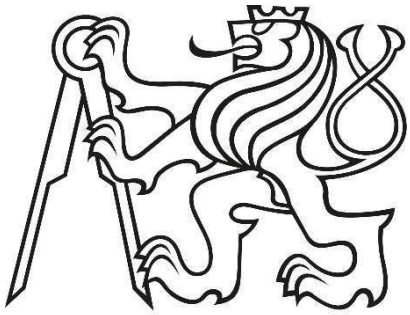
CZECH TECHNICAL UNIVERSITY IN PRAGUE

FACULTY OF CIVIL ENGINEERING

DEPARTMENT OF STEEL AND TIMBER STRUCTURES



DIPLOMA THESIS

Possibilities of using HSS in truss beams – a parametric study

APPENDIX

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Prague 2018

List of attachments

1. SSAB product description S355
2. SSAB product description S460
3. RUUKKI product description S690
4. Dimensioning of the cladding – RUUKKI Traypan software
5. Choosing the truss geometry. SCIA software output
6. Internal forces in main truss Dlubal RFEM software output
7. Internal forces in the columns Dlubal RFEM software output
8. Technical data HILTI anchors
9. Profis Anchor HILTI software output – design of the anchors for HEA240
10. Profis Anchor HILTI software output – design of the anchors for HEA340
11. IDEA Statica software output – connection design (C1-C6)
12. Results of the parametric study calculation

SSAB Domex®

SSAB Domex 355MC

General Product Description

SSAB Domex 355MC meets or exceeds the requirements of S355MC in EN 10149-2. Upon agreement, it can be delivered as double certified. This double certification will enable producers of steel structures, in accordance with EN 1090, to use SSAB Domex 355MC in their CE-marked final component or structure.

Dimension Range

SSAB Domex 355MC is available in thicknesses of 1.80-16.00 mm and widths up to 1860 mm as coils, slit coils and as cut to length in lengths up to 16 meters.

Mechanical Properties

Thickness (mm)	Yield strength R_{eH} (min MPa)	Tensile strength R_m (MPa)	Elongation A_{80} [1] (min %)	Elongation A_5 [2] (min %)	Min .inner bending radius for a 90° bend
1.80- 3	355	430- 550	19	23	0.2 xt
3.01- 6	355	430- 550		23	0.3 xt
6.01- 16	355	430- 550		23	0.5 xt

The mechanical properties are valid in the longitudinal direction.
Bending properties for both longitudinal and transversal direction
[1] A80 value applies for thicknesses < 3.00 mm
[2] A_5 value applies for thicknesses ≥ 3.00 mm

Impact Properties

Designation	Test temperature	Min. impact energy for longitudinal Charpy V- notch test
B	-	-
D	-20 °C	40 J
E	-40 °C	27 J

Impact testing according to ISO 148-1 is performed on thicknesses ≥ 6mm. The specified minimum value corresponds to a full-size specimen.

Chemical Composition (Ladle analysis)

C (max %)	Si (max %)	Mn (max %)	P (max %)	S (max %)	Al_{tot} (min %)	Nb (max %)	V (max %)	Ti (max %)
0.10	0.03[1]	1.50	0.025	0.010	0.015	0.09[2]	0.20[2]	0.15[2]

1) SSAB Domex 355MC meets the requirements of category A (thin coatings) for hot-dip zinc-coating in EN 10149-2. Category B for thick coatings is available on request (Si 0.15-0.21%).
2) The sum of Nb, V and Ti is max 0.22%.
The steel is grain refined.

Carbon Equivalent Values

Thickness (mm)	1.80 - 16
CEV Typical	0.17
CET Typical	0.13

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40} \qquad CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

Tolerances

SSAB Domex is delivered with SSAB Domex tolerances, with improved guarantees compared to EN 10051:2010. More details are available at SSAB.com

Thickness

SSAB Domex thickness tolerances correspond to 2/3 of EN 10051:2010 as default value. After special agreement, tolerances down to 1/3 of EN 10051:2010 can be delivered for certain products and dimensions.

Length and Width

SSAB Domex tolerances for width and length are according to SSAB standard and offer narrower width and length tolerances compared to EN 10051:2010.

For coil and sheet with mill edge, the width tolerances are corresponding to-0/+20 mm.

For coil and sheet with cut edge, the width tolerances are corresponding to-0/+2 mm.

After special agreement, tighter tolerances can be delivered for certain products and dimensions.

Length tolerances only apply for cut to length sheets.

Shape

SSAB Domex is delivered with shape tolerances according to EN 10051:2010. Tighter tolerances are available on request.

Flatness

SSAB Domex tolerances correspond to SSAB Flatness Guarantees Class A.

SSAB Domex tolerances guarantee a maximum flatness deviation of 3 mm/m in addition to the EN 10051:2010 flatness requirements.

Flatness guarantees only apply for cut to length sheets.

Surface Properties

According to EN 10 163-2 Class A, Subclass 3.

Delivery Conditions

Thermomechanically rolled.

Surface and edge condition

SSAB Domex 355MC is available with non-pickled or pickled surface with mill or cut edge.

Fabrication and Other Recommendations

SSAB Domex 355MC is a cold forming steel not suited for heat treatments at temperatures above 580°C, since the material then may lose its guaranteed properties.

SSAB Domex 355MC has good welding, cold forming and cutting performance.

For information concerning fabrication, see SSAB's brochures on www.ssab.com or consult Tech Support, techsupport@ssab.com.

Appropriate health and safety precautions must be taken when bending, welding, cutting, grinding or otherwise working on the product.

Contact Information

www.ssab.com/contact

SSAB Domex®

SSAB Domex 460MC

General Product Description

SSAB Domex 460MC meets or exceeds the requirements of S460MC in EN 10149-2. Upon agreement, it can be delivered as double certified. This double certification will enable producers of steel structures, in accordance with EN 1090, to use SSAB Domex 460MC in their CE-marked final component or structure.

Dimension Range

SSAB Domex 460MC is available in thicknesses of 2.00-13.00 mm and widths up to 1800 mm as coils, slit coils and as cut to length in lengths up to 16 meters.

Mechanical Properties

Thickness (mm)	Yield strength R_{eH} (min MPa)	Tensile strength R_m (MPa)	Elongation A_{80} [1] (min %)	Elongation A_5 [2] (min %)	Min .inner bending radius for a 90° bend
2- 3	460	550-670	15	19	0.5 xt
3.01- 6	460	550-670		19	0.7 xt
6.01- 13	460	550-670		19	0.9 xt

The mechanical properties are valid in the longitudinal direction.
Bending properties for both longitudinal and transversal direction
[1] A80 value applies for thicknesses < 3.00 mm
[2] A_5 value applies for thicknesses ≥ 3.00 mm

Impact Properties

Designation	Test temperature	Min. impact energy for longitudinal Charpy V- notch test
B	-	-
D	-20 °C	40 J
E	-40 °C	27 J

Impact testing according to ISO 148-1 is performed on thicknesses ≥ 6mm. The specified minimum value corresponds to a full-size specimen.

Chemical Composition (Ladle analysis)

C (max %)	Si (max %)	Mn (max %)	P (max %)	S (max %)	Al_{tot} (min %)	Nb (max %)	V (max %)	Ti (max %)
0.10	0.03[1]	1.50	0.025	0.010	0.015	0.09[2]	0.20[2]	0.15[2]

[1] SSAB Domex 460MC meets the requirements of category A (thin coatings) for hot-dip zinc-coating in EN 10149-2. Category B for thick coatings is available on request (Si 0.15-0.21%).
[2] The sum of Nb, V and Ti is max 0.22%.
The steel is grain refined.

Carbon Equivalent Values

Thickness (mm)	2 - 13
CEV Typical	0.29
CET Typical	0.20

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40}$$

$$CEV = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

Tolerances

SSAB Domex is delivered with SSAB Domex tolerances, with improved guarantees compared to EN 10051:2010. More details are available at SSAB.com

Thickness

SSAB Domex thickness tolerances correspond to 2/3 of EN 10051:2010 as default value. Tighter tolerances are available on request.

Length and Width

SSAB Domex tolerances for width and length are according to SSAB standard and offer narrower width and length tolerances compared to EN 10051:2010.

For coil and sheet with mill edge, the width tolerances are corresponding to-0/+20 mm.

For coil and sheet with cut edge, the width tolerances are corresponding to-0/+2 mm.

After special agreement, tighter tolerances can be delivered for certain products and dimensions.

Length tolerances only apply for cut to length sheets.

Shape

SSAB Domex is delivered with shape tolerances according to EN 10051:2010. Tighter tolerances are available on request.

Flatness

SSAB Domex tolerances correspond to SSAB Flatness Guarantees Class A.

SSAB Domex tolerances guarantee a maximum flatness deviation of 3 mm/m in addition to the EN 10051:2010 flatness requirements.

Flatness guarantees only apply for cut to length sheets.

Surface Properties

According to EN 10 163-2 Class A, Subclass 3.

Delivery Conditions

Thermomechanically rolled.

Surface and edge condition

SSAB Domex 460MC is available with non-pickled or pickled surface with mill or cut edge.

Fabrication and Other Recommendations

SSAB Domex 460MC is a cold forming steel not suited for heat treatments at temperatures above 580°C, since the material then may lose its guaranteed properties.

SSAB Domex 460MC has good welding, cold forming and cutting performance.

For information concerning fabrication, see SSAB's brochures on www.ssab.com or consult Tech Support, help@ssab.com.

Appropriate health and safety precautions must be taken when bending, welding, cutting, grinding or otherwise working on the product.

Contact Information

www.ssab.com/contact

Filename:
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Dimensioning code:: EN 14509, Euronormi EC3

GENERAL INFORMATION OF THE STRUCTURE

Basic data of the structure

Construction to be used in cladding	Composite Panel, external wall
Combination type in serviceability limit state	Frequent combination
Deflection limit:	L/100
Sheet:	1 SPB150WS
- thermal insulating capacity:	0.29 W/m2K
- sound reduction index:	32 dB

Influence of temperature difference considered	Case 1	Case 2
-temperature of inside surface	20	20
-temperature of outside surface	55	-30

Supports and splices

Support	dY	Support width	Type of splice	Support piece
A	-	200	End support	No
B	-	200	Gap at Support	No
C	-	200	Gap at Support	No
D	-	200	Gap at Support	No
E	-	200	Gap at Support	No
F	-	200	Gap at Support	No
G	-	200	Gap at Support	No
H	-	200	Gap at Support	No
I	-	200	Gap at Support	No
J	-	200	Gap at Support	No
K	-	200	Gap at Support	No
L	-	200	Gap at Support	No
M	-	200	Gap at Support	No
N	-	200	Gap at Support	No
O	-	200	Gap at Support	No
P	-	200	Gap at Support	No
Q	-	200	End support	No

Chosen sheets

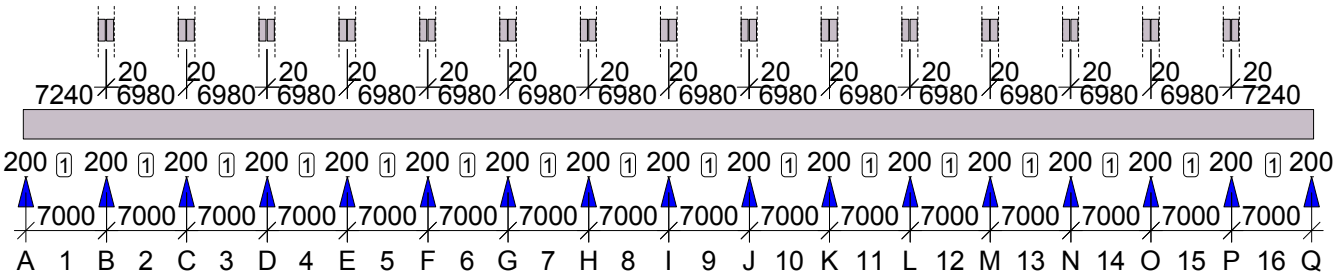
Nr		T,outer / T,inner [mm] / [mm]	Length [mm]	Weight [kg/st]
1	1 SPB150WS	0.60 / 0.70	7240	222.20
2	1 SPB150WS	0.60 / 0.60	6980	214.22
3	1 SPB150WS	0.60 / 0.60	6980	214.22
4	1 SPB150WS	0.50 / 0.50	6980	214.22
5	1 SPB150WS	0.50 / 0.50	6980	214.22
6	1 SPB150WS	0.50 / 0.50	6980	214.22
7	1 SPB150WS	0.50 / 0.50	6980	214.22
8	1 SPB150WS	0.50 / 0.50	6980	214.22
9	1 SPB150WS	0.50 / 0.50	6980	214.22
10	1 SPB150WS	0.50 / 0.50	6980	214.22
11	1 SPB150WS	0.50 / 0.50	6980	214.22

Nr		T,outer / T,inner [mm] / [mm]	Length [mm]	Weight [kg/st]
12	1 SPB150WS	0.50 / 0.50	6980	214.22
13	1 SPB150WS	0.50 / 0.50	6980	214.22
14	1 SPB150WS	0.60 / 0.60	6980	214.22
15	1 SPB150WS	0.60 / 0.60	6980	214.22
16	1 SPB150WS	0.60 / 0.70	7240	222.20

Total weight of the sheeting: 27.83 kg/m2

- Chosen sheets fulfill dimension criteria Maximum utilityrate: 93.8 %
- Chosen fastenings fulfill dimension criteria Maximum utilityrate: 89.8 %

Structural model



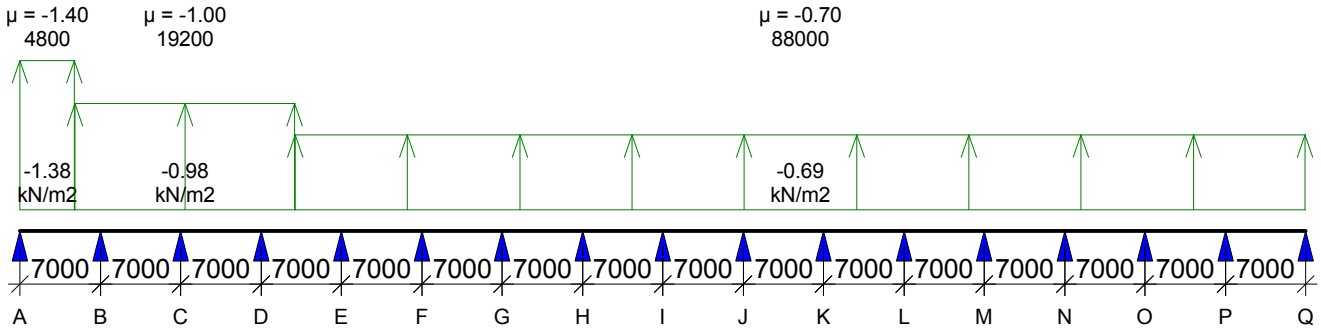
LOADS

Wind loads

Basic wind load 0.98 kN/m2

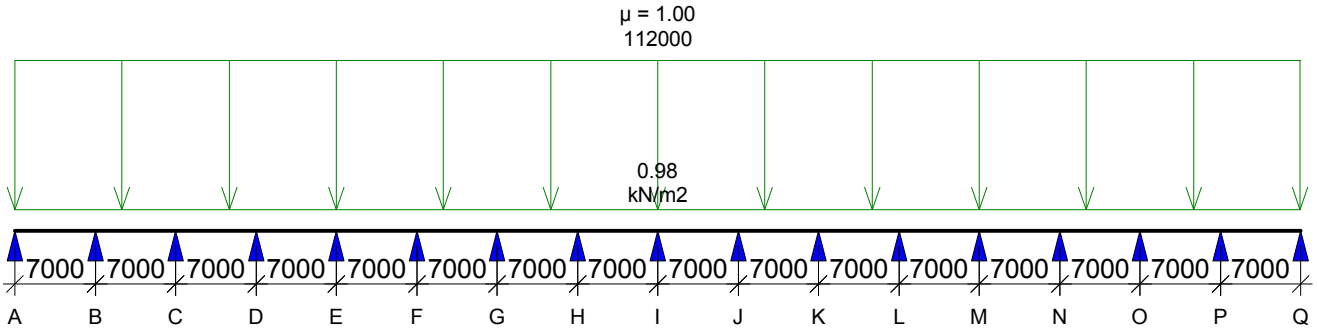
Load case: 1

- Form factors



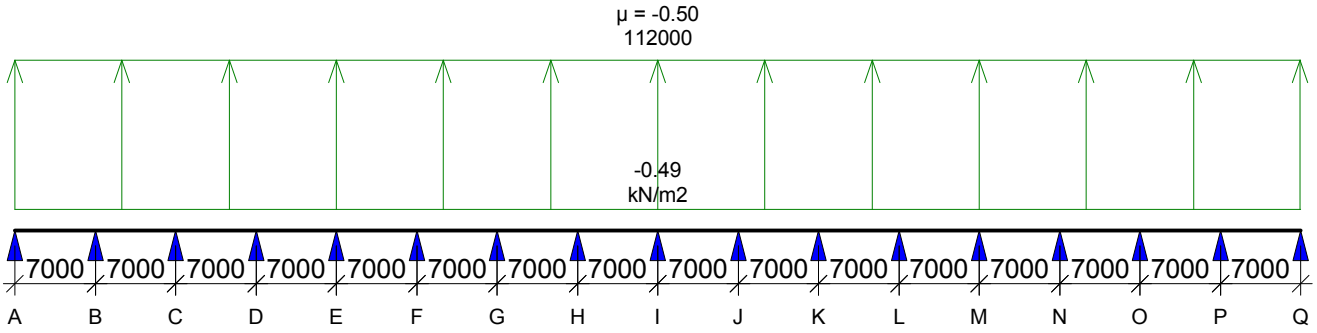
Load case: 2

- Form factors



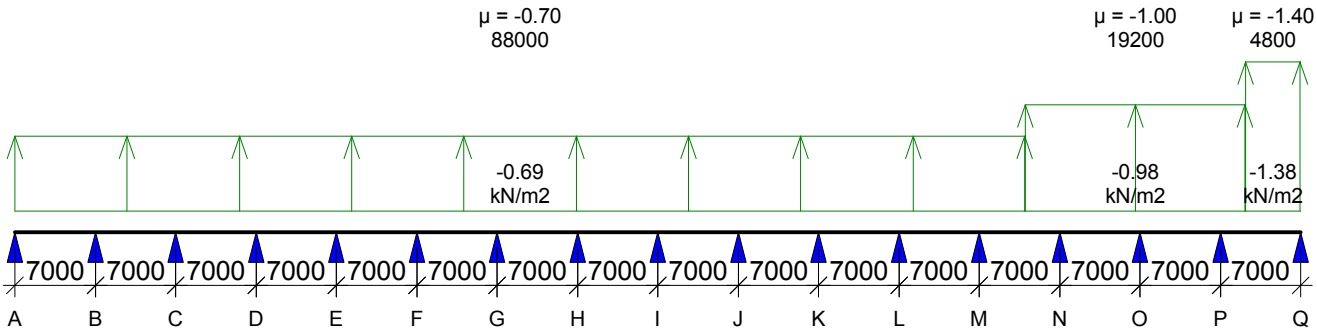
Load case: 3

- Form factors



Load case: 4

- Form factors



Explanation for loadparameters F1, F2, F3 and F4

- Uniform load:	F1	load intensity [kN/m2]
	F3	distance from the left support to load begin [mm]
	F4	loading length [mm]
- Trapezoid load:	F1	load intensity at left end [kN/m2]
	F2	load intensity at right end [kN/m2]
	F3	distance from the left support to load begin [mm]
	F4	loading length [mm]
- Line load:	F1	load intensity [kN/m]
(transversal)	F3	distance from the left support to load begin [mm]
	F4	loading length [mm]

- NB! loads are given to 1 m wide strip

Partial safety factors for loads:	Ultimate limit state			Serviceability limit state		
	Max	Min	Comb.fac	Max	Min	Comb.fac
Dead loads:	1.35	1.00		1.00	1.00	
Snow loads:	1.50	0.00	0.60	1.00 (*0.75)	0.00	0.75/0.45
Wind loads:	1.50	0.00	0.60	1.00 (*0.75)	0.00	0.75/0.45
Live loads:	1.50	0.00	0.70	1.00 (*0.50)	0.00	0.50/0.35
Termal Loads:	1.50	0.00	0.60	1.00	0.00	1.00/0.60

RESULTS

1 SPB150WS

Degree of utilization in each sheets

Sheet Nr	T,outer / T,inner [mm] / [mm]	Field [%]	Support [%]	Deflection [%]
1	0.60 / 0.70	93.8	70.5	54.6
2	0.60 / 0.60	84.0	58.8	50.3
3	0.60 / 0.60	84.0	58.8	50.3
4	0.50 / 0.50	91.4	58.8	55.0
5	0.50 / 0.50	91.4	58.8	55.0
6	0.50 / 0.50	91.4	58.8	55.0
7	0.50 / 0.50	91.4	58.8	55.0
8	0.50 / 0.50	91.4	58.8	55.0
9	0.50 / 0.50	91.4	58.8	55.0
10	0.50 / 0.50	91.4	58.8	55.0
11	0.50 / 0.50	91.4	58.8	55.0
12	0.50 / 0.50	91.4	58.8	55.0
13	0.50 / 0.50	91.4	58.8	55.0
14	0.60 / 0.60	84.0	58.8	50.3
15	0.60 / 0.60	84.0	58.8	50.3
16	0.60 / 0.70	93.8	70.5	54.6

