.57 < Lambda,max = 210.00 Lambda,z = 126.57 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.51 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.51 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

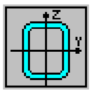
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 90 Simple bar_90 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -27.39 kN	My,Ed = 0.05 kN*m	
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	
	My,c,Rd = 5.99 kN*m	
	MN,y,Rd = 5.99 kN*m	
		Tt,Ed = 0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.11 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

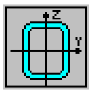
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 91 Simple bar_91 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 65.07 kN My,Ed = 0.05 kN*m
Nc,Rd = 244.40 kN My,Ed,max = 0.05 kN*m
Nb,Rd = 200.52 kN My,c,Rd = 5.99 kN*m
MN,y,Rd = 5.72 kN*m
Tt,Ed = 0.02 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.90 m	Lam_y = 0.75	Lz = 1.90 m	Lam_z = 0.75
Lcr,y = 1.90 m	Xy = 0.82	Lcr,z = 1.90 m	Xz = 0.82
Lamy = 70.90	kyy = 1.14	Lamz = 70.90	kzy = 0.74

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.27 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 70.90 < Lambda,max = 210.00 Lambda,z = 70.90 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.33 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 92 Simple bar_92 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -29.03 kN My,Ed = 0.03 kN*m
Nt,Rd = 101.99 kN My,pl,Rd = 1.40 kN*m
My,c,Rd = 1.40 kN*m

MN,y,Rd = 1.29 kN*m

Tt,Ed = 0.00 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.28 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

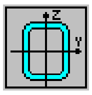
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 93 Simple bar_93 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 17.99 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.42	Lamz = 156.58	kzy = 1.43

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.18 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.60 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.60 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 94 Simple bar_94 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /72/ 1*1.00 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.59 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67

Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.66

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 95 Simple bar_95 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 12.80 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.27	Lamz = 156.58	kzy = 1.05

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 96 Simple bar_96 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.96 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.67

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.12 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 97 Simple bar_97 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.96 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = 0.01 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.67

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.12 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 98 Simple bar_98 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 12.80 kN	My,Ed = 0.03 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.27	Lamz = 156.58	kzy = 1.05

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 99 Simple bar_99 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /70/ 1*1.00 + 5*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 2.59 kN	My,Ed = 0.02 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = 0.02 kN*m	
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.40 kN*m	
		Tt,Ed = -0.00 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.05	Lamz = 156.58	kzy = 0.66

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.09 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

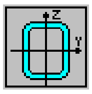
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 100 Simple bar_100 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

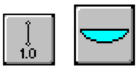
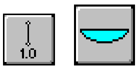
h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 17.99 kN	My,Ed = 0.03 kN*m		
Nc,Rd = 101.99 kN	My,Ed,max = 0.03 kN*m		
Nb,Rd = 31.61 kN	My,c,Rd = 1.40 kN*m		
	MN,y,Rd = 1.40 kN*m		
			Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

 About y axis:  About z axis:

Ly = 2.35 m	Lam_y = 1.67	Lz = 2.35 m	Lam_z = 1.67
Lcr,y = 2.35 m	Xy = 0.31	Lcr,z = 2.35 m	Xz = 0.31
Lamy = 156.58	kyy = 1.42	Lamz = 156.58	kzy = 1.43

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.18 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 156.58 < Lambda,max = 210.00 Lambda,z = 156.58 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.60 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.60 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

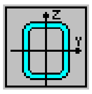
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 101 Simple bar_101 **POINT:** 2 **COORDINATE:** x = 0.50 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -29.03 kN My,Ed = 0.03 kN*m
Nt,Rd = 101.99 kN My,pl,Rd = 1.40 kN*m
My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.29 kN*m
Tt,Ed = -0.00 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.28 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.02 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 102 Simple bar_102 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -28.66 kN	My,Ed = 0.02 kN*m	
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	
	My,c,Rd = 1.40 kN*m	
	MN,y,Rd = 1.30 kN*m	
		Tt,Ed = 0.02 kN*m
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nt,Rd = 0.28 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 103 Simple bar_103 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.95 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4

tf=3 mm Wply=5970 mm3 Wplz=5970 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = -28.66 kN My,Ed = 0.02 kN*m
Nt,Rd = 101.99 kN My,pl,Rd = 1.40 kN*m
My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.30 kN*m
Tt,Ed = -0.02 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nt,Rd = 0.28 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

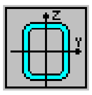
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 104 Simple bar_104 **POINT:** 2 **COORDINATE:** x = 0.50 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm gM0=1.00 gM1=1.00
b=40 mm Ay=217 mm2 Az=217 mm2 Ax=434 mm2
tw=3 mm Iy=97800 mm4 Iz=97800 mm4 Ix=151959 mm4
tf=3 mm Wply=5970 mm3 Wplz=5970 mm3

INTERNAL FORCES AND CAPACITIES:

N,Ed = 10.48 kN My,Ed = 0.01 kN*m
Nc,Rd = 101.99 kN My,Ed,max = 0.01 kN*m
Nb,Rd = 80.22 kN My,c,Rd = 1.40 kN*m
MN,y,Rd = 1.40 kN*m
Tt,Ed = 0.02 kN*m
Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.15 m	Lam_y = 0.82	Lz = 1.15 m	Lam_z = 0.82
Lcr,y = 1.15 m	Xy = 0.79	Lcr,z = 1.15 m	Xz = 0.79
Lamy = 76.61	kyy = 1.06	Lamz = 76.61	kzy = 0.66

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.10 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 76.61 < Lambda,max = 210.00   Lambda,z = 76.61 < Lambda,max = 210.00   STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 105   **POINT:** 1   **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 18.20 kN	My,Ed = 0.27 kN*m	Mz,Ed = -0.46 kN*m	Vy,Ed = -1.37 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.92 kN*m	Mz,Ed,max = 0.47 kN*m	Vy,T,Rd = 70.14 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.95 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 70.14 kN
			Tt,Ed = 0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kyy = 0.98	Lamz = 25.37	kyz = 0.59

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.24 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 106 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 3.18 kN	My,Ed = 0.64 kN*m	Mz,Ed = -0.94 kN*m	Vy,Ed = -2.76 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.64 kN*m	Mz,Ed,max = -0.94 kN*m	Vy,T,Rd = 69.39 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.16 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 69.39 kN
			Tt,Ed = 0.08 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.60	Lamz = 25.37	kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.11 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.16 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.07 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.04 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.21 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.23 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 107 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 18.54 kN	My,Ed = 0.25 kN*m	Mz,Ed = -1.42 kN*m	Vy,Ed = -4.19 kN
Nc,Rd = 244.40 kN	My,Ed,max = 1.19 kN*m	Mz,Ed,max = 1.43 kN*m	Vy,T,Rd = 68.36 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 1.37 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 68.36 kN
			Tt,Ed = 0.15 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.59	Lamz = 25.37	kzz = 0.98

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.24 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.10 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.06 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.41 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 108 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.68 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -1.17 kN	My,Ed = 0.48 kN*m	Mz,Ed = 1.87 kN*m	Vy,Ed = -5.44 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 67.29 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.01 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 67.29 kN
			Tt,Ed = 0.22 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.08 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.31 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.16 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.08 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Section OK !!!

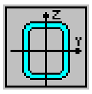
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 109 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 16.70 kN	My,Ed = -0.22 kN*m	Mz,Ed = -2.87 kN*m	Vy,Ed = -8.07 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.92 kN*m	Mz,Ed,max = -2.87 kN*m	Vy,T,Rd = 66.52 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 1.68 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 66.52 kN
			Tt,Ed = 0.27 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.59	Lamz = 25.37	kzz = 0.98

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.48 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.30 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.12 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.06 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.06 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.50 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.63 < 1.00 (6.3.3.(4))

Section OK !!!

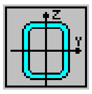
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 110 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

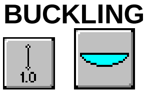
h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

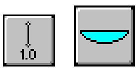
N,Ed = 18.20 kN	My,Ed = 0.27 kN*m	Mz,Ed = 0.46 kN*m	Vy,Ed = 1.37 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.92 kN*m	Mz,Ed,max = -0.47 kN*m	Vy,T,Rd = 70.14 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.95 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 70.14 kN
			Tt,Ed = -0.03 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:



About y axis:



About z axis:

Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kyy = 0.98	Lamz = 25.37	kyz = 0.59

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.02 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.24 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 111 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 3.18 kN	My,Ed = 0.64 kN*m	Mz,Ed = 0.94 kN*m	Vy,Ed = 2.76 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.64 kN*m	Mz,Ed,max = 0.94 kN*m	Vy,T,Rd = 69.39 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.16 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 69.39 kN
			Tt,Ed = -0.08 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.60	Lamz = 25.37	kzz = 1.00

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.01 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.11 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.16 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.07 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.04 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.21 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.23 < 1.00 (6.3.3.(4))

Section OK !!!

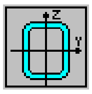
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 112 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

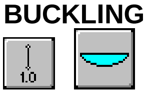
h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

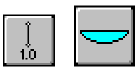
N,Ed = 18.54 kN	My,Ed = 0.25 kN*m	Mz,Ed = 1.42 kN*m	Vy,Ed = 4.19 kN
Nc,Rd = 244.40 kN	My,Ed,max = 1.19 kN*m	Mz,Ed,max = -1.43 kN*m	Vy,T,Rd = 68.36 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 1.37 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 68.36 kN
			Tt,Ed = -0.15 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:



About y axis:



About z axis:

Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.59	Lamz = 25.37	kzz = 0.98

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.24 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.10 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.06 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.41 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.43 < 1.00 (6.3.3.(4))

Section OK !!!

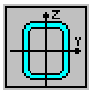
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 113 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.68 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -1.17 kN	My,Ed = 0.48 kN*m	Mz,Ed = -1.87 kN*m	Vy,Ed = 5.44 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 67.29 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.01 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 67.29 kN
			Tt,Ed = -0.22 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.08 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.31 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.16 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.08 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 114 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 16.70 kN	My,Ed = -0.22 kN*m	Mz,Ed = 2.87 kN*m	Vy,Ed = 8.07 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.92 kN*m	Mz,Ed,max = 2.87 kN*m	Vy,T,Rd = 66.52 kN
Nb,Rd = 240.58 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 1.68 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 66.52 kN
			Tt,Ed = -0.27 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.68 m	Lam_y = 0.27	Lz = 0.68 m	Lam_z = 0.27
Lcr,y = 0.68 m	Xy = 0.98	Lcr,z = 0.68 m	Xz = 0.98
Lamy = 25.37	kzy = 0.59	Lamz = 25.37	kzz = 0.98

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.07 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.48 < 1.00 (6.2.9.1.(2))

(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.30 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.12 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.06 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.06 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 25.37 < Lambda,max = 210.00 Lambda,z = 25.37 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.50 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.63 < 1.00 (6.3.3.(4))

Section OK !!!

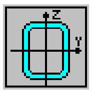
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 115 **POINT:** 3 **COORDINATE:** x = 0.25 L = 1.02 m

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.19 kN	My,Ed = -0.09 kN*m	Mz,Ed = -0.00 kN*m	Vy,Ed = 0.00 kN
Nc,Rd = 282.00 kN	My,Ed,max = -0.16 kN*m	Mz,Ed,max = -0.02 kN*m	Vy,T,Rd = 79.19 kN
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Mz,c,Rd = 7.99 kN*m	Vz,Ed = -0.15 kN
	MN,y,Rd = 7.99 kN*m	MN,z,Rd = 7.99 kN*m	Vz,T,Rd = 79.19 kN
	Mb,Rd = 7.99 kN*m		Tt,Ed = -0.17 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 157.23 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=4.10 m	Lam_LT = 0.23	fi,LT = 0.45	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 4.10 m	Lam_y = 0.35	Lz = 4.10 m	Lam_z = 1.42
Lcr,y = 1.02 m	Xy = 0.96	Lcr,z = 4.10 m	Xz = 0.41
Lamy = 33.26	kzy = 0.64	Lamz = 133.02	kzz = 1.11

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))

My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 33.26 < Lambda,max = 210.00 Lambda,z = 133.02 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 116 **POINT:** 1 **COORDINATE:** x = 0.75 L = 3.08 m

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 29.84 kN	My,Ed = -0.02 kN*m	Mz,Ed = 0.05 kN*m	Vy,Ed = 0.05 kN
Nc,Rd = 282.00 kN	My,Ed,max = -0.17 kN*m	Mz,Ed,max = -0.07 kN*m	Vy,T,Rd = 78.36 kN
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Mz,c,Rd = 7.99 kN*m	Vz,Ed = 0.09 kN
	MN,y,Rd = 7.99 kN*m	MN,z,Rd = 7.99 kN*m	Vz,T,Rd = 78.36 kN
	Mb,Rd = 7.99 kN*m		Tt,Ed = -0.23 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00 Mcr = 157.23 kN*m Curve,LT - d XLT = 1.00
Lcr,low=4.10 m Lam_LT = 0.23 fi,LT = 0.45 XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 4.10 m Lam_y = 0.35 Lz = 4.10 m Lam_z = 1.42
Lcr,y = 1.02 m Xy = 0.96 Lcr,z = 4.10 m Xz = 0.41
Lamy = 33.26 kzy = 0.65 Lamz = 133.02 kzz = 1.17

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.11 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.68 + (Mz,Ed/MN,z,Rd)^1.68 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 33.26 < Lambda,max = 210.00 Lambda,z = 133.02 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.28 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 117 Simple bar_117 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

----

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm gM0=1.00 gM1=1.00
b=40 mm Ay=217 mm2 Az=217 mm2 Ax=434 mm2

tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.12 kN	My,Ed = -0.02 kN*m	Mz,Ed = -0.07 kN*m	Vy,Ed = -0.26 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.94 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.01 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.94 kN
			Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

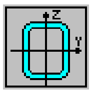
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 118 Simple bar_118 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.45 kN	My,Ed = -0.02 kN*m	Mz,Ed = 0.07 kN*m	Vy,Ed = -0.24 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.93 kN

	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.93 kN
			Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

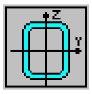
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 119 Simple bar_119 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.15 kN	My,Ed = 0.00 kN*m	Mz,Ed = -0.06 kN*m	Vy,Ed = -0.21 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.94 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = -0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.94 kN
			Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 120 Simple bar_120 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 15.11 kN	My,Ed = -0.05 kN*m	Mz,Ed = -0.09 kN*m	Vy,Ed = -0.13 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.05 kN*m	Mz,Ed,max = -0.09 kN*m	Vy,T,Rd = 29.28 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.07 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.28 kN
			Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kzy = 0.69	Lamz = 78.45	kzz = 1.09

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.15 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.70 + (Mz,Ed/MN,z,Rd)^1.70 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.28 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

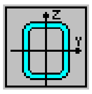
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 121 Simple bar_121 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -13.11 kN	My,Ed = -0.01 kN*m	Mz,Ed = -0.04 kN*m	Vy,Ed = -0.01 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 29.01 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.01 kN
			Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.13 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.69 + (Mz,Ed/MN,z,Rd)^1.69 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 122 Simple bar_122 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.39 kN	My,Ed = 0.01 kN*m	Mz,Ed = 0.02 kN*m	Vy,Ed = -0.01 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.01 kN*m	Mz,Ed,max = 0.03 kN*m	Vy,T,Rd = 29.22 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.01 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.22 kN
			Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kzy = 0.68	Lamz = 78.45	kzz = 1.08

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.69 + (Mz,Ed/MN,z,Rd)^1.69 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 78.45 < Lambda,max = 210.00   Lambda,z = 78.45 < Lambda,max = 210.00   STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

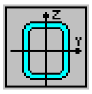
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 123 Simple bar_123   **POINT:** 3   **COORDINATE:** x = 1.00 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /70/ 1*1.00 + 5*1.50

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

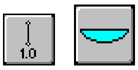
INTERNAL FORCES AND CAPACITIES:

N,Ed = 8.69 kN	My,Ed = -0.05 kN*m	Mz,Ed = 0.00 kN*m	Vy,Ed = -0.00 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.05 kN*m	Mz,Ed,max = 0.00 kN*m	Vy,T,Rd = 29.44 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = -0.07 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.44 kN
			Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:



About z axis:

Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kyy = 1.05	Lamz = 78.45	kyz = 0.65

VERIFICATION FORMULAS:
Section strength check:

N,Ed/Nc,Rd = 0.09 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.15 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

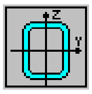
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 124 Simple bar_124 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

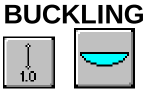
h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

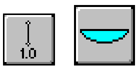
INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.40 kN	Mz,Ed = -0.05 kN*m	Vy,Ed = 0.16 kN
Nc,Rd = 101.99 kN	Mz,Ed,max = -0.05 kN*m	Vy,c,Rd = 29.44 kN
Nb,Rd = 96.87 kN	Mz,c,Rd = 1.40 kN*m	
	MN,z,Rd = 1.40 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:


About y axis:


About z axis:

Ly = 0.58 m	Lam_y = 0.41	Lz = 0.58 m	Lam_z = 0.41
Lcr,y = 0.58 m	Xy = 0.95	Lcr,z = 0.58 m	Xz = 0.95
Lamy = 38.64	kyz = 0.60	Lamz = 38.64	kzz = 1.00

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))

Mz,Ed/Mz,c,Rd = 0.03 < 1.00 (6.2.5.(1))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Vy,Ed/Vy,c,Rd = 0.01 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 38.64 < Lambda,max = 210.00 Lambda,z = 38.64 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.02 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.04 < 1.00 (6.3.3.(4))

Section OK !!!

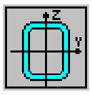
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 125 Simple bar_125 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.23 kN	Mz,Ed = 0.04 kN*m	Vy,Ed = 0.13 kN
Nt,Rd = 101.99 kN	Mz,pl,Rd = 1.40 kN*m	Vy,c,Rd = 29.44 kN
	Mz,c,Rd = 1.40 kN*m	
	MN,z,Rd = 1.40 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
Mz,Ed/Mz,c,Rd = 0.03 < 1.00 (6.2.5.(1))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Vy,Ed/Vy,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Section OK !!!

STEEL DESIGN

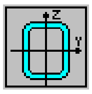
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 126 Simple bar_126 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.45 kN		Mz,Ed = 0.06 kN*m	Vy,Ed = 0.19 kN
Nt,Rd = 101.99 kN		Mz,pl,Rd = 1.40 kN*m	Vy,c,Rd = 29.44 kN
		Mz,c,Rd = 1.40 kN*m	
		MN,z,Rd = 1.40 kN*m	
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
Mz,Ed/Mz,c,Rd = 0.04 < 1.00 (6.2.5.(1))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Vy,Ed/Vy,c,Rd = 0.01 < 1.00 (6.2.6.(1))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 127 IPE 200_127 **POINT:** 1 **COORDINATE:** x = 0.75 L = 3.08 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 23.23 kN	My,Ed = -0.09 kN*m	
Nc,Rd = 282.00 kN	My,Ed,max = -0.15 kN*m	
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Vz,Ed = 0.15 kN
	MN,y,Rd = 7.99 kN*m	Vz,c,Rd = 81.41 kN
	Mb,Rd = 7.99 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 157.23 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=4.10 m	Lam_LT = 0.23	fi,LT = 0.45	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.10 m	Lam_y = 0.35	Lz = 4.10 m	Lam_z = 1.42
Lcr,y = 1.02 m	Xy = 0.96	Lcr,z = 4.10 m	Xz = 0.41
Lamy = 33.26	kyy = 1.05	Lamz = 133.02	kzy = 0.64

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 33.26 < Lambda,max = 210.00 Lambda,z = 133.02 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.21 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /15/ 1*1.00 + 2*1.00 + 6*1.00
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*

ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 128 IPE 200_128 **POINT:** 3 **COORDINATE:** x = 0.25 L = 1.02 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 12.89 kN	My,Ed = -0.10 kN*m	
Nc,Rd = 282.00 kN	My,Ed,max = -0.16 kN*m	
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Vz,Ed = -0.41 kN
	MN,y,Rd = 7.99 kN*m	Vz,c,Rd = 81.41 kN
	Mb,Rd = 7.99 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 157.23 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=4.10 m	Lam_LT = 0.23	fi,LT = 0.45	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.10 m	Lam_y = 0.35	Lz = 4.10 m	Lam_z = 1.42
Lcr,y = 1.02 m	Xy = 0.96	Lcr,z = 4.10 m	Xz = 0.41
Lamy = 33.26	kyy = 1.03	Lamz = 133.02	kzy = 0.62

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.01 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 33.26 < Lambda,max = 210.00 Lambda,z = 133.02 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.07 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.12 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS
Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /15/ 1*1.00 + 2*1.00 + 6*1.00
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

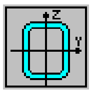
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 129 Simple bar_129 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.18 m

LOADS:
Governing Load Case: 9 ULS /12/ 1*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -6.03 kN	My,Ed = -0.04 kN*m	
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	
	My,c,Rd = 1.40 kN*m	Vz,Ed = -0.10 kN
	MN,y,Rd = 1.40 kN*m	Vz,c,Rd = 29.44 kN
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.06 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.03 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 130 Simple bar_130 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 8.20 kN	My,Ed = 0.00 kN*m	
Nc,Rd = 101.99 kN	My,Ed,max = -0.01 kN*m	
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Vz,Ed = -0.01 kN
	MN,y,Rd = 1.40 kN*m	Vz,c,Rd = 29.44 kN
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kyy = 1.05	Lamz = 78.45	kzy = 0.65

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.00 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))
Global stability check of member:
Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

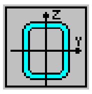
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 131 Simple bar_131 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -8.90 kN	My,Ed = -0.01 kN*m	
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	
	My,c,Rd = 1.40 kN*m	Vz,Ed = -0.02 kN
	MN,y,Rd = 1.40 kN*m	Vz,c,Rd = 29.44 kN
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.09 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.00 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.00 < 1.00 (6.2.6.(1))

Section OK !!!

STEEL DESIGN

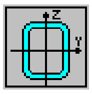
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 132 Simple bar_132 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.49 kN	My,Ed = -0.19 kN*m
Nc,Rd = 101.99 kN	My,Ed,max = -0.19 kN*m

Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Vz,Ed = -0.25 kN
	MN,y,Rd = 1.40 kN*m	Vz,c,Rd = 29.44 kN
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kyy = 1.07	Lamz = 78.45	kzy = 0.67

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.11 < 1.00 (6.2.4.(1))
My,Ed/My,c,Rd = 0.14 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.01 < 1.00 (6.2.6.(1))

Global stability check of member:

Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) = 0.29 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) = 0.24 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 133 Simple bar_133 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.12 kN	My,Ed = 0.02 kN*m	Mz,Ed = -0.07 kN*m	Vy,Ed = -0.26 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.94 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = -0.01 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.94 kN
			Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

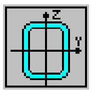
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 134 Simple bar_134 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.58 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.45 kN	My,Ed = 0.02 kN*m	Mz,Ed = 0.07 kN*m	Vy,Ed = -0.24 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.93 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = -0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.93 kN
			Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.02 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.05 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

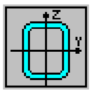
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 135 Simple bar_135 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -0.15 kN	My,Ed = -0.00 kN*m	Mz,Ed = -0.06 kN*m	Vy,Ed = -0.21 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 28.94 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 28.94 kN
			Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))

Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 136 IPE 200_136 **POINT:** 3 **COORDINATE:** x = 0.25 L = 1.02 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.19 kN	My,Ed = -0.09 kN*m	Mz,Ed = 0.00 kN*m	Vy,Ed = -0.00 kN
Nc,Rd = 282.00 kN	My,Ed,max = -0.16 kN*m	Mz,Ed,max = 0.02 kN*m	Vy,T,Rd = 79.19 kN
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Mz,c,Rd = 7.99 kN*m	Vz,Ed = -0.15 kN
	MN,y,Rd = 7.99 kN*m	MN,z,Rd = 7.99 kN*m	Vz,T,Rd = 79.19 kN
	Mb,Rd = 7.99 kN*m		Tt,Ed = 0.17 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 157.23 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=4.10 m	Lam_LT = 0.23	fi,LT = 0.45	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.10 m	Lam_y = 0.35	Lz = 4.10 m	Lam_z = 1.42
Lcr,y = 1.02 m	Xy = 0.96	Lcr,z = 4.10 m	Xz = 0.41
Lamy = 33.26	kzy = 0.64	Lamz = 133.02	kzz = 1.11

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.08 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.00 < 1.00 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.03 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 33.26 < Lambda,max = 210.00 Lambda,z = 133.02 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.10 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 20 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 137 IPE 200_137 **POINT:** 1 **COORDINATE:** x = 0.75 L = 3.08 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 80x80x4

h=80 mm	gM0=1.00	gM1=1.00	
b=80 mm	Ay=600 mm2	Az=600 mm2	Ax=1200 mm2
tw=4 mm	Iy=1140000 mm4	Iz=1140000 mm4	Ix=1755904 mm4
tf=4 mm	Wply=34000 mm3	Wplz=34000 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 29.84 kN	My,Ed = -0.02 kN*m	Mz,Ed = -0.05 kN*m	Vy,Ed = -0.05 kN
Nc,Rd = 282.00 kN	My,Ed,max = -0.17 kN*m	Mz,Ed,max = 0.07 kN*m	Vy,T,Rd = 78.36 kN
Nb,Rd = 115.61 kN	My,c,Rd = 7.99 kN*m	Mz,c,Rd = 7.99 kN*m	Vz,Ed = 0.09 kN
	MN,y,Rd = 7.99 kN*m	MN,z,Rd = 7.99 kN*m	Vz,T,Rd = 78.36 kN
	Mb,Rd = 7.99 kN*m		Tt,Ed = 0.23 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 157.23 kN*m	Curve,LT - d	XLT = 1.00
Lcr,low=4.10 m	Lam_LT = 0.23	fi,LT = 0.45	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:
Ly = 4.10 m   Lam_y = 0.35
Lcr,y = 1.02 m   Xy = 0.96
Lamy = 33.26   kzy = 0.65

About z axis:
Lz = 4.10 m   Lam_z = 1.42
Lcr,z = 4.10 m   Xz = 0.41
Lamz = 133.02   kzz = 1.17

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.11 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.68 + (Mz,Ed/MN,z,Rd)^1.68 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 33.26 < Lambda,max = 210.00   Lambda,z = 133.02 < Lambda,max = 210.00   STABLE
My,Ed,max/Mb,Rd = 0.02 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.28 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 20 mm   Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 20 mm   Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 138 Simple bar_138   **POINT:** 1   **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235)   fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 15.11 kN	My,Ed = -0.05 kN*m	Mz,Ed = 0.09 kN*m	Vy,Ed = 0.13 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.05 kN*m	Mz,Ed,max = 0.09 kN*m	Vy,T,Rd = 29.28 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.07 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.28 kN
			Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kzy = 0.69	Lamz = 78.45	kzz = 1.09

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.15 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.70 + (Mz,Ed/MN,z,Rd)^1.70 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.28 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 139 Simple bar_139 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -13.11 kN	My,Ed = -0.01 kN*m	Mz,Ed = 0.04 kN*m	Vy,Ed = 0.01 kN
Nt,Rd = 101.99 kN	My,pl,Rd = 1.40 kN*m	Mz,pl,Rd = 1.40 kN*m	Vy,T,Rd = 29.01 kN
	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.03 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.01 kN
			Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:

About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.13 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.01 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.69 + (Mz,Ed/MN,z,Rd)^1.69 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 140 Simple bar_140 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

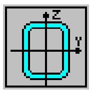
---

LOADS:

Governing Load Case: 9 ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

MATERIAL:

S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 13.39 kN	My,Ed = 0.01 kN*m	Mz,Ed = -0.02 kN*m	Vy,Ed = 0.01 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.01 kN*m	Mz,Ed,max = -0.03 kN*m	Vy,T,Rd = 29.22 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = 0.01 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.22 kN
			Tt,Ed = 0.01 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kzy = 0.68	Lamz = 78.45	kzz = 1.08

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.13 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.69 + (Mz,Ed/MN,z,Rd)^1.69 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 141 Simple bar_141 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.18 m

---

LOADS:
Governing Load Case: 9 ULS /72/ 1*1.00 + 6*1.50

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 40x40x3

h=40 mm	gM0=1.00	gM1=1.00	
b=40 mm	Ay=217 mm2	Az=217 mm2	Ax=434 mm2
tw=3 mm	Iy=97800 mm4	Iz=97800 mm4	Ix=151959 mm4
tf=3 mm	Wply=5970 mm3	Wplz=5970 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 8.69 kN	My,Ed = -0.05 kN*m	Mz,Ed = -0.00 kN*m	Vy,Ed = 0.00 kN
Nc,Rd = 101.99 kN	My,Ed,max = -0.05 kN*m	Mz,Ed,max = -0.00 kN*m	Vy,T,Rd = 29.44 kN
Nb,Rd = 79.03 kN	My,c,Rd = 1.40 kN*m	Mz,c,Rd = 1.40 kN*m	Vz,Ed = -0.07 kN
	MN,y,Rd = 1.40 kN*m	MN,z,Rd = 1.40 kN*m	Vz,T,Rd = 29.44 kN
			Tt,Ed = 0.00 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.18 m	Lam_y = 0.84	Lz = 1.18 m	Lam_z = 0.84
Lcr,y = 1.18 m	Xy = 0.77	Lcr,z = 1.18 m	Xz = 0.77
Lamy = 78.45	kyy = 1.05	Lamz = 78.45	kyz = 0.65

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.09 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.00 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.67 + (Mz,Ed/MN,z,Rd)^1.67 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 78.45 < Lambda,max = 210.00 Lambda,z = 78.45 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.15 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 142 Simple bar_142 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -141.23 kN	My,Ed = 0.11 kN*m	Mz,Ed = -0.09 kN*m	Vy,Ed = 0.28 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 69.62 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.36 kN
	MN,y,Rd = 3.29 kN*m	MN,z,Rd = 3.29 kN*m	Vz,T,Rd = 69.62 kN
			Tt,Ed = -0.06 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.58 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.67 + (Mz,Ed/MN,z,Rd)^2.67 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

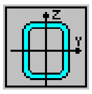
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 143 Simple bar_143 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 150.26 kN	My,Ed = 0.47 kN*m	Mz,Ed = 0.37 kN*m	Vy,Ed = -0.10 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.47 kN*m	Mz,Ed,max = 0.51 kN*m	Vy,T,Rd = 67.31 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.37 kN
	MN,y,Rd = 3.00 kN*m	MN,z,Rd = 3.00 kN*m	Vz,T,Rd = 67.31 kN
			Tt,Ed = -0.22 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kzy = 0.69	Lamz = 49.85	kzz = 1.08

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nc,Rd = 0.61 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.16 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.12 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.90 + (Mz,Ed/MN,z,Rd)^2.90 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)

Global stability check of member:

Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.81 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.82 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 144 Simple bar_144 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -117.73 kN	My,Ed = 0.38 kN*m	Mz,Ed = -0.26 kN*m	Vy,Ed = -0.23 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 69.89 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.23 kN
	MN,y,Rd = 4.04 kN*m	MN,z,Rd = 4.04 kN*m	Vz,T,Rd = 69.89 kN
			Tt,Ed = 0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.48 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.09 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.25 + (Mz,Ed/MN,z,Rd)^2.25 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

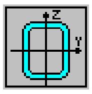
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 145 Simple bar_145 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 77.18 kN	My,Ed = 0.26 kN*m	Mz,Ed = 0.43 kN*m	Vy,Ed = 0.13 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.27 kN*m	Mz,Ed,max = 0.43 kN*m	Vy,T,Rd = 67.66 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.03 kN
	MN,y,Rd = 5.33 kN*m	MN,z,Rd = 5.33 kN*m	Vz,T,Rd = 67.66 kN
			Tt,Ed = -0.19 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kzy = 0.64	Lamz = 49.85	kzz = 1.03

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.32 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.87 + (Mz,Ed/MN,z,Rd)^1.87 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.44 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.45 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

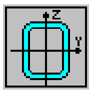
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 146 Simple bar_146 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -52.99 kN	My,Ed = 0.39 kN*m	Mz,Ed = 0.04 kN*m	Vy,Ed = -0.07 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 68.95 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.11 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 68.95 kN
			Tt,Ed = 0.11 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:

N,Ed/Nt,Rd = 0.22 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.06 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.75 + (Mz,Ed/MN,z,Rd)^1.75 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 147 Simple bar_147 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.43 kN	My,Ed = 0.23 kN*m	Mz,Ed = 0.12 kN*m	Vy,Ed = -0.14 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.35 kN*m	Mz,Ed,max = 0.30 kN*m	Vy,T,Rd = 67.81 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.15 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 67.81 kN
			Tt,Ed = -0.18 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kyy = 1.00	Lamz = 49.85	kyz = 0.61

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 148 Simple bar_148 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.34 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.43 kN	My,Ed = 0.23 kN*m	Mz,Ed = 0.12 kN*m	Vy,Ed = 0.14 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.35 kN*m	Mz,Ed,max = 0.30 kN*m	Vy,T,Rd = 67.81 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.15 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 67.81 kN
			Tt,Ed = 0.18 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kyy = 1.00	Lamz = 49.85	kyz = 0.61

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.05 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.04 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.01 < 1.00 (6.2.9.1.(6))

Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.14 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

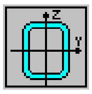
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 149 Simple bar_149 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.34 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -52.99 kN	My,Ed = 0.39 kN*m	Mz,Ed = 0.04 kN*m	Vy,Ed = 0.07 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 68.95 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.11 kN
	MN,y,Rd = 5.99 kN*m	MN,z,Rd = 5.99 kN*m	Vz,T,Rd = 68.95 kN
			Tt,Ed = -0.11 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:

About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.22 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.06 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.75 + (Mz,Ed/MN,z,Rd)^1.75 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)

Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 150 Simple bar_150 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.34 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 77.18 kN	My,Ed = 0.26 kN*m	Mz,Ed = 0.43 kN*m	Vy,Ed = -0.13 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.27 kN*m	Mz,Ed,max = 0.43 kN*m	Vy,T,Rd = 67.66 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.03 kN
	MN,y,Rd = 5.33 kN*m	MN,z,Rd = 5.33 kN*m	Vz,T,Rd = 67.66 kN
			Tt,Ed = 0.19 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kzy = 0.64	Lamz = 49.85	kzz = 1.03

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.32 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.05 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.87 + (Mz,Ed/MN,z,Rd)^1.87 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.04 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE

N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.44 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.45 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

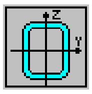
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 151 Simple bar_151 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.34 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -117.73 kN	My,Ed = 0.38 kN*m	Mz,Ed = -0.26 kN*m	Vy,Ed = 0.23 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 69.89 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.23 kN
	MN,y,Rd = 4.04 kN*m	MN,z,Rd = 4.04 kN*m	Vz,T,Rd = 69.89 kN
			Tt,Ed = -0.04 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.48 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.09 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.25 + (Mz,Ed/MN,z,Rd)^2.25 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

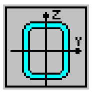
CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 152 Simple bar_152 **POINT:** 3 **COORDINATE:** x = 1.00 L = 1.34 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -141.23 kN	My,Ed = 0.11 kN*m	Mz,Ed = -0.09 kN*m	Vy,Ed = -0.28 kN
Nt,Rd = 244.40 kN	My,pl,Rd = 5.99 kN*m	Mz,pl,Rd = 5.99 kN*m	Vy,T,Rd = 69.62 kN
	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = 0.36 kN
	MN,y,Rd = 3.29 kN*m	MN,z,Rd = 3.29 kN*m	Vz,T,Rd = 69.62 kN
			Tt,Ed = 0.06 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.58 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.03 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.67 + (Mz,Ed/MN,z,Rd)^2.67 = 0.00 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 153 Simple bar_153 **POINT:** 1 **COORDINATE:** x = 0.00 L = 0.00 m

---

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 70x70x4

h=70 mm	gM0=1.00	gM1=1.00	
b=70 mm	Ay=520 mm2	Az=520 mm2	Ax=1040 mm2
tw=4 mm	Iy=747000 mm4	Iz=747000 mm4	Ix=1149984 mm4
tf=4 mm	Wply=25500 mm3	Wplz=25500 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 150.26 kN	My,Ed = 0.47 kN*m	Mz,Ed = -0.37 kN*m	Vy,Ed = 0.10 kN
Nc,Rd = 244.40 kN	My,Ed,max = 0.47 kN*m	Mz,Ed,max = -0.51 kN*m	Vy,T,Rd = 67.31 kN
Nb,Rd = 223.49 kN	My,c,Rd = 5.99 kN*m	Mz,c,Rd = 5.99 kN*m	Vz,Ed = -0.37 kN
	MN,y,Rd = 3.00 kN*m	MN,z,Rd = 3.00 kN*m	Vz,T,Rd = 67.31 kN
			Tt,Ed = 0.22 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 1.34 m	Lam_y = 0.53	Lz = 1.34 m	Lam_z = 0.53
Lcr,y = 1.34 m	Xy = 0.91	Lcr,z = 1.34 m	Xz = 0.91
Lamy = 49.85	kzy = 0.69	Lamz = 49.85	kzz = 1.08

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.61 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.16 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.12 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.90 + (Mz,Ed/MN,z,Rd)^2.90 = 0.01 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.01 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.05 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 49.85 < Lambda,max = 210.00 Lambda,z = 49.85 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.81 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.82 < 1.00 (6.3.3.(4))

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 154 Column_154 **POINT:** 3 **COORDINATE:** x = 1.00 L = 3.60 m

---

LOADS:
Governing Load Case: 9 ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: QH 120x120x5

h=120 mm	gM0=1.00	gM1=1.00	
b=120 mm	Ay=1135 mm2	Az=1135 mm2	Ax=2270 mm2
tw=5 mm	Iy=4980000 mm4	Iz=4980000 mm4	Ix=7604375 mm4
tf=5 mm	Wply=97600 mm3	Wplz=97600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 11.92 kN	My,Ed = -0.01 kN*m	Mz,Ed = 5.46 kN*m	Vy,Ed = -2.19 kN
Nc,Rd = 533.45 kN	My,Ed,max = -0.02 kN*m	Mz,Ed,max = 5.46 kN*m	Vy,T,Rd = 153.98 kN
Nb,Rd = 418.76 kN	My,c,Rd = 22.94 kN*m	Mz,c,Rd = 22.94 kN*m	Vz,Ed = 0.00 kN
	MN,y,Rd = 22.94 kN*m	MN,z,Rd = 22.94 kN*m	Vz,T,Rd = 153.98 kN
			Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 3.60 m	Lam_y = 0.82	Lz = 3.60 m	Lam_z = 0.82
Lcr,y = 3.60 m	Xy = 0.79	Lcr,z = 3.60 m	Xz = 0.79
Lamy = 76.86	kzy = 0.55	Lamz = 76.86	kzz = 0.70

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.02 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.00 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.24 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 1.66 + (Mz,Ed/MN,z,Rd)^1.66 = 0.09 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.01 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.00 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 76.86 < Lambda,max = 210.00 Lambda,z = 76.86 < Lambda,max = 210.00 STABLE
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.13 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.19 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS
Deflections (LOCAL SYSTEM): *Not analyzed*
Displacements (GLOBAL SYSTEM):
vx = 0 mm < vx max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /14/ 1*1.00 + 2*1.00 + 4*0.50 + 6*1.00
vy = 4 mm < vy max = L/150.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /9/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 8*0.60

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 155 **POINT:** 1 **COORDINATE:** x = 0.85 L = 4.10 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.78 kN	My,Ed = -14.62 kN*m	Mz,Ed = 0.71 kN*m	Vy,Ed = 0.64 kN
Nc,Rd = 669.75 kN	My,Ed,max = -14.62 kN*m		Mz,Ed,max = 0.71 kN*m Vy,T,Rd = 264.84 kN
Nb,Rd = 634.88 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = 9.05 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.68 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 4.82 m	Lam_y = 0.09	Lz = 4.82 m	Lam_z = 0.34
Lcr,y = 0.72 m	Xy = 1.00	Lcr,z = 0.72 m	Xz = 0.95
Lamy = 8.73	kyy = 1.01	Lamz = 32.26	kyz = 1.58

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.28 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.07 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.15 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 8.73 < Lambda,max = 210.00 Lambda,z = 32.26 < Lambda,max = 210.00 STABLE

My,Ed,max/Mb,Rd = 0.58 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.72 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.46 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 1 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 156 **POINT:** 1 **COORDINATE:** x = 0.34 L = 0.79 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.78 kN	My,Ed = -4.09 kN*m	Mz,Ed = -0.25 kN*m	Vy,Ed = -0.17 kN
Nc,Rd = 669.75 kN	My,Ed,max = -8.83 kN*m	Mz,Ed,max = -0.25 kN*m	Vy,T,Rd = 264.84 kN
Nb,Rd = 516.66 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = 4.80 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.68 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.31 m	Lam_y = 0.30	Lz = 2.31 m	Lam_z = 0.72
Lcr,y = 2.31 m	Xy = 0.98	Lcr,z = 1.51 m	Xz = 0.77
Lamy = 27.94	kyy = 1.01	Lamz = 67.76	kyz = 0.80

VERIFICATION FORMULAS:

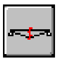
Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.08 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

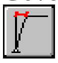
Lambda,y = 27.94 < Lambda,max = 210.00 Lambda,z = 67.76 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.22 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS



Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50



Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

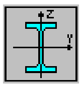
STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 157 **POINT:** 3 **COORDINATE:** x = 0.66 L = 1.51 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa



SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 0.07 kN	My,Ed = -3.26 kN*m	Mz,Ed = 0.12 kN*m	Vy,Ed = -0.00 kN
Nc,Rd = 669.75 kN	My,Ed,max = -7.75 kN*m	Mz,Ed,max = 0.12 kN*m	Vy,T,Rd = 264.24 kN
Nb,Rd = 516.66 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -4.27 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.40 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.02 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00 Mcr = 63.19 kN*m Curve,LT - b XLT = 0.76
Lcr,low=2.31 m Lam_LT = 0.91 fi,LT = 0.89 XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis:
Ly = 2.31 m Lam_y = 0.30
Lcr,y = 2.31 m Xy = 0.98
Lamy = 27.94 kyy = 1.00

About z axis:
Lz = 2.31 m Lam_z = 0.72
Lcr,z = 1.51 m Xz = 0.77
Lamz = 67.76 kyz = 0.78

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nc,Rd = 0.00 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.06 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.02 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.02 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:
Lambda,y = 27.94 < Lambda,max = 210.00 Lambda,z = 67.76 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.19 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.20 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.11 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 158 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -33.02 kN	My,Ed = -13.39 kN*m	Mz,Ed = -0.37 kN*m	Vy,Ed = 0.33 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.63 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.84 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.58 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.05 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.26 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.04 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.10 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.53 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 1 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 159 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.64 kN	My,Ed = -7.91 kN*m	Mz,Ed = -0.25 kN*m	Vy,Ed = 0.76 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.27 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.69 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.41 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.15 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.05 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.20 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 160 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.64 kN	My,Ed = -13.45 kN*m	Mz,Ed = -0.79 kN*m	Vy,Ed = 0.76 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.27 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.70 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.41 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.26 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.14 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.53 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 161 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -2.31 kN	My,Ed = -9.93 kN*m	Mz,Ed = -0.23 kN*m	Vy,Ed = 0.81 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.04 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -7.64 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.77 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.19 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.06 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:

My,Ed/Mb,Rd = 0.25 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

uz = 0 mm < uz max = L/200.00 = 12 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*

ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 162 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -2.31 kN	My,Ed = -16.16 kN*m	Mz,Ed = -0.81 kN*m	Vy,Ed = 0.81 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.04 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -9.65 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.77 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))

My,Ed/MN,y,Rd = 0.31 < 1.00 (6.2.9.1.(2))

Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.17 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.64 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 3 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 163 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.13 kN	My,Ed = -7.38 kN*m	Mz,Ed = -0.17 kN*m	Vy,Ed = 0.65 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.70 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.46 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.08 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.14 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.04 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.18 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 164 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.13 kN	My,Ed = -12.75 kN*m	Mz,Ed = -0.64 kN*m	Vy,Ed = 0.65 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.70 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.47 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.08 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.00 kN*m

Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00 Mcr = 27.36 kN*m Curve,LT - b XLT = 0.48
Lcr,low=4.82 m Lam_LT = 1.38 fi,LT = 1.38 XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:
N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.25 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.12 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.50 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 165 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.86 kN	My,Ed = -7.28 kN*m	Mz,Ed = -0.08 kN*m	Vy,Ed = 0.32 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.73 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.45 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.10 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.14 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.18 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /5/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 6*0.60
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 166 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.86 kN	My,Ed = -12.65 kN*m	Mz,Ed = -0.31 kN*m	Vy,Ed = 0.32 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.73 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.46 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.10 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = 0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.24 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.09 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.50 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 1 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 167 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -1.60 kN	My,Ed = -10.53 kN*m	
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	
	My,c,Rd = 51.94 kN*m	Vz,Ed = -7.86 kN
	MN,y,Rd = 51.94 kN*m	Vz,c,Rd = 190.17 kN
	Mb,Rd = 40.45 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.20 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.04 < 1.00 (6.2.6.(1))
Global stability check of member:
My,Ed/Mb,Rd = 0.26 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /12/ 1*1.00 + 2*1.00 + 4*0.50 + 5*1.00
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 168 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -1.60 kN	My,Ed = -16.92 kN*m	
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	
	My,c,Rd = 51.94 kN*m	Vz,Ed = -9.88 kN
	MN,y,Rd = 51.94 kN*m	Vz,c,Rd = 190.17 kN
	Mb,Rd = 25.37 kN*m	
		Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/My,c,Rd = 0.33 < 1.00 (6.2.5.(1))
Vz,Ed/Vz,c,Rd = 0.05 < 1.00 (6.2.6.(1))
Global stability check of member:
My,Ed/Mb,Rd = 0.67 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /15/ 1*1.00 + 2*1.00 + 6*1.00
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 169 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.86 kN	My,Ed = -7.28 kN*m	Mz,Ed = 0.08 kN*m	Vy,Ed = -0.32 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.73 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.45 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.10 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:
About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.14 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.01 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.18 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS
Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 170 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -3.86 kN	My,Ed = -12.65 kN*m	Mz,Ed = 0.31 kN*m	Vy,Ed = -0.32 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.73 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.46 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.10 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.24 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.03 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.09 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.50 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 24 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

uz = 1 mm < uz max = L/200.00 = 24 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*

ANALYSIS TYPE: Member Verification

CODE GROUP:

MEMBER: 171 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.13 kN	My,Ed = -7.38 kN*m	Mz,Ed = 0.17 kN*m	Vy,Ed = -0.65 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.70 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.46 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.08 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))

My,Ed/MN,y,Rd = 0.14 < 1.00 (6.2.9.1.(2))

Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))

(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.04 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.18 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 172 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.13 kN	My,Ed = -12.75 kN*m	Mz,Ed = 0.64 kN*m	Vy,Ed = -0.65 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.70 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.47 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 190.08 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = -0.00 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.25 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.06 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.12 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.00 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.50 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 173 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -2.31 kN	My,Ed = -9.93 kN*m	Mz,Ed = 0.23 kN*m	Vy,Ed = -0.81 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.04 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -7.64 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.77 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.19 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.06 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.25 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 174 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:

Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:

S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -2.31 kN	My,Ed = -16.16 kN*m	Mz,Ed = 0.81 kN*m	Vy,Ed = -0.81 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 265.04 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -9.65 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.77 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.00 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.31 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.17 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.64 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 3 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 175 **POINT:** 3 **COORDINATE:** x = 1.00 L = 2.31 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.64 kN	My,Ed = -7.91 kN*m	Mz,Ed = 0.25 kN*m	Vy,Ed = -0.76 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.27 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -6.69 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.41 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:

Section strength check:

N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.15 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.05 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.04 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)

Global stability check of member:

My,Ed/Mb,Rd = 0.20 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 12 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 176 **POINT:** 3 **COORDINATE:** x = 0.15 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = -5.64 kN	My,Ed = -13.45 kN*m	Mz,Ed = 0.79 kN*m	Vy,Ed = -0.76 kN
Nt,Rd = 669.75 kN	My,pl,Rd = 51.94 kN*m	Mz,pl,Rd = 10.48 kN*m	Vy,T,Rd = 264.27 kN
	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -8.70 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.41 kN
	Mb,Rd = 25.37 kN*m		Tt,Ed = -0.02 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 27.36 kN*m	Curve,LT - b	XLT = 0.48
Lcr,low=4.82 m	Lam_LT = 1.38	fi,LT = 1.38	XLT,mod = 0.49

BUCKLING PARAMETERS:

About y axis: About z axis:

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nt,Rd = 0.01 < 1.00 (6.2.3.(1))
My,Ed/MN,y,Rd = 0.26 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.08 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.14 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.02 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
My,Ed/Mb,Rd = 0.53 < 1.00 (6.3.2.1.(1))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 2 mm < uz max = L/200.00 = 24 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 177 **POINT:** 3 **COORDINATE:** x = 0.66 L = 1.51 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.78 kN	My,Ed = -4.09 kN*m	Mz,Ed = -0.25 kN*m	Vy,Ed = 0.17 kN
Nc,Rd = 669.75 kN	My,Ed,max = -8.83 kN*m	Mz,Ed,max = -0.25 kN*m	Vy,T,Rd = 264.84 kN
Nb,Rd = 516.66 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -4.80 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.68 kN
	Mb,Rd = 40.45 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 63.19 kN*m	Curve,LT - b	XLT = 0.76
Lcr,low=2.31 m	Lam_LT = 0.91	fi,LT = 0.89	XLT,mod = 0.78