Maximum utilityrate: 93.8 %
Dimensioning case: Moment in the field

Degree of utilization in each spans

Field/ Support	M [%]	R/V [%]	Combination [%]	Deflection [%]
A	4.9	70.5 V	0.0 M+V	
1	93.8 (3500)			54.6 (3500)
B	3.9	61.6 V	0.0 M+V	
2	84.0 (3500)			50.3 (3500)
C	3.9	58.8 R	0.0 M+V	
3	84.0 (3500)			50.3 (3500)
D	4.3	58.8 R	0.0 M+V	
4	91.4 (3500)			55.0 (3500)
E	3.6	58.8 R	0.0 M+V	
5	91.4 (3500)			55.0 (3500)

Field/ Support	M [%]	R/V [%]	Combination [%]	Deflection [%]
F	3.3	58.8 R	0.0 M+V	
6	91.4 (3500)			55.0 (3500)
G	3.3	58.8 R	0.0 M+V	
7	91.4 (3500)			55.0 (3500)
H	3.3	58.8 R	0.0 M+V	
8	91.4 (3500)			55.0 (3500)
I	3.3	58.8 R	0.0 M+V	
9	91.4 (3500)			55.0 (3500)
J	3.3	58.8 R	0.0 M+V	
10	91.4 (3500)			55.0 (3500)
K	3.3	58.8 R	0.0 M+V	
11	91.4 (3500)			55.0 (3500)
L	3.3	58.8 R	0.0 M+V	
12	91.4 (3500)			55.0 (3500)
M	3.6	58.8 R	0.0 M+V	
13	91.4 (3500)			55.0 (3500)
N	4.3	58.8 R	0.0 M+V	
14	84.0 (3500)			50.3 (3500)
O	3.9	58.8 R	0.0 M+V	
15	84.0 (3500)			50.3 (3500)
P	3.9	61.6 V	0.0 M+V	
16	93.8 (3500)			54.6 (3500)
Q	4.9	70.5 V	0.0 M+V	

(The dimensioning point is printed in braces)
Maximum utilityrate: 93.8 %
Dimensioning case: Moment in the field

Span results

Span/ Support	Moment [N/mm2] Msd	Mc,rd	Point load capasity [kN/m] Fsd	Rw,rd	Deflection [mm] f	f,allowed
A	4.9	98.4	5.17	18.21		
1	-123.8	132.0			38.2	70.0
B	3.8	98.4	5.17	8.79		
2	-110.9	132.0			-35.2	70.0
C	3.8	98.4	5.17	8.79		
3	-110.9	132.0			-35.2	70.0
D	4.2	98.4	5.17	8.79		
4	131.6	144.0			-38.5	70.0
E	3.5	98.4	5.17	8.79		
5	131.6	144.0			-38.5	70.0
F	3.3	98.4	5.17	8.79		
6	131.6	144.0			-38.5	70.0
G	3.3	98.4	5.17	8.79		
7	131.6	144.0			-38.5	70.0
H	3.3	98.4	5.17	8.79		
8	131.6	144.0			-38.5	70.0
I	3.3	98.4	5.17	8.79		
9	131.6	144.0			-38.5	70.0
J	3.3	98.4	5.17	8.79		
10	131.6	144.0			-38.5	70.0
K	3.3	98.4	5.17	8.79		
11	131.6	144.0			-38.5	70.0
L	3.3	98.4	5.17	8.79		
12	131.6	144.0			-38.5	70.0
M	3.5	98.4	5.17	8.79		
13	131.6	144.0			-38.5	70.0

N	4.2	98.4	5.17	8.79		
14	-110.9	132.0			-35.2	70.0
O	3.8	98.4	5.17	8.79		
15	-110.9	132.0			-35.2	70.0
P	3.8	98.4	5.17	8.79		
16	-123.8	132.0			38.2	70.0
Q	4.9	98.4	5.17	18.21		

Support reactions Fsd [kN/m]

Support	Dead load ą)	Snow ą)		Wind ą)		Temp. ą)		Combination ˛)	
		min	max	min	max	min	max	min	max
A	0.00	-	-	-4.68	3.44	0.00	0.00	-7.03	5.17
B	0.00	-	-	-7.54	6.89	0.00	0.00	-11.31	10.33
C	0.00	-	-	-6.89	6.89	0.00	0.00	-10.33	10.33
D	0.00	-	-	-6.55	6.89	0.00	0.00	-9.83	10.33
E	0.00	-	-	-5.01	6.89	0.00	0.00	-7.51	10.33
F	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
G	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
H	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
I	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
J	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
K	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
L	0.00	-	-	-4.82	6.89	0.00	0.00	-7.23	10.33
M	0.00	-	-	-5.01	6.89	0.00	0.00	-7.51	10.33
N	0.00	-	-	-6.55	6.89	0.00	0.00	-9.83	10.33
O	0.00	-	-	-6.89	6.89	0.00	0.00	-10.33	10.33
P	0.00	-	-	-7.54	6.89	0.00	0.00	-11.31	10.33
Q	0.00	-	-	-4.68	3.44	0.00	0.00	-7.03	5.17

ą) Values are unfactored
˛) Combination values are factored

DIMENSIONING FOR FASTENINGS

Fastening to support

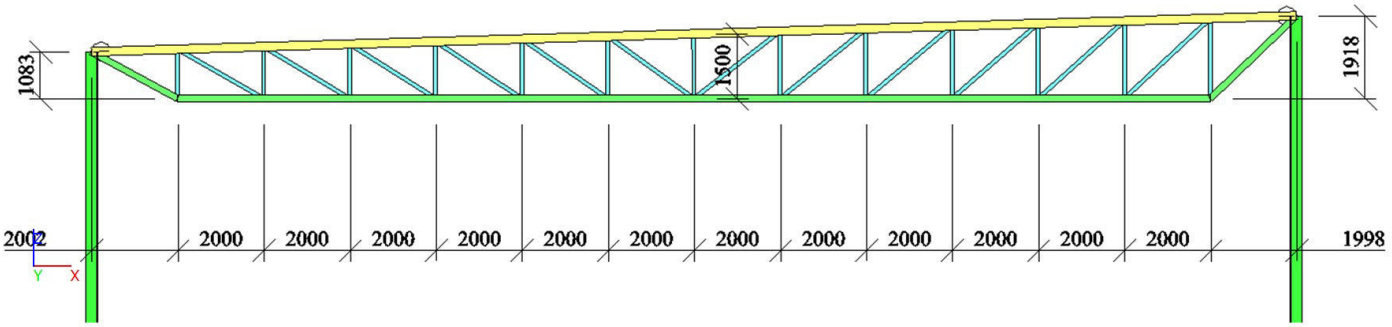
Support steel yield strength:	355	N/mm2
Support wall thickness:	5	mm
Screw material, gasket:		Carbon-steel, hardened, with washer
Screw type:		SDT14-S19-5,5*186
Manufacturer:		SFS intec Oy
Total number of fasteners/calculation width:	120	pc/m (whole calculation model)

Support	Pc [1])	Distance [2])	Utilityrate [%]	Dimensioning criterion
A	5	30	82.2	Pull-over resistance of the fastener
B	4/4	30	89.8	Pull-over resistance of the fastener
C	4/4	30	75.6	Pull-over resistance of the fastener
D	4/5	30	85.3	Pull-over resistance of the fastener
E	4/4	30	89.1	Pull-over resistance of the fastener
F	4/4	30	82.7	Pull-over resistance of the fastener
G	4/4	30	82.7	Pull-over resistance of the fastener
H	4/4	30	82.7	Pull-over resistance of the fastener
I	4/4	30	82.7	Pull-over resistance of the fastener
J	4/4	30	82.7	Pull-over resistance of the fastener
K	4/4	30	82.7	Pull-over resistance of the fastener
L	4/4	30	82.7	Pull-over resistance of the fastener
M	4/4	30	89.1	Pull-over resistance of the fastener
N	5/4	30	85.3	Pull-over resistance of the fastener
O	4/4	30	75.6	Pull-over resistance of the fastener

P	4/4	30	89.8	Pull-over resistance of the fastener
Q	5	30	82.2	Pull-over resistance of the fastener

ą) number of fasteners/sheet end
ˌ) distance between fastener and end of the sheet [mm]

1. Truss V1



1.1. Bill of material V1

Name	Mass [kg]	Surface [m²]	Volume [m³]
Total results :	3854,5	53,912	4,9102e-01

Explanations of symbols	
Surface	Note: only one surface of each 2D member is taken into account for calculation of the surface area.

CSS	Material	Unit mass [kg/m]	Length [m]	Mass [kg]	Surface [m²]	Unit volume mass [kg/m³]	Volume [m³]
CS8 - V1 - SHS90/90/6.3	S 355	16,2	49,593	805,9	17,060	7850,0	1,0266e-01
CS9 - V1 - SHSCF200/200/12.0	S 355	66,0	28,012	1849,3	20,673	7850,0	2,3558e-01
CS10 - V1 - SHSCF150/150/10.0	S 355	41,3	29,046	1199,3	16,178	7850,0	1,5278e-01

1.2. Check of steel V1

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS
Layer : Truss1

Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B117	CS9 - V1 - SHSCF200/200/12.0	S 355	1. LC/1	4,003	0,83	0,43	0,83
B120	CS10 - V1 - SHSCF150/150/10.0	S 355	1. LC/1	10,000	0,87	0,87	0,00
B135	CS8 - V1 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,89	0,47	0,89

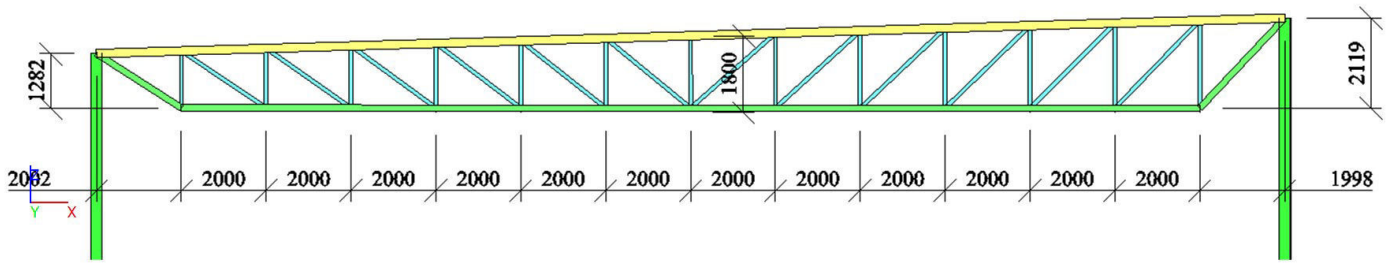
1.3. Deformations on member

Linear calculation, Extreme : Cross-section, System : Principal
Selection : All
Combinations : SLS
Cross-section : CS10 - V1 - SHSCF150/150/10.0

Member	dx [m]	Case	ux [mm]	uy [mm]	uz [mm]	fix [mrad]	fiy [mrad]	fiz [mrad]	Resultant [mm]
B120	0,000	SLS/3	**-21,8**	0,0	-6,8	0,0	4,1	0,0	22,9
B120	24,000	SLS/4	**26,3**	0,0	-19,6	0,0	-11,2	0,0	32,8
B120	10,999	SLS/5	15,2	0,0	**-102,6**	0,0	0,0	0,0	103,7
B123	2,770	SLS/3	-16,2	0,0	**15,1**	0,0	-2,7	0,0	22,1
B123	0,692	SLS/5	3,2	0,0	-22,7	0,0	**-12,1**	0,0	22,9
B122	1,517	SLS/5	17,9	0,0	-8,1	0,0	**14,0**	0,0	19,6

2. Truss V2

2.1. Analysis model



2.2. Bill of material V2

Name	Mass [kg]	Surface [m²]	Volume [m³]
Total results :	3461,9	56,248	4,4101e-01

Explanations of symbols	
Surface	Note: only one surface of each 2D member is taken into account for calculation of the surface area.

CSS	Material	Unit mass [kg/m]	Length [m]	Mass [kg]	Surface [m²]	Unit volume mass [kg/m³]	Volume [m³]
CS8 - V2 - SHS90/90/6.3	S 355	16,2	53,677	872,2	18,465	7850,0	1,1111e-01
CS9 - V2 - SHSCF200/200/10.0	S 355	57,0	28,012	1596,5	21,205	7850,0	2,0337e-01
CS10 - V2 - SHSCF150/150/8.0	S 355	33,9	29,289	993,3	16,578	7850,0	1,2653e-01

2.3. Check of steel

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS
Layer : Truss2

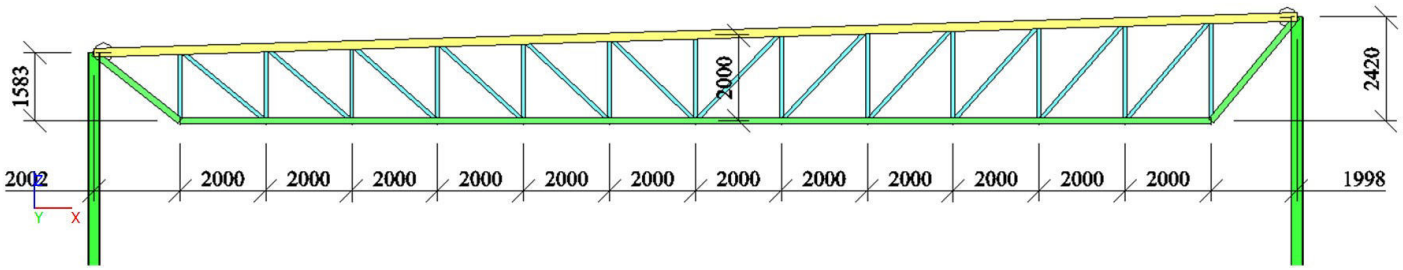
Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B148	CS9 - V2 - SHSCF200/200/10.0	S 355	1. LC/1	4,003	0,87	0,43	0,87
B151	CS10 - V2 - SHSCF150/150/8.0	S 355	1. LC/1	10,000	0,94	0,94	0,00
B166	CS8 - V2 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,90	0,46	0,90

2.4. Deformations on member

Linear calculation, Extreme : Global
Selection : All
Combinations : SLS
Cross-section : CS10 - V2 - SHSCF150/150/8.0

Member	dx [m]	Case	ux [mm]	uy [mm]	uz [mm]	fix [mrad]	fiy [mrad]	fiz [mrad]	Resultant [mm]
B151	0,000	SLS/6	**-23,9**	0,0	-8,4	0,0	5,1	0,0	25,4
B151	24,000	SLS/4	**25,7**	0,0	-18,6	0,0	-10,5	0,0	31,7
B151	0,000	SLS/7	-0,2	**0,0**	-16,3	**0,0**	8,8	**0,0**	16,3
B151	11,000	SLS/5	13,7	0,0	**-95,0**	0,0	0,1	0,0	96,0
B154	2,912	SLS/3	-16,7	0,0	**17,2**	0,0	-2,8	0,0	24,0
B154	0,728	SLS/5	1,9	0,0	-21,5	0,0	**-11,4**	0,0	21,6
B153	1,783	SLS/5	16,5	0,0	-9,2	0,0	**13,1**	0,0	18,9

3. Truss V3



3.1. Bill of material

Name	Mass [kg]	Surface [m²]	Volume [m³]
Total results :	3284,1	58,911	4,1835e-01

Explanations of symbols	
Surface	Note: only one surface of each 2D member is taken into account for calculation of the surface area.

CSS	Material	Unit mass [kg/m]	Length [m]	Mass [kg]	Surface [m²]	Unit volume mass [kg/m³]	Volume [m³]
CS8 - V3 - SHS90/90/6.3	S 355	16,2	60,027	975,4	20,649	7850,0	1,2426e-01
CS9 - V3 - SHSCF200/200/8.0	S 355	46,5	28,012	1301,8	21,458	7850,0	1,6583e-01
CS10 - V3 - SHSCF150/150/8.0	S 355	33,9	29,690	1006,8	16,805	7850,0	1,2826e-01

3.2. Check of steel

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS
Layer : Truss3

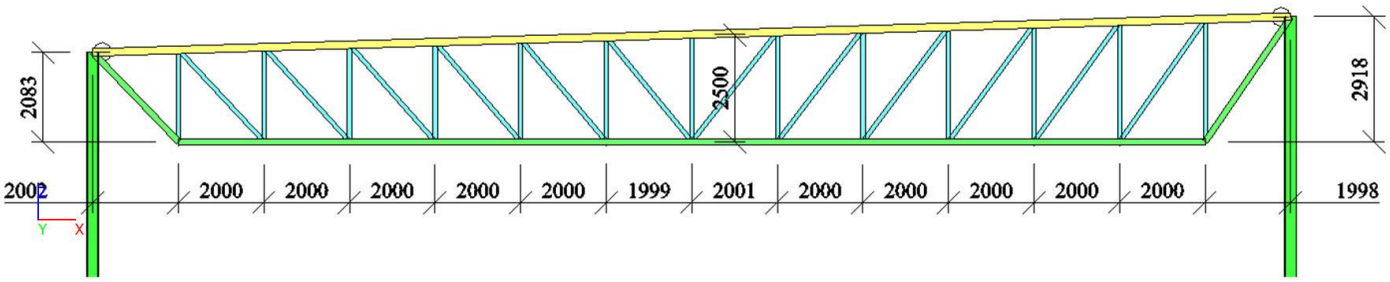
Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B24	CS9 - V3 - SHSCF200/200/8.0	S 355	1. LC/1	4,003	0,87	0,44	0,87
B27	CS10 - V3 - SHSCF150/150/8.0	S 355	1. LC/1	10,000	0,79	0,79	0,00
B42	CS8 - V3 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,92	0,46	0,92

3.3. Deformations on member

Linear calculation, Extreme : Global
Selection : All
Combinations : SLS
Cross-section : CS10 - V3 - SHSCF150/150/8.0

Member	dx [m]	Case	ux [mm]	uy [mm]	uz [mm]	fix [mrad]	fiy [mrad]	fiz [mrad]	Resultant [mm]
B27	0,000	SLS/6	**-24,8**	0,0	-6,7	0,0	4,1	0,0	25,7
B27	24,000	SLS/4	**22,1**	0,0	-15,2	0,0	-8,5	0,0	26,8
B27	0,000	SLS/7	-1,1	**0,0**	-13,0	**0,0**	6,9	**0,0**	13,0
B27	11,333	SLS/5	11,5	0,0	**-77,8**	0,0	0,0	0,0	78,7
B30	3,138	SLS/6	-16,4	0,0	**19,2**	0,0	-3,0	0,0	25,3
B30	0,628	SLS/5	0,1	0,0	-19,0	0,0	**-9,2**	0,0	19,0
B29	1,914	SLS/5	14,2	0,0	-5,6	0,0	**10,1**	0,0	15,3

4. Truss V4



4.1. Bill of material

Name	Mass [kg]	Surface [m²]	Volume [m³]
Total results :	3169,3	61,905	4,0373e-01

Explanations of symbols	
Surface	Note: only one surface of each 2D member is taken into account for calculation of the surface area.

CSS	Material	Unit mass [kg/m]	Length [m]	Mass [kg]	Surface [m²]	Unit volume mass [kg/m³]	Volume [m³]
CS8 - V4 - SHSCF100/100/6.3	S 355	17,4	70,971	1236,8	26,472	7850,0	1,5755e-01
CS9 - V4 - SHSCF180/180/8.0	S 355	41,4	28,012	1161,1	19,217	7850,0	1,4791e-01
CS10 - V4 - SHSCF140/140/6.3	S 355	25,4	30,426	771,5	16,217	7850,0	9,8274e-02

4.2. Check of steel

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS
Layer : Truss4

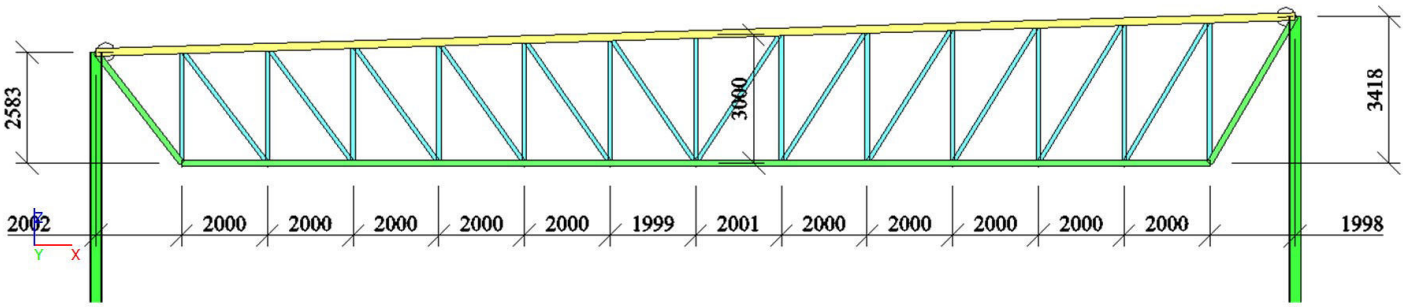
Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B55	CS9 - V4 - SHSCF180/180/8.0	S 355	1. LC/1	4,003	0,87	0,39	0,87
B58	CS10 - V4 - SHSCF140/140/6.3	S 355	1. LC/1	10,000	0,85	0,85	0,00
B73	CS8 - V4 - SHSCF100/100/6.3	S 355	2. LC/2	0,000	0,87	0,42	0,87

4.3. Deformations on member

Linear calculation, Extreme : Global
Selection : All
Combinations : SLS
Cross-section : CS10 - V4 - SHSCF140/140/6.3

Member	dx [m]	Case	ux [mm]	uy [mm]	uz [mm]	fix [mrad]	fiy [mrad]	fiz [mrad]	Resultant [mm]
B58	0,000	SLS/6	**-29,6**	0,0	-5,5	0,0	3,4	0,0	30,1
B58	24,000	SLS/4	**21,6**	0,0	-13,0	0,0	-7,0	0,0	25,3
B58	0,000	SLS/7	-3,2	**0,0**	-10,7	**0,0**	5,5	**0,0**	11,1
B58	11,333	SLS/5	9,7	0,0	**-64,0**	0,0	0,1	0,0	64,8
B61	3,537	SLS/6	-16,9	0,0	**24,0**	0,0	-3,4	0,0	29,4
B61	0,707	SLS/5	-0,8	0,0	-17,1	0,0	**-7,5**	0,0	17,2
B60	2,167	SLS/5	11,8	0,0	-3,6	0,0	**8,0**	0,0	12,3

5. Truss V5



5.1. Bill of material

Name	Mass [kg]	Surface [m²]	Volume [m³]
Total results :	3085,8	68,100	3,9310e-01

Explanations of symbols	
Surface	Note: only one surface of each 2D member is taken into account for calculation of the surface area.