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 2.31 m	Lam_y = 0.30	Lz = 2.31 m	Lam_z = 0.72
Lcr,y = 2.31 m	Xy = 0.98	Lcr,z = 1.51 m	Xz = 0.77
Lamy = 27.94	kyy = 1.01	Lamz = 67.76	kyz = 0.80

VERIFICATION FORMULAS:
Section strength check:
N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.08 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.02 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.03 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.03 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 27.94 < Lambda,max = 210.00 Lambda,z = 67.76 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.22 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.27 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.18 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

Deflections (LOCAL SYSTEM):

uy = 0 mm < uy max = L/200.00 = 12 mm Verified

Governing Load Case: 15 SLS:CHR /3/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50 + 5*0.60

uz = 0 mm < uz max = L/200.00 = 12 mm Verified

Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

STEEL DESIGN

CODE: *EN 1993-1:2005/A1:2014, Eurocode 3: Design of steel structures.*
ANALYSIS TYPE: Member Verification

CODE GROUP:
MEMBER: 178 **POINT:** 3 **COORDINATE:** x = 1.00 L = 0.72 m

LOADS:
Governing Load Case: 9 ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

MATERIAL:
S 235 (S 235) fy = 235.00 MPa

SECTION PARAMETERS: IPE 200

h=200 mm	gM0=1.00	gM1=1.00	
b=100 mm	Ay=1960 mm2	Az=1402 mm2	Ax=2850 mm2
tw=6 mm	Iy=19400000 mm4	Iz=1420000 mm4	Ix=70200 mm4
tf=9 mm	Wply=221000 mm3	Wplz=44600 mm3	

INTERNAL FORCES AND CAPACITIES:

N,Ed = 21.78 kN	My,Ed = -14.62 kN*m	Mz,Ed = 0.71 kN*m	Vy,Ed = -0.64 kN
Nc,Rd = 669.75 kN	My,Ed,max = -14.62 kN*m		Mz,Ed,max = 0.71 kN*m Vy,T,Rd = 264.84 kN
Nb,Rd = 634.88 kN	My,c,Rd = 51.94 kN*m	Mz,c,Rd = 10.48 kN*m	Vz,Ed = -9.05 kN
	MN,y,Rd = 51.94 kN*m	MN,z,Rd = 10.48 kN*m	Vz,T,Rd = 189.68 kN
	Mb,Rd = 51.94 kN*m		Tt,Ed = -0.01 kN*m
			Class of section = 1

LATERAL BUCKLING PARAMETERS:

z = 1.00	Mcr = 417.00 kN*m	Curve,LT - b	XLT = 1.00
Lcr,low=0.72 m	Lam_LT = 0.35	fi,LT = 0.54	XLT,mod = 1.00

BUCKLING PARAMETERS:

About y axis:		About z axis:	
Ly = 0.72 m	Lam_y = 0.09	Lz = 0.72 m	Lam_z = 0.34
Lcr,y = 0.72 m	Xy = 1.00	Lcr,z = 0.72 m	Xz = 0.95
Lamy = 8.73	kyy = 0.99	Lamz = 32.26	kyz = 0.67

VERIFICATION FORMULAS:
Section strength check:

N,Ed/Nc,Rd = 0.03 < 1.00 (6.2.4.(1))
My,Ed/MN,y,Rd = 0.28 < 1.00 (6.2.9.1.(2))
Mz,Ed/MN,z,Rd = 0.07 < 1.00 (6.2.9.1.(2))
(My,Ed/MN,y,Rd)^ 2.00 + (Mz,Ed/MN,z,Rd)^1.00 = 0.15 < 1.00 (6.2.9.1.(6))
Vy,Ed/Vy,T,Rd = 0.00 < 1.00 (6.2.6-7)
Vz,Ed/Vz,T,Rd = 0.05 < 1.00 (6.2.6-7)
Tau,ty,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Tau,tz,Ed/(fy/(sqrt(3)*gM0)) = 0.01 < 1.00 (6.2.6)
Global stability check of member:
Lambda,y = 8.73 < Lambda,max = 210.00 Lambda,z = 32.26 < Lambda,max = 210.00 STABLE
My,Ed,max/Mb,Rd = 0.28 < 1.00 (6.3.2.1.(1))
N,Ed/(Xy*N,Rk/gM1) + kyy*My,Ed,max/(XLT*My,Rk/gM1) + kyz*Mz,Ed,max/(Mz,Rk/gM1) = 0.36 < 1.00 (6.3.3.(4))
N,Ed/(Xz*N,Rk/gM1) + kzy*My,Ed,max/(XLT*My,Rk/gM1) + kzz*Mz,Ed,max/(Mz,Rk/gM1) = 0.25 < 1.00 (6.3.3.(4))

LIMIT DISPLACEMENTS

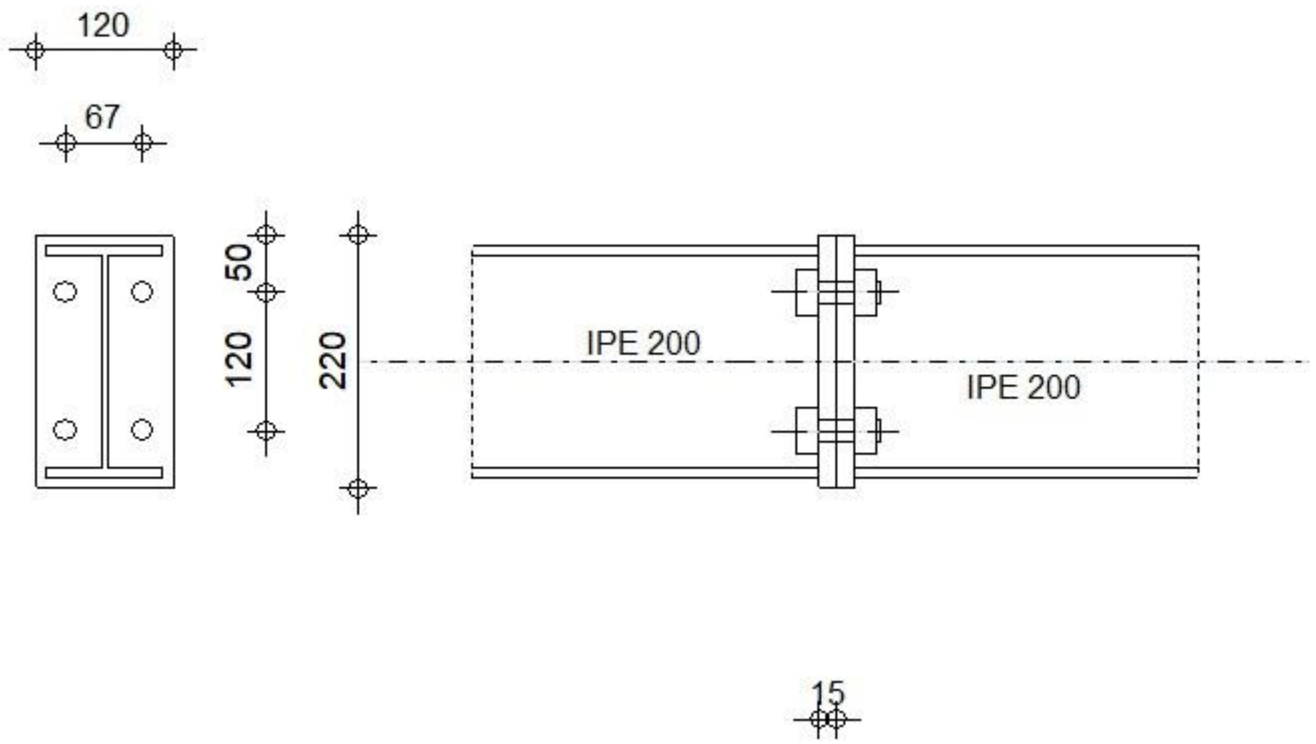
Deflections (LOCAL SYSTEM):
uy = 0 mm < uy max = L/200.00 = 4 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50
uz = 0 mm < uz max = L/200.00 = 4 mm Verified
Governing Load Case: 15 SLS:CHR /1/ 1*1.00 + 2*1.00 + 3*1.00 + 4*0.50

Displacements (GLOBAL SYSTEM): *Not analyzed*

Section OK !!!

Connection Verification

	Autodesk Robot Structural Analysis Professional 2020 **Design of fixed beam-to-beam connection** EN 1993-1-8:2005/AC:2009	OK Ratio **0.26**



GENERAL

Connection no.: 9

Connection name: Beam-Beam

Structure node: 129

Structure bars: 155, 156

GEOMETRY

LEFT SIDE

BEAM

Section: IPE 200

Bar no.: 155

α =	-180.0	[Deg]	Inclination angle
h_{bl} =	200	[mm]	Height of beam section
b_{fbl} =	100	[mm]	Width of beam section
t_{wbl} =	6	[mm]	Thickness of the web of beam section
t_{fbl} =	9	[mm]	Thickness of the flange of beam section
r_{bl} =	12	[mm]	Radius of beam section fillet

α =	-180.0	[Deg]	Inclination angle
A_{bl} =	2850	[mm^2]	Cross-sectional area of a beam
I_{xbl} =	19400000	[mm^4]	Moment of inertia of the beam section

Material: S 235

f_{yb} =	235.00	[MPa]	Resistance

RIGHT SIDE

BEAM

Section: IPE 200

Bar no.: 156

α =	-0.0	[Deg]	Inclination angle
h_{br} =	200	[mm]	Height of beam section
b_{fbr} =	100	[mm]	Width of beam section
t_{wbr} =	6	[mm]	Thickness of the web of beam section
t_{fbr} =	9	[mm]	Thickness of the flange of beam section
r_{br} =	12	[mm]	Radius of beam section fillet
A_{br} =	2850	[mm^2]	Cross-sectional area of a beam
I_{xbr} =	19400000	[mm^4]	Moment of inertia of the beam section

Material: S 235

f_{yb} =	235.00	[MPa]	Resistance

BOLTS

The shear plane passes through the UNTHREADED portion of the bolt.

d =	20	[mm]	Bolt diameter
Class =	8.8		Bolt class
F_{tRd} =	141.12	[kN]	Tensile resistance of a bolt
n_h =	2		Number of bolt columns
n_v =	2		Number of bolt rows
h_1 =	50	[mm]	Distance between first bolt and upper edge of front plate

Horizontal spacing e_i = 67 [mm]

Vertical spacing p_i = 120 [mm]

PLATE

h_{pr} =	220	[mm]	Plate height	
b_{pr} =	120	[mm]	Plate width	
t_{pr} =	15	[mm]	Plate thickness	
Material:	S 235			
f_{ypr} =	235.00	[MPa]	Resistance	

FILLET WELDS

a_w =	4	[mm]	Web weld	
a_f =	4	[mm]	Flange weld	

MATERIAL FACTORS

γ_{M0} =	1.00		Partial safety factor	[2.2]
γ_{M1} =	1.00		Partial safety factor	[2.2]
γ_{M2} =	1.25		Partial safety factor	[2.2]
γ_{M3} =	1.25		Partial safety factor	[2.2]

LOADS

Ultimate limit state

Case: 9: ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

$M_{b1,Ed}$ =	8.83	[kN*m]	Bending moment in the right beam	
$V_{b1,Ed}$ =	7.04	[kN]	Shear force in the right beam	
$N_{b1,Ed}$ =	-21.78	[kN]	Axial force in the right beam	

RESULTS

BEAM RESISTANCES

COMPRESSION

A_b =	2850	[mm^2]	Area	EN1993-1-1:[6.2.4]

$N_{cb,Rd} = A_b f_{yb} / \gamma_{M0}$

$N_{cb,Rd}$ =	669.75	[kN]	Design compressive resistance of the section	EN1993-1-1:[6.2.4]

SHEAR

A_{vb} =	1402	[mm^2]	Shear area	EN1993-1-1:[6.2.6.(3)]

$V_{cb,Rd} = A_{vb} (f_{yb} / \sqrt{3}) / \gamma_{M0}$

$V_{cb,Rd}$ =	190.17	[kN]	Design sectional resistance for shear	EN1993-1-1:[6.2.6.(2)]

$V_{b1,Ed}$ / $V_{cb,Rd} \le 1,0$ 0.04 < 1.00 verified (0.04)

BENDING - PLASTIC MOMENT (WITHOUT BRACKETS)

W_{plb} = 221000 [mm^3] Plastic section modulus EN1993-1-1:[6.2.5.(2)]

$M_{b,pl,Rd} = W_{plb} f_{yb} / \gamma_{M0}$

$M_{b,pl,Rd}$ = 51.94 [kN*m] Plastic resistance of the section for bending (without stiffeners) EN1993-1-1:[6.2.5.(2)]

BENDING ON THE CONTACT SURFACE WITH PLATE OR CONNECTED ELEMENT

W_{pl} = 221000 [mm^3] Plastic section modulus EN1993-1-1:[6.2.5]

$M_{cb,Rd} = W_{pl} f_{yb} / \gamma_{M0}$

$M_{cb,Rd}$ = 51.94 [kN*m] Design resistance of the section for bending EN1993-1-1:[6.2.5]

FLANGE AND WEB - COMPRESSION

$M_{cb,Rd}$ = 51.94 [kN*m] Design resistance of the section for bending EN1993-1-1:[6.2.5]

h_f = 192 [mm] Distance between the centroids of flanges [6.2.6.7.(1)]

$F_{c,fb,Rd} = M_{cb,Rd} / h_f$

$F_{c,fb,Rd}$ = 271.20 [kN] Resistance of the compressed flange and web [6.2.6.7.(1)]

GEOMETRICAL PARAMETERS OF A CONNECTION

EFFECTIVE LENGTHS AND PARAMETERS - FRONT PLATE

Nr	m	m_x	e	e_x	p	$l_{eff,cp}$	$l_{eff,nc}$	$l_{eff,1}$	$l_{eff,2}$	$l_{eff,cp,g}$	$l_{eff,nc,g}$	$l_{eff,1,g}$	$l_{eff,2,g}$
1	26	-	26	-	120	165	151	151	151	203	142	142	142
2	26	-	26	-	120	165	138	138	138	203	129	129	129

m – Bolt distance from the web

m_x – Bolt distance from the beam flange

e – Bolt distance from the outer edge

e_x – Bolt distance from the horizontal outer edge

p – Distance between bolts

$l_{eff,cp}$ – Effective length for a single bolt in the circular failure mode

$l_{eff,nc}$ – Effective length for a single bolt in the non-circular failure mode

$l_{eff,1}$ – Effective length for a single bolt for mode 1

$l_{eff,2}$ – Effective length for a single bolt for mode 2

$l_{eff,cp,g}$ – Effective length for a group of bolts in the circular failure mode

$l_{eff,nc,g}$ – Effective length for a group of bolts in the non-circular failure mode

$l_{eff,1,g}$ – Effective length for a group of bolts for mode 1

m – Bolt distance from the web

$l_{eff,2,g}$ – Effective length for a group of bolts for mode 2

CONNECTION RESISTANCE FOR COMPRESSION

$N_{j,Rd} = \text{Min} (N_{cb,Rd})$

$N_{j,Rd}$ =	669.75	[kN]	Connection resistance for compression	[6.2]

$N_{b1,Ed} / N_{j,Rd} \leq 1,0$	0.03 < 1.00	verified	(0.03)

CONNECTION RESISTANCE FOR BENDING

$F_{t,Rd}$ =	141.12	[kN]	Bolt resistance for tension	[Table 3.4]
$B_{p,Rd}$ =	244.29	[kN]	Punching shear resistance of a bolt	[Table 3.4]

$F_{t,fc,Rd}$ – column flange resistance due to bending

$F_{t,wc,Rd}$ – column web resistance due to tension

$F_{t,ep,Rd}$ – resistance of the front plate due to bending

$F_{t,wb,Rd}$ – resistance of the web in tension

$F_{t,fc,Rd} = \text{Min} (F_{T,1,fc,Rd} , F_{T,2,fc,Rd} , F_{T,3,fc,Rd})$ [6.2.6.4] , [Tab.6.2]

$F_{t,wc,Rd} = \omega\, b_{eff,t,wc}\, t_{wc}\, f_{yc} / \gamma_{M0}$ [6.2.6.3.(1)]

$F_{t,ep,Rd} = \text{Min} (F_{T,1,ep,Rd} , F_{T,2,ep,Rd} , F_{T,3,ep,Rd})$ [6.2.6.5] , [Tab.6.2]

$F_{t,wb,Rd} = b_{eff,t,wb}\, t_{wb}\, f_{yb} / \gamma_{M0}$ [6.2.6.8.(1)]

RESISTANCE OF THE BOLT ROW NO. 1

$F_{t1,Rd,comp}$ - Formula	$F_{t1,Rd,comp}$	Component
$F_{t1,Rd} = \text{Min} (F_{t1,Rd,comp})$	199.07	Bolt row resistance
$F_{t,ep,Rd(1)} = 217.38$	217.38	Front plate - tension
$F_{t,wb,Rd(1)} = 199.07$	199.07	Beam web - tension
$B_{p,Rd} = 488.58$	488.58	Bolts due to shear punching
$F_{c,fb,Rd} = 271.20$	271.20	Beam flange - compression

RESISTANCE OF THE BOLT ROW NO. 2

$F_{t2,Rd,comp}$ - Formula	$F_{t2,Rd,comp}$	Component
$F_{t2,Rd} = \text{Min} (F_{t2,Rd,comp})$	72.14	Bolt row resistance
$F_{t,ep,Rd(2)} = 210.77$	210.77	Front plate - tension
$F_{t,wb,Rd(2)} = 181.74$	181.74	Beam web - tension
$B_{p,Rd} = 488.58$	488.58	Bolts due to shear punching

$F_{t2,Rd,comp}$ - Formula	$F_{t2,Rd,comp}$	Component
$F_{c,fb,Rd} - \sum_1^1 F_{tj,Rd}$ = 271.20 - 199.07	72.14	Beam flange - compression
$F_{t,ep,Rd(2+1)} - \sum_1^1 F_{tj,Rd}$ = 419.06 - 199.07	220.00	Front plate - tension - group
$F_{t,wb,Rd(2+1)} - \sum_1^1 F_{tj,Rd}$ = 356.99 - 199.07	157.92	Beam web - tension - group

SUMMARY TABLE OF FORCES

Nr	h_j	$F_{tj,Rd}$	$F_{t,fc,Rd}$	$F_{t,wc,Rd}$	$F_{t,ep,Rd}$	$F_{t,wb,Rd}$	$F_{t,Rd}$	$B_{p,Rd}$
1	156	199.07	-	-	217.38	199.07	282.24	488.58
2	36	72.14	-	-	210.77	181.74	282.24	488.58

CONNECTION RESISTANCE FOR BENDING $M_{j,Rd}$

$M_{j,Rd} = \sum h_j F_{tj,Rd}$

$M_{j,Rd}$ =	33.58	[kN*m]	Connection resistance for bending	[6.2]
$M_{b1,Ed} / M_{j,Rd} \leq 1,0$	0.26 < 1.00		verified	(0.26)

CONNECTION RESISTANCE FOR SHEAR

α_v =	0.60		Coefficient for calculation of $F_{v,Rd}$	[Table 3.4]
$F_{v,Rd}$ =	120.64	[kN]	Shear resistance of a single bolt	[Table 3.4]
$F_{t,Rd,max}$ =	141.12	[kN]	Tensile resistance of a single bolt	[Table 3.4]
$F_{b,Rd,int}$ =	216.00	[kN]	Bearing resistance of an intermediate bolt	[Table 3.4]
$F_{b,Rd,ext}$ =	108.65	[kN]	Bearing resistance of an outermost bolt	[Table 3.4]

Nr	$F_{tj,Rd,N}$	$F_{tj,Ed,N}$	$F_{tj,Rd,M}$	$F_{tj,Ed,M}$	$F_{tj,Ed}$	$F_{vj,Rd}$
1	282.24	-10.89	199.07	52.34	41.44	215.97
2	282.24	-10.89	72.14	18.96	8.07	236.34

$F_{tj,Rd,N}$ – Bolt row resistance for simple tension

$F_{tj,Ed,N}$ – Force due to axial force in a bolt row

$F_{tj,Rd,M}$ – Bolt row resistance for simple bending

$F_{tj,Ed,M}$ – Force due to moment in a bolt row

$F_{tj,Ed}$ – Maximum tensile force in a bolt row

$F_{vj,Rd}$ – Reduced bolt row resistance

$F_{tj,Ed,N} = N_{j,Ed} F_{tj,Rd,N} / N_{j,Rd}$

$F_{tj,Ed,M} = M_{j,Ed} F_{tj,Rd,M} / M_{j,Rd}$

$F_{tj,Ed} = F_{tj,Ed,N} + F_{tj,Ed,M}$

$F_{vj,Rd} = Min (n_h F_{v,Ed} (1 - F_{tj,Ed}/ (1.4 n_h F_{t,Rd,max}), n_h F_{v,Rd} , n_h F_{b,Rd}))$

$V_{j,Rd} = n_h \sum_1^n F_{vj,Rd}$ [Table 3.4]

$V_{j,Rd}$ = 452.31 [kN] Connection resistance for shear [Table 3.4]

$V_{b1,Ed} / V_{j,Rd} \leq 1,0$ 0.02 < 1.00 verified (0.02)

WELD RESISTANCE

A_w = 2635 [mm^2] Area of all welds [4.5.3.2(2)]

A_{wy} = 1363 [mm^2] Area of horizontal welds [4.5.3.2(2)]

A_{wz} = 1272 [mm^2] Area of vertical welds [4.5.3.2(2)]

I_{wy} = 15516176 [mm^4] Moment of inertia of the weld arrangement with respect to the hor. axis [4.5.3.2(5)]

$\sigma_{\perp max}=\tau_{\perp max}$ = -46.89 [MPa] Normal stress in a weld [4.5.3.2(6)]

$\sigma_{\perp}=\tau_{\perp}$ = -37.83 [MPa] Stress in a vertical weld [4.5.3.2(5)]

τ_{II} = 5.54 [MPa] Tangent stress [4.5.3.2(5)]

β_w = 0.80 Correlation coefficient [4.5.3.2(7)]

$\sqrt{[\sigma_{\perp max}^2 + 3*(\tau_{\perp max}^2)]} \leq f_u/(\beta_w*\gamma_{M2})$ 93.77 < 360.00 verified (0.26)

$\sqrt{[\sigma_{\perp}^2 + 3*(\tau_{\perp}^2+\tau_{II}^2)]} \leq f_u/(\beta_w*\gamma_{M2})$ 76.27 < 360.00 verified (0.21)

$\sigma_{\perp} \leq 0.9*f_u/\gamma_{M2}$ 46.89 < 259.20 verified (0.18)

CONNECTION STIFFNESS

t_{wash} = 4 [mm] Washer thickness [6.2.6.3.(2)]

h_{head} = 14 [mm] Bolt head height [6.2.6.3.(2)]

h_{nut} = 20 [mm] Bolt nut height [6.2.6.3.(2)]

L_b = 49 [mm] Bolt length [6.2.6.3.(2)]

k_{10} = 8 [mm] Stiffness coefficient of bolts [6.3.2.(1)]

STIFFNESSES OF BOLT ROWS

Nr	hj	k_3	k_4	k_5	$k_{eff,j}$	$k_{eff,j}$ h_j	$k_{eff,j}$ h_j^2
					Sum	915	122702
1	156			24	5	750	116792
2	36			22	5	165	5910

$k_{eff,j} = 1 / (\sum_3^5 (1 / k_{i,j}))$ [6.3.3.1.(2)]

$z_{eq} = \sum_j k_{eff,j} h_j^2 / \sum_j k_{eff,j} h_j$

z_{eq} = 134 [mm] Equivalent force arm [6.3.3.1.(3)]

$k_{eq} = \sum_j k_{eff,j} h_j / z_{eq}$

k_{eq} =	7	[mm]	Equivalent stiffness coefficient of a bolt arrangement	[6.3.3.1.(1)]

$S_{j,ini} = E z_{eq}^2 k_{eq}$ [6.3.1.(4)]

$S_{j,ini}$ =	25767.37	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
μ =	1.00		Stiffness coefficient of a connection	[6.3.1.(6)]

$S_j = S_{j,ini} / \mu$ [6.3.1.(4)]

S_j =	25767.37	[kN*m]	Final rotational stiffness	[6.3.1.(4)]

Connection classification due to stiffness.