CSS	Material	Unit mass [kg/m]	Length [m]	Mass [kg]	Surface [m²]	Unit volume mass [kg/m³]	Volume [m³]
CS8 - V5 - SHS100/100/6.3	S 355	18,2	82,307	1499,0	31,606	7850,0	1,9095e-01
CS9 - V5 - SHSCF180/180/6.3	S 355	33,3	28,012	932,4	19,413	7850,0	1,1877e-01
CS10 - V5 - SHS140/140/5.0	S 355	21,0	31,227	654,5	17,081	7850,0	8,3376e-02

5.2. Check of steel

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS
Layer : Truss6

Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B86	CS9 - V5 - SHSCF180/180/6.3	S 355	1. LC/1	4,003	0,87	0,39	0,87
B89	CS10 - V5 - SHS140/140/5.0	S 355	1. LC/1	10,000	0,86	0,86	0,00
B104	CS8 - V5 - SHS100/100/6.3	S 355	2. LC/2	0,000	0,94	0,40	0,94

5.3. Deformations on member

Linear calculation, Extreme : Global
Selection : All
Combinations : SLS
Cross-section : CS10 - V5 - SHS140/140/5.0

Member	dx [m]	Case	ux [mm]	uy [mm]	uz [mm]	fix [mrad]	fiy [mrad]	fiz [mrad]	Resultant [mm]
B89	0,000	SLS/6	**-31,8**	0,0	-4,9	0,0	3,0	0,0	32,2
B89	24,000	SLS/4	**21,2**	0,0	-11,9	0,0	-6,1	0,0	24,3
B89	0,000	SLS/7	-4,1	**0,0**	-9,5	**0,0**	4,7	**0,0**	10,3
B89	11,999	SLS/5	9,4	0,0	**-57,1**	0,0	-0,2	0,0	57,9
B92	3,959	SLS/6	-16,3	0,0	**27,1**	0,0	-3,7	0,0	31,6
B92	0,660	SLS/5	-1,7	0,0	-16,8	0,0	**-6,5**	0,0	16,9
B91	2,614	SLS/5	10,8	0,0	-3,3	0,0	**6,8**	0,0	11,3

6. Check of steel

Linear calculation, Extreme : Cross-section
Selection : All
Class : All ULS

Member	css	mat	Case	dx [m]	un.check [-]	sec.check [-]	stab.check [-]
B24	CS9 - V3 - SHSCF200/200/8.0	S 355	1. LC/1	4,003	0,87	0,44	0,87
B88	CS10 - C1 - HEB280	S 355	2. LC/2	0,000	0,51	0,08	0,51
B27	CS10 - V3 - SHSCF150/150/8.0	S 355	1. LC/1	10,000	0,79	0,79	0,00
B42	CS8 - V3 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,92	0,46	0,92
B55	CS9 - V4 - SHSCF180/180/8.0	S 355	1. LC/1	4,003	0,87	0,39	0,87
B58	CS10 - V4 - SHSCF140/140/6.3	S 355	1. LC/1	10,000	0,85	0,85	0,00
B73	CS8 - V4 - SHSCF100/100/6.3	S 355	2. LC/2	0,000	0,87	0,42	0,87
B86	CS9 - V5 - SHSCF180/180/6.3	S 355	1. LC/1	4,003	0,87	0,39	0,87
B89	CS10 - V5 - SHS140/140/5.0	S 355	1. LC/1	10,000	0,86	0,86	0,00
B104	CS8 - V5 - SHS100/100/6.3	S 355	2. LC/2	0,000	0,94	0,40	0,94
B117	CS9 - V1 - SHSCF200/200/12.0	S 355	1. LC/1	4,003	0,83	0,43	0,83
B120	CS10 - V1 - SHSCF150/150/10.0	S 355	1. LC/1	10,000	0,87	0,87	0,00
B135	CS8 - V1 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,89	0,47	0,89
B148	CS9 - V2 - SHSCF200/200/10.0	S 355	1. LC/1	4,003	0,87	0,43	0,87
B151	CS10 - V2 - SHSCF150/150/8.0	S 355	1. LC/1	10,000	0,94	0,94	0,00
B166	CS8 - V2 - SHS90/90/6.3	S 355	2. LC/2	0,000	0,90	0,46	0,90

MODEL - GENERAL DATA

General	Model name	:	Truss3D_big3	
	Project name	:	Diploma	
	Type of model	:	3D	
	Positive direction of global axis Z	:	Upward	
	Classification of load cases and combinations	:	According to Standard: EN 1990 National annex: CSN - Czech Republic	

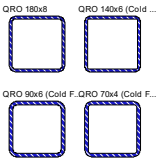
FE MESH SETTINGS

General	Target length of finite elements	l_{FE}	:	0.5 m
	Maximum distance between a node and a line to integrate it into the line	ε	:	0.0 m
	Maximum number of mesh nodes (in thousands)		:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
	☒ Activate member divisions for large deformation or post-critical analysis			
	☒ Use division for members with node lying on them			
Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
	Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
	Shape direction of finite elements		:	Triangles and quadrangles ☒ Same squares where possible

1.3 MATERIALS

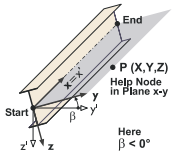
Matl. No.	Modulus E [MPa]	Modulus G [MPa]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/K]	Partial Factor γ_M [-]	Material Model
1	Steel S 355 | EN 1993-1-1:2005-05						
	210000.000	80769.200	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic
2	Steel S 690 QL | EN 1993-1-12:2007-02						
	210000.000	80769.200	0.300	78.50	1.20E-05	1.00	Isotropic Linear Elastic

1.13 CROSS-SECTIONS



Section No.	Matl. No.	J [mm⁴] / A [mm²]	I_y [mm⁴] / A_y [mm²]	I_z [mm⁴] / A_z [mm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
2	QRO 180x8 | EN 10219-2:2006							
	1	41890000.0 5280.0	25460000.0 2325.7	25460000.0 2325.7	0.00	0.00	180.0	180.0
3	QRO 140x6 (kaltgefertigt)							
	2	14790000.0 3120.0	9200000.0 1355.2	9200000.0 1355.2	0.00	0.00	140.0	140.0
8	QRO 90x6 (kaltgefertigt)							
	1	3680000.0 1920.0	2200000.0 854.1	2200000.0 854.1	0.00	0.00	90.0	90.0
17	QRO 70x4 (kaltgefertigt)							
	2	1190000.0 1010.0	721000.0 446.5	721000.0 446.5	0.00	0.00	70.0	70.0

1.17 MEMBERS



Mbr. No.	Line No.	Member	Rotation Type	Rotation β [°]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
60	426	Beam	Angle	0.00	2	2	1	-	-	-	2.001	XZ
85	576	Beam	Angle	0.00	3	3	2	-	-	-	2.000	X
97	374	Beam	Angle	0.00	20	20	-	-	-	-	1.584	Z
100	116	Beam	Angle	0.00	8	8	1	1	-	-	1.642	Z
157	139	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
180	184	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
205	106	Beam	Angle	0.00	17	17	1	1	-	-	2.551	XZ
221	221	Beam	Angle	0.00	8	8	1	1	-	-	1.703	Z
222	259	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
233	228	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
245	231	Beam	Angle	0.00	17	17	1	1	-	-	2.627	XZ
284	293	Beam	Angle	0.00	8	8	1	1	-	-	1.764	Z
315	321	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
319	944	Beam	Angle	0.00	17	17	1	1	-	-	2.667	XZ
320	1486	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
373	141	Beam	Angle	0.00	17	17	1	1	-	-	2.588	XZ
393	400	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
395	502	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
402	402	Beam	Angle	0.00	17	17	1	1	-	-	2.707	XZ
494	1498	Beam	Angle	0.00	8	8	1	1	-	-	1.885	Z
539	385	Beam	Angle	0.00	8	8	1	1	-	-	1.824	Z
588	586	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
599	618	Beam	Angle	0.00	17	17	1	1	-	-	2.748	XZ
600	601	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
654	673	Beam	Angle	0.00	8	8	1	1	-	-	1.945	Z
669	665	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X

1.17 MEMBERS

Mbr. No.	Line No.	Member	Rotation Type	Rotation β [°]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
754	967	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
771	1329	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
772	812	Beam	Angle	0.00	17	17	1	1	-	-	2.876	XZ
823	2454	Beam	Angle	0.00	8	8	1	1	-	-	2.006	Z
830	804	Beam	Angle	0.00	8	8	1	1	-	-	2.067	Z
837	2092	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
843	971	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
898	927	Beam	Angle	0.00	20	20	-	-	-	-	4.570	Z
910	926	Beam	Angle	0.00	20	20	-	-	-	-	5.000	Z
911	1000	Beam	Angle	0.00	1	1	-	-	-	-	9.570	Z
1019	1027	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
1021	1160	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
1064	1070	Beam	Angle	0.00	8	8	1	1	-	-	2.188	Z
1099	686	Beam	Angle	0.00	17	17	1	1	-	-	2.790	XZ
1108	1526	Beam	Angle	0.00	17	17	1	1	-	-	3.009	XZ
1170	1021	Beam	Angle	0.00	17	17	1	1	-	-	2.964	XZ
1191	1203	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
1198	1351	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
1274	1310	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
1300	1355	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
1316	1377	Beam	Angle	0.00	8	8	1	1	-	-	2.369	Z
1345	1531	Beam	Angle	0.00	8	8	1	1	-	-	2.248	Z
1370	1535	Beam	Angle	0.00	17	17	1	1	-	-	3.101	XZ
1373	1367	Beam	Angle	0.00	2	2	-	1	-	-	2.001	XZ
1402	2124	Beam	Angle	0.00	1	1	-	-	-	-	0.846	Z
1481	1358	Beam	Angle	0.00	17	17	1	1	-	-	3.147	XZ
1530	1112	Beam	Angle	0.00	3	3	-	-	-	-	2.000	X
1604	1154	Beam	Angle	0.00	8	8	1	1	-	-	2.127	Z
1606	851	Beam	Angle	0.00	17	17	1	1	-	-	2.920	XZ
1689	667	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
1874	1744	Beam	Angle	0.00	2	2	-	-	-	-	2.001	XZ
1877	1246	Beam	Angle	0.00	8	8	1	1	-	-	2.309	Z
2101	1423	Beam	Angle	0.00	1	1	-	-	-	-	1.584	Z
2227	1199	Beam	Angle	0.00	17	17	1	1	-	-	3.055	XZ
3232	1360	Beam	Angle	0.00	3	3	-	2	-	-	2.000	X

1.21 SETS OF MEMBERS

Set No.	Set of Members Description	Type	Member No.	Length [m]	Comment
68	Column	Contin. member	97,898,910	11.154	
69	Column	Contin. member	2101,1402,911	12.000	
71	Upper chord	Contin. member	60,180,233,320,395, 588,1689,771,837,1019, 1874,1191,1274,1373	28.013	

2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CSN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Self-weight	Permanent	☒	0.000	0.000	-1.000
LC2	Roof and walls	Permanent	☐			
LC3	Technology	Permanent	☐			
LC4	Longitudinal wind longitudinal wind pressure	Wind	☐			
LC5	Transverse wind X+ transverse wind suction	Wind	☐			
LC6	Transverse wind X- transverse wind suction	Wind	☐			
LC7	Snow	Snow (H ≤ 1000 m a.s.l.)	☐			
LC8	Internal forces Y longitudinal wind pressure	Wind	☐			
LC9	Internal forces +X transverse wind suction	Wind	☐			
LC10	Internal forces -X transverse wind suction	Wind	☐			
LC11	Imperfection towards +Y	Imperfection	☐			
LC12	Imperfection towards +X	Imperfection	☐			
LC13	Imperfection towards -X	Imperfection	☐			
LC14	Live load on the floor	Imposed - Category B: office areas	☐			

2.5 LOAD COMBINATIONS

Load Combin.	DS	Load Combination Description	No.	Factor	Load Case
CO1		ULS max pressure 1	1	1.35	LC1 Self-weight
			2	1.35	LC2 Roof and walls
			3	1.35	LC3 Technology
			4	0.90	LC4 Longitudinal wind
			5	1.50	LC7 Snow
			6	0.90	LC8 Internal forces Y
			7	1.00	LC11 Imperfection towards +Y
			8	1.50	LC14 Live load on the floor

2.5 LOAD COMBINATIONS

Load Combin.	DS	Load Combination Description	No.	Factor	Load Case	
CO2		ULS max pressure 2	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	1.50	LC4	Longitudinal wind
			5	0.75	LC7	Snow
			6	1.50	LC8	Internal forces Y
			7	1.00	LC11	Imperfection towards +Y
			8	1.50	LC14	Live load on the floor
CO3		ULS max suction 1	1	1.00	LC1	Self-weight
			2	1.00	LC2	Roof and walls
			3	1.50	LC5	Transverse wind X+
			4	1.50	LC9	Internal forces +X
			5	1.00	LC12	Imperfection towards +X
CO4		ULS max suction 2	1	1.00	LC1	Self-weight
			2	1.00	LC2	Roof and walls
			3	1.50	LC6	Transverse wind X-
			4	1.00	LC13	Imperfection towards -X
CO5		USL wind X+	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	0.90	LC5	Transverse wind X+
			5	1.50	LC7	Snow
			6	0.90	LC9	Internal forces +X
			7	1.00	LC12	Imperfection towards +X
CO6		USL wind X+	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	1.50	LC5	Transverse wind X+
			5	0.75	LC7	Snow
			6	1.50	LC9	Internal forces +X
			7	1.00	LC12	Imperfection towards +X
CO7		USL wind X-	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	0.90	LC6	Transverse wind X-
			5	1.50	LC7	Snow
			6	0.90	LC10	Internal forces -X
			7	1.00	LC13	Imperfection towards -X
CO8		USL wind X-	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	1.50	LC6	Transverse wind X-
			5	0.75	LC7	Snow
			6	1.50	LC10	Internal forces -X
			7	1.00	LC13	Imperfection towards -X
CO21		SLS max pressure 1	1	1.00	LC3	Technology
			2	0.60	LC4	Longitudinal wind
			3	1.00	LC7	Snow
			4	0.60	LC8	Internal forces Y
			5	1.00	LC11	Imperfection towards +Y
			6	1.00	LC14	Live load on the floor
			7	1.00	LC14	Live load on the floor
CO22		SLS max pressure 2	1	1.00	LC1	Self-weight
			2	1.00	LC2	Roof and walls
			3	1.00	LC3	Technology
			4	1.00	LC4	Longitudinal wind
			5	0.50	LC7	Snow
			6	1.00	LC8	Internal forces Y
			7	1.00	LC11	Imperfection towards +Y
			8	1.00	LC14	Live load on the floor
CO23		SLS wind only	1	1.00	LC5	Transverse wind X+
			2	1.00	LC9	Internal forces +X
			3	1.00	LC12	Imperfection towards +X

2.6 RESULT COMBINATIONS

Result Combin.	DS	Result Combination Description	No.	Factor	Loading		Criterion	Alternate Group
RC1		Design Internal Forces	1	1.00	CO1	ULS max pressure 1	Variable	1
			2	1.00	CO2	ULS max pressure 2	Variable	1
			3	1.00	CO3	ULS max suction 1	Variable	1
			4	1.00	CO4	ULS max suction 2	Variable	1
			5	1.00	CO5	USL wind X+	Variable	1
			6	1.00	CO6	USL wind X+	Variable	1
			7	1.00	CO7	USL wind X-	Variable	1
			8	1.00	CO8	USL wind X-	Variable	1
			9	1.00	CO4	ULS max suction 2	Variable	1
RC3		Characteristic Values	1	1.00	CO21	SLS max pressure 1	Variable	1
			2	1.00	CO22	SLS max pressure 2	Variable	1
			3	1.00	CO23	SLS wind only	Variable	1
			4	1.00	CO21	SLS max pressure 1	Variable	1
			5	1.00	CO22	SLS max pressure 2	Variable	1
			6	1.00	CO23	SLS wind only	Variable	1
			7	1.00	CO24	SLS max suction 1	Variable	1
			8	1.00	CO25	SLS max suction 2	Variable	1
			9	1.00	CO26	SLS wind X+	Variable	1
			10	1.00	CO27	SLS wind X+	Variable	1
			11	1.00	CO28	SLS wind X-	Variable	1
			12	1.00	CO29	SLS wind X-	Variable	1

LC2
Roof and walls

3.2 MEMBER LOADS

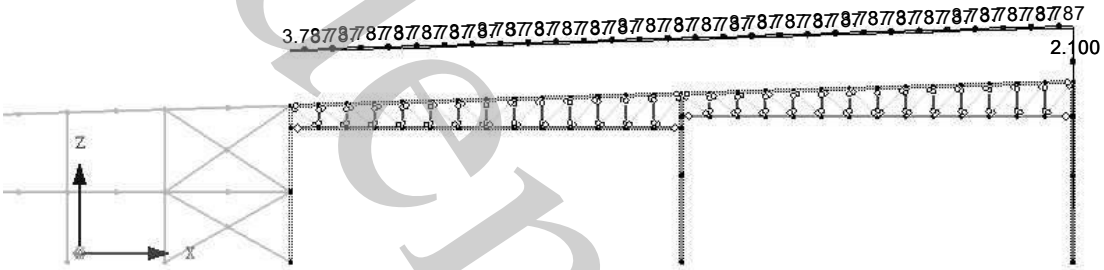
LC2: Roof and walls

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
6	Members		Force	Uniform	ZP	Projected Length	p	-3.787	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640								

LC2: ROOF AND WALLS

LC2: Roof and walls
Loads [kN/m]

In Y-direction



10.812 m

LC3
Technology

3.2 MEMBER LOADS

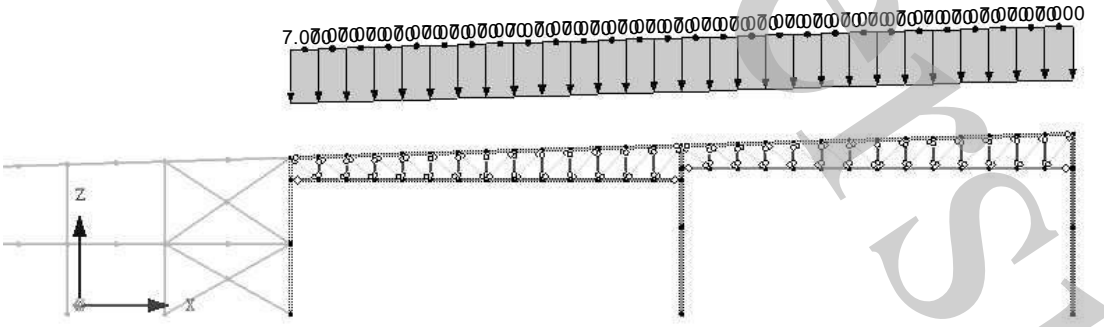
LC3: Technology

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
5	Members		Force	Uniform	ZP	Projected Length	p	-7.000	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640								

LC3: TECHNOLOGY

LC3: Technology
Loads [kN/m]