$S_{j,rig}$ =	14139.70	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]
$S_{j,pin}$ =	883.73	[kN*m]	Stiffness of a pinned connection	[5.2.2.5]

$S_{j,ini} \ge S_{j,rig}$ RIGID

WEAKEST COMPONENT:

BEAM FLANGE AND WEB - COMPRESSION

Connection conforms to the code	Ratio	0.26

Connection Verification

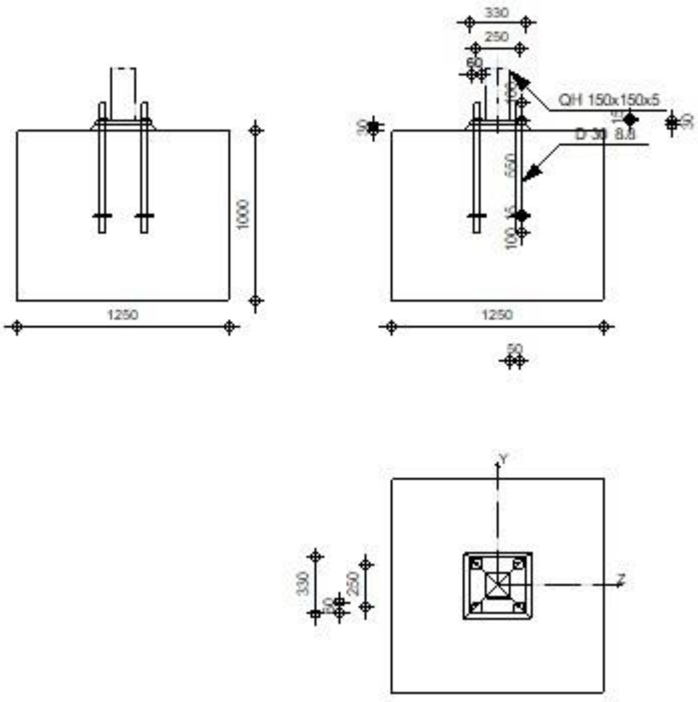
Autodesk Robot Structural Analysis Professional 2020

Fixed column base design

Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete

OK

Ratio **0.26**



GENERAL

Connection no.: 2

Connection name: Fixed column base

Structure node: 14

Structure bars: 12

GEOMETRY

COLUMN

Section: QH 150x150x5

Bar no.: 12

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	150	[mm]	Height of column section
b_{fc} =	150	[mm]	Width of column section
t_{wc} =	5	[mm]	Thickness of the web of column section
t_{fc} =	5	[mm]	Thickness of the flange of column section
r_c =	5	[mm]	Radius of column section fillet
A_c =	2870	[mm^2]	Cross-sectional area of a column

L_c =	3.60	[m]	Column length
I_{yc} =	10020000	[mm^4]	Moment of inertia of the column section

Material: S 235

f_{yc} =	235.00	[MPa]	Resistance
f_{uc} =	360.00	[MPa]	Yield strength of a material

COLUMN BASE

l_{pd} =	330	[mm]	Length
b_{pd} =	330	[mm]	Width
t_{pd} =	30	[mm]	Thickness

Material: S 235

f_{ypd} =	235.00	[MPa]	Resistance
f_{upd} =	360.00	[MPa]	Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Anchor class
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material
d =	30	[mm]	Bolt diameter
A_s =	561	[mm^2]	Effective section area of a bolt
A_v =	707	[mm^2]	Area of bolt section
n_H =	2		Number of bolt columns
n_V =	2		Number of bolt rows

Horizontal spacing e_{Hi} = 250 [mm]

Vertical spacing e_{Vi} = 250 [mm]

Anchor dimensions

L_1 =	100	[mm]
L_2 =	550	[mm]
L_3 =	100	[mm]

Anchor plate

d =	100	[mm]	Diameter
t_p =	15	[mm]	Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	60	[mm]	Length
b_{wd} =	60	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00	Partial safety factor
γ_{M2} =	1.25	Partial safety factor
γ_C =	1.50	Partial safety factor

SPREAD FOOTING

L =	1250	[mm]	Spread footing length
B =	1250	[mm]	Spread footing width
H =	1000	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	5	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

$N_{j,Ed}$ =	3.78	[kN]	Axial force
$V_{j,Ed,y}$ =	-4.06	[kN]	Shear force
$V_{j,Ed,z}$ =	0.41	[kN]	Shear force
$M_{j,Ed,y}$ =	-0.41	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	-6.34	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	26.67	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3*f_j*\gamma_{M0}))}$

c =	51	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	108	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	27264	[mm^2]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	245380	[mm^2]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0}*f_{cd}*\sqrt{(A_{c1}/A_{c0})} \leq 3*A_{c0}*f_{cd}$

F_{rdu} =	1090.58	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j*F_{rdu}/(b_{eff}*l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,y}$ =	27264	[mm^2]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	27264	[mm^2]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i}*f_{jd}$

$F_{c,Rd,y}$ =	727.05	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	727.05	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	156000	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	36.66	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	145	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	252.83	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]
$W_{pl,z}$ =	156000	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	36.66	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	145	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	252.83	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$F_{C,Rd,y} = \min(F_{c,Rd,y}, F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	252.83	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = \min(F_{c,Rd,z}, F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	252.83	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	561	[mm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	274.67	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	299.20	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = \min(F_{t,Rd,s1}, F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	274.67	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7147	[mm^2]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	248.16	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	333	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^{0}$ =	244.95	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	1000	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	500	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	1000000	[mm²]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	625000	[mm²]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.63		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	500	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	1.00	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ =	70.88	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	520	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^{0} = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^{0}$ =	477.27	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	1040	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	520	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	1081600	[mm²]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	637500	[mm²]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.59		Factor related to anchor spacing and edge distance	CEB [9.2.5]
c =	500	[mm]	Minimum edge distance from an anchor	CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	0.99		Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.5]
$\psi_{ec,N}$ =	1.00		Factor related to distribution of tensile forces acting on anchors	CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ =	1.00		Shell spalling factor	CEB [9.2.5]
$\psi_{ucr,N}$ =	1.00		Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \le 1.2$

$\psi_{h,N}$ =	0.97		Coeff. related to the foundation height	CEB [9.2.5]
$\gamma_{M,sp}$ =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0} * \psi_{A,N} * \psi_{s,N} * \psi_{ec,N} * \psi_{re,N} * \psi_{ucr,N} * \psi_{h,N} / \gamma_{M,sp}$

$F_{t,Rd,sp}$ =	125.41	[kN]	Design anchor resistance to splitting of concrete	CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s}, F_{t,Rd,p}, F_{t,Rd,c}, F_{t,Rd,sp})$

$F_{t,Rd}$ =	70.88	[kN]	Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.09	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	141.75	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ =	141.75	[kN]	Tension resistance of a plate	[6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.09	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	141.75	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	141.75	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$N_{j,Rd}$ =	283.51	[kN]	Resistance of a spread footing for axial tension	[6.2.8.3]

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	141.75	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	141.75	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \leq 1,0$ (6.24)	0.01 < 1.00	verified	(0.01)

e_y =	109	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	73	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	125	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	16.50	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \leq 1,0$ (6.23)	0.02 < 1.00	verified	(0.02)

e_z =	1674	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	73	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	125	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	26.83	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \leq 1,0$ (6.23)	0.24 < 1.00	verified	(0.24)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \leq 1,0$	0.26 < 1.00	verified	(0.26)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ =	0.42	Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,y}$ =	0.42	Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,y}$ =	1.80	Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y} * \alpha_{b,y} * f_{up} * d * t_p / \gamma_{M2}$

$F_{1,vb,Rd,y} =$ 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z} =$	0.42	Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,z} =$	0.42	Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,z} =$	1.80	Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z} * \alpha_{b,z} * f_{up} * d * t_p / \gamma_{M2}$

$F_{1,vb,Rd,z} =$ 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

$\alpha_b =$	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
$A_{vb} =$	707	[mm^2]	Area of bolt section	[6.2.2.(7)]
$f_{ub} =$	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
$\gamma_{M2} =$	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b * f_{ub} * A_{vb} / \gamma_{M2}$

$F_{2,vb,Rd} =$ 112.19 [kN] Shear resistance of a bolt - without lever arm [6.2.2.(7)]

$\alpha_M =$	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s} =$	2.40	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
$l_{sm} =$	60	[mm]	Lever arm length	CEB [9.3.2.2]
$\gamma_{Ms} =$	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M * M_{Rk,s} / (l_{sm} * \gamma_{Ms})$

$F_{v,Rd,sm} =$ 66.54 [kN] Shear resistance of a bolt - with lever arm CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c} =$	153.09	[kN]	Design uplift capacity	CEB [9.2.4]
$k_3 =$	2.00		Factor related to the anchor length	CEB [9.3.3]
$\gamma_{Mc} =$	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3 * N_{Rk,c} / \gamma_{Mc}$

$F_{v,Rd,cp} =$ 141.75 [kN] Concrete resistance for pry-out failure CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}^0 =$	315.56	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y} =$	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]

$V_{Rk,c,y}{}^0$ =	315.56 [kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{h,V,y}$ =	1.00	Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.90	Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00	Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00	Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00	Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}{}^0 * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	87.66	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}{}^0$ =	315.56 [kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	0.67	Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00	Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	0.90	Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00	Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00	Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00	Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}{}^0 * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	87.66	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	0.00	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	0.00	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b$*min($F_{1,vb,Rd,y}$, $F_{2,vb,Rd}$, $F_{v,Rd,sm}$, $F_{v,Rd,cp}$, $F_{v,Rd,c,y}$) + $F_{f,Rd}$

$V_{j,Rd,y}$ =	266.15	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$	0.02 < 1.00	verified	(0.02)

$V_{j,Rd,z} = n_b$*min($F_{1,vb,Rd,z}$, $F_{2,vb,Rd}$, $F_{v,Rd,sm}$, $F_{v,Rd,cp}$, $F_{v,Rd,c,z}$) + $F_{f,Rd}$

$V_{j,Rd,z}$ =	266.15	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.00 < 1.00	verified	(0.00)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.02 < 1.00	verified	(0.02)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_\perp$ =	33.17	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	33.17	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	-2.71	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	0.27	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_\perp / (0.9*f_u/\gamma_{M2}) \leq 1.0$ (4.1)	0.13 < 1.00	verified	(0.13)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{yII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.18 < 1.00	verified	(0.18)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{zII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.18 < 1.00	verified	(0.18)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	108	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.65		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	14234.96	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	17535.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} < S_{j,rig,y}$ SEMI-RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.65		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	15426.47	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	17535.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} < S_{j,rig,z}$ SEMI-RIGID [5.2.2.5.(2)]

WEAKEST COMPONENT:

FOUNDATION - CONCRETE CONE PULL-OUT FAILURE

Connection conforms to the code	Ratio	0.26

Connection Verification

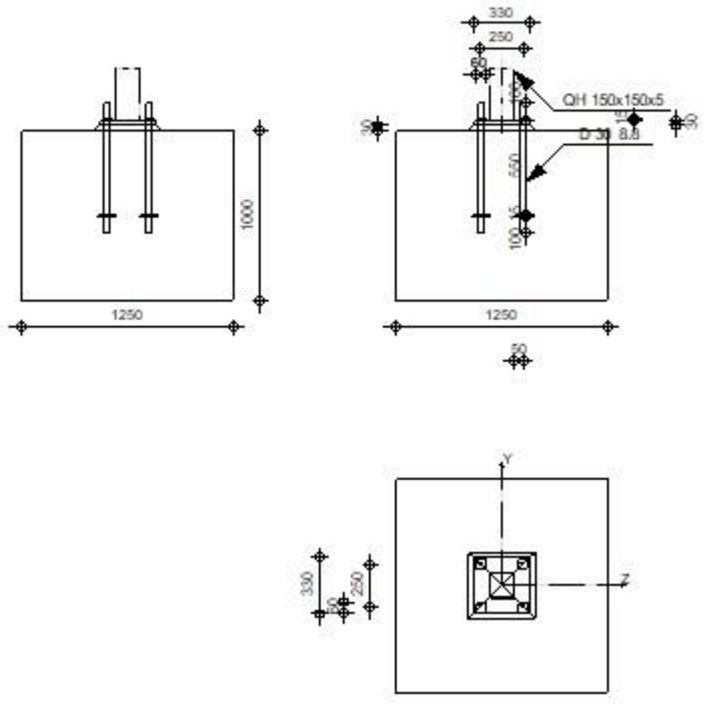
Autodesk Robot Structural Analysis Professional 2020

Fixed column base design

Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete

OK

Ratio **0.26**



GENERAL

Connection no.: 4

Connection name: Fixed column base

Structure node: 13

Structure bars: 11

GEOMETRY

COLUMN

Section: QH 150x150x5

Bar no.: 11

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	150	[mm]	Height of column section
b_{fc} =	150	[mm]	Width of column section
t_{wc} =	5	[mm]	Thickness of the web of column section
t_{fc} =	5	[mm]	Thickness of the flange of column section
r_c =	5	[mm]	Radius of column section fillet
A_c =	2870	[mm^2]	Cross-sectional area of a column

L_c =	3.60	[m]	Column length
I_{yc} =	10020000	[mm^4]	Moment of inertia of the column section
Material:	S 235		
f_{yc} =	235.00	[MPa]	Resistance
f_{uc} =	360.00	[MPa]	Yield strength of a material

COLUMN BASE

l_{pd} =	330	[mm]	Length
b_{pd} =	330	[mm]	Width
t_{pd} =	30	[mm]	Thickness
Material:	S 235		
f_{ypd} =	235.00	[MPa]	Resistance
f_{upd} =	360.00	[MPa]	Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Anchor class
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material
d =	30	[mm]	Bolt diameter
A_s =	561	[mm^2]	Effective section area of a bolt
A_v =	707	[mm^2]	Area of bolt section
n_H =	2		Number of bolt columns
n_V =	2		Number of bolt rows

Horizontal spacing e_{Hi} = 250 [mm]

Vertical spacing e_{Vi} = 250 [mm]

Anchor dimensions

L_1 =	100	[mm]
L_2 =	550	[mm]
L_3 =	100	[mm]

Anchor plate

d =	100	[mm]	Diameter
t_p =	15	[mm]	Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	60	[mm]	Length
b_{wd} =	60	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00		Partial safety factor
γ_{M2} =	1.25		Partial safety factor
γ_C =	1.50		Partial safety factor

SPREAD FOOTING

L =	1250	[mm]	Spread footing length
B =	1250	[mm]	Spread footing width
H =	1000	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	5	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /9/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 8*0.90

$N_{j,Ed}$ =	3.78	[kN]	Axial force
$V_{j,Ed,y}$ =	-4.06	[kN]	Shear force
$V_{j,Ed,z}$ =	-0.41	[kN]	Shear force
$M_{j,Ed,y}$ =	0.41	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	-6.34	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	26.67	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3*f_j*\gamma_{M0}))}$

c =	51	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	108	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	27264	[mm²]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	245380	[mm²]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0}*f_{cd}*\sqrt{(A_{c1}/A_{c0})} \leq 3*A_{c0}*f_{cd}$

F_{rdu} =	1090.58	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j*F_{rdu}/(b_{eff}*l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,y}$ =	27264	[mm²]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	27264	[mm²]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i}*f_{jd}$

$F_{c,Rd,y}$ =	727.05	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	727.05	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	156000	[mm³]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	36.66	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	145	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	252.83	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]
$W_{pl,z}$ =	156000	[mm³]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	36.66	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	145	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	252.83	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$F_{C,Rd,y} = \min(F_{c,Rd,y},F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	252.83	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = \min(F_{c,Rd,z},F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	252.83	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	561	[mm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	274.67	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	299.20	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = \min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	274.67	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7147	[mm^2]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	248.16	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	333	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	244.95	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	1000	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	500	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	1000000	[mm²]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	625000	[mm²]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.63		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	500	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	1.00	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^0 * \psi_{A,N} * \psi_{s,N} * \psi_{ec,N} * \psi_{re,N} * \psi_{ucr,N} / \gamma_{Mc}$

$F_{t,Rd,c}$ =	70.88	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	520	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	477.27	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	1040	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	520	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	1081600	[mm²]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	637500	[mm²]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.59		Factor related to anchor spacing and edge distance	CEB [9.2.5]
c =	500	[mm]	Minimum edge distance from an anchor	CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ = 0.99 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.5]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ = 1.00 Shell spalling factor CEB [9.2.5]

$\psi_{ucr,N}$ = 1.00 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \le 1.2$

$\psi_{h,N}$ =	0.97		Coeff. related to the foundation height	CEB [9.2.5]
$\gamma_{M,sp}$ =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}^{0} * \psi_{A,N} * \psi_{s,N} * \psi_{ec,N} * \psi_{re,N} * \psi_{ucr,N} * \psi_{h,N} / \gamma_{M,sp}$

$F_{t,Rd,sp}$ =	125.41	[kN]	Design anchor resistance to splitting of concrete	CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s} , F_{t,Rd,p} , F_{t,Rd,c} , F_{t,Rd,sp})$

$F_{t,Rd}$ =	70.88	[kN]	Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.09	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	141.75	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd} , F_{T,2,Rd} , F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ =	141.75	[kN]	Tension resistance of a plate	[6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.09	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	141.75	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	141.75	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$N_{j,Rd}$ =	283.51	[kN]	Resistance of a spread footing for axial tension	[6.2.8.3]

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	141.75	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	141.75	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \le 1,0$ (6.24)	0.01 < 1.00	verified	(0.01)

e_y =	109	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	73	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	125	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	16.50	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \le 1,0$ (6.23)	0.02 < 1.00	verified	(0.02)

e_z =	1674	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	73	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	125	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	26.83	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$ (6.23)	0.24 < 1.00	verified	(0.24)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$	0.26 < 1.00	verified	(0.26)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ =	0.42	Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,y}$ =	0.42	Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,y}$ =	1.80	Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y}$ =	194.40	[kN]	Resistance of an anchor bolt for bearing pressure onto the base plate	[6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z}$ =	0.42		Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,z}$ =	0.42		Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,z}$ =	1.80		Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z}$ =	194.40	[kN]	Resistance of an anchor bolt for bearing pressure onto the base plate	[6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

α_b =	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
A_{vb} =	707	[mm²]	Area of bolt section	[6.2.2.(7)]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
γ_{M2} =	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd}$ =	112.19	[kN]	Shear resistance of a bolt - without lever arm	[6.2.2.(7)]
α_M =	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s}$ =	2.40	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
l_{sm} =	60	[mm]	Lever arm length	CEB [9.3.2.2]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm}$ =	66.54	[kN]	Shear resistance of a bolt - with lever arm	CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c}$ =	153.09	[kN]	Design uplift capacity	CEB [9.2.4]
k_3 =	2.00		Factor related to the anchor length	CEB [9.3.3]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp}$ =	141.75	[kN]	Concrete resistance for pry-out failure	CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}^0$ =	315.56	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]

$V_{Rk,c,y}{}^{0}$ =	315.56	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{h,V,y}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}{}^{0}*\psi_{A,V,y}*\psi_{h,V,y}*\psi_{s,V,y}*\psi_{ec,V,y}*\psi_{\alpha,V,y}*\psi_{ucr,V,y}/\gamma_{Mc}$

$F_{v,Rd,c,y}$ =	87.66	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}{}^{0}$ =	315.56	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}{}^{0}*\psi_{A,V,z}*\psi_{h,V,z}*\psi_{s,V,z}*\psi_{ec,V,z}*\psi_{\alpha,V,z}*\psi_{ucr,V,z}/\gamma_{Mc}$

$F_{v,Rd,c,z}$ =	87.66	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	0.00	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d}*N_{c,Ed}$

$F_{f,Rd}$ =	0.00	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b$*min($F_{1,vb,Rd,y}$, $F_{2,vb,Rd}$, $F_{v,Rd,sm}$, $F_{v,Rd,cp}$, $F_{v,Rd,c,y}$) + $F_{f,Rd}$

$V_{j,Rd,y}$ =	266.15	[kN]	Connection resistance for shear		CEB [9.3.1]
$V_{j,Ed,y} / V_{j,Rd,y} \le 1,0$			0.02 < 1.00	verified	(0.02)

$V_{j,Rd,z} = n_b$*min($F_{1,vb,Rd,z}$, $F_{2,vb,Rd}$, $F_{v,Rd,sm}$, $F_{v,Rd,cp}$, $F_{v,Rd,c,z}$) + $F_{f,Rd}$

$V_{j,Rd,z}$ =	266.15	[kN]	Connection resistance for shear		CEB [9.3.1]
$V_{j,Ed,z} / V_{j,Rd,z} \le 1,0$			0.00 < 1.00	verified	(0.00)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \le 1,0$			0.02 < 1.00	verified	(0.02)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_\perp$ =	33.17	[MPa]	Normal stress in a weld		[4.5.3.(7)]
$\tau_\perp$ =	33.17	[MPa]	Perpendicular tangent stress		[4.5.3.(7)]
τ_{yII} =	-2.71	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$		[4.5.3.(7)]
τ_{zII} =	-0.27	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$		[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient		[4.5.3.(7)]
$\sigma_\perp / (0.9 f_u/\gamma_{M2}) \le 1.0$ (4.1)			0.13 < 1.00	verified	(0.13)
$\sqrt{\sigma_\perp^2 + 3.0 (\tau_{yII}^2 + \tau_\perp^2)} / (f_u/(\beta_W \gamma_{M2})) \le 1.0$ (4.1)			0.18 < 1.00	verified	(0.18)
$\sqrt{\sigma_\perp^2 + 3.0 (\tau_{zII}^2 + \tau_\perp^2)} / (f_u/(\beta_W \gamma_{M2})) \le 1.0$ (4.1)			0.18 < 1.00	verified	(0.18)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	108	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c \sqrt{b_{eff} l_{eff}}/(1.275 E)$

$k_{13,y}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850 l_{eff} t_p^3/(m^3)$

$k_{15,y}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6 A_b/L_b$

$k_{16,y}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.65		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	14234.96	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	17535.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} < S_{j,rig,y}$ SEMI-RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.65		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	15426.47	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	17535.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} < S_{j,rig,z}$ SEMI-RIGID [5.2.2.5.(2)]

WEAKEST COMPONENT:

FOUNDATION - CONCRETE CONE PULL-OUT FAILURE

Connection conforms to the code	Ratio	0.26

Connection Verification

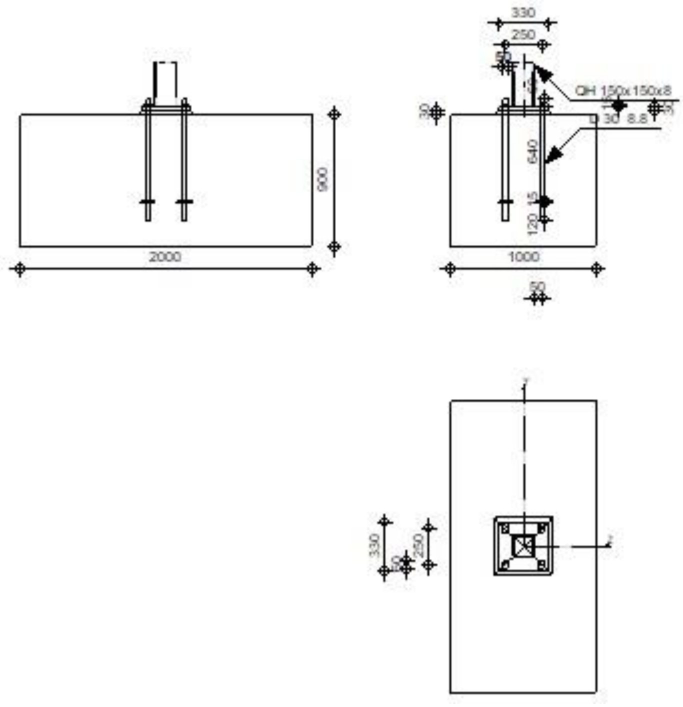
Autodesk Robot Structural Analysis Professional 2020

Fixed column base design

Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete

OK

Ratio **0.75**



GENERAL

Connection no.: 10

Connection name: Fixed column base

Structure node: 59

Structure bars: 39

GEOMETRY

COLUMN

Section: QH 150x150x8

Bar no.: 39

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	150	[mm]	Height of column section
b_{fc} =	150	[mm]	Width of column section
t_{wc} =	8	[mm]	Thickness of the web of column section
t_{fc} =	8	[mm]	Thickness of the flange of column section
r_c =	12	[mm]	Radius of column section fillet
A_c =	4480	[mm^2]	Cross-sectional area of a column

L_c =	3.60	[m]	Column length
I_{yc} =	14910000	[mm⁴]	Moment of inertia of the column section

Material: S 235

f_{yc} =	235.00	[MPa]	Resistance
f_{uc} =	360.00	[MPa]	Yield strength of a material