In Y-direction



10.812 m

LC4
Longitudinal wind

3.2 MEMBER LOADS

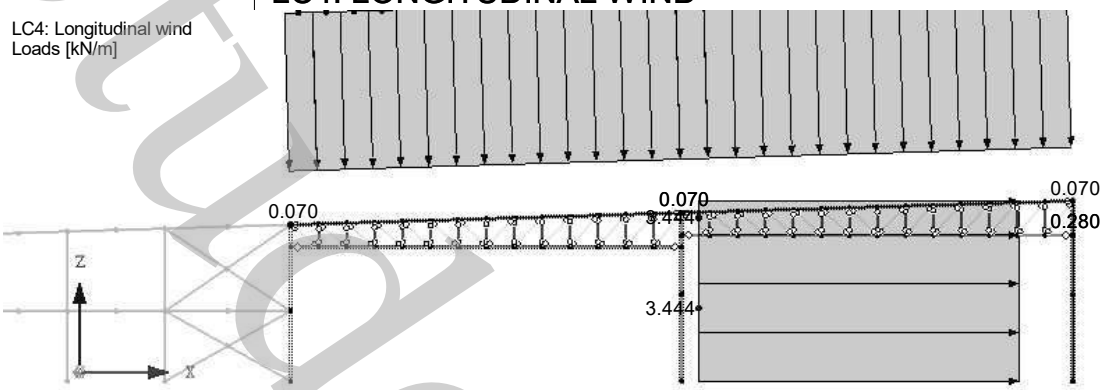
LC4: Longitudinal wind

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
16	Members		Force	Uniform	z	True Length	p	1.379	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640								
	External forces								
18	Members	940,2824	Force	Uniform	XL	True Length	p	3.444	kN/m
	External forces								

LC4: LONGITUDINAL WIND

LC4: Longitudinal wind
Loads [kN/m]

In Y-direction



10.812 m

LC5
Transverse wind X+

3.2 MEMBER LOADS

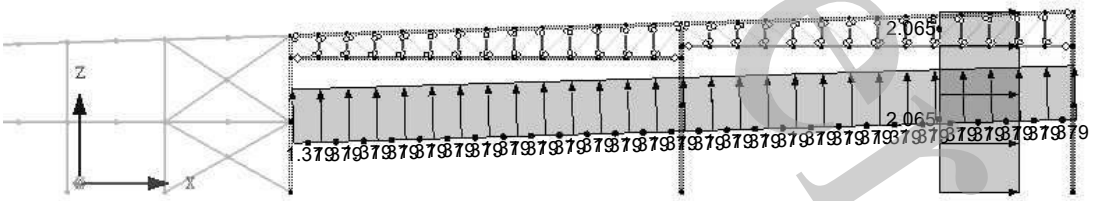
LC5: Transverse wind X+

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
31	Members		Force	Uniform	z	True Length	p	-1.379	kN/m
	60,180,233,320,395,588,771,837,902,907,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627,2759,2845, 2889,3059,3067,3297,3343,3640								
	External forces								
36	Members	940,2824	Force	Uniform	z	True Length	p	2.065	kN/m
	External forces								

LC5: TRANSVERSE WIND X+

LC5: Transverse wind X+
Loads [kN/m]

In Y-direction



10.812 m

LC6
Transverse wind X-

3.2 MEMBER LOADS

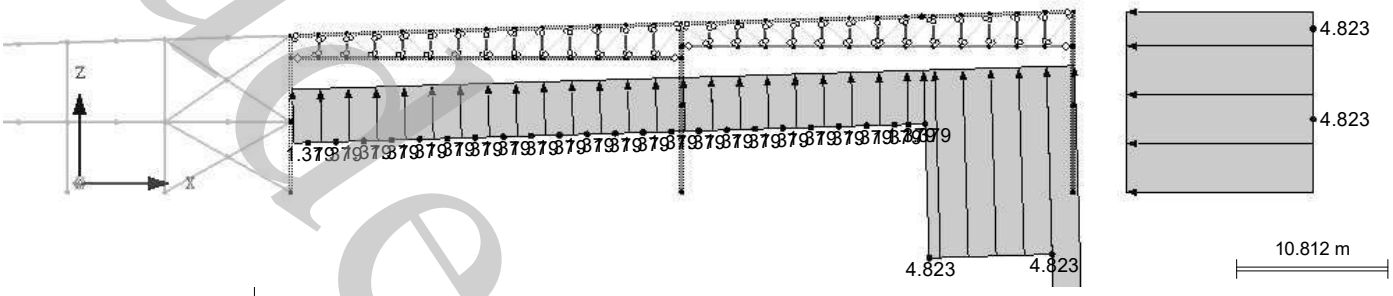
LC6: Transverse wind X-

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
31	Members		Force	Uniform	z	True Length	p	-1.379	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,3059,3297, 3343,3640								
	External forces								
36	Members	940,2824	Force	Uniform	z	True Length	p	-4.823	kN/m
	External forces								

LC6: TRANSVERSE WIND X-

LC6: Transverse wind X-
Loads [kN/m]

In Y-direction



LC7
Snow

3.2 MEMBER LOADS

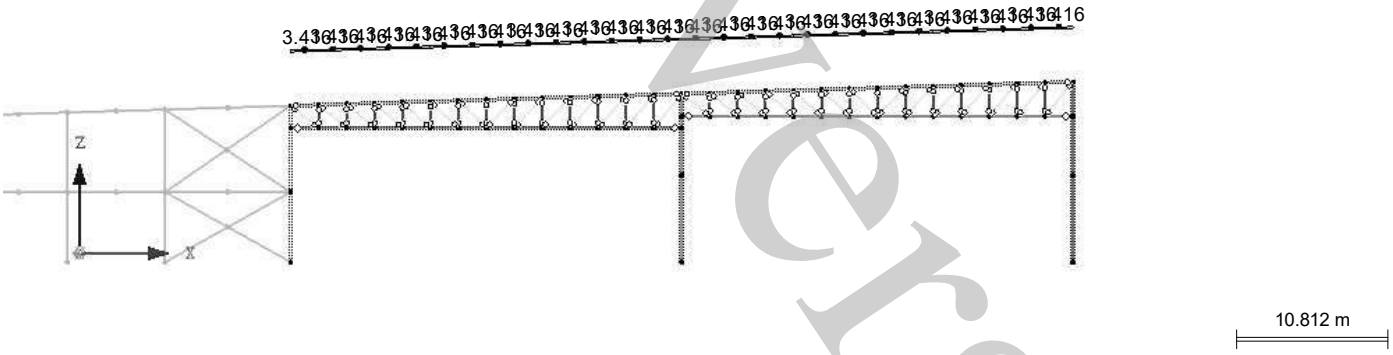
LC7: Snow

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
11	Members		Force	Uniform	ZL	True Length	p	-3.416	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640								

LC7: SNOW

LC7: Snow
Loads [kN/m]

In Y-direction



LC8
Internal forces Y

3.2 MEMBER LOADS

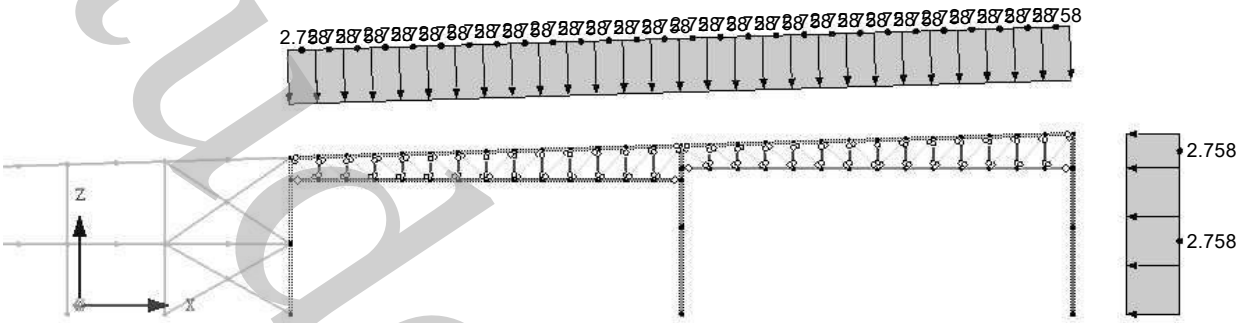
LC8: Internal forces Y

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
17	Members		Force	Uniform	z	True Length	p	2.758	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640								
19	Internal forces Members Internal forces	940,2824	Force	Uniform	XL	True Length	p	-2.758	kN/m

LC8: INTERNAL FORCES Y

LC8: Internal forces Y
Loads [kN/m]

In Y-direction



10.812 m

LC9
Internal forces +X

3.2 MEMBER LOADS

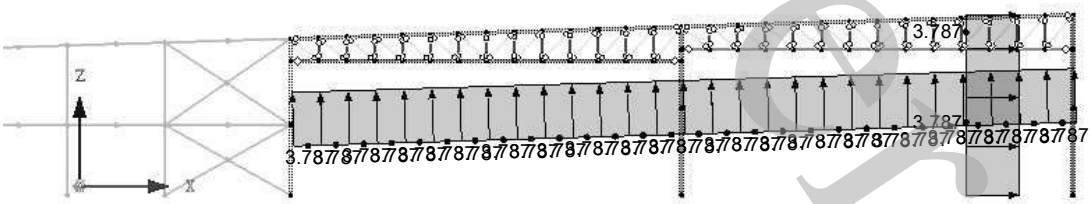
LC9: Internal forces +X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
7	Members		Force	Uniform	z	True Length	p	-3.787	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640 Internal forces								
23	Members	940,2824	Force	Uniform	z	True Length	p	3.787	kN/m
	External forces								

LC9: INTERNAL FORCES +X

LC9: Internal forces +X
Loads [kN/m]

In Y-direction



10.812 m

LC10
Internal forces -X

3.2 MEMBER LOADS

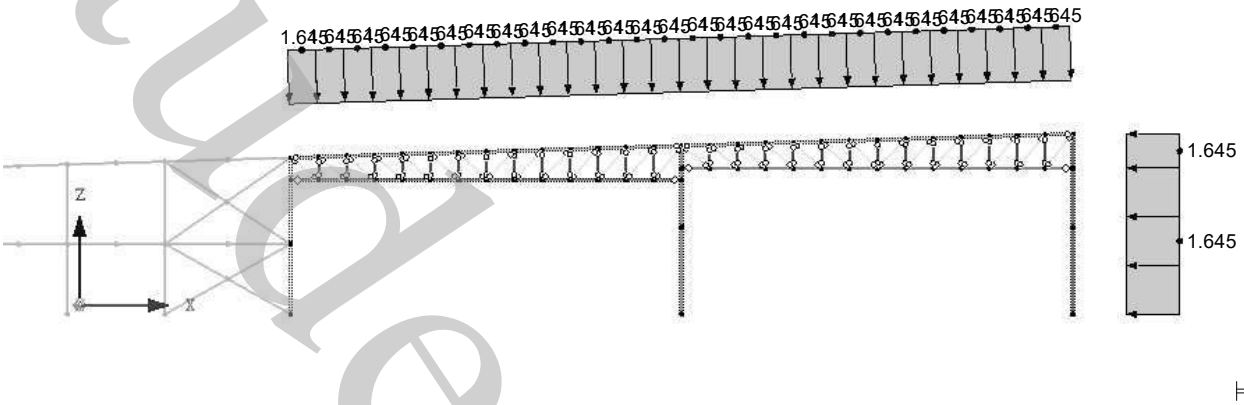
LC10: Internal forces -X

No.	Reference to	On Members No.	Load Type	Load Distribution	Load Direction	Reference Length	Load Parameters Symbol	Value	Unit
7	Members		Force	Uniform	z	True Length	p	1.645	kN/m
	60,180,233,320,395,588,771,837,897,902,907,909,1019,1191,1274,1373,1544,1689,1816,1874,1957,2082,2617,2627, 2759,2845,2889,3059,3067,3297,3343,3640 Internal forces								
18	Members	940,2824	Force	Uniform	z	True Length	p	-1.645	kN/m
	External forces								

LC10: INTERNAL FORCES -X

LC10: Internal forces -X
Loads [kN/m]

In Y-direction



3.14 IMPERFECTIONS

LC11
Imperfection towards +Y

LC11: Imperfection towards +Y

No.	Reference to	On Members No.	Dir.	Inclination $1/\varphi_0$ [-,m]	Precamber l/e_0 [-,m]	Apply e_0 from ε_0 [-]	Comment
43	Set of members	70	y	379.4730	0.0000	-	
57	Set of members	20,22,32,34,45,47, 58,60,71,73,84,86, 97,99,110,112,121, 123,132,134,143,145, 154,156,165,167,176, 178,187,189,198,200, 209,211,220,222,224, 225	y	0.0000	-632.4000	-	
	Precamber activity criterion:				Always		

3.14 IMPERFECTIONS

LC12
Imperfection towards +X

LC12: Imperfection towards +X

No.	Reference to	On Members No.	Dir.	Inclination $1/\varphi_0$ [-,m]	Precamber l/e_0 [-,m]	Apply e_0 from ε_0 [-]	Comment
1	Set of members	1-5,38-42,44,51-55, 57,64-68,70,77-81,83, 90-94,96,103-107,109, 114-118,120,125-129, 131,136-140,142, 147-151,153,158-162, 164,169-173,175, 180-184,186,191-195, 197,202-206,208, 213-217,219	z	396.8630	0.0000	-	
2	Set of members	6,43,56,69,82,95, 108,119,130,141,152, 163,174,185,196,207, 218	z	396.8630	0.0000	-	

3.14 IMPERFECTIONS

LC13
Imperfection towards -X

LC13: Imperfection towards -X

No.	Reference to	On Members No.	Dir.	Inclination $1/\varphi_0$ [-,m]	Precamber l/e_0 [-,m]	Apply e_0 from ε_0 [-]	Comment
6	Set of members	64-70	z	-396.8630	0.0000	-	

4.12 CROSS-SECTIONS - INTERNAL FORCES

Member No.	LC/CO	Node No.	Location x [m]	Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z
	Section No. 2: QRO 180x8 | EN 10219-2:2006								
2136	CO23	MAX N	2.001	▷ 302.708	-0.433	4.922	0.046	-0.463	-0.050
588	CO1	MIN N	0.000	▷ -1319.750	-2.154	26.375	0.018	1.784	-2.676
1459	CO1	MAX V_z	0.000	-325.317	0.389	▷ 27.018	-0.028	-5.617	1.940
1689	CO1	MIN V_z	2.001	-1308.100	0.558	▷ -27.069	0.025	-0.460	2.083
808	CO1	MAX M_y	1.000	-1252.700	-2.167	-0.610	0.091	▷ 15.484	-0.841
1695	CO1	MIN M_y	2.001	-452.439	0.564	-25.556	-0.015	▷ -5.834	1.870
	Section No. 3: QRO 140x6 (Cold Formed)								
996	CO1	MAX N	1.000	▷ 1292.950	0.008	-0.532	0.005	3.186	0.005
2098	CO23	MIN N	0.000	▷ -261.906	-0.003	-0.013	-0.007	-0.794	-0.012
1791	CO1	MAX V_z	2.000	1145.910	-0.128	▷ 2.294	-0.021	4.790	0.184
996	CO1	MIN V_z	0.000	1292.940	0.015	▷ -2.694	0.005	4.697	0.016

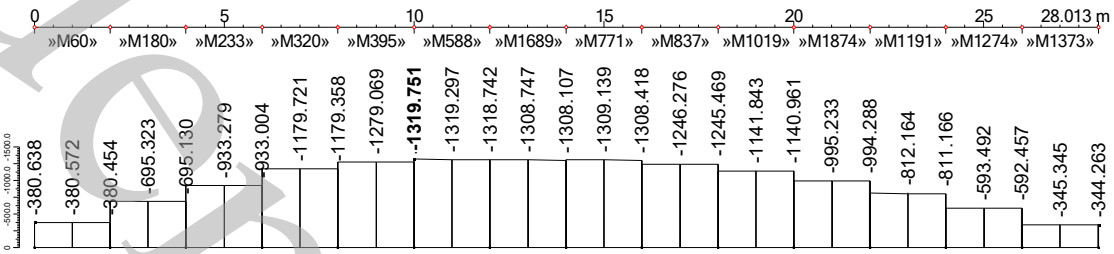
4.12 CROSS-SECTIONS - INTERNAL FORCES

Member No.	LC/CO	Node No.	Location x [m]	Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z
1791	CO1	MAX M_y	2.000	1145.910	-0.128	2.294	-0.021	4.790	0.184
1969	CO23	MIN M_y	1.000	-253.836	-0.001	-0.001	0.007	-0.848	0.036
Section No. 8: QRO 90x6 (Cold Formed)									
1323	CO23	MAX N	0.000	70.895	0.000	0.000	0.013	0.000	0.000
1323	CO1	MIN N	0.000	-347.468	0.000	-0.003	-0.141	0.000	-0.002
114	CO7	MAX V_z	0.000	-276.795	-0.001	0.003	-0.142	0.000	0.002
1347	CO7	MIN V_z	0.000	-295.114	-0.001	-0.003	0.109	0.000	0.001
1739	CO2	MAX M_y	1.642	-317.826	-0.006	-0.003	0.260	0.001	-0.004
1766	CO2	MIN M_y	1.764	-202.575	0.002	-0.002	-0.201	0.000	0.002

RESULT DIAGRAMS ON UPPER CHORD

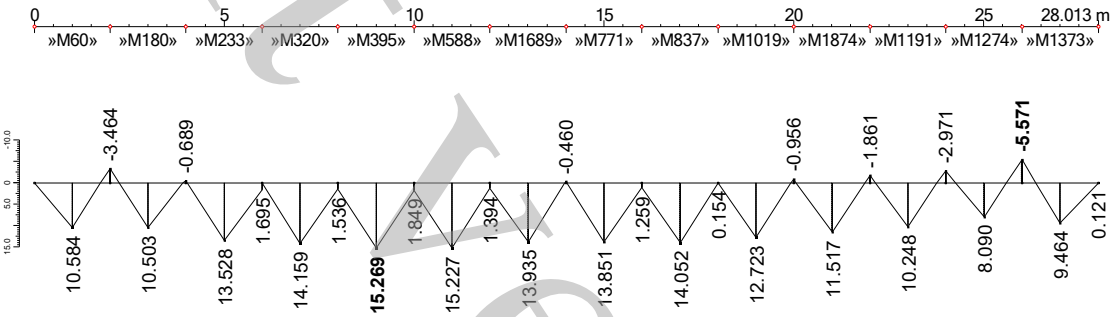
[redacted]
[redacted]

	x [m]	N [kN]
max	--	--
min	10.005	-1319.751



[redacted]
[redacted]

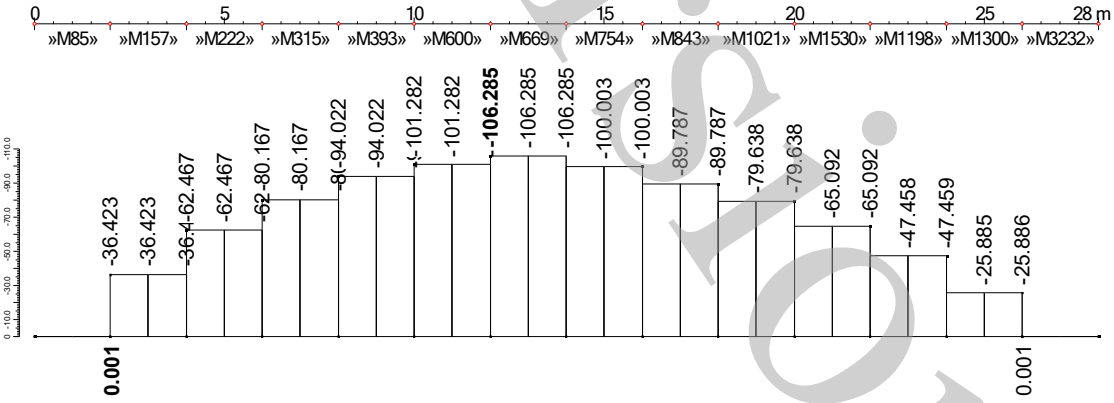
	x [m]	My [kNm]
max	9.004	15.269
min	26.012	-5.571