COLUMN BASE

l_{pd} =	330	[mm]	Length
b_{pd} =	330	[mm]	Width
t_{pd} =	30	[mm]	Thickness

Material: S 235

f_{ypd} =	235.00	[MPa]	Resistance
f_{upd} =	360.00	[MPa]	Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Anchor class
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material
d =	30	[mm]	Bolt diameter
A_s =	561	[mm²]	Effective section area of a bolt
A_v =	707	[mm²]	Area of bolt section
n_H =	2		Number of bolt columns
n_V =	2		Number of bolt rows

Horizontal spacing e_{Hi} = 250 [mm]

Vertical spacing e_{Vi} = 250 [mm]

Anchor dimensions

L_1 =	60	[mm]
L_2 =	640	[mm]
L_3 =	120	[mm]

Anchor plate

d =	100	[mm]	Diameter
t_p =	15	[mm]	Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	50	[mm]	Length
b_{wd} =	60	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00	Partial safety factor
γ_{M2} =	1.25	Partial safety factor
γ_C =	1.50	Partial safety factor

SPREAD FOOTING

L =	1000	[mm]	Spread footing length
B =	2000	[mm]	Spread footing width
H =	900	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	6	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

$N_{j,Ed}$ =	-126.15	[kN]	Axial force
$V_{j,Ed,y}$ =	-3.33	[kN]	Shear force
$V_{j,Ed,z}$ =	19.84	[kN]	Shear force
$M_{j,Ed,y}$ =	-21.65	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	-5.72	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	26.67	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3*f_j*\gamma_{M0}))}$

c =	51	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	111	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	28023	[mm^2]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	252206	[mm^2]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0}*f_{cd}*\sqrt{(A_{c1}/A_{c0})} \le 3*A_{c0}*f_{cd}$

F_{rdu} =	1120.92	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j*F_{rdu}/(b_{eff}*l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,n}$ =	62954	[mm^2]	Bearing area for compression	[6.2.8.2.(1)]
$A_{c,y}$ =	28023	[mm^2]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	28023	[mm^2]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i}*f_{jd}$

$F_{c,Rd,n}$ =	1678.78	[kN]	Bearing resistance of concrete for compression	[6.2.8.2.(1)]
$F_{c,Rd,y}$ =	747.28	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	747.28	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	237000	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	55.70	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	142	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	392.22	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

$W_{pl,z}$ =	237000	[mm³]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	55.70	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	142	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	392.22	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$N_{j,Rd} = F_{c,Rd,n}$

$N_{j,Rd}$ =	1678.78	[kN]	Resistance of a spread footing for axial compression	[6.2.8.2.(1)]

$F_{C,Rd,y} = \min(F_{c,Rd,y},F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	392.22	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = \min(F_{c,Rd,z},F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	392.22	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	561	[mm²]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	274.67	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	299.20	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = \min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	274.67	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7147	[mm²]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	248.16	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	583	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^{0} = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^{0}$ =	567.06	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	1750	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	875	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	3062500	[mm²]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	1000000	[mm²]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.33		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	375	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \le 1.0$

$\psi_{s,N}$ =	0.83	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ =	71.03	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	610	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^{0} = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^{0}$ =	606.39	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	1220	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	610	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	1488400	[mm²]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	723975	[mm²]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.49		Factor related to anchor spacing and edge distance	CEB [9.2.5]
c =	375	[mm]	Minimum edge distance from an anchor	CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	0.88	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.5]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.5]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \leq 1.2$

$\psi_{h,N}$ =	0.82		Coeff. related to the foundation height	CEB [9.2.5]
$\gamma_{M,sp}$ =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}*\psi_{h,N}/\gamma_{M,sp}$

$F_{t,Rd,sp}$ =	98.60	[kN]	Design anchor resistance to splitting of concrete	CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s} , F_{t,Rd,p} , F_{t,Rd,c} , F_{t,Rd,sp})$

$F_{t,Rd}$ =	71.03	[kN]	Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.23	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	142.06	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd} , F_{T,2,Rd} , F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ =	142.06	[kN]	Tension resistance of a plate	[6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	200.23	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	142.06	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	142.06	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	142.06	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	142.06	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \leq 1,0$ (6.24)	0.08 < 1.00	verified	(0.08)

e_y =	172	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	71	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	125	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	44.48	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \leq 1,0$ (6.23)	0.49 < 1.00	verified	(0.49)

e_z =	45	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	71	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	125	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	21.72	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \leq 1,0$ (6.23)	0.26 < 1.00	verified	(0.26)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \leq 1,0$	0.75 < 1.00	verified	(0.75)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ = 0.42 Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,y}$ = 0.42 Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,y}$ = 1.80 Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y}$ = 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z}$ = 0.42 Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,z}$ = 0.42 Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,z}$ = 1.80 Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z}$ = 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

α_b = 0.25 Coeff. for resistance calculation $F_{2,vb,Rd}$ [6.2.2.(7)]

A_{vb} = 707 [mm²] Area of bolt section [6.2.2.(7)]

f_{ub} = 800.00 [MPa] Tensile strength of the anchor material [6.2.2.(7)]

γ_{M2} = 1.25 Partial safety factor [6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd}$ = 112.19 [kN] Shear resistance of a bolt - without lever arm [6.2.2.(7)]

α_M = 2.00 Factor related to the fastening of an anchor in the foundation CEB [9.3.2.2]

$M_{Rk,s}$ = 2.54 [kN*m] Characteristic bending resistance of an anchor CEB [9.3.2.2]

l_{sm} = 60 [mm] Lever arm length CEB [9.3.2.2]

γ_{Ms} = 1.20 Partial safety factor CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm}$ = 70.48 [kN] Shear resistance of a bolt - with lever arm CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c}$ = 153.42 [kN] Design uplift capacity CEB [9.2.4]

k_3 = 2.00 Factor related to the anchor length CEB [9.3.3]

γ_{Mc} = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp}$ = 142.06 [kN] Concrete resistance for pry-out failure CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}{}^0$ =	754.23 [kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.20	Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y}$ =	1.13	Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.79	Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00	Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00	Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00	Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}{}^0 * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	60.96	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}{}^0$ =	211.61 [kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	1.00	Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00	Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	1.00	Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00	Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00	Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00	Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}{}^0 * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	97.97	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	126.15	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	37.84	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b*\min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{f,Rd}$

$V_{j,Rd,y}$ =	281.67	[kN]	Connection resistance for shear		CEB [9.3.1]
$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$			0.01 < 1.00	verified	(0.01)

$V_{j,Rd,z} = n_b*\min(F_{1,vb,Rd,z}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,z}) + F_{f,Rd}$

$V_{j,Rd,z}$ =	319.78	[kN]	Connection resistance for shear		CEB [9.3.1]
$V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$			0.06 < 1.00	verified	(0.06)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$			0.07 < 1.00	verified	(0.07)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_{\perp}$ =	128.00	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_{\perp}$ =	128.00	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	-1.85	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	11.02	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_{\perp} / (0.9*f_u/\gamma_{M2}) \leq 1.0$ (4.1)	0.49 < 1.00	verified	(0.49)
$\sqrt{(\sigma_{\perp}^2 + 3.0 (\tau_{yII}^2 + \tau_{\perp}^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.71 < 1.00	verified	(0.71)
$\sqrt{(\sigma_{\perp}^2 + 3.0 (\tau_{zII}^2 + \tau_{\perp}^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.63 < 1.00	verified	(0.63)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	111	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	253	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.66		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	22257.27	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	26092.50	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} < S_{j,rig,y}$ SEMI-RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.66		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	39711.32	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	26092.50	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} \geq S_{j,rig,z}$ RIGID [5.2.2.5.(2)]

WEAKEST COMPONENT:

COLUMN FLANGE - COMPRESSION

Connection conforms to the code	Ratio	0.75

Connection Verification

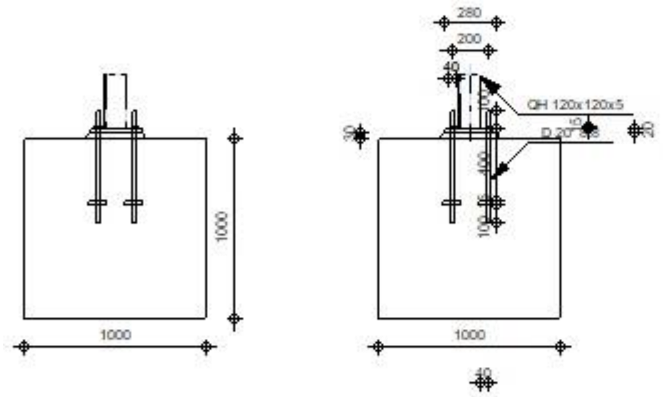
Autodesk Robot Structural Analysis Professional 2020

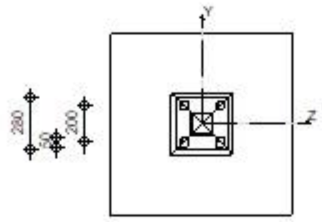
Fixed column base design

Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete

OK

Ratio **0.53**





GENERAL

Connection no.: 6

Connection name: Fixed column base

Structure node: 18

Structure bars: 14

GEOMETRY

COLUMN

Section: QH 120x120x5

Bar no.: 14

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	120	[mm]	Height of column section
b_{fc} =	120	[mm]	Width of column section
t_{wc} =	5	[mm]	Thickness of the web of column section
t_{fc} =	5	[mm]	Thickness of the flange of column section
r_c =	5	[mm]	Radius of column section fillet
A_c =	2270	[mm^2]	Cross-sectional area of a column

L_c =	3.60	[m]	Column length
I_{yc} =	4980000	[mm^4]	Moment of inertia of the column section

Material: S 235

f_{yc} =	235.00	[MPa]	Resistance
f_{uc} =	360.00	[MPa]	Yield strength of a material

COLUMN BASE

l_{pd} =	280	[mm]	Length
b_{pd} =	280	[mm]	Width
t_{pd} =	20	[mm]	Thickness

Material: S 235

f_{ypd} =	235.00	[MPa]	Resistance
f_{upd} =	360.00	[MPa]	Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Anchor class
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material
d =	20	[mm]	Bolt diameter
A_s =	245	[mm^2]	Effective section area of a bolt
A_v =	314	[mm^2]	Area of bolt section
n_H =	2		Number of bolt columns
n_V =	2		Number of bolt rows

Horizontal spacing e_{Hi} = 200 [mm]

Vertical spacing e_{Vi} = 200 [mm]

Anchor dimensions

L_1 =	100	[mm]
L_2 =	400	[mm]
L_3 =	100	[mm]

Anchor plate

d =	100	[mm]	Diameter
t_p =	15	[mm]	Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	40	[mm]	Length
b_{wd} =	50	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00	Partial safety factor
γ_{M2} =	1.25	Partial safety factor
γ_C =	1.50	Partial safety factor

SPREAD FOOTING

L =	1000	[mm]	Spread footing length
B =	1000	[mm]	Spread footing width
H =	1000	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	5	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /5/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 6*0.90

$N_{j,Ed}$ =	-15.63	[kN]	Axial force
$V_{j,Ed,y}$ =	7.58	[kN]	Shear force
$V_{j,Ed,z}$ =	0.06	[kN]	Shear force
$M_{j,Ed,y}$ =	-0.11	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	8.60	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	26.67	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3*f_j*\gamma_{M0}))}$

c =	34	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	74	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	189	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	13870	[mm^2]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	124826	[mm^2]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0}*f_{cd}*\sqrt{(A_{c1}/A_{c0})} \leq 3*A_{c0}*f_{cd}$

F_{rdu} =	554.78	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j*F_{rdu}/(b_{eff}*l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,n}$ =	33836	[mm^2]	Bearing area for compression	[6.2.8.2.(1)]
$A_{c,y}$ =	13870	[mm^2]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	13870	[mm^2]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i}*f_{jd}$

$F_{c,Rd,n}$ =	902.29	[kN]	Bearing resistance of concrete for compression	[6.2.8.2.(1)]
$F_{c,Rd,y}$ =	369.86	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	369.86	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	97600	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	22.94	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	115	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	199.44	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

$W_{pl,z}$ =	97600	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	22.94	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	115	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	199.44	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$N_{j,Rd} = F_{c,Rd,n}$

$N_{j,Rd}$ =	902.29	[kN]	Resistance of a spread footing for axial compression	[6.2.8.2.(1)]

$F_{C,Rd,y} = \min(F_{c,Rd,y},F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	199.44	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = \min(F_{c,Rd,z},F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	199.44	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	245	[mm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	119.95	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	130.67	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = \min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	119.95	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7540	[mm^2]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	261.80	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	267	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	175.27	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	800	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	400	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	640000	[mm²]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	400000	[mm²]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.63		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	400	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \le 1.0$

$\psi_{s,N}$ =	1.00	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^0*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ =	50.72	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	370	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	286.46	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	740	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	370	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	547600	[mm²]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	347800	[mm²]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ = 0.64 Factor related to anchor spacing and edge distance CEB [9.2.5]

c = 370 [mm] Minimum edge distance from an anchor CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \le 1.0$

$\psi_{s,N}$ = 1.00 Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete CEB [9.2.5]

$\psi_{ec,N}$ = 1.00 Factor related to distribution of tensile forces acting on anchors CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ = 1.00 Shell spalling factor CEB [9.2.5]

$\psi_{ucr,N}$ = 1.00 Factor taking into account whether the anchorage is in cracked or non-cracked concrete CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \le 1.2$

$\psi_{h,N}$ = 1.20 Coeff. related to the foundation height CEB [9.2.5]

$\gamma_{M,sp}$ = 2.16 Partial safety factor CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}*\psi_{h,N}/\gamma_{M,sp}$

$F_{t,Rd,sp}$ = 101.08 [kN] Design anchor resistance to splitting of concrete CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s}, F_{t,Rd,p}, F_{t,Rd,c}, F_{t,Rd,sp})$

$F_{t,Rd}$ = 50.72 [kN] Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	232.64	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	108.87	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	101.43	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ = 101.43 [kN] Tension resistance of a plate [6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	232.64	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	108.87	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	101.43	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	101.43	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	101.43	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	101.43	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \le 1{,}0$ (6.24)	0.02 < 1.00	verified	(0.02)

e_y =	7	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	58	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	100	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	2.52	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \le 1{,}0$ (6.23)	0.04 < 1.00	verified	(0.04)

e_z =	550	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	58	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	100	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	17.84	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \le 1{,}0$ (6.23)	0.48 < 1.00	verified	(0.48)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \le 1{,}0$	0.53 < 1.00	verified	(0.53)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y} = 0.61$ Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,y} = 0.61$ Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,y} = 2.50$ Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y} = 174.55$ [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z} = 0.61$ Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,z} = 0.61$ Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,z} = 2.50$ Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z} = 174.55$ [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

$\alpha_b =$	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
$A_{vb} =$	314	[mm^2]	Area of bolt section	[6.2.2.(7)]
$f_{ub} =$	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
$\gamma_{M2} =$	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd} =$	49.86	[kN]	Shear resistance of a bolt - without lever arm	[6.2.2.(7)]
$\alpha_M =$	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s} =$	0.64	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
$l_{sm} =$	50	[mm]	Lever arm length	CEB [9.3.2.2]
$\gamma_{Ms} =$	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm} =$	21.18	[kN]	Shear resistance of a bolt - with lever arm	CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c} =$	109.54	[kN]	Design uplift capacity	CEB [9.2.4]
$k_3 =$	2.00		Factor related to the anchor length	CEB [9.3.3]
$\gamma_{Mc} =$	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp} =$	101.43	[kN]	Concrete resistance for pry-out failure	CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}^{0}$ =	172.23	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}^{0} * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	47.84	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}^{0}$ =	172.23	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}^{0} * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	47.84	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	15.63	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	4.69	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b*\min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{f,Rd}$

$V_{j,Rd,y}$ =	89.41	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \le 1,0$	0.08 < 1.00	verified	(0.08)

$V_{j,Rd,z} = n_b*\min(F_{1,vb,Rd,z}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,z}) + F_{f,Rd}$

$V_{j,Rd,z}$ =	89.41	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,z} / V_{j,Rd,z} \le 1,0$	0.00 < 1.00	verified	(0.00)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \le 1,0$	0.09 < 1.00	verified	(0.09)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_\perp$ =	68.78	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	68.78	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	6.32	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	0.05	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_\perp / (0.9*f_u/\gamma_{M2}) \le 1.0$ (4.1)	0.27 < 1.00	verified	(0.27)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{yII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2})) \le 1.0$ (4.1)	0.38 < 1.00	verified	(0.38)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{zII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2})) \le 1.0$ (4.1)	0.38 < 1.00	verified	(0.38)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	74	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	189	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	13	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	5	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	235	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ =	2	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.82		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	18323.49	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	8715.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} \geq S_{j,rig,y}$ RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	13	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	5	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	235	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	2	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.82		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	6538.62	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	8715.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} < S_{j,rig,z}$ SEMI-RIGID [5.2.2.5.(2)]

WEAKEST COMPONENT:

FOUNDATION - CONCRETE CONE PULL-OUT FAILURE

Connection conforms to the code	Ratio	0.53

Connection Verification

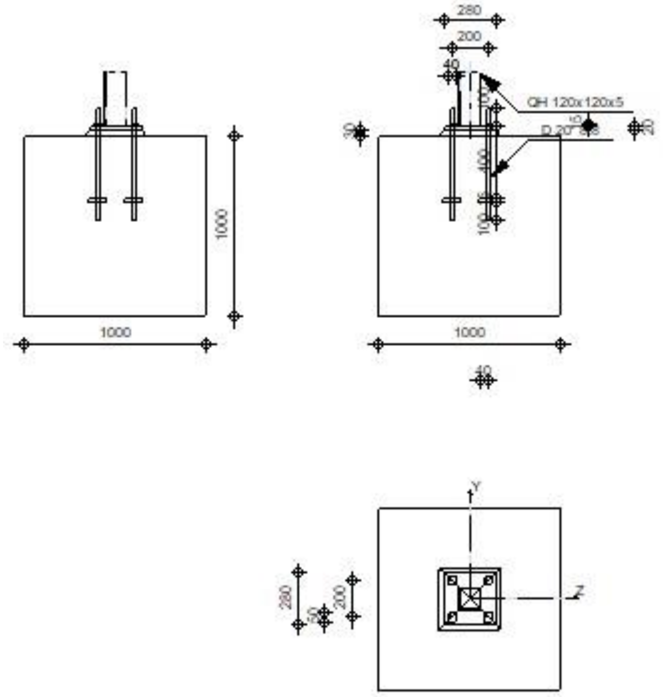
Autodesk Robot Structural Analysis Professional 2020

Fixed column base design

Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete

OK

Ratio **0.20**



GENERAL

Connection no.: 7

Connection name: Fixed column base

Structure node: 16

Structure bars: 13

GEOMETRY

COLUMN

Section: QH 120x120x5

Bar no.: 13

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	120	[mm]	Height of column section
b_{fc} =	120	[mm]	Width of column section
t_{wc} =	5	[mm]	Thickness of the web of column section
t_{fc} =	5	[mm]	Thickness of the flange of column section
r_c =	5	[mm]	Radius of column section fillet
A_c =	2270	[mm^2]	Cross-sectional area of a column

L_c =	3.60	[m]	Column length
I_{yc} =	4980000	[mm^4]	Moment of inertia of the column section

Material: S 235

f_{yc} =	235.00	[MPa]	Resistance
f_{uc} =	360.00	[MPa]	Yield strength of a material

COLUMN BASE

l_{pd} =	280	[mm]	Length
b_{pd} =	280	[mm]	Width
t_{pd} =	20	[mm]	Thickness

Material: S 235

f_{ypd} =	235.00	[MPa]	Resistance
f_{upd} =	360.00	[MPa]	Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class =	8.8		Anchor class
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material
d =	20	[mm]	Bolt diameter
A_s =	245	[mm^2]	Effective section area of a bolt
A_v =	314	[mm^2]	Area of bolt section
n_H =	2		Number of bolt columns
n_V =	2		Number of bolt rows

Horizontal spacing e_{Hi} = 200 [mm]

Vertical spacing e_{Vi} = 200 [mm]

Anchor dimensions

L_1 =	100	[mm]
L_2 =	400	[mm]
L_3 =	100	[mm]

Anchor plate

d =	100	[mm]	Diameter
t_p =	15	[mm]	Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	40	[mm]	Length
b_{wd} =	50	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00	Partial safety factor
γ_{M2} =	1.25	Partial safety factor
γ_C =	1.50	Partial safety factor

SPREAD FOOTING

L =	1000	[mm]	Spread footing length
B =	1000	[mm]	Spread footing width
H =	1000	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	5	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /3/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75 + 5*0.90

$N_{j,Ed}$ =	-22.49	[kN]	Axial force
$V_{j,Ed,y}$ =	1.96	[kN]	Shear force
$V_{j,Ed,z}$ =	-9.27	[kN]	Shear force
$M_{j,Ed,y}$ =	0.19	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	1.99	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	26.67	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3*f_j*\gamma_{M0}))}$

c =	34	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	74	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	189	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	13870	[mm^2]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	124826	[mm^2]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0}*f_{cd}*\sqrt{(A_{c1}/A_{c0})} \le 3*A_{c0}*f_{cd}$

F_{rdu} =	554.78	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j*F_{rdu}/(b_{eff}*l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,n}$ =	33836	[mm^2]	Bearing area for compression	[6.2.8.2.(1)]
$A_{c,y}$ =	13870	[mm^2]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	13870	[mm^2]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i}*f_{jd}$

$F_{c,Rd,n}$ =	902.29	[kN]	Bearing resistance of concrete for compression	[6.2.8.2.(1)]
$F_{c,Rd,y}$ =	369.86	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	369.86	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	97600	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	22.94	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	115	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	199.44	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

$W_{pl,z}$ =	97600	[mm³]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	22.94	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	115	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	199.44	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$N_{j,Rd} = F_{c,Rd,n}$

$N_{j,Rd}$ =	902.29	[kN]	Resistance of a spread footing for axial compression	[6.2.8.2.(1)]

$F_{C,Rd,y} = min(F_{c,Rd,y},F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	199.44	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = min(F_{c,Rd,z},F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	199.44	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	245	[mm²]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	119.95	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	130.67	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	119.95	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7540	[mm²]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	261.80	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	267	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	175.27	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	800	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	400	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	640000	[mm^2]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	400000	[mm^2]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.63		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	400	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	1.00	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^0*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ =	50.72	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	370	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	286.46	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	740	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	370	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	547600	[mm^2]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	347800	[mm^2]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.64		Factor related to anchor spacing and edge distance	CEB [9.2.5]
c =	370	[mm]	Minimum edge distance from an anchor	CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	1.00	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.5]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.5]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \leq 1.2$

$\psi_{h,N}$ =	1.20		Coeff. related to the foundation height	CEB [9.2.5]
$\gamma_{M,sp}$ =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}*\psi_{h,N}/\gamma_{M,sp}$

$F_{t,Rd,sp}$ =	101.08	[kN]	Design anchor resistance to splitting of concrete	CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s} , F_{t,Rd,p} , F_{t,Rd,c} , F_{t,Rd,sp})$

$F_{t,Rd}$ =	50.72	[kN]	Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	232.64	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	108.87	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	101.43	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd} , F_{T,2,Rd} , F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ =	101.43	[kN]	Tension resistance of a plate	[6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]

$l_{eff,1}$ =	140	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	3.29	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	232.64	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	108.87	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	101.43	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	101.43	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	101.43	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	101.43	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \le 1,0$ (6.24)	0.02 < 1.00	verified	(0.02)

e_y =	8	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	58	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	100	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	2.90	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \le 1,0$ (6.23)	0.06 < 1.00	verified	(0.06)

e_z =	88	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	58	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	100	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	14.73	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$ (6.23)	0.13 < 1.00	verified	(0.13)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \le 1,0$	0.20 < 1.00	verified	(0.20)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ = 0.61	Coeff. taking account of the bolt position - in the direction of shear		[Table 3.4]
$\alpha_{b,y}$ = 0.61	Coeff. for resistance calculation $F_{1,vb,Rd}$		[Table 3.4]
$k_{1,y}$ = 2.50	Coeff. taking account of the bolt position - perpendicularly to the direction of shear		[Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y}$ = 174.55 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z}$ = 0.61	Coeff. taking account of the bolt position - in the direction of shear	[Table 3.4]
$\alpha_{b,z}$ = 0.61	Coeff. for resistance calculation $F_{1,vb,Rd}$	[Table 3.4]
$k_{1,z}$ = 2.50	Coeff. taking account of the bolt position - perpendicularly to the direction of shear	[Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z}$ = 174.55 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

α_b =	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
A_{vb} =	314	[mm^2]	Area of bolt section	[6.2.2.(7)]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
γ_{M2} =	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd}$ = 49.86 [kN] Shear resistance of a bolt - without lever arm [6.2.2.(7)]

α_M =	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s}$ =	0.75	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
l_{sm} =	50	[mm]	Lever arm length	CEB [9.3.2.2]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm}$ = 25.13 [kN] Shear resistance of a bolt - with lever arm CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c}$ =	109.54	[kN]	Design uplift capacity	CEB [9.2.4]
k_3 =	2.00		Factor related to the anchor length	CEB [9.3.3]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp}$ = 101.43 [kN] Concrete resistance for pry-out failure CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}^{0}$ =	172.23	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}^{0} * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	47.84	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}^{0}$ =	172.23	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	0.67		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	0.90		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}^{0} * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	47.84	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	22.49	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	6.75	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b*\min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{f,Rd}$

$V_{j,Rd,y}$ =	107.28	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$	0.02 < 1.00	verified	(0.02)

$V_{j,Rd,z} = n_b*\min(F_{1,vb,Rd,z}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,z}) + F_{f,Rd}$

$V_{j,Rd,z}$ =	107.28	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.09 < 1.00	verified	(0.09)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.10 < 1.00	verified	(0.10)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_\perp$ =	21.27	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_\perp$ =	21.27	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	1.64	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	-7.72	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_\perp / (0.9*f_u/\gamma_{M2}) \leq 1.0$ (4.1)	0.08 < 1.00	verified	(0.08)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{yII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2}))) \leq 1.0$ (4.1)	0.12 < 1.00	verified	(0.12)
$\sqrt{(\sigma_\perp^2 + 3.0 (\tau_{zII}^2 + \tau_\perp^2))} / (f_u/(\beta_W*\gamma_{M2}))) \leq 1.0$ (4.1)	0.12 < 1.00	verified	(0.12)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	74	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	189	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	13	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	5	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	235	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ =	2	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.82		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	18323.49	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	8715.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} \geq S_{j,rig,y}$ RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	13	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	140	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	57	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	5	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	235	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	2	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.82		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	11918.62	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	8715.00	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} \geq S_{j,rig,z}$ RIGID [5.2.2.5.(2)]

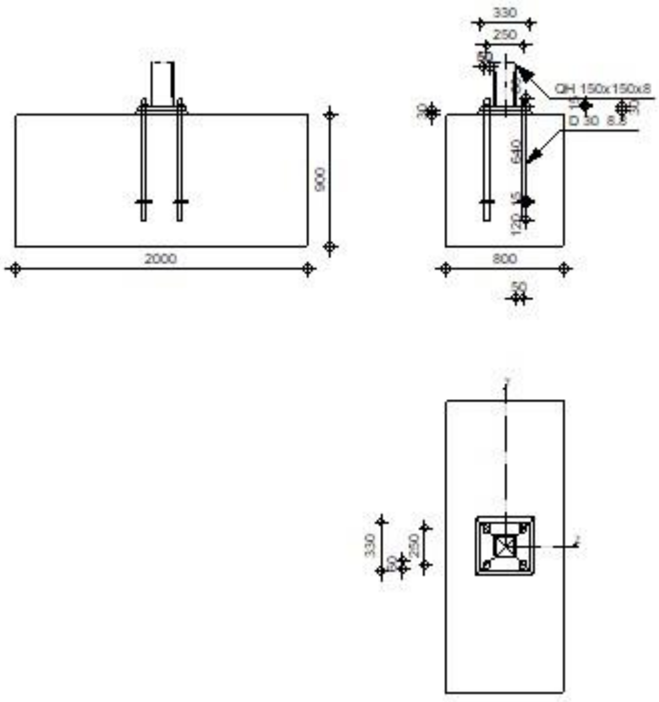
WEAKEST COMPONENT:

COLUMN FLANGE - COMPRESSION

Connection conforms to the code	Ratio	0.20

Connection Verification

	Autodesk Robot Structural Analysis Professional 2020 **Fixed column base design** Eurocode 3: EN 1993-1-8:2005/AC:2009 + CEB Design Guide: Design of fastenings in concrete	OK Ratio **0.86**



GENERAL

Connection no.: 11

Connection name: Fixed column base

Structure node: 57

Structure bars: 38

GEOMETRY

COLUMN

Section: QH 150x150x8

Bar no.: 38

L_c =	3.60	[m]	Column length
α =	0.0	[Deg]	Inclination angle
h_c =	150	[mm]	Height of column section
b_{fc} =	150	[mm]	Width of column section
t_{wc} =	8	[mm]	Thickness of the web of column section
t_{fc} =	8	[mm]	Thickness of the flange of column section
r_c =	12	[mm]	Radius of column section fillet
A_c =	4480	[mm^2]	Cross-sectional area of a column

L_c = 3.60 [m] Column length

I_{yc} = 14910000 [mm^4] Moment of inertia of the column section

Material: S 235

f_{yc} = 235.00 [MPa] Resistance

f_{uc} = 360.00 [MPa] Yield strength of a material

COLUMN BASE

l_{pd} = 330 [mm] Length

b_{pd} = 330 [mm] Width

t_{pd} = 30 [mm] Thickness

Material: S 235

f_{ypd} = 235.00 [MPa] Resistance

f_{upd} = 360.00 [MPa] Yield strength of a material

ANCHORAGE

The shear plane passes through the UNTHREADED portion of the bolt.

Class = 8.8 Anchor class

f_{yb} = 640.00 [MPa] Yield strength of the anchor material

f_{ub} = 800.00 [MPa] Tensile strength of the anchor material

d = 30 [mm] Bolt diameter

A_s = 561 [mm^2] Effective section area of a bolt

A_v = 707 [mm^2] Area of bolt section

n_H = 2 Number of bolt columns

n_V = 2 Number of bolt rows

Horizontal spacing e_{Hi} = 250 [mm]

Vertical spacing e_{Vi} = 250 [mm]

Anchor dimensions

L_1 = 60 [mm]

L_2 = 640 [mm]

L_3 = 120 [mm]

Anchor plate

d = 100 [mm] Diameter

t_p = 15 [mm] Thickness

Material: S 235

f_y =	235.00	[MPa]	Resistance

Washer

l_{wd} =	50	[mm]	Length
b_{wd} =	60	[mm]	Width
t_{wd} =	15	[mm]	Thickness

MATERIAL FACTORS

γ_{M0} =	1.00		Partial safety factor
γ_{M2} =	1.25		Partial safety factor
γ_C =	1.50		Partial safety factor

SPREAD FOOTING

L =	800	[mm]	Spread footing length
B =	2000	[mm]	Spread footing width
H =	900	[mm]	Spread footing height

Concrete

Class C20/25

f_{ck} =	20.00	[MPa]	Characteristic resistance for compression

Grout layer

t_g =	30	[mm]	Thickness of leveling layer (grout)
$f_{ck,g}$ =	12.00	[MPa]	Characteristic resistance for compression
$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete

WELDS

a_p =	6	[mm]	Footing plate of the column base

LOADS

Case: 9: ULS /1/ 1*1.35 + 2*1.35 + 3*1.50 + 4*0.75

$N_{j,Ed}$ =	-126.15	[kN]	Axial force
$V_{j,Ed,y}$ =	-3.33	[kN]	Shear force
$V_{j,Ed,z}$ =	-19.84	[kN]	Shear force
$M_{j,Ed,y}$ =	21.65	[kN*m]	Bending moment
$M_{j,Ed,z}$ =	-5.72	[kN*m]	Bending moment

RESULTS

COMPRESSION ZONE

COMPRESSION OF CONCRETE

f_{cd} =	13.33	[MPa]	Design compressive resistance	EN 1992-1:[3.1.6.(1)]
f_j =	23.97	[MPa]	Design bearing resistance under the base plate	[6.2.5.(7)]

$c = t_p \sqrt{(f_{yp}/(3 * f_j * \gamma_{M0}))}$

c =	54	[mm]	Additional width of the bearing pressure zone	[6.2.5.(4)]
b_{eff} =	116	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	258	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]
A_{c0} =	30101	[mm^2]	Area of the joint between the base plate and the foundation	EN 1992-1:[6.7.(3)]
A_{c1} =	270908	[mm^2]	Maximum design area of load distribution	EN 1992-1:[6.7.(3)]

$F_{rdu} = A_{c0} * f_{cd} * \sqrt{(A_{c1}/A_{c0})} \leq 3 * A_{c0} * f_{cd}$

F_{rdu} =	1204.04	[kN]	Bearing resistance of concrete	EN 1992-1:[6.7.(3)]
β_j =	0.67		Reduction factor for compression	[6.2.5.(7)]

$f_{jd} = \beta_j * F_{rdu}/(b_{eff} * l_{eff})$

f_{jd} =	26.67	[MPa]	Design bearing resistance	[6.2.5.(7)]
$A_{c,n}$ =	66150	[mm^2]	Bearing area for compression	[6.2.8.2.(1)]
$A_{c,y}$ =	30101	[mm^2]	Bearing area for bending My	[6.2.8.3.(1)]
$A_{c,z}$ =	30101	[mm^2]	Bearing area for bending Mz	[6.2.8.3.(1)]

$F_{c,Rd,i} = A_{C,i} * f_{jd}$

$F_{c,Rd,n}$ =	1764.01	[kN]	Bearing resistance of concrete for compression	[6.2.8.2.(1)]
$F_{c,Rd,y}$ =	802.69	[kN]	Bearing resistance of concrete for bending My	[6.2.8.3.(1)]
$F_{c,Rd,z}$ =	802.69	[kN]	Bearing resistance of concrete for bending Mz	[6.2.8.3.(1)]

COLUMN FLANGE AND WEB IN COMPRESSION

CL =	1.00		Section class	EN 1993-1-1:[5.5.2]
$W_{pl,y}$ =	237000	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,y}$ =	55.70	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,y}$ =	142	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,y} = M_{c,Rd,y} / h_{f,y}$

$F_{c,fc,Rd,y}$ =	392.22	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

$W_{pl,z}$ =	237000	[mm^3]	Plastic section modulus	EN1993-1-1:[6.2.5.(2)]
$M_{c,Rd,z}$ =	55.70	[kN*m]	Design resistance of the section for bending	EN1993-1-1:[6.2.5]
$h_{f,z}$ =	142	[mm]	Distance between the centroids of flanges	[6.2.6.7.(1)]

$F_{c,fc,Rd,z} = M_{c,Rd,z} / h_{f,z}$

$F_{c,fc,Rd,z}$ =	392.22	[kN]	Resistance of the compressed flange and web	[6.2.6.7.(1)]

RESISTANCES OF SPREAD FOOTING IN THE COMPRESSION ZONE

$N_{j,Rd} = F_{c,Rd,n}$

$N_{j,Rd}$ =	1764.01	[kN]	Resistance of a spread footing for axial compression	[6.2.8.2.(1)]

$F_{C,Rd,y} = \min(F_{c,Rd,y},F_{c,fc,Rd,y})$

$F_{C,Rd,y}$ =	392.22	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

$F_{C,Rd,z} = \min(F_{c,Rd,z},F_{c,fc,Rd,z})$

$F_{C,Rd,z}$ =	392.22	[kN]	Resistance of spread footing in the compression zone	[6.2.8.3]

TENSION ZONE

STEEL FAILURE

A_b =	561	[mm^2]	Effective anchor area	[Table 3.4]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[Table 3.4]
Beta =	0.85		Reduction factor of anchor resistance	[3.6.1.(3)]

$F_{t,Rd,s1} = beta*0.9*f_{ub}*A_b/\gamma_{M2}$

$F_{t,Rd,s1}$ =	274.67	[kN]	Anchor resistance to steel failure	[Table 3.4]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]
f_{yb} =	640.00	[MPa]	Yield strength of the anchor material	CEB [9.2.2]

$F_{t,Rd,s2} = f_{yb}*A_b/\gamma_{Ms}$

$F_{t,Rd,s2}$ =	299.20	[kN]	Anchor resistance to steel failure	CEB [9.2.2]

$F_{t,Rd,s} = \min(F_{t,Rd,s1},F_{t,Rd,s2})$

$F_{t,Rd,s}$ =	274.67	[kN]	Anchor resistance to steel failure	

PULL-OUT FAILURE

f_{ck} =	20.00	[MPa]	Characteristic compressive strength of concrete	EN 1992-1:[3.1.2]
A_h =	7147	[mm^2]	Bearing area of the head	CEB [15.1.2.3]
p_k =	140.00	[MPa]	Characteristic strength of concrete (pull-out)	CEB [15.1.2.3]
γ_{Mp} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,p} = p_k*A_h/\gamma_{Mp}$

$F_{t,Rd,p}$ =	248.16	[kN]	Design uplift capacity	CEB [9.2.3]

CONCRETE CONE FAILURE

h_{ef} =	583	[mm]	Effective anchorage depth	CEB [9.2.4]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	567.06	[kN]	Characteristic resistance of an anchor	CEB [9.2.4]
$s_{cr,N}$ =	1750	[mm]	Critical width of the concrete cone	CEB [9.2.4]
$c_{cr,N}$ =	875	[mm]	Critical edge distance	CEB [9.2.4]
$A_{c,N0}$ =	3062500	[mm^2]	Maximum area of concrete cone	CEB [9.2.4]
$A_{c,N}$ =	800000	[mm^2]	Actual area of concrete cone	CEB [9.2.4]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.26		Factor related to anchor spacing and edge distance	CEB [9.2.4]
c =	275	[mm]	Minimum edge distance from an anchor	CEB [9.2.4]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \leq 1.0$

$\psi_{s,N}$ =	0.79	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.4]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.4]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \leq 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.4]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.4]
γ_{Mc} =	2.16	Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,c} = N_{Rk,c}^0*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}/\gamma_{Mc}$

$F_{t,Rd,c}$ =	54.47	[kN]	Design anchor resistance to concrete cone failure	EN 1992-1:[8.4.2.(2)]

SPLITTING FAILURE

h_{ef} =	610	[mm]	Effective anchorage depth	CEB [9.2.5]

$N_{Rk,c}^0 = 9.0[N^{0.5}/mm^{0.5}]*f_{ck}^{0.5}*h_{ef}^{1.5}$

$N_{Rk,c}^0$ =	606.39	[kN]	Design uplift capacity	CEB [9.2.5]
$s_{cr,N}$ =	1220	[mm]	Critical width of the concrete cone	CEB [9.2.5]
$c_{cr,N}$ =	610	[mm]	Critical edge distance	CEB [9.2.5]
$A_{c,N0}$ =	1488400	[mm^2]	Maximum area of concrete cone	CEB [9.2.5]
$A_{c,N}$ =	588000	[mm^2]	Actual area of concrete cone	CEB [9.2.5]

$\psi_{A,N} = A_{c,N}/A_{c,N0}$

$\psi_{A,N}$ =	0.40		Factor related to anchor spacing and edge distance	CEB [9.2.5]
c =	275	[mm]	Minimum edge distance from an anchor	CEB [9.2.5]

$\psi_{s,N} = 0.7 + 0.3*c/c_{cr.N} \le 1.0$

$\psi_{s,N}$ =	0.84	Factor taking account the influence of edges of the concrete member on the distribution of stresses in the concrete	CEB [9.2.5]
$\psi_{ec,N}$ =	1.00	Factor related to distribution of tensile forces acting on anchors	CEB [9.2.5]

$\psi_{re,N} = 0.5 + h_{ef}[mm]/200 \le 1.0$

$\psi_{re,N}$ =	1.00	Shell spalling factor	CEB [9.2.5]
$\psi_{ucr,N}$ =	1.00	Factor taking into account whether the anchorage is in cracked or non-cracked concrete	CEB [9.2.5]

$\psi_{h,N} = (h/(2*h_{ef}))^{2/3} \le 1.2$

$\psi_{h,N}$ =	0.82		Coeff. related to the foundation height	CEB [9.2.5]
$\gamma_{M,sp}$ =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{t,Rd,sp} = N_{Rk,c}{}^{0}*\psi_{A,N}*\psi_{s,N}*\psi_{ec,N}*\psi_{re,N}*\psi_{ucr,N}*\psi_{h,N}/\gamma_{M,sp}$

$F_{t,Rd,sp}$ =	75.63	[kN]	Design anchor resistance to splitting of concrete	CEB [9.2.5]

TENSILE RESISTANCE OF AN ANCHOR

$F_{t,Rd} = \min(F_{t,Rd,s}, F_{t,Rd,p}, F_{t,Rd,c}, F_{t,Rd,sp})$

$F_{t,Rd}$ =	54.47	[kN]	Tensile resistance of an anchor

BENDING OF THE BASE PLATE

Bending moment $M_{j,Ed,y}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	185.51	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	108.94	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,y} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,y}$ =	108.94	[kN]	Tension resistance of a plate	[6.2.4]

Bending moment $M_{j,Ed,z}$

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
$l_{eff,2}$ =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]

$l_{eff,1}$ =	165	[mm]	Effective length for a single bolt for mode 1	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]
$M_{pl,1,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 1	[6.2.4]
$M_{pl,2,Rd}$ =	8.72	[kN*m]	Plastic resistance of a plate for mode 2	[6.2.4]
$F_{T,1,Rd}$ =	493.53	[kN]	Resistance of a plate for mode 1	[6.2.4]
$F_{T,2,Rd}$ =	185.51	[kN]	Resistance of a plate for mode 2	[6.2.4]
$F_{T,3,Rd}$ =	108.94	[kN]	Resistance of a plate for mode 3	[6.2.4]

$F_{t,pl,Rd,z} = \min(F_{T,1,Rd}, F_{T,2,Rd}, F_{T,3,Rd})$

$F_{t,pl,Rd,z}$ =	108.94	[kN]	Tension resistance of a plate	[6.2.4]

RESISTANCES OF SPREAD FOOTING IN THE TENSION ZONE

$F_{T,Rd,y} = F_{t,pl,Rd,y}$

$F_{T,Rd,y}$ =	108.94	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

$F_{T,Rd,z} = F_{t,pl,Rd,z}$

$F_{T,Rd,z}$ =	108.94	[kN]	Resistance of a column base in the tension zone	[6.2.8.3]

CONNECTION CAPACITY CHECK

$N_{j,Ed} / N_{j,Rd} \leq 1{,}0$ (6.24)	0.07 < 1.00	verified	(0.07)

e_y =	172	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,y}$ =	71	[mm]	Lever arm $F_{C,Rd,y}$	[6.2.8.1.(2)]
$z_{t,y}$ =	125	[mm]	Lever arm $F_{T,Rd,y}$	[6.2.8.1.(3)]
$M_{j,Rd,y}$ =	36.42	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,y} / M_{j,Rd,y} \leq 1{,}0$ (6.23)	0.59 < 1.00	verified	(0.59)

e_z =	45	[mm]	Axial force eccentricity	[6.2.8.3]
$z_{c,z}$ =	71	[mm]	Lever arm $F_{C,Rd,z}$	[6.2.8.1.(2)]
$z_{t,z}$ =	125	[mm]	Lever arm $F_{T,Rd,z}$	[6.2.8.1.(3)]
$M_{j,Rd,z}$ =	21.72	[kN*m]	Connection resistance for bending	[6.2.8.3]

$M_{j,Ed,z} / M_{j,Rd,z} \leq 1{,}0$ (6.23)	0.26 < 1.00	verified	(0.26)
$M_{j,Ed,y} / M_{j,Rd,y} + M_{j,Ed,z} / M_{j,Rd,z} \leq 1{,}0$	0.86 < 1.00	verified	(0.86)

SHEAR

BEARING PRESSURE OF AN ANCHOR BOLT ONTO THE BASE PLATE

Shear force $V_{j,Ed,y}$

$\alpha_{d,y}$ = 0.42 Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,y}$ = 0.42 Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,y}$ = 1.80 Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,y} = k_{1,y}*\alpha_{b,y}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,y}$ = 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

Shear force $V_{j,Ed,z}$

$\alpha_{d,z}$ = 0.42 Coeff. taking account of the bolt position - in the direction of shear [Table 3.4]

$\alpha_{b,z}$ = 0.42 Coeff. for resistance calculation $F_{1,vb,Rd}$ [Table 3.4]

$k_{1,z}$ = 1.80 Coeff. taking account of the bolt position - perpendicularly to the direction of shear [Table 3.4]

$F_{1,vb,Rd,z} = k_{1,z}*\alpha_{b,z}*f_{up}*d*t_p / \gamma_{M2}$

$F_{1,vb,Rd,z}$ = 194.40 [kN] Resistance of an anchor bolt for bearing pressure onto the base plate [6.2.2.(7)]

SHEAR OF AN ANCHOR BOLT

α_b =	0.25		Coeff. for resistance calculation $F_{2,vb,Rd}$	[6.2.2.(7)]
A_{vb} =	707	[mm^2]	Area of bolt section	[6.2.2.(7)]
f_{ub} =	800.00	[MPa]	Tensile strength of the anchor material	[6.2.2.(7)]
γ_{M2} =	1.25		Partial safety factor	[6.2.2.(7)]

$F_{2,vb,Rd} = \alpha_b*f_{ub}*A_{vb}/\gamma_{M2}$

$F_{2,vb,Rd}$ =	112.19	[kN]	Shear resistance of a bolt - without lever arm	[6.2.2.(7)]
α_M =	2.00		Factor related to the fastening of an anchor in the foundation	CEB [9.3.2.2]
$M_{Rk,s}$ =	2.54	[kN*m]	Characteristic bending resistance of an anchor	CEB [9.3.2.2]
l_{sm} =	60	[mm]	Lever arm length	CEB [9.3.2.2]
γ_{Ms} =	1.20		Partial safety factor	CEB [3.2.3.2]

$F_{v,Rd,sm} = \alpha_M*M_{Rk,s}/(l_{sm}*\gamma_{Ms})$

$F_{v,Rd,sm}$ =	70.48	[kN]	Shear resistance of a bolt - with lever arm	CEB [9.3.1]

CONCRETE PRY-OUT FAILURE

$N_{Rk,c}$ =	117.66	[kN]	Design uplift capacity	CEB [9.2.4]
k_3 =	2.00		Factor related to the anchor length	CEB [9.3.3]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,cp} = k_3*N_{Rk,c}/\gamma_{Mc}$

$F_{v,Rd,cp}$ =	108.94	[kN]	Concrete resistance for pry-out failure	CEB [9.3.1]

CONCRETE EDGE FAILURE

Shear force $V_{j,Ed,y}$

$V_{Rk,c,y}{}^{0}$ =	754.23	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,y}$ =	0.14		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,y}$ =	1.13		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,y}$ =	0.76		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,y}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,y}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,y}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,y} = V_{Rk,c,y}{}^{0} * \psi_{A,V,y} * \psi_{h,V,y} * \psi_{s,V,y} * \psi_{ec,V,y} * \psi_{\alpha,V,y} * \psi_{ucr,V,y} / \gamma_{Mc}$

$F_{v,Rd,c,y}$ =	43.40	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

Shear force $V_{j,Ed,z}$

$V_{Rk,c,z}{}^{0}$ =	132.89	[kN]	Characteristic resistance of an anchor	CEB [9.3.4.(a)]
$\psi_{A,V,z}$ =	1.00		Factor related to anchor spacing and edge distance	CEB [9.3.4]
$\psi_{h,V,z}$ =	1.00		Factor related to the foundation thickness	CEB [9.3.4.(c)]
$\psi_{s,V,z}$ =	1.00		Factor related to the influence of edges parallel to the shear load direction	CEB [9.3.4.(d)]
$\psi_{ec,V,z}$ =	1.00		Factor taking account a group effect when different shear loads are acting on the individual anchors in a group	CEB [9.3.4.(e)]
$\psi_{\alpha,V,z}$ =	1.00		Factor related to the angle at which the shear load is applied	CEB [9.3.4.(f)]
$\psi_{ucr,V,z}$ =	1.00		Factor related to the type of edge reinforcement used	CEB [9.3.4.(g)]
γ_{Mc} =	2.16		Partial safety factor	CEB [3.2.3.1]

$F_{v,Rd,c,z} = V_{Rk,c,z}{}^{0} * \psi_{A,V,z} * \psi_{h,V,z} * \psi_{s,V,z} * \psi_{ec,V,z} * \psi_{\alpha,V,z} * \psi_{ucr,V,z} / \gamma_{Mc}$

$F_{v,Rd,c,z}$ =	61.52	[kN]	Concrete resistance for edge failure	CEB [9.3.1]

SPLITTING RESISTANCE

$C_{f,d}$ =	0.30		Coeff. of friction between the base plate and concrete	[6.2.2.(6)]
$N_{c,Ed}$ =	126.15	[kN]	Compressive force	[6.2.2.(6)]

$F_{f,Rd} = C_{f,d} * N_{c,Ed}$

$F_{f,Rd}$ =	37.84	[kN]	Slip resistance	[6.2.2.(6)]

SHEAR CHECK

$V_{j,Rd,y} = n_b*min(F_{1,vb,Rd,y}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,y}) + F_{f,Rd}$