RESULT DIAGRAMS ON LOWER CHORD

[redacted]
[redacted]

	x [m]	N [kN]
max	2.000	0.001
min	12.000	-106.285



4.5 MEMBERS - GLOBAL DEFORMATIONS

Result Combinations

Member No.	RC	Node No.	Location x [m]		Displacements [mm] u_x	u_y	u_z	Rotations [rad] φ_x	φ_y	φ_z	Section
60	RC3	56	2.001	Max u_z	6.2	2.3	9.4	0.0001	0.0141	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006
60	RC3	56	2.001	Min u_z	-8.4	-0.0	-32.7	-0.0000	-0.0041	-0.0000	
85	RC3	52	2.000	Max u_z	9.5	1.0	9.1	0.0001	0.0142	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
85	RC3	52	2.000	Min u_z	-22.0	-0.1	-31.8	-0.0000	-0.0041	-0.0001	
157	RC3	89	2.000	Max u_z	9.2	0.9	16.9	0.0001	0.0125	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
157	RC3	89	2.000	Min u_z	-21.3	-0.3	-58.7	-0.0000	-0.0037	-0.0001	
180	RC3	194	2.001	Max u_z	6.2	2.3	17.2	0.0001	0.0125	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
180	RC3	194	2.001	Min u_z	-8.4	-0.0	-59.5	-0.0000	-0.0036	-0.0003	
222	RC3	427	2.000	Max u_z	8.8	0.8	23.6	0.0001	0.0102	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
222	RC3	427	2.000	Min u_z	-20.0	-0.4	-81.5	-0.0000	-0.0030	-0.0001	
233	RC3	868	2.001	Max u_z	5.9	1.3	23.8	0.0002	0.0100	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
233	RC3	868	2.001	Min u_z	-8.5	-0.0	-82.1	-0.0000	-0.0029	-0.0005	
315	RC3	288	2.000	Max u_z	8.2	0.7	28.8	0.0002	0.0075	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
315	RC3	288	2.000	Min u_z	-18.4	-0.6	-99.2	-0.0000	-0.0022	-0.0001	
320	RC3	949	2.001	Max u_z	5.5	0.6	28.9	0.0002	0.0074	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
320	RC3	949	2.001	Min u_z	-9.0	-0.6	-99.7	-0.0001	-0.0022	-0.0002	
393	RC3	238	2.000	Max u_z	7.5	0.6	32.5	0.0002	0.0047	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
393	RC3	238	2.000	Min u_z	-16.5	-0.7	-111.5	-0.0000	-0.0014	-0.0000	
395	RC3	240	2.001	Max u_z	5.2	0.6	32.5	0.0002	0.0046	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006
395	RC3		2.001	Min u_z	-10.1	-0.7	-111.8	-0.0001	-0.0014	-0.0001	
588	RC3	316	2.001	Max u_z	5.7	1.7	34.5	0.0002	0.0018	0.0005	
											2 - QRO 180x8 | EN 10219-2:2006
588	RC3		2.001	Min u_z	-11.3	-0.1	-118.2	-0.0001	-0.0006	-0.0001	
600	RC3	351	2.000	Max u_z	6.8	0.7	34.4	0.0002	0.0018	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
600	RC3	351	2.000	Min u_z	-14.4	-0.7	-118.0	-0.0000	-0.0006	-0.0000	
669	RC3		1.000	Max u_z	6.4	0.7	34.8	0.0002	0.0004	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
669	RC3		1.000	Min u_z	-13.3	-0.7	-119.1	-0.0000	-0.0002	-0.0000	
754	RC3	348	0.000	Max u_z	6.0	0.8	34.8	0.0002	0.0002	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
754	RC3	348	0.000	Min u_z	-12.2	-0.6	-119.0	-0.0001	-0.0008	-0.0000	
771	RC3	1702	0.000	Max u_z	6.2	2.2	34.8	0.0002	0.0002	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
771	RC3	1702	0.000	Min u_z	-12.7	-0.2	-119.2	-0.0001	-0.0007	-0.0000	
837	RC3	685	0.000	Max u_z	6.8	1.7	33.7	0.0002	0.0009	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
837	RC3	685	0.000	Min u_z	-14.2	-0.0	-115.4	-0.0001	-0.0032	-0.0005	
843	RC3	446	0.000	Max u_z	5.3	0.8	33.6	0.0002	0.0010	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
843	RC3	446	0.000	Min u_z	-10.2	-0.6	-115.0	-0.0001	-0.0033	-0.0000	
1019	RC3	459	0.000	Max u_z	7.3	0.9	31.1	0.0002	0.0017	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
1019	RC3	459	0.000	Min u_z	-15.8	-0.6	-106.4	-0.0001	-0.0057	-0.0002	
1021	RC3	439	0.000	Max u_z	6.2	0.8	30.9	0.0002	0.0017	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
1021	RC3	439	0.000	Min u_z	-8.6	-0.6	-105.8	-0.0001	-0.0058	-0.0000	
1191	RC3	558	0.000	Max u_z	8.5	1.9	22.0	0.0002	0.0029	0.0004	
											2 - QRO 180x8 | EN 10219-2:2006
1191	RC3	558	0.000	Min u_z	-18.9	-0.2	-74.9	-0.0001	-0.0099	-0.0001	
1198	RC3	554	0.000	Max u_z	8.2	0.6	21.7	0.0002	0.0029	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
1198	RC3	554	0.000	Min u_z	-7.8	-0.6	-73.9	-0.0001	-0.0099	-0.0001	
1274	RC3	743	0.000	Max u_z	9.0	2.4	15.7	0.0003	0.0034	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
1274	RC3	743	0.000	Min u_z	-20.3	-0.2	-53.6	-0.0001	-0.0115	-0.0001	
1300	RC3	592	0.000	Max u_z	8.9	0.3	15.4	0.0003	0.0034	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
1300	RC3	592	0.000	Min u_z	-7.5	-0.6	-52.4	-0.0001	-0.0116	-0.0001	
1373	RC3	649	0.000	Max u_z	9.5	1.7	8.7	0.0003	0.0037	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
1373	RC3	649	0.000	Min u_z	-21.6	-0.1	-29.5	-0.0001	-0.0125	-0.0007	
1530	RC3	747	0.000	Max u_z	7.2	0.8	26.9	0.0002	0.0023	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
1530	RC3	747	0.000	Min u_z	-8.2	-0.6	-91.9	-0.0001	-0.0080	-0.0001	
1535	RC3	778	2.000	Max u_z	14.9	0.1	17.4	0.0002	0.0124	0.0002	
											3 - QRO 140x6 (kaltgefertigt)
1535	RC3	778	2.000	Min u_z	-35.3	-0.8	-59.1	-0.0001	-0.0037	-0.0000	
1544	RC3	1591	2.001	Max u_z	10.0	2.9	17.7	0.0003	0.0124	0.0002	
											2 - QRO 180x8 | EN 10219-2:2006
1544	RC3	1591	2.001	Min u_z	-22.7	-0.2	-59.8	-0.0001	-0.0036	-0.0001	
1625	RC3	822	2.000	Max u_z	14.5	0.4	24.1	0.0002	0.0101	0.0002	
											3 - QRO 140x6 (kaltgefertigt)
1625	RC3	822	2.000	Min u_z	-34.1	-0.7	-81.6	-0.0001	-0.0030	-0.0000	
1689	RC3		1.000	Max u_z	5.9	2.1	34.9	0.0002	0.0005	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006

4.5 MEMBERS - GLOBAL DEFORMATIONS

Result Combinations

Member No.	RC	Node No.	Location x [m]		Displacements [mm] u_x	u_y	u_z	Rotations [rad] φ_x	φ_y	φ_z	Section
1689	RC3		1.000	Min u_z	-12.0	-0.2	-119.5	-0.0001	-0.0002	-0.0001	
1816	RC3	1626	2.001	Max u_z	11.0	0.9	32.8	0.0002	0.0045	0.0002	
											2 - QRO 180x8 | EN 10219-2:2006
1816	RC3	1626	2.001	Min u_z	-25.1	-0.6	-111.5	-0.0001	-0.0013	-0.0000	
1874	RC3	524	0.000	Max u_z	7.9	1.1	27.1	0.0002	0.0023	0.0004	
											2 - QRO 180x8 | EN 10219-2:2006
1874	RC3	524	0.000	Min u_z	-17.4	-0.2	-92.7	-0.0001	-0.0079	-0.0001	
1957	RC3	727	2.001	Max u_z	9.9	2.0	9.8	0.0003	0.0141	0.0009	
											2 - QRO 180x8 | EN 10219-2:2006
1957	RC3	727	2.001	Min u_z	-22.5	-0.0	-33.2	-0.0001	-0.0042	-0.0002	
1959	RC3	1424	2.000	Max u_z	13.9	0.7	29.2	0.0002	0.0074	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
1959	RC3	1424	2.000	Min u_z	-32.5	-0.6	-99.1	-0.0001	-0.0022	-0.0000	
1993	RC3	973	2.000	Max u_z	12.5	0.8	34.6	0.0002	0.0017	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
1993	RC3	973	2.000	Min u_z	-28.7	-0.6	-117.5	-0.0001	-0.0005	-0.0000	
2054	RC3		1.000	Max u_z	12.1	0.8	35.0	0.0002	0.0003	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
2054	RC3		1.000	Min u_z	-27.7	-0.7	-118.5	-0.0001	-0.0001	-0.0000	
2082	RC3		1.000	Max u_z	11.7	2.1	35.0	0.0002	0.0003	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006
2082	RC3		1.000	Min u_z	-26.9	-0.1	-118.9	-0.0001	-0.0001	-0.0001	
2319	RC3	728	2.000	Max u_z	15.2	0.0	9.5	0.0003	0.0142	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
2319	RC3	728	2.000	Min u_z	-35.9	-0.7	-32.3	-0.0001	-0.0042	-0.0001	
2414	RC3	1121	0.000	Max u_z	10.4	0.7	30.8	0.0001	0.0017	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
2414	RC3	1121	0.000	Min u_z	-23.2	-0.7	-104.6	-0.0000	-0.0059	-0.0000	
2496	RC3	1371	0.000	Max u_z	9.8	0.8	26.7	0.0001	0.0024	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
2496	RC3	1371	0.000	Min u_z	-21.8	-0.6	-90.5	-0.0000	-0.0081	-0.0000	
2584	RC3	1451	0.000	Max u_z	9.3	0.9	21.3	0.0001	0.0029	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
2584	RC3	1451	0.000	Min u_z	-20.6	-0.4	-72.3	-0.0000	-0.0100	-0.0000	
2617	RC3	1230	0.000	Max u_z	14.3	1.3	21.6	0.0002	0.0029	0.0005	
											2 - QRO 180x8 | EN 10219-2:2006
2617	RC3	1230	0.000	Min u_z	-33.3	-0.1	-73.3	-0.0000	-0.0099	-0.0001	
2622	RC3	946	2.000	Max u_z	13.2	0.8	32.8	0.0002	0.0046	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
2622	RC3	946	2.000	Min u_z	-30.7	-0.6	-111.2	-0.0001	-0.0014	-0.0000	
2627	RC3	1493	0.000	Max u_z	13.2	0.7	31.0	0.0002	0.0017	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
2627	RC3	1493	0.000	Min u_z	-30.5	-0.7	-105.2	-0.0001	-0.0058	-0.0003	
2759	RC3	1291	0.000	Max u_z	15.3	2.2	8.1	0.0002	0.0037	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
2759	RC3	1291	0.000	Min u_z	-35.6	-0.1	-27.5	-0.0000	-0.0126	-0.0003	
2845	RC3	1513	0.000	Max u_z	14.9	2.1	15.3	0.0002	0.0034	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006
2845	RC3	1513	0.000	Min u_z	-34.6	-0.2	-51.7	-0.0000	-0.0116	-0.0000	
2889	RC3	1078	0.000	Max u_z	12.6	1.7	33.7	0.0002	0.0010	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
2889	RC3	1078	0.000	Min u_z	-29.0	-0.0	-114.4	-0.0001	-0.0033	-0.0005	
3059	RC3	847	2.001	Max u_z	10.6	1.2	29.3	0.0002	0.0073	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
3059	RC3	847	2.001	Min u_z	-24.1	-0.1	-99.6	-0.0001	-0.0021	-0.0004	
3067	RC3	1228	0.000	Max u_z	13.8	0.6	26.9	0.0002	0.0024	0.0003	
											2 - QRO 180x8 | EN 10219-2:2006
3067	RC3	1228	0.000	Min u_z	-31.9	-0.5	-91.3	-0.0000	-0.0081	-0.0001	
3139	RC3	1601	0.000	Max u_z	9.0	1.0	14.9	0.0001	0.0034	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
3139	RC3	1601	0.000	Min u_z	-19.8	-0.3	-50.5	-0.0000	-0.0117	-0.0000	
3213	RC3	1007	0.000	Max u_z	11.7	0.8	34.9	0.0001	0.0003	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
3213	RC3	1007	0.000	Min u_z	-26.7	-0.7	-118.2	-0.0000	-0.0009	-0.0000	
3232	RC3	630	0.000	Max u_z	9.3	0.2	8.3	0.0003	0.0037	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
3232	RC3	630	0.000	Min u_z	-7.4	-0.5	-28.1	-0.0001	-0.0125	-0.0000	
3297	RC3	1064	0.000	Max u_z	12.0	2.2	34.9	0.0002	0.0002	0.0000	
											2 - QRO 180x8 | EN 10219-2:2006
3297	RC3	1064	0.000	Min u_z	-27.6	-0.2	-118.4	-0.0001	-0.0008	-0.0000	
3343	RC3	1481	2.001	Max u_z	10.2	2.2	24.3	0.0003	0.0100	0.0001	
											2 - QRO 180x8 | EN 10219-2:2006
3343	RC3	1481	2.001	Min u_z	-23.3	-0.2	-82.3	-0.0001	-0.0029	-0.0005	
3401	RC3	1671	0.000	Max u_z	11.0	0.7	33.6	0.0001	0.0010	0.0000	
											3 - QRO 140x6 (kaltgefertigt)
3401	RC3	1671	0.000	Min u_z	-24.9	-0.7	-114.0	-0.0000	-0.0034	-0.0000	
3601	RC3	1575	0.000	Max u_z	8.8	1.1	7.7	0.0001	0.0037	0.0001	
											3 - QRO 140x6 (kaltgefertigt)
3601	RC3	1575	0.000	Min u_z	-19.4	-0.0	-26.1	-0.0000	-0.0125	-0.0000	
3640	RC3	970	2.001	Max u_z	11.5	1.7	34.7	0.0002	0.0017	0.0005	
											2 - QRO 180x8 | EN 10219-2:2006
3640	RC3		2.001	Min u_z	-26.3	-0.0	-117.7	-0.0001	-0.0005	-0.0001	

4.6 MEMBERS - INTERNAL FORCES

Result Combinations

Member No.	RC	Node No.	Location x [m]		Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z	Corresponding Load Cases
100	RC1	56	1.642	Max N	29.783	-0.000	0.000	0.002	-0.000	0.000	CO 3
		52	0.000	Min N	-319.480	0.000	0.003	0.118	0.000	-0.002	CO 2
	RC3	52	0.000	Max N	64.412	-0.000	0.000	-0.006	0.000	-0.000	
		52	0.000	Min N	-227.496	0.000	0.001	0.075	0.000	-0.001	CO 22
205	RC1	222	0.000	Max N	516.278	0.003	0.042	-0.002	0.000	0.000	CO 1
		52	2.551	Min N	-46.516	-0.000	-0.096	-0.000	-0.000	-0.000	CO 3
	RC3	222	0.000	Max N	367.581	0.001	0.038	-0.001	0.000	0.000	CO 22
		222	0.000	Min N	-103.659	-0.000	-0.000	-0.000	0.000	-0.000	CO 23
221	RC1	194	1.703	Max N	22.306	0.000	0.000	0.002	0.000	0.000	CO 2
		89	0.000	Min N	-258.856	-0.000	0.003	-0.087	-0.000	0.001	CO 5
	RC3	89	0.000	Max N	51.460	-0.000	0.000	-0.003	0.000	-0.000	CO 22
		89	0.000	Min N	-184.092	-0.000	0.001	-0.051	-0.000	0.000	CO 26
245	RC1	194	0.000	Max N	311.389	0.002	0.053	-0.010	0.000	0.000	CO 2
		427	2.627	Min N	-23.312	0.000	-0.087	0.000	-0.000	0.000	CO 5
	RC3	194	0.000	Max N	221.913	0.001	0.045	-0.006	0.000	0.000	CO 22
		194	0.000	Min N	-61.494	-0.000	-0.000	-0.000	-0.000	-0.000	CO 28
284	RC1	868	1.764	Max N	15.779	0.000	0.000	0.003	0.000	0.000	CO 2
		427	0.000	Min N	-204.079	0.000	0.002	-0.123	-0.000	0.001	
	RC3	427	0.000	Max N	39.723	-0.000	0.000	0.005	-0.000	0.000	CO 22
		427	0.000	Min N	-144.813	0.000	0.001	-0.074	-0.000	0.001	CO 24
319	RC1	868	0.000	Max N	214.421	0.002	0.061	-0.016	0.000	0.000	CO 2
		288	2.667	Min N	-18.540	0.000	-0.086	0.000	-0.000	0.000	
	RC3	868	0.000	Max N	152.893	0.001	0.051	-0.010	0.000	0.000	CO 22
		868	0.000	Min N	-43.121	-0.000	-0.000	0.001	0.000	0.000	
373	RC1	56	0.000	Max N	406.392	-0.002	0.047	0.013	-0.000	-0.000	CO 3
		89	2.588	Min N	-33.760	-0.000	-0.091	0.000	0.000	0.000	CO 2
	RC3	56	0.000	Max N	289.498	-0.001	0.041	0.009	-0.000	-0.000	
		56	0.000	Min N	-81.021	-0.000	-0.000	-0.001	-0.000	-0.000	CO 22
402	RC1	949	0.000	Max N	133.317	0.000	0.071	-0.006	-0.000	0.000	CO 7
		238	2.707	Min N	-9.900	0.000	-0.083	0.000	-0.000	0.000	
	RC3	949	0.000	Max N	95.218	0.000	0.058	-0.004	-0.000	0.000	CO 28
		949	0.000	Min N	-26.646	-0.000	-0.000	0.002	0.000	0.000	
494	RC1	240	1.885	Max N	7.557	0.000	0.000	-0.006	-0.000	-0.000	
		238	0.000	Min N	-93.299	0.000	0.001	0.083	-0.000	-0.000	CO 1
	RC3	238	0.000	Max N	17.707	0.000	0.000	-0.010	-0.000	-0.000	CO 24
		238	0.000	Min N	-65.627	0.000	0.001	0.051	-0.000	-0.000	CO 22
539	RC1	949	1.824	Max N	13.198	0.000	0.000	0.002	0.000	0.000	CO 7
		288	0.000	Min N	-145.129	0.000	0.002	-0.030	0.000	0.000	
	RC3	288	0.000	Max N	28.404	-0.000	0.000	0.006	0.000	0.000	CO 28
		288	0.000	Min N	-102.611	0.000	0.001	-0.022	0.000	0.000	
599	RC1	240	0.000	Max N	54.339	-0.000	0.088	0.011	0.000	-0.000	
		351	2.748	Min N	-6.949	0.000	-0.082	-0.001	0.000	-0.000	CO 1
	RC3	240	0.000	Max N	38.673	-0.000	0.068	0.006	0.000	-0.000	CO 24
		240	0.000	Min N	-11.277	0.000	-0.000	-0.001	0.000	-0.000	CO 22
654	RC1	316	1.945	Max N	5.640	-0.000	0.000	-0.010	0.000	-0.000	
		351	0.000	Min N	-41.798	-0.000	0.001	0.102	0.000	-0.000	CO 1
	RC3	351	0.000	Max N	7.607	-0.000	0.000	-0.021	0.000	-0.000	
		351	0.000	Min N	-28.712	-0.000	0.000	0.071	0.000	-0.000	CO 22
772	RC1	685	2.876	Max N	90.570	0.000	-0.077	-0.015	-0.000	-0.000	CO 3
		348	0.000	Min N	-7.662	0.000	0.082	0.001	-0.000	-0.000	CO 1
	RC3	685	2.876	Max N	64.585	0.000	-0.062	-0.010	-0.000	-0.000	CO 24
		348	0.000	Min N	-18.104	0.000	0.000	0.003	-0.000	-0.000	CO 22
823	RC1	1702	2.006	Max N	5.418	-0.000	-0.000	0.001	-0.000	-0.000	CO 6
		348	0.000	Min N	-56.975	-0.000	-0.000	-0.008	-0.000	-0.000	CO 1
	RC3	348	0.000	Max N	10.438	-0.000	-0.000	0.000	-0.000	-0.000	CO 27
		348	0.000	Min N	-39.727	-0.000	-0.000	-0.004	-0.000	-0.000	CO 22
830	RC1	685	2.067	Max N	11.823	-0.000	-0.000	0.010	-0.000	-0.000	
		446	0.000	Min N	-114.707	-0.000	-0.001	-0.098	-0.000	-0.000	CO 1
	RC3	446	0.000	Max N	22.444	0.000	-0.000	0.019	-0.000	-0.000	CO 24
		446	0.000	Min N	-80.784	-0.000	-0.000	-0.068	-0.000	-0.000	CO 22
1064	RC1	524	2.188	Max N	17.369	-0.000	-0.000	-0.009	0.000	0.000	CO 1
		747	0.000	Min N	-206.923	-0.000	-0.002	0.078	0.000	0.001	
	RC3	747	0.000	Max N	40.818	-0.000	-0.000	-0.011	0.000	0.000	CO 22
		747	0.000	Min N	-147.002	-0.000	-0.001	0.053	0.000	0.000	CO 24
1099	RC1	316	0.000	Max N	1.486	0.000	0.079	-0.002	-0.000	0.000	CO 3
		348	2.790	Min N	-15.462	0.000	-0.115	0.016	-0.000	-0.000	CO 1
	RC3	316	0.000	Max N	3.287	-0.000	0.000	-0.003	-0.000	-0.000	CO 24
		348	2.790	Min N	-10.999	0.000	-0.083	0.011	-0.000	-0.000	CO 21
1108	RC1	558	0.000	Max N	275.103	-0.002	0.050	0.017	0.000	-0.000	
		747	3.009	Min N	-21.971	0.000	-0.089	-0.001	0.000	-0.000	CO 2
	RC3	558	0.000	Max N	196.103	-0.001	0.043	0.011	0.000	-0.000	CO 24
		558	0.000	Min N	-54.732	0.000	-0.000	-0.001	0.000	-0.000	CO 22
1170	RC1	524	0.000	Max N	217.082	-0.001	0.056	0.011	0.000	-0.000	
		439	2.964	Min N	-15.126	0.000	-0.086	-0.002	0.000	-0.000	CO 1
	RC3	524	0.000	Max N	154.866	-0.000	0.047	0.008	0.000	-0.000	CO 24
		524	0.000	Min N	-42.748	0.000	-0.000	-0.003	0.000	-0.000	CO 22
1316	RC1	649	2.369	Max N	32.477	0.000	-0.000	0.009	-0.000	-0.000	
		630	0.000	Min N	-338.864	-0.000	-0.003	-0.142	-0.000	-0.002	CO 1
	RC3	630	0.000	Max N	68.536	0.000	-0.000	0.014	0.000	-0.000	CO 24
		630	0.000	Min N	-241.382	-0.000	-0.002	-0.093	-0.000	-0.001	CO 22
1345	RC1	558	2.248	Max N	21.232	-0.000	-0.000	-0.004	0.000	0.000	CO 2
		554	0.000	Min N	-252.491	-0.001	-0.002	0.114	0.000	0.001	
	RC3	554	0.000	Max N	50.071	-0.000	-0.000	-0.004	0.000	0.000	CO 22
		554	0.000	Min N	-179.644	-0.000	-0.001	0.070	0.000	0.001	CO 24
1370	RC1	649	0.000	Max N	384.790	0.003	0.041	-0.021	-0.000	0.000	CO 2
		592	3.101	Min N	-33.532	-0.000	-0.097	0.002	0.000	0.000	
	RC3	649	0.000	Max N	274.097	0.001	0.036	-0.014	-0.000	0.000	CO 22
		649	0.000	Min N	-77.029	-0.000	-0.000	0.003	0.000	0.000	CO 24
1481	RC1	694	3.147	Max N	441.546	-0.000	-0.037	-0.007	0.000	-0.000	CO 3
		630	0.000	Min N	-40.820	-0.000	0.104	-0.001	-0.000	0.000	CO 1
	RC3	694	3.147	Max N	314.388	-0.000	-0.033	-0.002	0.000	-0.000	CO 23
		630	0.000	Min N	-88.807	0.000	0.000	-0.002	-0.000	0.000	CO 28

4.6 MEMBERS - INTERNAL FORCES

Result Combinations

Member No.	RC	Node No.	Location x [m]		Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z	Corresponding Load Cases
1604	RC1	459	2.127	Max N	12.063	0.000	-0.000	0.001	0.000	-0.000	
		439	0.000	Min N	-162.005	-0.000	-0.001	-0.035	-0.000	-0.000	CO 2
	RC3	439	0.000	Max N	31.322	-0.000	-0.000	0.005	0.000	-0.000	
		439	0.000	Min N	-114.867	-0.000	-0.001	-0.022	-0.000	-0.000	CO 22
1606	RC1	459	0.000	Max N	152.417	0.000	0.065	-0.006	-0.000	0.000	CO 2
		446	2.920	Min N	-14.995	-0.000	-0.085	-0.000	-0.000	-0.000	CO 3
	RC3	459	0.000	Max N	108.496	-0.000	0.054	-0.004	-0.000	0.000	CO 22
		459	0.000	Min N	-30.936	0.000	-0.000	-0.000	0.000	-0.000	CO 23
1877	RC1	743	2.309	Max N	26.569	-0.000	-0.000	0.004	-0.000	-0.000	CO 2
		592	0.000	Min N	-293.907	-0.001	-0.003	0.036	0.000	0.000	CO 7
	RC3	592	0.000	Max N	58.963	-0.000	-0.000	0.008	-0.000	-0.000	CO 22
		592	0.000	Min N	-209.284	-0.000	-0.001	0.019	0.000	0.000	CO 28
2227	RC1	743	0.000	Max N	333.670	-0.001	0.045	0.006	0.000	-0.000	CO 7
		554	3.055	Min N	-27.018	0.000	-0.093	0.001	-0.000	0.000	CO 2
	RC3	743	0.000	Max N	237.776	-0.000	0.039	0.003	0.000	-0.000	CO 28
		743	0.000	Min N	-66.347	0.000	-0.000	0.002	-0.000	0.000	CO 22

4.11 SETS OF MEMBERS - INTERNAL FORCES

Result Combinations

Member No.	RC	Node No.	Location x [m]		Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z	Corresponding Load Cases
	Continuous Members No. 68: Column										
97	RC1		1.584	MAX N	▷ 47.819	0.012	-0.061	0.000	0.006	-0.006	CO 2
910	RC1	551	0.000	MIN N	▷ -736.565	-0.218	-0.398	-0.001	0.000	0.000	CO 8
910	RC1	535	5.000	MAX V_y	-732.493 ▷	1.819	-0.193	0.000	-1.644	0.606	CO 2
910	RC1	551	0.000	MIN V_y	-734.849 ▷	-0.219	-0.503	-0.001	0.000	0.000	CO 8
910	RC1	535	5.000	MAX V_z	-607.254	0.005 ▷	1.462	-0.001	-0.562	0.400	CO 2
910	RC1	535	5.000	MIN V_z	-515.635	-0.009 ▷	-1.331	0.000	-0.175	0.370	
97	RC1	222	1.584	MAX M_T	-461.899	1.087	0.515 ▷	0.002	0.108	0.017	CO 2
898	RC1	582	4.570	MIN M_T	-466.003	1.305	0.420 ▷	-0.002	-0.581	-0.018	CO 2
910	RC1	535	5.000	MAX M_y	-104.387	-0.010	-0.117	0.000 ▷	0.798	0.058	CO 2
898	RC1	535	0.000	MIN M_y	-468.013	0.054	0.278	-0.001 ▷	-2.594	0.587	
910	RC1		4.000	MAX M_z	-731.592	-0.034	-0.332	0.000	-1.789 ▷	0.612	CO 2
97	RC1	582	0.000	MIN M_z	-463.189	-0.030	0.502	0.002	-0.705 ▷	-0.033	CO 2
	Continuous Members No. 69: Column										
2101	RC1	694	1.584	MAX N	▷ 66.065	-0.025	-0.003	0.001	0.010	0.017	CO 3
911	RC1	562	0.000	MIN N	▷ -719.545	1.501	-0.019	0.001	0.000	0.000	CO 3
911	RC1	695	9.570	MAX V_y	-708.246 ▷	2.362	0.015	0.002	-0.049	-0.303	CO 6
911	RC1		0.000	MIN V_y	-719.544 ▷	-0.388	-0.019	0.001	0.000	0.000	CO 3
2101	RC1	694	1.584	MAX V_z	-602.960	-0.062 ▷	1.581	0.005	-0.008	-0.050	CO 3
911	RC1	695	9.570	MIN V_z	-477.309	0.230 ▷	-1.213	0.001	0.045	0.079	CO 1
2101	RC1	674	0.000	MAX M_T	-705.651	-0.224	0.021 ▷	0.007	-0.034	-0.436	CO 6
1402	RC1	695	0.000	MIN M_T	-707.655	0.217	0.017 ▷	-0.036	-0.049	-0.278	CO 1
911	RC1		6.208	MAX M_y	-326.410	-0.031	0.012	0.000 ▷	0.092	0.497	CO 1
911	RC1		6.208	MIN M_y	-542.360	0.017	-0.015	-0.001 ▷	-0.215	0.864	CO 3
911	RC1		4.966	MAX M_z	-714.975	-0.026	-0.006	0.000	-0.061 ▷	1.282	CO 1
1402	RC1	674	0.846	MIN M_z	-706.875	2.052	0.020	-0.036	-0.034 ▷	-0.451	CO 1
	Continuous Members No. 70: Column										
2824	RC1	1360	2.430	MAX N	▷ 29.877	0.010	-56.118	0.000	-0.019	-0.010	CO 7
940	RC1	563	0.000	MIN N	▷ -414.435	0.322	4.276	0.003	0.000	0.000	CO 6
2824	RC1	1360	2.430	MAX V_y	-355.909 ▷	2.143	-7.148	-0.003	-0.012	-0.003	CO 7
940	RC1		6.208	MIN V_y	-384.474 ▷	-1.620	0.234	0.004	23.598	-1.423	CO 2
2824	RC1	1360	2.430	MAX V_z	-224.136	0.023 ▷	66.810	0.001	0.013	0.036	CO 7
940	RC1		0.000	MIN V_z	-280.988	-0.051 ▷	-66.793	0.002	-0.001	0.000	CO 6
940	RC1	1340	10.416	MAX M_T	-174.127	0.052	-37.670 ▷	0.007	117.034	0.099	CO 2
2824	RC1	1340	0.000	MIN M_T	-366.251	0.115	-4.583 ▷	-0.010	14.311	1.603	CO 4
940	RC1		6.208	MAX M_y	-192.463	0.045	1.850	0.001 ▷	192.072	0.313	CO 5
940	RC1		6.208	MIN M_y	-255.874	-0.034	-2.174	0.005 ▷	-216.987	0.301	CO 2
940	RC1		10.416	MAX M_z	-366.571	0.223	-4.585	-0.004	14.311 ▷	1.621	CO 2
940	RC1		6.208	MIN M_z	-384.474	-1.620	0.234	0.004	23.598 ▷	-1.423	CO 2
	Continuous Members No. 71: Upper chord										
588	RC1		2.001	MAX N	▷ 154.975	0.150	3.345	-0.011	0.048	-0.091	CO 2
588	RC1	240	0.000	MIN N	▷ -1319.750	-2.154	26.375	0.018	1.784	-2.676	CO 2
60	RC1	222	0.000	MAX V_y	-380.638 ▷	4.229	22.747	0.022	0.000	-0.001	
1373	RC1	694	2.001	MIN V_y	-344.263 ▷	-4.141	-21.575	0.019	0.000	0.000	
1373	RC1	649	0.000	MAX V_z	-346.365	0.785 ▷	27.015	-0.037	-5.571	2.825	CO 2
1689	RC1	1702	2.001	MIN V_z	-1308.100	0.558 ▷	-27.069	0.025	-0.460	2.083	CO 3
60	RC1	56	2.001	MAX M_T	-379.157	-0.710	-26.029 ▷	0.082	-3.454	2.792	CO 2
1373	RC1	649	0.000	MIN M_T	-341.757	0.809	26.926 ▷	-0.039	-5.558	2.963	CO 3
395	RC1		1.000	MAX M_y	-1279.070	0.474	0.154	0.023 ▷	15.269	-2.079	CO 3
1274	RC1	649	2.001	MIN M_y	-592.445	0.967	-25.636	-0.016 ▷	-5.571	2.668	CO 3
1274	RC1		1.000	MAX M_z	-587.866	0.111	-1.316	-0.015	8.054 ▷	3.364	CO 2
837	RC1	459	2.001	MIN M_z	-1236.710	2.115	-26.591	0.038	0.028 ▷	-3.080	CO 2
	Continuous Members No. 228: Lower chord										
669	RC1		1.000	MAX N	▷ 1251.370	0.010	-0.399	0.002	3.295	0.008	CO 4
669	RC1	351	0.000	MIN N	▷ -106.285	-0.001	0.243	-0.003	-0.477	-0.016	CO 3
85	RC1	582	0.000	MAX V_y	0.023 ▷	0.213	1.103	0.010	0.000	0.004	CO 2
3232	RC1	695	2.000	MIN V_y	▷						
				MAX V_z	1211.950	0.050 ▷	2.178	-0.006	4.659	-0.089	
669	RC1	351	0.000	MIN V_z	1251.370	0.020 ▷	2.507	0.002	4.659	0.021	CO 3
3232	RC1	630	0.000	MAX M_T	-0.001	-0.280	0.069 ▷	0.034	0.523	-0.523	
600	[illegible]				[illegible]	[illegible]	[illegible] ▷	[illegible]	[illegible]	[illegible]	CO 1
669	RC1	351	0.000	MAX M_y	1251.370	0.020	-2.507	0.002 ▷	4.659	0.021	CO 1
315	[illegible]				[illegible]	[illegible]	[illegible]	[illegible] ▷	[illegible]	0.003	CO 4

4.11 SETS OF MEMBERS - INTERNAL FORCES

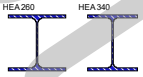
Result Combinations

Member No.		Node No.	Location x [m]		Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z	Corresponding Load Cases
222	RC1	427	2.000	MAX M_z	714.058	-0.160	1.248	0.021	3.815	0.182	CO 2
3232	RC1	630	0.000	MIN M_z	-0.001	-0.280	0.072	0.033	0.518	-0.524	CO 2

4.12 CROSS-SECTIONS - INTERNAL FORCES

Result Combinations

Member No.	RC	Node No.	Location x [m]		Forces [kN] N	V_y	V_z	Moments [kNm] M_T	M_y	M_z	Corresponding Load Cases
	Section No. 1: HEA 260										
1394	RC1		1.584	MAX N	70.132	-0.019	0.004	0.000	0.078	-0.030	CO 1
3300	RC1		0.000	MIN N	-767.756	0.378	-0.060	-0.002	0.004	0.000	CO 1
1394	RC1		1.584	MAX V_z	-630.757	-0.085	1.661	0.011	-0.207	0.266	CO 1
3300	RC1		0.000	MIN V_z	-508.943	0.207	-1.285	-0.001	0.002	0.000	CO 1
3119	RC1		6.208	MAX M_y	-572.358	-0.035	0.034	0.003	0.272	-1.097	CO 3
2214	RC1		6.208	MIN M_y	-633.439	-0.147	-0.009	0.001	-0.414	-0.868	CO 1
	Section No. 2: QRO 180x8 | EN 10219-2:2006										
2136	RC1		2.001	MAX N	175.369	-0.235	3.370	0.024	0.006	-0.028	CO 2
588	RC1		0.000	MIN N	-1319.750	-2.154	26.375	0.018	1.784	-2.676	CO 2
1459	RC1		0.000	MAX V_z	-325.317	0.389	27.018	-0.028	-5.617	1.940	CO 2
1689	RC1		2.001	MIN V_z	-1308.100	0.558	-27.069	0.025	-0.460	2.083	CO 3
808	RC1		1.000	MAX M_y	-1252.700	-2.167	-0.610	0.091	15.484	-0.841	CO 3
1695	RC1		2.001	MIN M_y	-452.439	0.564	-25.556	-0.015	-5.834	1.870	CO 3
	Section No. 3: QRO 140x6 (Cold Formed)										
996	RC1		1.000	MAX N	1292.950	0.008	-0.532	0.005	3.186	0.005	CO 4
3285	RC1		0.000	MIN N	-115.968	-0.009	0.231	-0.001	-0.494	0.011	CO 7
1791	RC1		2.000	MAX V_z	1145.910	-0.128	2.294	-0.021	4.790	0.184	CO 2
996	RC1		0.000	MIN V_z	1292.940	0.015	-2.694	0.005	4.697	0.016	CO 3
1791	RC1		2.000	MAX M_y	1145.910	-0.128	2.294	-0.021	4.790	0.184	CO 2
503	RC1		2.000	MIN M_y	-87.675	-0.002	-0.259	0.000	-0.513	-0.012	CO 3
	Section No. 17: QRO 70x4 (Cold Formed)										
62	RC1		0.000	MAX N	525.693	0.002	0.042	-0.002	0.000	0.000	CO 1
3634	RC1		2.551	MIN N	-51.171	0.000	-0.098	-0.001	0.000	0.000	CO 5
2097	RC1		0.000	MAX V_z	-25.062	0.000	0.120	-0.012	0.000	0.000	CO 1
2097	RC1		2.790	MIN V_z	-25.270	0.000	-0.120	-0.012	0.000	0.000	CO 8
2945	RC1		1.049	MAX M_y	-43.678	0.000	0.039	0.061	0.078	0.000	CO 6
3632	RC1		0.000	MIN M_y	404.476	-0.004	0.048	0.029	0.000	0.000	CO 2



1.13 CROSS-SECTIONS

Section No.	Matl. No.	J [mm⁴] / A [mm²]	I_y [mm⁴] / A_y [mm²]	I_z [mm⁴] / A_z [mm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	HEA 260							
	1	523700.0 8682.0	104500000.0 5407.7	36680000.0 1658.0	0.00	0.00	260.0	250.0
18	HEA 340							
	1	1272000.0 13350.0	276900000.0 8242.6	74360000.0 2792.9	0.00	0.00	300.0	330.0

CROSS-SECTION PROPERTIES

HEA 260

Cross-Section Property	Symbol	Value	Unit
Depth	d	250.0	mm
Width	b	260.0	mm
Web thickness	t_w	7.5	mm
Flange thickness	t_f	12.5	mm
Root fillet radius	r	24.0	mm
Depth between flanges	$d-2t_f$	225.0	mm
Depth of straight web	T	177.0	mm
Cross-sectional area	A	8682.0	mm^2
Shear area	A_y	5407.7	mm^2
Shear area	A_z	1658.0	mm^2
Shear area according to EC 3	$A_{v,y}$	6736.3	mm^2
Shear area according to EC 3	$A_{v,z}$	2875.8	mm^2
Plastic shear area	$A_{pl,y}$	6500.0	mm^2
Plastic shear area	$A_{pl,z}$	1781.3	mm^2
Moment of inertia	I_y	1.045E+08	mm^4
Moment of inertia	I_z	3.668E+07	mm^4
Governing radius of gyration	r_y	109.7	mm
Governing radius of gyration	r_z	65.0	mm
Polar radius of gyration	r_o	127.5	mm
Radius of gyration of flange plus 1/5 of web area	r_{zg}	69.1	mm
Volume	V	8682000.0	mm^3/m
Weight	wt	68.2	kg/m
Surface	A_{surf}	1.480	m^2/m
Section factor	A_m/V	170.468	1/m
Torsional constant	J	523700.0	mm^4
Warping constant	C_w	5.164E+11	mm^6
Elastic section modulus	S_y	836400.0	mm^3
Elastic section modulus	S_z	282100.0	mm^3
Warping section modulus	W_w	3.345E+07	mm^4
Statical moment of area	$Q_{y,max}$	459900.0	mm^3
Statical moment of area	$Q_{z,max}$	105625.0	mm^3
Normalized warping constant	W_{no}	15437.5	mm^2
Warping statical moment	Q_w	1.254E+07	mm^4
Plastic section modulus	Z_y	919800.0	mm^3
Plastic section modulus	Z_z	430200.0	mm^3
Plastic warping section modulus	Z_w	5.017E+07	mm^4
Plastic shape factor	Z_y/S_y	1.100	
Plastic shape factor	Z_z/S_z	1.525	
Plastic shape factor	Z_w/W_w	1.500	
Buckling curve (DIN 18800-2:2008-11)	$BC_{y,DIN}$	b	
Buckling curve (DIN 18800-2:2008-11)	$BC_{z,DIN}$	c	
Buckling curve for steel with f_y>=460 N/mm² (DIN 18800-2:2008-11)	$BC_{y,DIN,S460}$	a	
Buckling curve for steel with f_y>=460 N/mm² (DIN 18800-2:2008-11)	$BC_{z,DIN,S460}$	b	
Buckling curve acc. to EN	$BC_{y,EN}$	b	
Buckling curve acc. to EN	$BC_{z,EN}$	c	
Buckling curve acc. to EN for steel S 460	$BC_{y,EN,S460}$	a	
Buckling curve acc. to EN for steel S 460	$BC_{z,EN,S460}$	a	

STRESS POINTS

HEA 260

S-Point No.	Coordinates y	z	Stat. Moments of Area S_y [mm³]	S_z [mm³]	Thickness t [mm]	Warping ω [mm²]	Aω [mm⁴]	
0	-130.0	-125.0	0.0	0.0	12.5	15437.5	0.0	
1	-27.8	-125.0	-151777.0	-100712.0	12.5	3295.3	-1.20E+07	
2	0.0	-125.0	-198406.0	-106362.0	12.5	0.0	-1.25E+07	
3	27.8	-125.0	-151777.0	100712.0	12.5	-3295.3	1.197E+07	
4	130.0	-125.0	0.0	0.0	12.5	-15437.5	0.0	
5	-130.0	125.0	0.0	0.0	12.5	-15437.5	0.0	
6	-27.8	125.0	-151777.0	100712.0	12.5	-3295.3	-1.20E+07	
7	0.0	125.0	-198406.0	106362.0	12.5	0.0	-1.25E+07	
8	27.8	125.0	-151777.0	-100712.0	12.5	3295.3	1.197E+07	
9	130.0	125.0	0.0	0.0	12.5	15437.5	0.0	
10	0.0	-88.5	-427916.0	0.0	7.5	0.0	0.0	
11	0.0	88.5	-427916.0	0.0	7.5	0.0	0.0	
12	0.0	0.0	-457322.0	0.0	7.5	0.0	0.0	

C/T-PARTS

HEA 340

c/t-Part No.	Restrained	c [mm] t [mm]	c/t [-]	Coordinates y_{Start}, z_{Start}	Coordinates y_{End}, z_{End}	Avg. Stat. Moments [mm³] S_y	S_z
1	One Side	118.3	7.17	-31.75	-150.00	152919.00	107881.00
		16.5		-165.00	-165.00		
2	One Side	118.3	7.17	31.75	150.00	152919.00	107881.00
		16.5		-165.00	-165.00		
3	One Side	118.3	7.17	-31.75	-150.00	152919.00	107881.00
		16.5		165.00	165.00		
4	One Side	118.3	7.17	31.75	150.00	152919.00	107881.00
		16.5		165.00	165.00		
5	Both Sides	243.0	25.58	0.00	0.00	901626.00	0.00
		9.5		-121.50	121.50		