$V_{j,Rd,y}$ =	211.45	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,y} / V_{j,Rd,y} \leq 1,0$	0.02 < 1.00	verified	(0.02)

$V_{j,Rd,z} = n_b*min(F_{1,vb,Rd,z}, F_{2,vb,Rd}, F_{v,Rd,sm}, F_{v,Rd,cp}, F_{v,Rd,c,z}) + F_{f,Rd}$

$V_{j,Rd,z}$ =	283.94	[kN]	Connection resistance for shear	CEB [9.3.1]

$V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.07 < 1.00	verified	(0.07)
$V_{j,Ed,y} / V_{j,Rd,y} + V_{j,Ed,z} / V_{j,Rd,z} \leq 1,0$	0.09 < 1.00	verified	(0.09)

WELDS BETWEEN THE COLUMN AND THE BASE PLATE

$\sigma_{\perp}$ =	128.00	[MPa]	Normal stress in a weld	[4.5.3.(7)]
$\tau_{\perp}$ =	128.00	[MPa]	Perpendicular tangent stress	[4.5.3.(7)]
τ_{yII} =	-1.85	[MPa]	Tangent stress parallel to $V_{j,Ed,y}$	[4.5.3.(7)]
τ_{zII} =	-11.02	[MPa]	Tangent stress parallel to $V_{j,Ed,z}$	[4.5.3.(7)]
β_W =	0.80		Resistance-dependent coefficient	[4.5.3.(7)]

$\sigma_{\perp} / (0.9*f_u/\gamma_{M2}) \leq 1.0$ (4.1)	0.49 < 1.00	verified	(0.49)
$\sqrt{(\sigma_{\perp}^2 + 3.0 (\tau_{yII}^2 + \tau_{\perp}^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.71 < 1.00	verified	(0.71)
$\sqrt{(\sigma_{\perp}^2 + 3.0 (\tau_{zII}^2 + \tau_{\perp}^2))} / (f_u/(\beta_W*\gamma_{M2})) \leq 1.0$ (4.1)	0.63 < 1.00	verified	(0.63)

CONNECTION STIFFNESS

Bending moment $M_{j,Ed,y}$

b_{eff} =	116	[mm]	Effective width of the bearing pressure zone under the flange	[6.2.5.(3)]
l_{eff} =	258	[mm]	Effective length of the bearing pressure zone under the flange	[6.2.5.(3)]

$k_{13,y} = E_c*\sqrt{(b_{eff}*l_{eff})}/(1.275*E)$

$k_{13,y}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,y} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,y}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,y} = 1.6*A_b/L_b$

$k_{16,y}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]

$\lambda_{0,y}$ =	0.66		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,y}$ =	22457.85	[kN*m]	Initial rotational stiffness	[Table 6.12]
$S_{j,rig,y}$ =	26092.50	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,y} < S_{j,rig,y}$ SEMI-RIGID [5.2.2.5.(2)]

Bending moment $M_{j,Ed,z}$

$k_{13,z} = E_c*\sqrt{(A_{c,z})}/(1.275*E)$

$k_{13,z}$ =	19	[mm]	Stiffness coeff. of compressed concrete	[Table 6.11]
l_{eff} =	165	[mm]	Effective length for a single bolt for mode 2	[6.2.6.5]
m =	71	[mm]	Distance of a bolt from the stiffening edge	[6.2.6.5]

$k_{15,z} = 0.850*l_{eff}*t_p^3/(m^3)$

$k_{15,z}$ =	11	[mm]	Stiffness coeff. of the base plate subjected to tension	[Table 6.11]
L_b =	330	[mm]	Effective anchorage depth	[Table 6.11]

$k_{16,z} = 1.6*A_b/L_b$

$k_{16,z}$ =	3	[mm]	Stiffness coeff. of an anchor subjected to tension	[Table 6.11]
$\lambda_{0,z}$ =	0.66		Column slenderness	[5.2.2.5.(2)]
$S_{j,ini,z}$ =	41157.36	[kN*m]	Initial rotational stiffness	[6.3.1.(4)]
$S_{j,rig,z}$ =	26092.50	[kN*m]	Stiffness of a rigid connection	[5.2.2.5]

$S_{j,ini,z} \geq S_{j,rig,z}$ RIGID [5.2.2.5.(2)]

WEAKEST COMPONENT:

FOUNDATION - CONCRETE CONE PULL-OUT FAILURE

Connection conforms to the code	Ratio	0.86

Posouzení plošného základu

Vstupní data

Projekt

Akce : Rekonštrukcia a prístavba strediska čistoty
Část : Základová pätka Z1
Odběratel : RB ARCHITECTS
Vypracoval : Ing.Pavol Kohutiar
Datum : 22. 5. 2021

Nastavení

Slovensko - EN 1997

Materiály a normy

Betonové konstrukce : EN 1992-1-1 (EC2)
Součinitele EN 1992-1-1 : standardní

Sedání

Metoda výpočtu : ČSN 73 1001 (Výpočet pomocí edometrického modulu)
Omezení deformační zóny : pomocí strukturní pevnosti

Patky

Výpočet pro odvodněné podmínky : EC 7-1 (EN 1997-1:2003)
Posouzení tažené patky : standardní postup
Dovolená excentricita : 0.333
Metodika posouzení : výpočet podle EN 1997
Návrhový přístup : 2 - redukce zatížení a odporu

Součinitele redukce zatížení (F)			
Trvalá návrhová situace			
		Nepříznivé	Příznivé
Stálé zatížení :	γ_G =	1.35 [–]	1.00 [–]

Součinitele redukce odporu (R)		
Trvalá návrhová situace		
Součinitel redukce svislé únosnosti :	γ_{Rvs} =	1.40 [–]
Součinitel redukce vodorovné únosnosti :	γ_{Rhs} =	1.10 [–]

Základní parametry zemin

Číslo	Název	Vzorek	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m³]	γ_{su} [kN/m³]	δ [°]
1	Třída F1, konzistence tuhá		29.00	8.00	19.00	9.00	
2	Třída F4, konzistence tuhá		24.50	14.00	18.50	8.50	
3	Třída F6, konzistence tuhá		19.00	12.00	21.00	11.00	

Pro výpočet tlaku v klidu jsou všechny zeminy zadány jako nesoudržné.

Parametry zemin

Třída F1, konzistence tuhá

Objemová tíha : γ = 19.00 kN/m^3
Úhel vnitřního tření : φ_{ef} = 29.00 °
Soudržnost zeminy : c_{ef} = 8.00 kPa
Edometrický modul : E_{oed} = 24.00 MPa

Koef. strukturní pevnosti : m = 0.10
Obj.tíha sat.zeminy : γ_{sat} = 19.00 kN/m^3

Třída F4, konzistence tuhá

Objemová tíha : γ = 18.50 kN/m^3
Úhel vnitřního tření : φ_{ef} = 24.50 °
Soudržnost zeminy : c_{ef} = 14.00 kPa
Edometrický modul : E_{oed} = 8.00 MPa
Koef. strukturní pevnosti : m = 0.10
Obj.tíha sat.zeminy : γ_{sat} = 18.50 kN/m^3

Třída F6, konzistence tuhá

Objemová tíha : γ = 21.00 kN/m^3
Úhel vnitřního tření : φ_{ef} = 19.00 °
Soudržnost zeminy : c_{ef} = 12.00 kPa
Edometrický modul : E_{oed} = 9.50 MPa
Koef. strukturní pevnosti : m = 0.10
Obj.tíha sat.zeminy : γ_{sat} = 21.00 kN/m^3

Založení

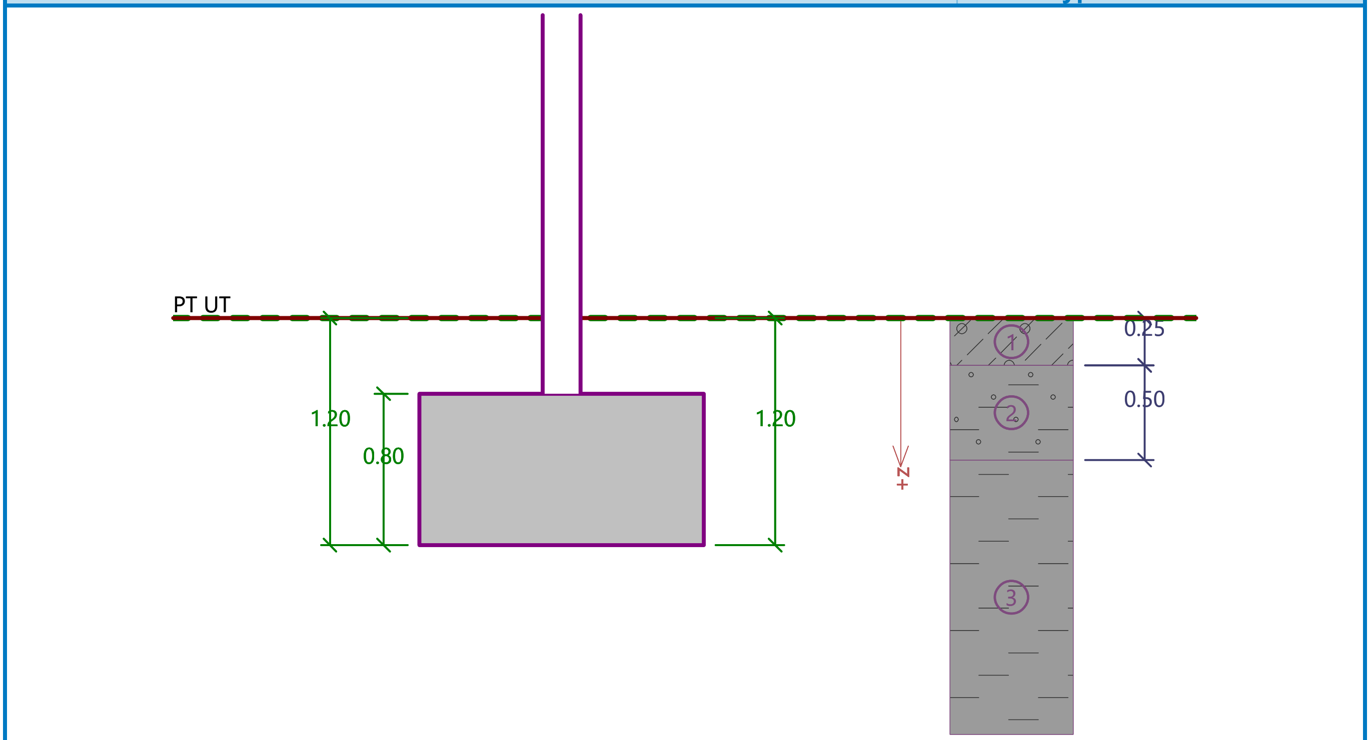
Typ základu: excentrická patka

Hloubka od původního terénu h_z = 1.20 m
Hloubka základové spáry d = 1.20 m
Tloušťka základu t = 0.80 m
Sklon upraveného terénu s_1 = 0.00 °
Sklon základové spáry s_2 = 0.00 °

Nadloží

Typ: zadat objemovou tíhu
Objemová tíha zeminy nad základem = 20.00 kN/m^3

Název : Založení | **Fáze - výpočet : 1 - 0**



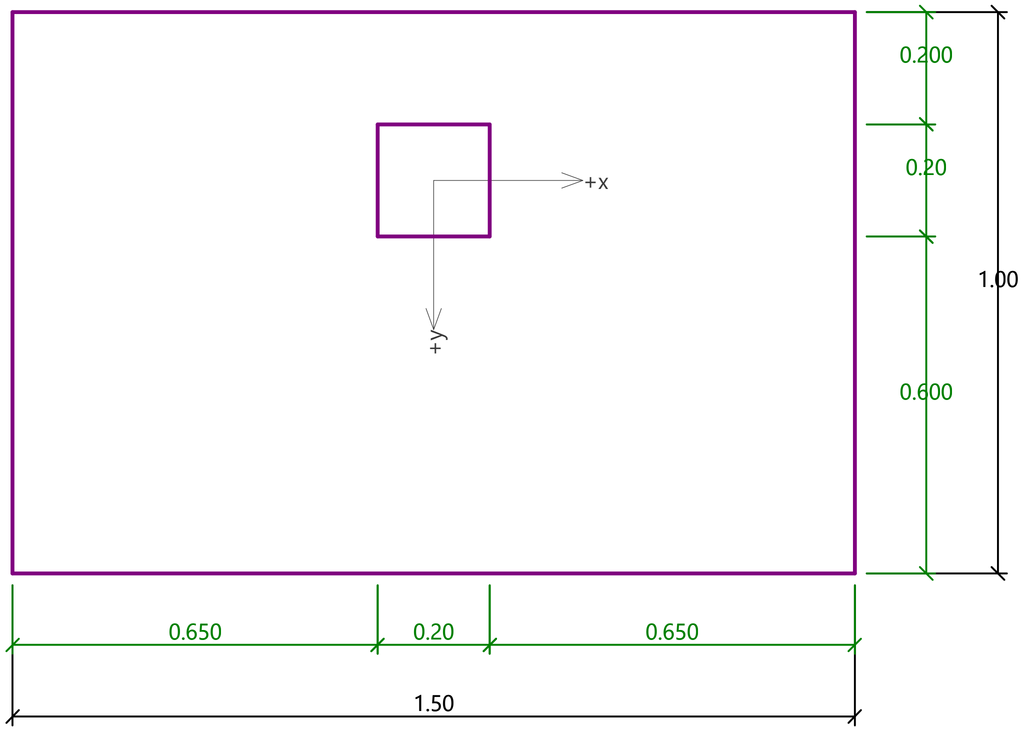
Geometrie konstrukce

Typ základu: excentrická patka

Délka patky x = 1.50 m
Šířka patky y = 1.00 m
Šířka sloupu ve směru x c_x = 0.20 m
Šířka sloupu ve směru y c_y = 0.20 m

Vzdál. osy sloupu od kraje patky ve směru x = 0.75 m
Vzdál. osy sloupu od kraje patky ve směru y = 0.70 m
Objem patky = 1.20 m^3
Objem výkopu = 1.80 m^3
Objem zásypu = 0.58 m^3

Název : Geometrie | **Fáze - výpočet : 1 - 0**



Materiál konstrukce

Objemová tíha γ = 23.00 kN/m^3
Výpočet betonových konstrukcí proveden podle normy EN 1992-1-1 (EC2).

Beton: C 20/25

Válcová pevnost v tlaku f_{ck} = 20.00 MPa
Pevnost v tahu f_{ctm} = 2.20 MPa
Modul pružnosti E_{cm} = 30000.00 MPa

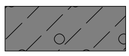
Ocel podélná: B500B

Mez kluzu f_{yk} = 500.00 MPa

Ocel příčná: B500B

Mez kluzu f_{yk} = 500.00 MPa

Geologický profil a přiřazení zemin

Číslo	Mocnost vrstvy t [m]	Hloubka z [m]	Přiřazená zemina	Vzorek
1	0.25	0.00 .. 0.25	Třída F1, konzistence tuhá	

Číslo	Mocnost vrstvy t [m]	Hloubka z [m]	Přiřazená zemina	Vzorek
2	0.50	0.25 .. 0.75	Třída F4, konzistence tuhá	
3	1.50	0.75 .. 2.25	Třída F6, konzistence tuhá	
4	3.00	2.25 .. 5.25	Třída F6, konzistence tuhá	
5	-	5.25 .. ∞	Třída F6, konzistence tuhá	

Zatížení

Číslo	Zatížení		Název	Typ	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
	nové	změna							
1	Ano		MSU	Návrhové	75.00	12.50	12.50	7.50	7.50
2	Ano		MSP	Užitné	50.00	7.50	7.50	5.00	5.00

Celkové nastavení výpočtu

Typ výpočtu : výpočet pro odvodněné podmínky

Nastavení výpočtu fáze

Návrhová situace : trvalá

Posouzení čís. 1

Posouzení zatěžovacích stavů

Název	Vl. tíha příznivě	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Využití [%]	Vyhovuje
MSU	Ano	-0.06	-0.03	87.82	255.86	34.32	Ano
MSU	Ne	-0.05	-0.03	96.84	258.53	37.46	Ano

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.
Spočtená vlastní tíha patky $G = 37.26$ kN
Spočtená tíha nadloží $Z = 15.77$ kN

Posouzení svislé únosnosti

Tvar kontaktního napětí : obdélník
Nejnepříznivější zatěžovací stav číslo 1. (MSU)

Parametry smykové plochy pod základem:
Hloubka smykové plochy $z_{sp} = 1.13$ m
Dosah smykové plochy $l_{sp} = 2.90$ m

Výpočtová únosnost zákl. půdy $R_d = 258.53$ kPa
Extrémní kontaktní napětí $\sigma = 96.84$ kPa

Svislá únosnost VYHOVUJE

Posouzení excentricity zatížení

Max. excentricita ve směru délky patky $e_x = 0.038<0.333$
Max. excentricita ve směru šířky patky $e_y = 0.031<0.333$
Max. prostorová excentricita $e_t = 0.049<0.333$

Excentricita zatížení základu VYHOVUJE

Posouzení vodorovné únosnosti

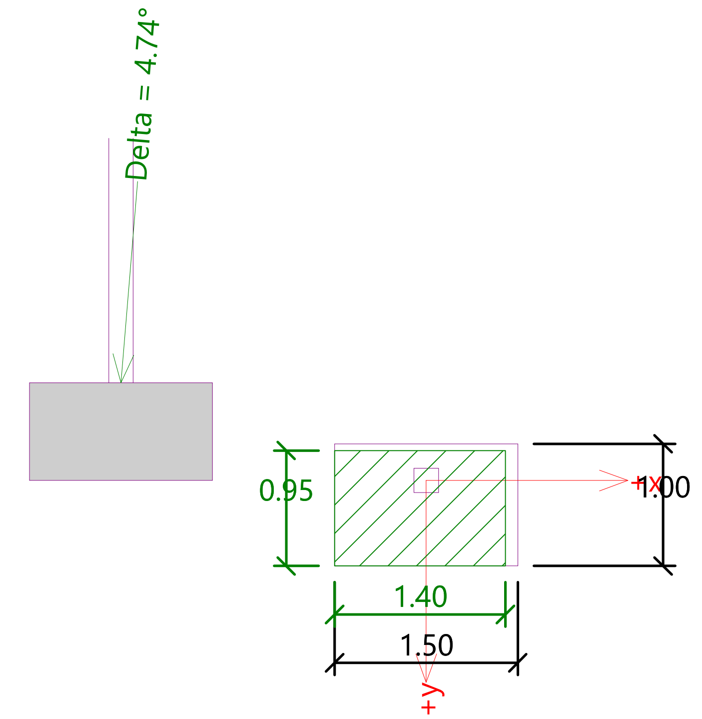
Nejnepříznivější zatěžovací stav číslo 1. (MSU)
Zemní odpor: klidový
Výpočtová velikost zemního odporu $S_{pd} = 7.89$ kN

Horizontální únosnost základu R_{dh} = 57.14 kN
Extrémní horizontální síla H = 10.61 kN

Vodorovná únosnost VYHOVUJE

Únosnost základu VYHOVUJE

Název : 1.MS	**Fáze - výpočet : 1 - 1**



Posouzení čís. 1

Sednutí a natočení základu - vstupní data

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.
Výpočet proveden s uvažováním koeficientu κ_1 (vliv hloubky založení).
Napětí v základové spáře uvažováno od upraveného terénu.
Spočtená vlastní tíha patky G = 27.60 kN
Spočtená tíha nadloží Z = 11.68 kN

Sednutí středu hrany x - 1 = 1.3 mm
Sednutí středu hrany x - 2 = 1.0 mm
Sednutí středu hrany y - 1 = 1.2 mm
Sednutí středu hrany y - 2 = 0.8 mm
Sednutí středu základu = 2.2 mm
Sednutí charakterist. bodu = 1.4 mm

(1-hrana max.tlačená; 2-hrana min.tlačená)

Sednutí a natočení základu - výsledky

Tuhost základu:
Spočtený vážený průměrný modul přetvárnosti E_{def} = 4.43 MPa
Základ je ve směru délky tuhý (k=1026.57)
Základ je ve směru šířky tuhý (k=3464.66)

Posouzení excentricity zatížení

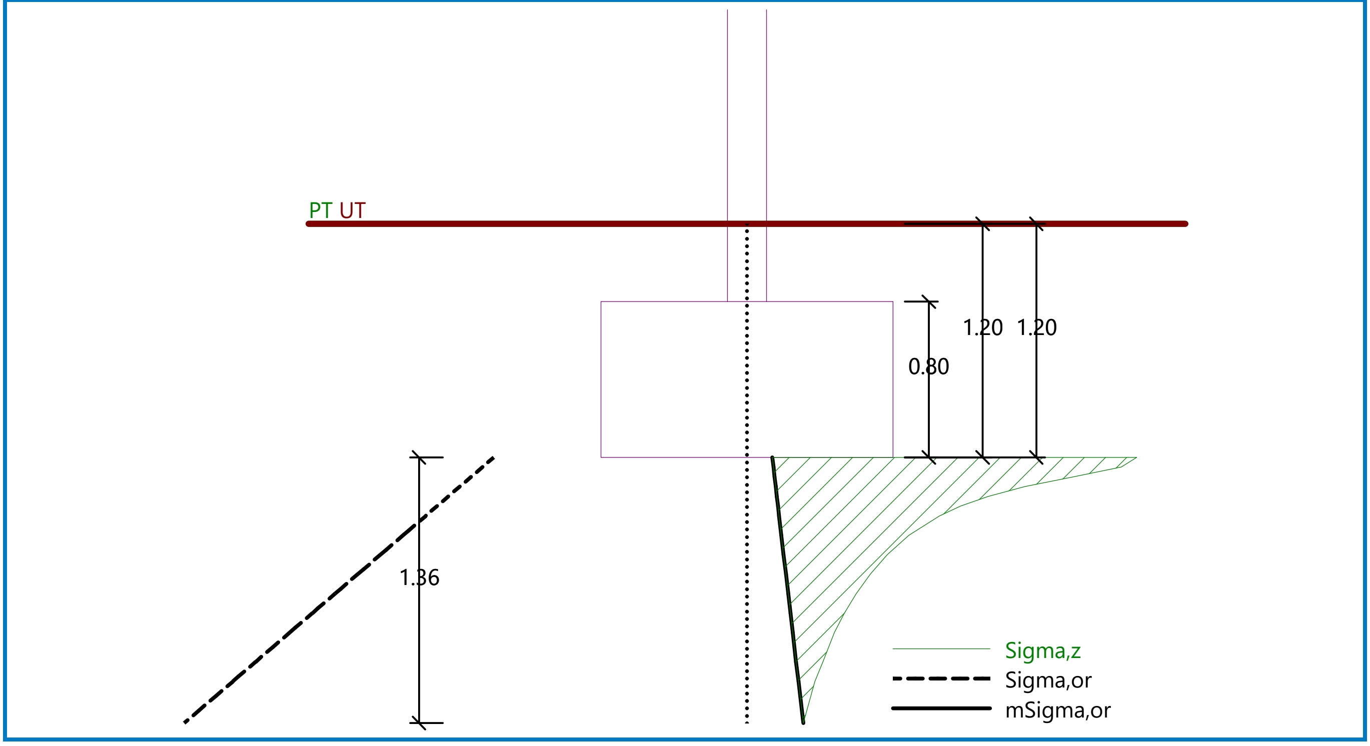
Max. excentricita ve směru délky patky e_x = 0.026<0.333
Max. excentricita ve směru šířky patky e_y = 0.017<0.333
Max. prostorová excentricita e_t = 0.031<0.333

Excentricita zatížení základu VYHOVUJE

Celkové sednutí a natočení základu:
Sednutí základu = 1.4 mm
Hloubka deformační zóny = 1.36 m

Natočení ve směru x = 0.302 (tan*1000); (1.7E-02 °)
Natočení ve směru y = 0.243 (tan*1000); (1.4E-02 °)

Název : 2.MS	Fáze - výpočet : 1 - 1



Dimenzace čís. 1

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.

Posouzení podélné výztuže základu ve směru x

8 ks profil 16.0 mm, krytí 50.0 mm
Šířka průřezu = 1.00 m
Výška průřezu = 0.80 m

Stupeň vyztužení	ρ	=	0.22 %	>	0.13 %	=	ρ_{min}
Poloha neutrálné osy	x	=	0.07 m	<	0.46 m	=	x_{max}
Moment na mezi únosnosti	M_{Rd}	=	500.57 kNm	>	14.18 kNm	=	M_{Ed}

Průřez VYHOVUJE.

Posouzení podélné výztuže základu ve směru y

8 ks profil 16.0 mm, krytí 50.0 mm
Šířka průřezu = 1.50 m
Výška průřezu = 0.80 m

Stupeň vyztužení	ρ	=	0.14 %	>	0.13 %	=	ρ_{min}
Poloha neutrálné osy	x	=	0.04 m	<	0.46 m	=	x_{max}
Moment na mezi únosnosti	M_{Rd}	=	506.69 kNm	>	17.32 kNm	=	M_{Ed}

Průřez VYHOVUJE.