1.21 SETS OF MEMBERS

Set No.	Set of Members Description	Type	Member No.	Length [m]	Comment
56	Column	Contin. member	1975,1577,730	12.000	
96	Column	Contin. member	2831,1302	12.846	
218	Column	Contin. member	3241,1460,3300	12.000	

2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CSN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Self-weight	Permanent	☒	0.000	0.000	-1.000
LC2	Roof and walls	Permanent	☐			
LC3	Technology	Permanent	☐			
LC4	Longitudinal wind longitudinal wind pressure	Wind	☐			
LC5	Transverse wind X+ transverse wind suction	Wind	☐			
LC6	Transverse wind X- transverse wind suction	Wind	☐			
LC7	Snow	Snow (H ≤ 1000 m a.s.l.)	☐			
LC8	Internal forces Y longitudinal wind pressure	Wind	☐			
LC9	Internal forces +X transverse wind suction	Wind	☐			
LC10	Internal forces -X transverse wind suction	Wind	☐			
LC11	Imperfection towards +Y	Imperfection	☐			
LC12	Imperfection towards +X	Imperfection	☐			
LC13	Imperfection towards -X	Imperfection	☐			
LC14	Live load on the floor	Imposed - Category B: office areas	☐			

2.5 LOAD COMBINATIONS

Load Combin.	DS	Load Combination Description	No.	Factor	Load Case	
CO1		ULS max pressure 1	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	0.90	LC4	Longitudinal wind
			5	1.50	LC7	Snow
			6	0.90	LC8	Internal forces Y
			7	1.00	LC11	Imperfection towards +Y
			8	1.50	LC14	Live load on the floor
CO2		ULS max pressure 2	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	1.50	LC4	Longitudinal wind
			5	0.75	LC7	Snow
			6	1.50	LC8	Internal forces Y
			7	1.00	LC11	Imperfection towards +Y
			8	1.50	LC14	Live load on the floor
CO3		ULS max suction 1	1	1.00	LC1	Self-weight
			2	1.00	LC2	Roof and walls
			3	1.50	LC5	Transverse wind X+
			4	1.50	LC9	Internal forces +X
			5	1.00	LC12	Imperfection towards +X
CO4		ULS max suction 2	1	1.00	LC1	Self-weight
			2	1.00	LC2	Roof and walls
			3	1.50	LC6	Transverse wind X-
			4	1.00	LC13	Imperfection towards -X
CO5		USL wind X+	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls
			3	1.35	LC3	Technology
			4	0.90	LC5	Transverse wind X+
			5	1.50	LC7	Snow
			6	0.90	LC9	Internal forces +X
			7	1.00	LC12	Imperfection towards +X
CO6		USL wind X+	1	1.35	LC1	Self-weight
			2	1.35	LC2	Roof and walls

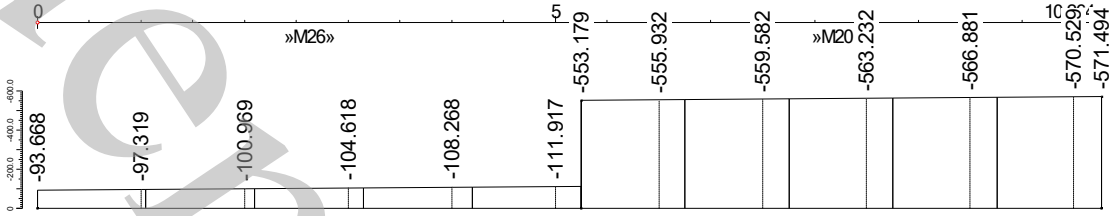
2.6 RESULT COMBINATIONS

Result Combin.	Result Combination DS	Description	No.	Factor	Loading		Criterion	Alternate Group
			3	1.00	CO23	SLS wind only	Variable	1
			4	1.00	CO21	SLS max pressure 1	Variable	1
			5	1.00	CO22	SLS max pressure 2	Variable	1
			6	1.00	CO23	SLS wind only	Variable	1
			7	1.00	CO24	SLS max suction 1	Variable	1
			8	1.00	CO25	SLS max suction 2	Variable	1
			9	1.00	CO26	SLS wind X+	Variable	1
			10	1.00	CO27	SLS wind X+	Variable	1
			11	1.00	CO28	SLS wind X-	Variable	1
			12	1.00	CO29	SLS wind X-	Variable	1

RESULT DIAGRAMS ON MEMBER M26,M201 (OUTER COLUMN IN ADMINISTRATIVE PART)

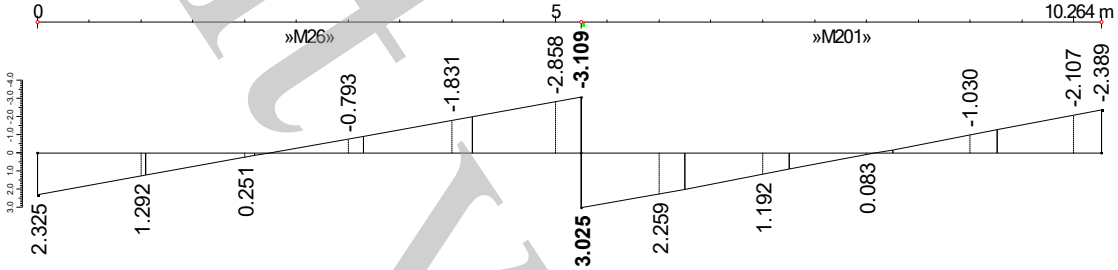
[redacted]
[redacted]

	x [m]	N [kN]
max	–	–
min	10.264	-571.494



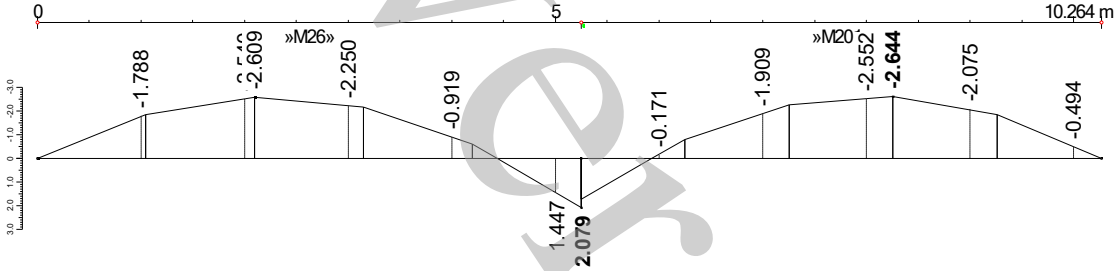
[redacted]
[redacted]

	x [m]	Vz [kN]
max	5.245	3.025
min	5.245	-3.109



[redacted]
[redacted]

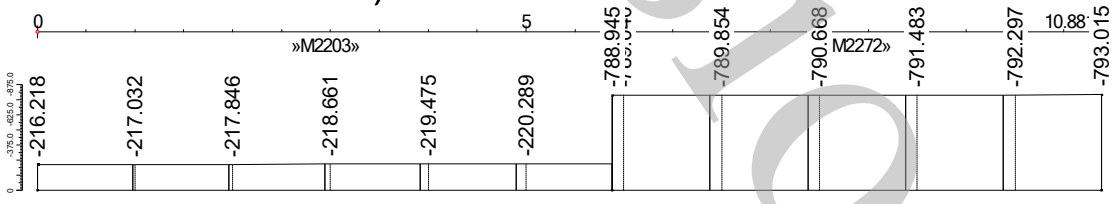
	x [m]	My [kNm]
max	5.245	2.079
min	8.257	-2.644



RESULT DIAGRAMS ON MEMBER M2203,M2272 (INNER COLUMN IN ADMINISTRATIVE PART)

[redacted]
[redacted]

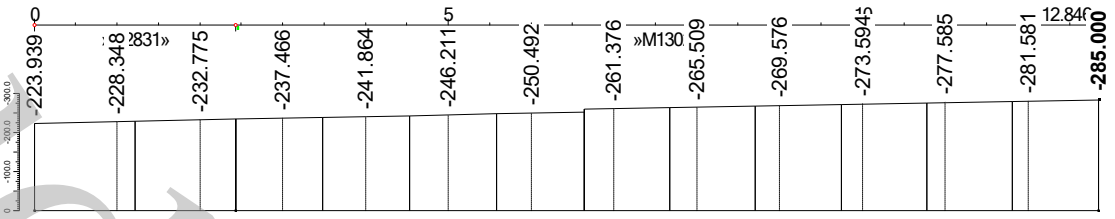
	x [m]	N [kN]
max	–	–
min	10.881	-793.015



RESULT DIAGRAMS ON MEMBER M2831,M1302 (OUTER COLUMN IN HALL PART)

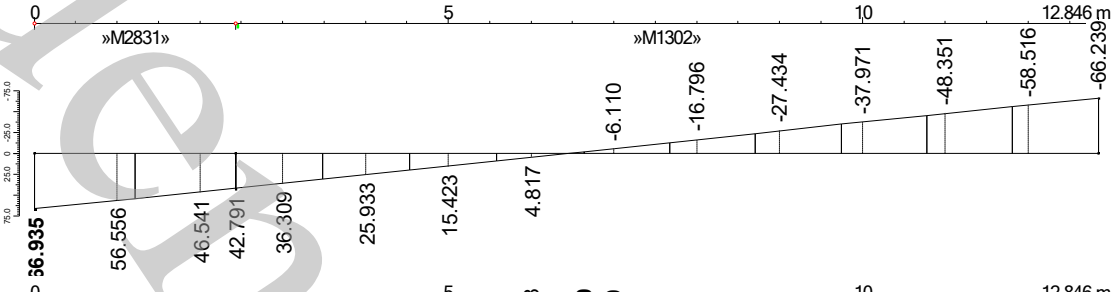
[redacted]

	x [m]	N [kN]
max	–	–
min	12.846	-285.000



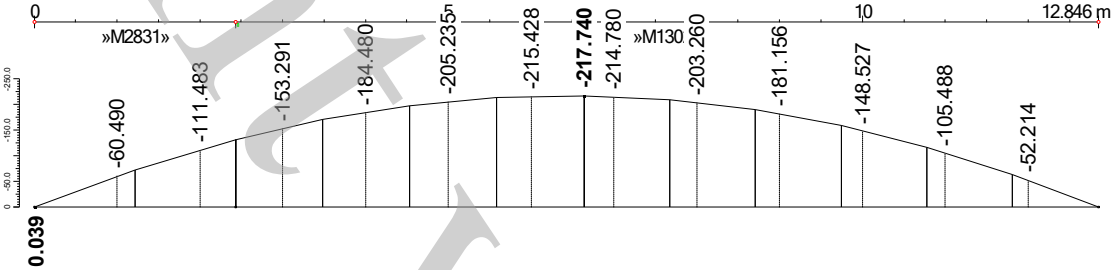
[redacted]

	x [m]	Vz [kN]
max	0.000	66.935
min	12.846	-66.927



[redacted]

	x [m]	My [kNm]
max	0.000	0.039
min	6.638	-217.740

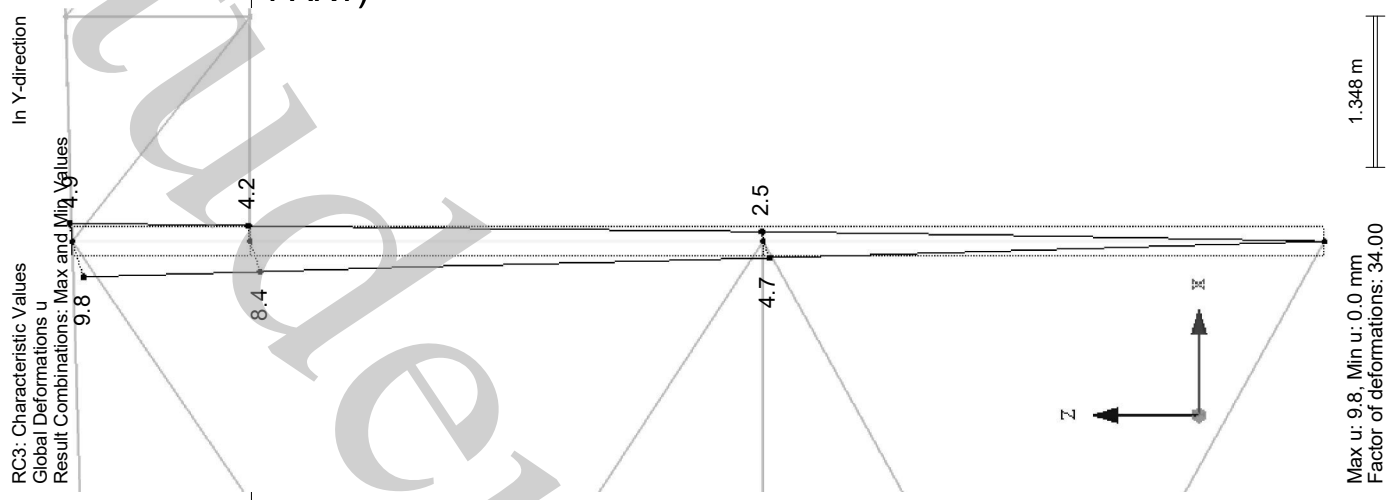


4.4 MEMBERS - LOCAL DEFORMATIONS

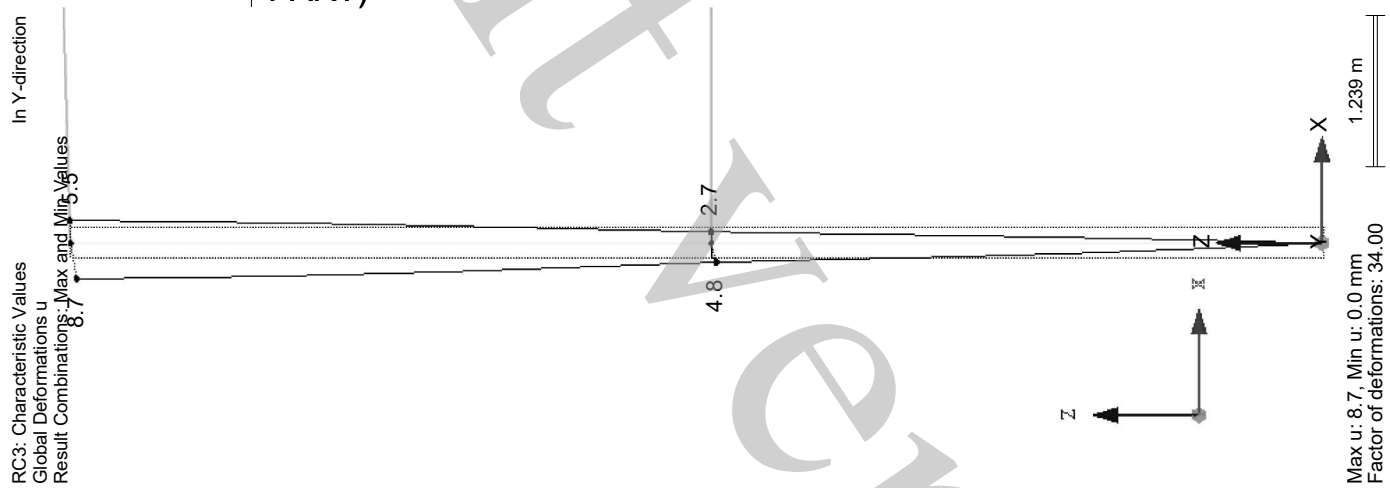
Result Combinations

Member No.	RC	Node No.	Location x [m]		Displacements [mm] u_x	u_y	u_z	Rotations [rad] φ_x	φ_y	φ_z	Section
26	RC3		5.245	Max u_z	0.2	0.0	4.0	0.0002	0.0004	0.0001	20 - HEA 240
26	RC3		4.196	Min u_z	-1.5	-1.7	-6.2	-0.0003	-0.0004	-0.0000	
201	RC3	9	5.019	Max u_z	0.1	0.0	2.4	0.0002	0.0006	0.0000	20 - HEA 240
201	RC3	9	5.019	Min u_z	-1.3	-1.2	-3.9	-0.0003	-0.0004	-0.0002	
231	RC3	523	1.584	Max u_z	0.6	0.2	5.1	0.0001	0.0006	0.0002	20 - HEA 240
231	RC3	523	1.584	Min u_z	-3.0	-1.1	-7.9	-0.0001	-0.0004	-0.0000	
730	RC3	670	9.570	Max u_z	0.8	0.2	7.9	0.0002	0.0019	0.0003	1 - HEA 260
730	RC3	670	9.570	Min u_z	-2.8	-0.3	-18.2	0.0000	-0.0008	-0.0001	
1260	RC3	30	4.570	Max u_z	0.6	0.1	4.5	0.0000	0.0006	0.0002	20 - HEA 240
1260	RC3	30	4.570	Min u_z	-2.7	-1.3	-7.2	-0.0002	-0.0004	-0.0000	
1272	RC3	785	5.000	Max u_z	0.3	0.1	2.6	0.0000	0.0008	0.0000	20 - HEA 240
1272	RC3	785	5.000	Min u_z	-1.7	-1.3	-4.4	-0.0001	-0.0004	-0.0001	
1302	RC3		7.260	Max u_z	0.2	0.1	43.4	0.0048	0.0028	0.0000	18 - HEA 340
1302	RC3		7.260	Min u_z	-0.8	-1.1	-62.0	-0.0053	-0.0002	-0.0002	
1460	RC3	713	0.846	Max u_z	0.9	0.2	7.7	0.0003	0.0017	0.0001	1 - HEA 260
1460	RC3	713	0.846	Min u_z	-3.1	-1.1	-17.8	0.0000	-0.0007	-0.0005	
1577	RC3	672	0.846	Max u_z	0.8	0.4	8.6	0.0000	0.0019	0.0003	1 - HEA 260
1577	RC3	672	0.846	Min u_z	-3.0	-0.2	-19.8	-0.0002	-0.0008	-0.0001	
1975	RC3	731	1.584	Max u_z	1.0	0.9	9.9	0.0000	0.0019	0.0003	1 - HEA 260
1975	RC3	731	1.584	Min u_z	-3.4	-0.3	-22.8	-0.0001	-0.0008	-0.0001	
2203	RC3	1381	5.881	Max u_z	0.6	0.1	4.3	0.0001	0.0006	0.0000	20 - HEA 240
2203	RC3	1381	5.881	Min u_z	-2.3	-1.3	-7.3	-0.0000	-0.0003	-0.0001	
2272	RC3	1380	5.000	Max u_z	0.4	0.2	2.2	0.0000	0.0007	0.0000	20 - HEA 240
2272	RC3	1380	5.000	Min u_z	-1.8	-0.7	-3.8	-0.0000	-0.0004	-0.0001	
2831	RC3	1527	0.000	Max u_z	0.3	0.1	32.5	0.0002	0.0083	0.0000	18 - HEA 340
2831	RC3	1527	0.000	Min u_z	-1.1	-1.4	-53.2	-0.0001	-0.0057	-0.0000	
3241	RC3	714	1.584	Max u_z	1.0	0.4	8.8	0.0001	0.0017	0.0002	1 - HEA 260
3241	RC3	714	1.584	Min u_z	-3.6	-2.0	-20.4	-0.0000	-0.0007	-0.0005	
3300	RC3	1647	9.570	Max u_z	0.8	0.1	7.1	0.0000	0.0017	0.0001	1 - HEA 260
3300	RC3	1647	9.570	Min u_z	-2.9	-0.7	-16.4	-0.0004	-0.0007	-0.0005	

GLOBAL DEFORMATIONS U (INNER COLUMN IN ADMINISTRATIVE PART)



GLOBAL DEFORMATIONS u (OUTER COLUMN IN ADMINISTRATIVE PART)