Posouzení základu na protlačení

Normálová síla v sloupu = 75.00 kN

Maximální únosnost na obvodu sloupu

Síla přenesená roznášením do zákl. půdy = 2.00 kN

Síla přenášená smykovou pevností patky		=	73.00	kN
Uvažovaný obvod sloupu	u_0	=	0.80	m
Smykové napětí na obvodu sloupu	$v_{Ed,max}$	=	0.38	MPa
Únosnost na obvodu sloupu	$v_{Rd,max}$	=	2.94	MPa

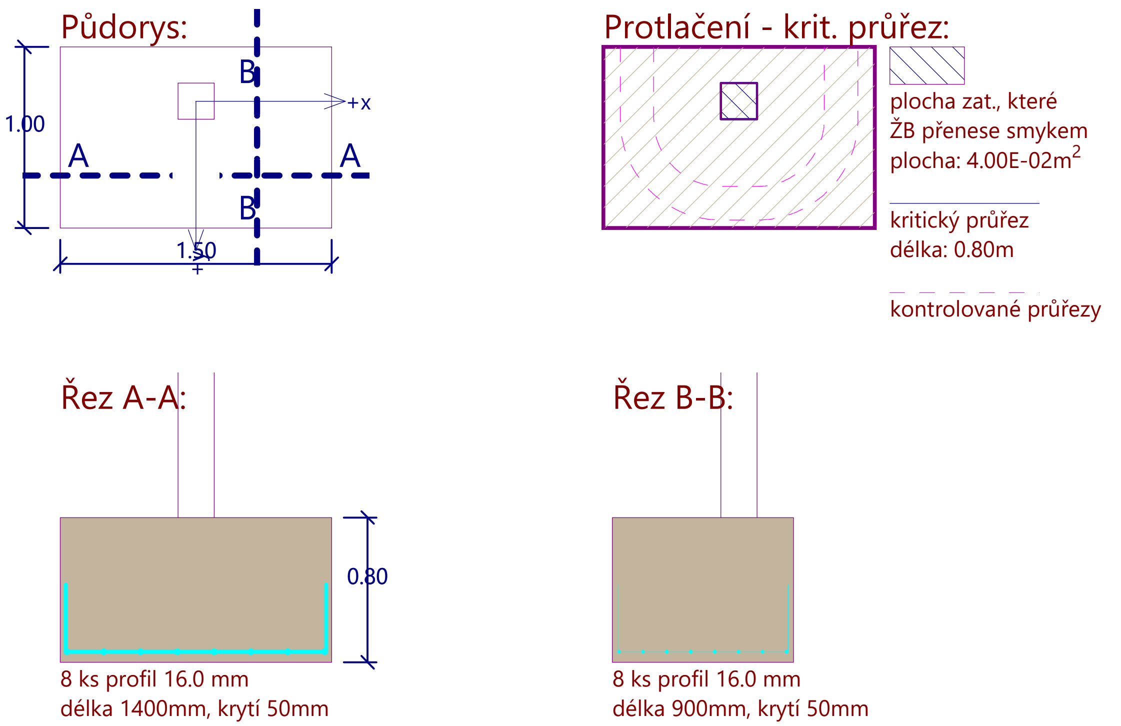
Kritický průřez bez smykové výztuže

Síla přenesená roznášením do zákl. půdy		=	33.36	kN
Síla přenášená smykovou pevností patky		=	41.64	kN
Vzdálenost průřezu od sloupu		=	0.37	m
Délka průřezu	u	=	2.17	m
Smykové napětí na průřezu	v_{Ed}	=	0.05	MPa
Únosnost nevyztuženého průřezu	$v_{Rd,c}$	=	1.17	MPa

$v_{Ed} < v_{Rd,c}$ => Výztuž není nutná

Základ na protlačení VYHOVUJE

Název : Dimenzování | **Fáze - výpočet : 1 - 1**



Posouzení plošného základu

Vstupní data

Projekt

Akce	:	Rekonštrukcia a prístavba strediska čistoty
Část	:	Základová pätka Z2
Odběratel	:	RB ARCHITECTS
Vypracoval	:	Ing.Pavol Kohutiar
Datum	:	22. 5. 2021

Nastavení

Slovensko - EN 1997

Materiály a normy

Betonové konstrukce : EN 1992-1-1 (EC2)
Součinitele EN 1992-1-1 : standardní

Sedání

Metoda výpočtu : ČSN 73 1001 (Výpočet pomocí edometrického modulu)
Omezení deformační zóny : pomocí strukturní pevnosti

Patky

Výpočet pro odvodněné podmínky : EC 7-1 (EN 1997-1:2003)
Posouzení tažené patky : standardní postup
Dovolená excentricita : 0.333
Metodika posouzení : výpočet podle EN 1997
Návrhový přístup : 2 - redukce zatížení a odporu

Součinitele redukce zatížení (F)			
Trvalá návrhová situace			
		Nepříznivé	Příznivé
Stálé zatížení :	γ_G =	1.35 [–]	1.00 [–]

Součinitele redukce odporu (R)		
Trvalá návrhová situace		
Součinitel redukce svislé únosnosti :	γ_{Rvs} =	1.40 [–]
Součinitel redukce vodorovné únosnosti :	γ_{Rhs} =	1.10 [–]

Základní parametry zemin

Číslo	Název	Vzorek	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m^3]	γ_{su} [kN/m^3]	δ [°]
1	Třída F1, konzistence tuhá		29.00	8.00	19.00	9.00	
2	Třída F4, konzistence tuhá		24.50	14.00	18.50	8.50	
3	Třída F6, konzistence tuhá		19.00	12.00	21.00	11.00	

Pro výpočet tlaku v klidu jsou všechny zeminy zadány jako nesoudržné.

Parametry zemin

Třída F1, konzistence tuhá

Objemová tíha :	γ	=	19.00 kN/m^3
Úhel vnitřního tření :	φ_{ef}	=	29.00 °
Soudržnost zeminy :	c_{ef}	=	8.00 kPa
Edometrický modul :	E_{oed}	=	24.00 MPa

Koef. strukturní pevnosti :	m	=	0.10
Obj.tíha sat.zeminy :	γ_{sat}	=	19.00 kN/m^3

Třída F4, konzistence tuhá

Objemová tíha :	γ	=	18.50 kN/m^3
Úhel vnitřního tření :	φ_{ef}	=	24.50 °
Soudržnost zeminy :	c_{ef}	=	14.00 kPa
Edometrický modul :	E_{oed}	=	8.00 MPa
Koef. strukturní pevnosti :	m	=	0.10
Obj.tíha sat.zeminy :	γ_{sat}	=	18.50 kN/m^3

Třída F6, konzistence tuhá

Objemová tíha :	γ	=	21.00 kN/m^3
Úhel vnitřního tření :	φ_{ef}	=	19.00 °
Soudržnost zeminy :	c_{ef}	=	12.00 kPa
Edometrický modul :	E_{oed}	=	9.50 MPa
Koef. strukturní pevnosti :	m	=	0.10
Obj.tíha sat.zeminy :	γ_{sat}	=	21.00 kN/m^3

Založení

Typ základu: excentrická patka

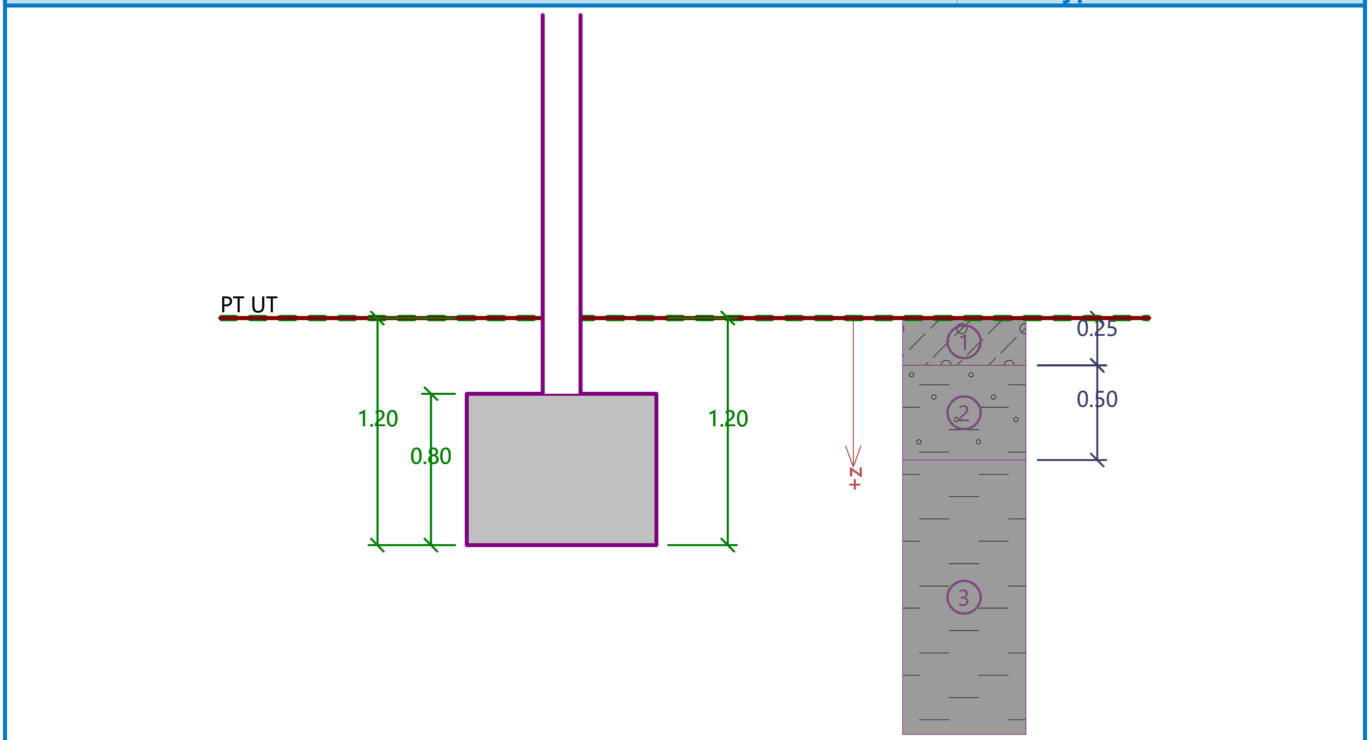
Hloubka od původního terénu	h_z	=	1.20	m
Hloubka základové spáry	d	=	1.20	m
Tloušťka základu	t	=	0.80	m
Sklon upraveného terénu	s_1	=	0.00	°
Sklon základové spáry	s_2	=	0.00	°

Nadloží

Typ: zadat objemovou tíhu

Objemová tíha zeminy nad základem = 20.00 kN/m^3

Název : Založení | **Fáze - výpočet : 1 - 0**



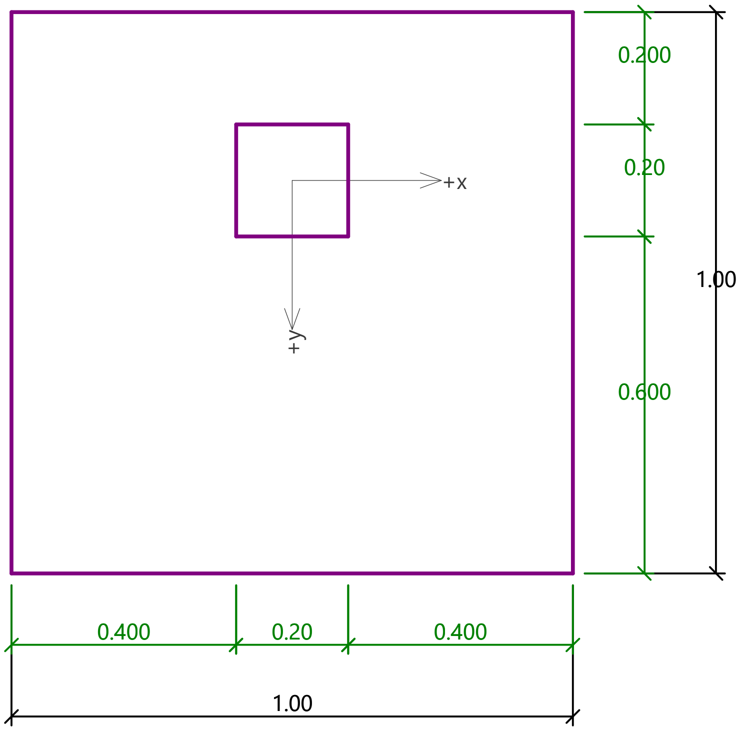
Geometrie konstrukce

Typ základu: excentrická patka

Délka patky x = 1.00 m
Šířka patky y = 1.00 m
Šířka sloupu ve směru x c_x = 0.20 m
Šířka sloupu ve směru y c_y = 0.20 m

Vzdál. osy sloupu od kraje patky ve směru x = 0.50 m
Vzdál. osy sloupu od kraje patky ve směru y = 0.70 m
Objem patky = 0.80 m^3
Objem výkopu = 1.20 m^3
Objem zásypu = 0.38 m^3

Název : Geometrie | **Fáze - výpočet : 1 - 0**



Materiál konstrukce

Objemová tíha γ = 23.00 kN/m^3
Výpočet betonových konstrukcí proveden podle normy EN 1992-1-1 (EC2).

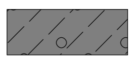
Beton: C 20/25

Válcová pevnost v tlaku	f_{ck} =	20.00	MPa
Pevnost v tahu	f_{ctm} =	2.20	MPa
Modul pružnosti	E_{cm} =	30000.00	MPa

Ocel podélná: B500B
Mez kluzu f_{yk} = 500.00 MPa

Ocel příčná: B500B
Mez kluzu f_{yk} = 500.00 MPa

Geologický profil a přiřazení zemin

Číslo	Mocnost vrstvy t [m]	Hloubka z [m]	Přiřazená zemina	Vzorek
1	0.25	0.00 .. 0.25	Třída F1, konzistence tuhá	

Číslo	Mocnost vrstvy t [m]	Hloubka z [m]	Přiřazená zemina	Vzorek
2	0.50	0.25 .. 0.75	Třída F4, konzistence tuhá	
3	1.50	0.75 .. 2.25	Třída F6, konzistence tuhá	
4	3.00	2.25 .. 5.25	Třída F6, konzistence tuhá	
5	-	5.25 .. ∞	Třída F6, konzistence tuhá	

Zatížení

Číslo	Zatížení nové	Zatížení změna	Název	Typ	N [kN]	M_x [kNm]	M_y [kNm]	H_x [kN]	H_y [kN]
1	Ano		MSU	Návrhové	38.00	6.00	6.00	7.00	7.00
2	Ano		MSP	Užitné	26.00	4.00	4.00	6.00	6.00

Celkové nastavení výpočtu

Typ výpočtu : výpočet pro odvodněné podmínky

Nastavení výpočtu fáze

Návrhová situace : trvalá

Posouzení čís. 1

Posouzení zatěžovacích stavů

Název	Vl. tíha příznivě	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Využití [%]	Vyhovuje
MSU	Ano	-0.01	-0.06	74.15	249.20	29.75	Ano
MSU	Ne	-0.01	-0.05	83.10	255.10	32.57	Ano

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.
Spočtená vlastní tíha patky G = 24.84 kN
Spočtená tíha nadloží Z = 10.37 kN

Posouzení svislé únosnosti

Tvar kontaktního napětí : obdélník
Nejnepříznivější zatěžovací stav číslo 1. (MSU)

Parametry smykové plochy pod základem:
Hloubka smykové plochy z_{sp} = 1.13 m
Dosah smykové plochy l_{sp} = 2.90 m

Výpočtová únosnost zákl. půdy R_d = 255.10 kPa
Extrémní kontaktní napětí σ = 83.10 kPa

Svislá únosnost VYHOVUJE

Posouzení excentricity zatížení

Max. excentricita ve směru délky patky e_x = 0.006<0.333
Max. excentricita ve směru šířky patky e_y = 0.062<0.333
Max. prostorová excentricita e_t = 0.063<0.333

Excentricita zatížení základu VYHOVUJE

Posouzení vodorovné únosnosti

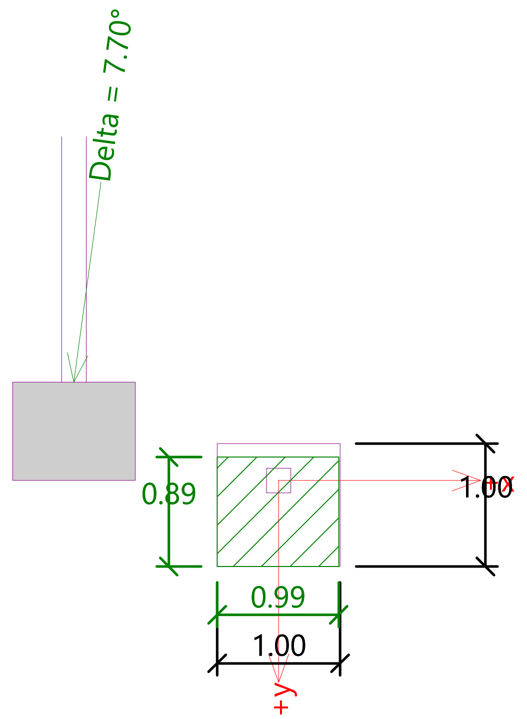
Nejnepříznivější zatěžovací stav číslo 1. (MSU)
Zemní odpor: klidový
Výpočtová velikost zemního odporu S_{pd} = 7.89 kN

Horizontální únosnost základu R_{dh} = 36.66 kN
Extrémní horizontální síla H = 9.90 kN

Vodorovná únosnost VYHOVUJE

Únosnost základu VYHOVUJE

Název : 1.MS	Fáze - výpočet : 1 - 1



Posouzení čís. 1

Sednutí a natočení základu - vstupní data

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.
Výpočet proveden s uvažováním koeficientu κ_1 (vliv hloubky založení).
Napětí v základové spáře uvažováno od upraveného terénu.
Spočtená vlastní tíha patky G = 18.40 kN
Spočtená tíha nadloží Z = 7.68 kN

Sednutí středu hrany x - 1 = 1.0 mm
Sednutí středu hrany x - 2 = 0.3 mm
Sednutí středu hrany y - 1 = 0.7 mm
Sednutí středu hrany y - 2 = 0.6 mm
Sednutí středu základu = 1.3 mm
Sednutí charakterist. bodu = 0.8 mm

(1-hrana max.tlačená; 2-hrana min.tlačená)

Sednutí a natočení základu - výsledky

Tuhost základu:
Spočtený vážený průměrný modul přetvárnosti E_{def} = 4.43 MPa
Základ je ve směru délky tuhý (k=3464.66)
Základ je ve směru šířky tuhý (k=3464.66)

Posouzení excentricity zatížení

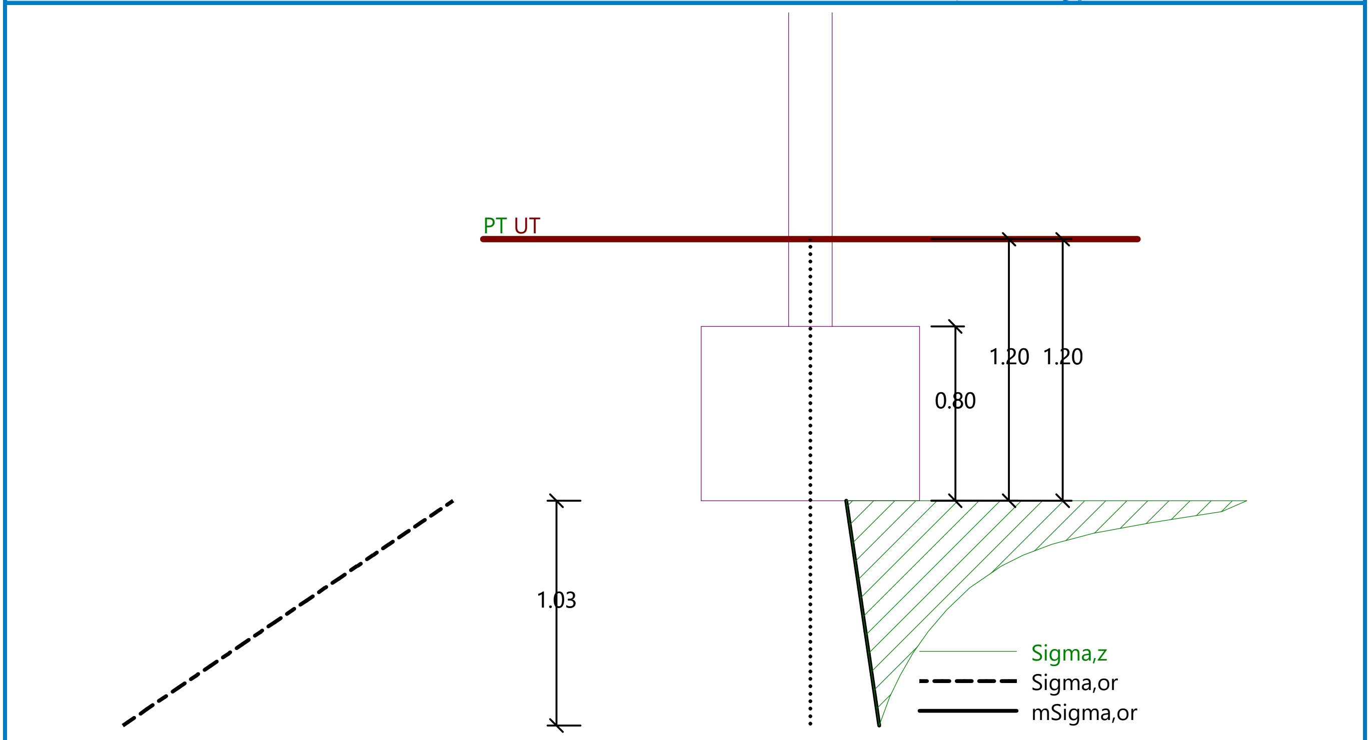
Max. excentricita ve směru délky patky e_x = 0.015<0.333
Max. excentricita ve směru šířky patky e_y = 0.069<0.333
Max. prostorová excentricita e_t = 0.071<0.333

Excentricita zatížení základu VYHOVUJE

Celkové sednutí a natočení základu:
Sednutí základu = 0.8 mm
Hloubka deformační zóny = 1.03 m

Natočení ve směru x = 0.175 (tan*1000); (1.0E-02 °)
Natočení ve směru y = 0.780 (tan*1000); (4.5E-02 °)

Název : 2.MS	Fáze - výpočet : 1 - 1



Dimenzace čís. 1

Výpočet proveden s automatickým výběrem nejnepříznivějších zatěžovacích stavů.

Posouzení podélné výztuže základu ve směru x

0.40 m ≤ 0.40 m
Maximální vyložení patky je menší než 0.50 * tloušťka patky, výztuž není nutná.

Posouzení podélné výztuže základu ve směru y

6.60 ks profil 16.0 mm, krytí 50.0 mm
Šířka průřezu = 1.00 m
Výška průřezu = 0.80 m

Stupeň vyztužení	ρ	=	0.18 %	>	0.13 %	=	ρ_{min}
Poloha neutrálné osy	x	=	0.05 m	<	0.46 m	=	x_{max}
Moment na mezi únosnosti	M_{Rd}	=	415.62 kNm	>	10.07 kNm	=	M_{Ed}

Průřez VYHOVUJE.

Posouzení základu na protlačení

Normálová síla v sloupu = 38.00 kN

Maximální únosnost na obvodu sloupu

Síla přenesená roznášením do zákl. půdy		=	1.52	kN
Síla přenášená smykovou pevností patky		=	36.48	kN
Uvažovaný obvod sloupu	u_0	=	0.80	m
Smykové napětí na obvodu sloupu	$v_{Ed,max}$	=	0.18	MPa
Únosnost na obvodu sloupu	$v_{Rd,max}$	=	2.94	MPa

Kritický průřez bez smykové výztuže

Síla přenesená roznášením do zákl. půdy		=	25.35	kN
Síla přenášená smykovou pevností patky		=	12.65	kN
Vzdálenost průřezu od sloupu		=	0.37	m
Délka průřezu	u	=	2.17	m
Smykové napětí na průřezu	v_{Ed}	=	0.02	MPa
Únosnost nevyztuženého průřezu	$v_{Rd,c}$	=	1.17	MPa

$v_{Ed} < v_{Rd,c}$ => Výztuž není nutná

Základ na protlačení VYHOVUJE

Název : Dimenzování **Fáze - výpočet : 1 - 1**