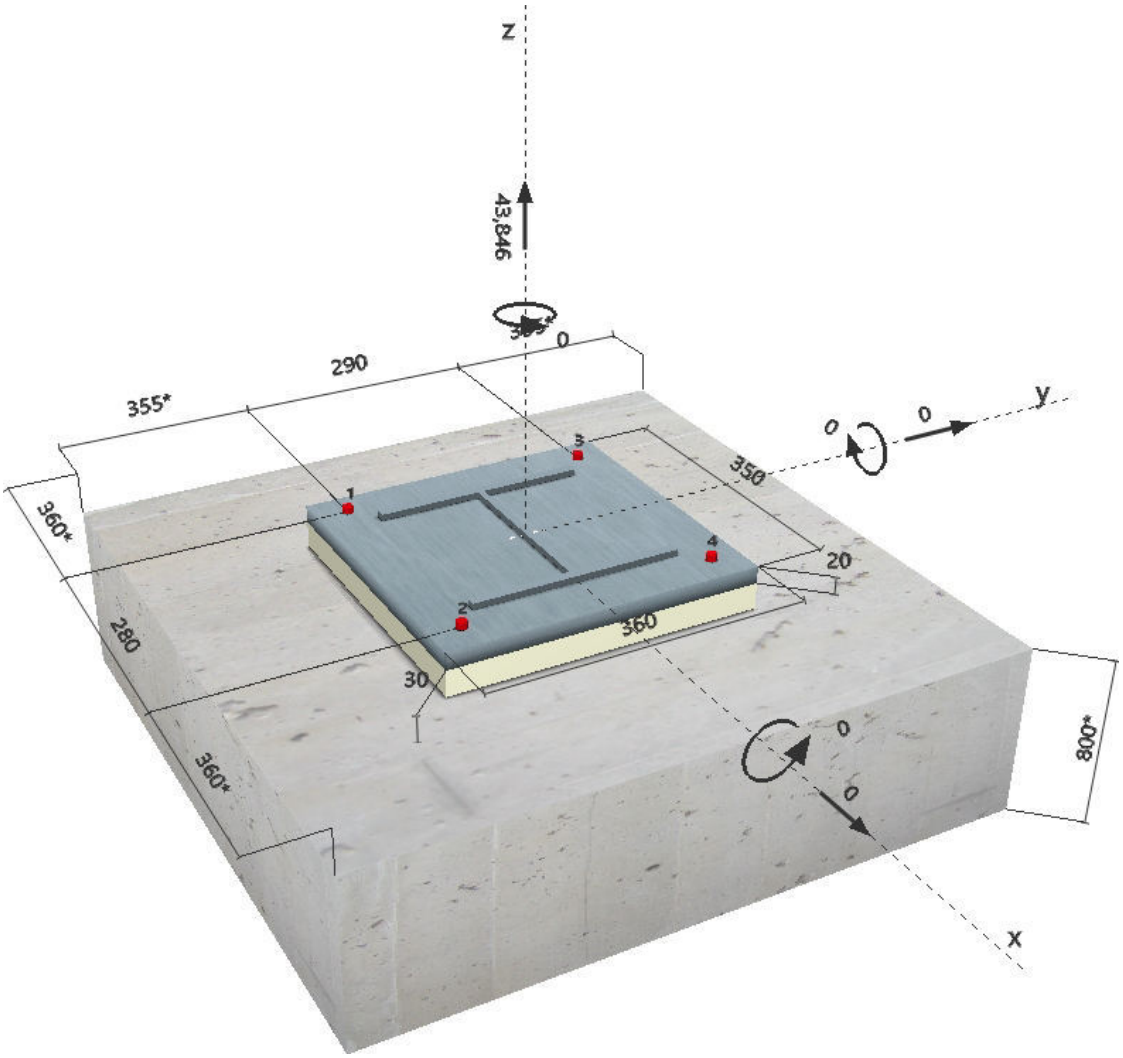
Company:		Page:	1
Specifier:	Nina Feber	Project:	Diploma thesis
Address:		Fastening Point:	
Phone I Fax:	|	Date:	15.12.2017
E-Mail:			

Specifier's comments:

1 Input data

Anchor type and size:	**HIT-HY 200-A + HIT-V (5.8) M12**
Effective embedment depth:	$h_{ef,opti}$ = 70 mm ($h_{ef,limit}$ = 240 mm)
Material:	5.8
Approval No.:	ETA 11/0493
Issued I Valid:	28.07.2017 | -
Proof:	Design method ETAG BOND (EOTA TR 029)
Stand-off installation:	without clamping (anchor); restraint level (baseplate): 2,00; e_b = 30 mm; t = 20 mm
	Hilti Grout: , multipurpose, $f_{c,Grout}$ = 30,00 N/mm^2
Baseplate:	l_x x l_y x t = 350 mm x 360 mm x 20 mm; (Recommended plate thickness: not calculated
Profile:	IPBi/HEA; (L x W x T x FT) = 230 mm x 240 mm x 8 mm x 12 mm
Base material:	uncracked concrete, C20/25, $f_{c,cube}$ = 25,00 N/mm^2; h = 800 mm, Temp. short/long: 40/24 °C
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	No reinforcement or Reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm)
	no longitudinal edge reinforcement

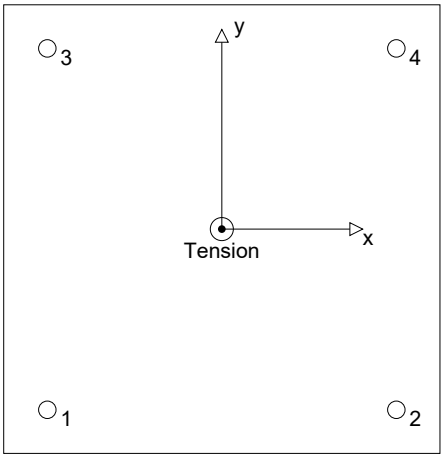
Geometry [mm] & Loading [kN, kNm]



Company:		Page:	2
Specifier:	Nina Feber	Project:	Diploma thesis
Address:		Fastening Point:	
Phone I Fax:	|	Date:	15.12.2017
E-Mail:			

2 Load case/Resulting anchor forces

Load case: Design loads



Anchor reactions [kN]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	10,962	0,000	0,000	0,000
2	10,962	0,000	0,000	0,000
3	10,962	0,000	0,000	0,000
4	10,962	0,000	0,000	0,000

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [N/mm^2]
resulting tension force in (x/y)=(0/0): 43,846 [kN]
resulting compression force in (x/y)=(0/0): 0,000 [kN]

3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	10,962	28,000	40	OK
Combined pullout-concrete cone failure**	43,846	126,669	35	OK
Concrete cone failure**	43,846	78,869	56	OK
Splitting failure**	N/A	N/A	N/A	N/A

* most unfavourable anchor **anchor group (anchors in tension)

3.1 Steel failure

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]
42,000	1,500	28,000	10,962

3.2 Combined pullout-concrete cone failure

$A_{p,N}$ [mm^2]	$A^0_{p,N}$ [mm^2]	$\tau_{Rk,ucr,25}$ [N/mm^2]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	c_{min} [mm]
176400	44100	18,00	210	105	355

ψ_c	$\tau_{Rk,ucr}$ [N/mm^2]	k	$\psi^0_{g,Np}$	$\psi_{g,Np}$
1,000	18,00	3,200	1,000	1,000

$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
0	1,000	0	1,000	1,000	1,000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
47,501	190,004	1,500	126,669	43,846

3.3 Concrete cone failure

$A_{c,N}$ [mm^2]	$A^0_{c,N}$ [mm^2]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]
176400	44100	105	210

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1,000	0	1,000	1,000	1,000

k_1	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
10,100	29,576	1,500	78,869	43,846

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Address:		Fastening Point:	
Phone I Fax:	|	Date:	15.12.2017
E-Mail:			

4 Shear load (EOTA TR 029, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilisation β_V [%]	Status
Steel failure (without lever arm)*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout failure*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* most unfavourable anchor **anchor group (relevant anchors)

5 Displacements (highest loaded anchor)

Short term loading:

N_{Sk} = 8,120 [kN] δ_N = 0,092 [mm]

V_{Sk} = 0,000 [kN] δ_V = 0,000 [mm]

δ_{NV} = 0,092 [mm]

Long term loading:

N_{Sk} = 8,120 [kN] δ_N = 0,185 [mm]

V_{Sk} = 0,000 [kN] δ_V = 0,000 [mm]

δ_{NV} = 0,185 [mm]

Comments: Tension displacements are valid with half of the required installation torque moment for uncracked concrete! Shear displacements are valid without friction between the concrete and the baseplate! The gap due to the drilled hole and clearance hole tolerances are not included in this calculation!

The acceptable anchor displacements depend on the fastened construction and must be defined by the designer!

6 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Checking the transfer of loads into the base material is required in accordance with EOTA TR 029, Section 7!
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 4.1 of EOTA TR029! For larger diameters of the clearance hole see Chapter 1.1. of EOTA TR029!
- The accessory list in this report is for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- Drilled hole cleaning must be performed according to instructions for use (blow 4 times with the hand pump, brush 4 times, blow again 4 times with the hand pump).
- Characteristic bond resistances depend on short- and long-term temperatures.
- Please contact Hilti to check feasibility of HIT-V rod supply.
- Edge reinforcement is not required to avoid splitting failure

Fastening meets the design criteria!

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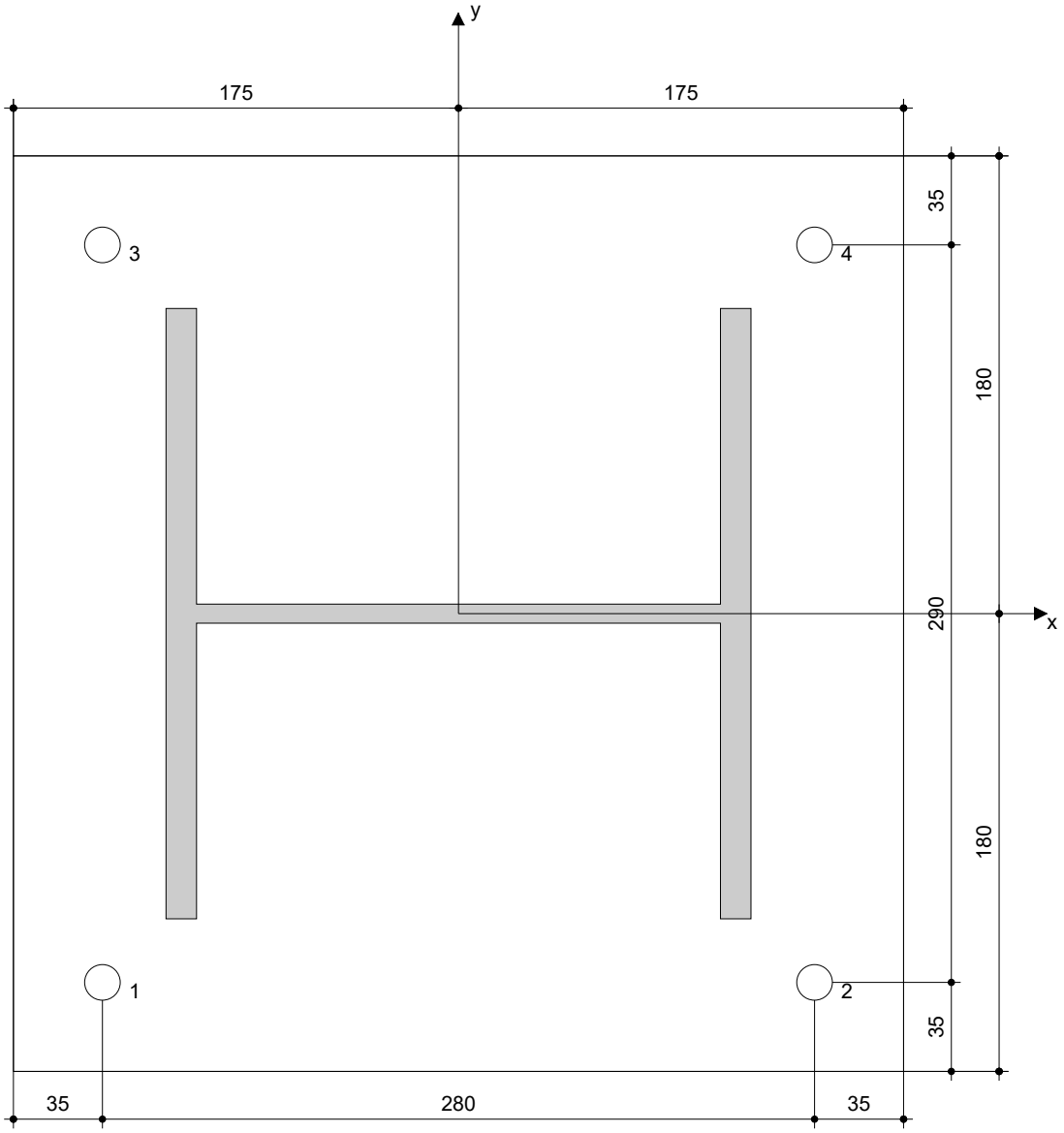
Address:		Fastening Point:	
Phone I Fax:	|	Date:	15.12.2017
E-Mail:			

7 Installation data

Baseplate, steel: -
Profile: IPBi/HEA; 230 x 240 x 8 x 12 mm
Hole diameter in the fixture: d_f = 14 mm
Plate thickness (input): 20 mm
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Anchor type and size: HIT-HY 200-A + HIT-V (5.8) M12
Installation torque: 0,040 kNm
Hole diameter in the base material: 14 mm
Hole depth in the base material: 70 mm
Minimum thickness of the base material: 100 mm
Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer	• Manual blow-out pump	• Dispenser including cassette and mixer
• Properly sized drill bit	• Proper diameter wire brush	• Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-140	-145	360	640	355	645
2	140	-145	640	360	355	645
3	-140	145	360	640	645	355
4	140	145	640	360	645	355

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Specifier:	Nina Feber	Project:	Diploma thesis
Address:		Fastening Point:	
Phone I Fax:	|	Date:	15.12.2017
E-Mail:			

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

HIT-HY 200
pro lepené kotvy do betonu

Inovativní hybridní lepicí hmota určená pro těžké kotvení s unikátními kotevními šrouby HIT-Z, standardními kotevními šrouby HIT-V, závitovými tyčemi, závitovými pouzdry HIS-N a pro dodatečné vlepování výztuží do betonu

Základní materiál:
- Beton s trhlinami
- Beton bez trhlin

Použití:
- Kotvení nosných ocelových konstrukcí, sloupů
- Kotvení pomocné ocelové konstrukce, schodiště
- Zábradlí, bezpečnostní bariéry
- Dodatečné vlepování výztuží

Výhody:
- První chemická kotva na trhu bez nutnosti čištění v případě použití HIT-Z kotevního šroubu
- Odstranění nutnosti čištění v případě vrtání dutými vrtáky TE-CD/TE-YD
- Rychletuhnoucí hmota s řadou technických certifikací a jednou z největších únosností na trhu
- Vysoké únosnosti s kotevními šrouby HIT-Z v betonu s trhlinami
- Možnost osazení HIT-Z šroubů do diamantem vrtaných otvorů s čištěním tlakovou vodou
- Dvě varianty lepicí hmoty pro různé doby zpracování a vytvrzení
- Variabilní kotevní hloubka závisející na požadované únosnosti – úspora času a nákladů
- Možnost dodatečného vlepování výztuží
- Širší rozsah montážních teplot od -10 °C do +40 °C s HIT-V šroubem, pouzdrem HIS-N a výztuží
- Neobsahuje nebezpečné chemické látky, splňuje zdravotní a bezpečnostní požadavky pro použití, skladování a přepravu
- Nový Hilti PROFIS software pro rychlé a spolehlivé navrhování
- Odolnost vůči seismickému namáhání

HIT-HY 200-A pro kotevní aplikace
= kratký čas pro zpracování a vytvrzení při osazení kotevních šroubů

HIT-HY 200-R pro dodatečně vlepovanou výztuž
= delší čas pro zpracování a vytvrzení při vlepování betonářských výztuží

HIT-HY 200-A lepená kotva do betonu

Označení	Objem balení (ml)	Objednací množství (ks)	Č. výrobku
HIT-HY 200-A	330	1	**2022 696**
HIT-HY 200-A + Hilti box	330	20	**2063 108**
HIT-HY 200-A	500	1	**2022 697**
HIT-HY 200-A + Hilti box	500	10	**2074 483**
HIT-HY 200-A + Hilti box	500	20	**2049 186**

HIT-HY 200-R lepená kotva do betonu

Označení	Objem balení (ml)	Objednací množství (ks)	Č. výrobku
HIT-HY 200-R	330	1	**2022 699**
HIT-HY 200-R + Hilti box	330	20	**2074 485**
HIT-HY 200-R	500	1	**2022 790**
HIT-HY 200-R + Hilti box	500	10	**2074 486**
HIT-HY 200-R + Hilti box	500	20	**2074 487**

* 330 a 500 ml obsahuje 2 ks statických směšovačů

HIT-RE M směšovač

Označení	Objednací množství (ks)	Č. výrobku
HIT-RE M	1	**337 111**

Vytlačovací přístroje
na str. 80

SAFEset

Technická data pro použití HIT-HY 200 s kotevním šroubem HIT-Z

Data jsou kompatibilní s	ETA 12/0006 (HIT-HY 200-A) a EOTA TR 029 ETA 12/0028 (HIT-HY 200-R) a EOTA TR 029					
Základní materiál	**Beton > C20/25 (B25), příklepem nebo diamantem vrtaný kotevní otvor**					
HIT-Z šroub		**M8**	**M10**	**M12**	**M16**	**M20**
Průměr vrtání	d_0 [mm]	10	12	14	18	22
Průměr otvoru v kotevní desce	$d_f \leq$ [mm]	9*/11**	12*/14**	14*/16**	18*/20**	22*/24**
Efektivní kotevní hloubka	h_{ef} [mm]	70	90	110	145	180
Vzdálenost od okraje	$c_{cr,sp}$ [mm]	175	260	345	410	560
Osová vzdálenost	$s_{cr,sp}$ [mm]	350	520	690	820	1120
Minimální vzdálenost od okraje	c_{min} [mm]	40	50	60	80	100
Minimální osová vzdálenost	s_{min} [mm]	40	50	60	80	100
Minimální tloušťka betonu	h_{min} [mm]	130	150	170	245	280
Utahovací moment	T_{inst} [Nm]	10	25	40	80	150
Orientační spotřeba kotvící hmoty	[ml]	4	7	10	19	32
Beton bez trhlin						
Dovolené namáhání v tahu	N_{rec} [kN]	11,4	18,1	25,9	42,0	58,1
Dovolené namáhání ve smyku	V_{rec} [kN]	6,9	10,9	15,4	27,4	41,7
Návrhová únosnost v tahu	N_{Rd} [kN]	16,0	25,3	36,2	58,8	81,3
Návrhová únosnost ve smyku	V_{Rd} [kN]	9,6	15,2	21,6	38,4	58,4
Beton s trhlinami						
Dovolené namáhání v tahu	N_{rec} [kN]	10,0	14,6	19,8	29,9	41,4
Dovolené namáhání ve smyku	V_{rec} [kN]	6,9	10,9	15,4	27,4	41,7
Návrhová únosnost v tahu	N_{Rd} [kN]	14,1	20,5	27,7	41,9	58,0
Návrhová únosnost ve smyku	V_{Rd} [kN]	9,6	15,2	21,6	38,4	58,4

* v případě převlečné montáže
** v případě průvlekové montáže

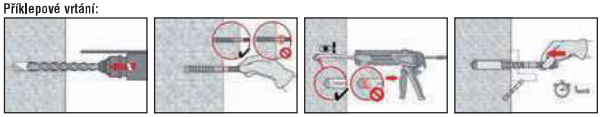
Podmínky platnosti: Hodnoty dovoleného namáhání a návrhové únosnosti jsou platné pro jednu samostatnou kotvu bez vlivu vzdáleností od okraje a pro kotevní hloubku a tloušťku základního materiálu, které jsou uvedeny v tabulce.
Max. dlouhodobá provozní teplota 24°C, max. krátkodobá provozní teplota 40°C. Příklepem nebo diamantem vrtaný otvor v suchém nebo vlhkém betonu. Kotevní šroub HIT-Z – kvalita oceli 6.8.
Pro podrobnější informace použijte Fastening Technology Manual nebo Hilti PROFIS Anchor návrhový software.

Doby pro zpracování a vytvrzení:

Teplota	HIT-HY 200-A		HIT-HY 200-R	
	Doba pro zpracování T_{gel}	Doba pro vytvrzení T_{cure}	Doba pro zpracování T_{gel}	Doba pro vytvrzení T_{cure}
+5 °C	25 min	2 h	1 h	3 h
+10 °C	15 min	1 h	40 min	2 h
+20 °C	7 min	30 min	15 min	1 h
+30 °C	4 min	30 min	9 min	1 h
+40 °C	3 min	30 min	6 min	1 h

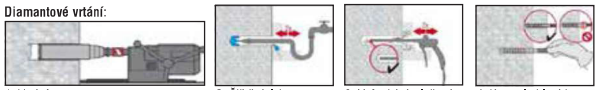
Postup osazování:

Příklepové vrtání:



1. Vrtání otvoru příklepovým vrtákem
2. Kontrola hloubky osazení
3. Vytlačení lepicí hmoty HIT-HY 200
4. Osazení šroubu HIT-Z

Diamantové vrtání:



1. Vrtání otvoru diamantovou korunkou
2. Čištění tlakovou vodou ode dna
3. Vyfoukání stlačeným vzduchem
4. Kontrola hloubky osazení

5. Vytlačení lepicí hmoty HIT-HY 200
6. Osazení šroubu HIT-Z

HIT-Z kotevní šroub bez nutnosti čištění

Dodáváno včetně šetihranné matky a podložky
Materiál: galvanický pozink 6.8, nerezová ocel A4

Závit	Užitná délka (mm)[1]	Délka šroubu (mm)	Vrtaný ∅ d_0 (mm)	Baleno ks	Označení	Č. výrobku HIT-Z galv. zinek	Č. výrobku HIT-RZ nerez A4
M8	65	80	10	40	**HIT-Z M8x80**	**2018364**	**2018422**
M8	85	100	10	40	**HIT-Z M8x100**	**2018365**	**2018423**
M8	105	120	10	40	**HIT-Z M8x120**	**2018366**	**2018424**
M10	78	95	12	40	**HIT-Z M10x95**	**2018367**	**2018425**
M10	98	115	12	40	**HIT-Z M10x115**	**2018368**	**2018426**
M10	118	135	12	40	**HIT-Z M10x135**	**2018369**	**2018427**
M10	143	160	12	40	**HIT-Z M10x160**	**2018410**	**2018428**
M12	86	105	14	20	**HIT-Z M12x105**	**2018411**	**2018429**
M12	121	140	14	20	**HIT-Z M12x140**	**2018412**	**2018430**
M12	136	155	14	20	**HIT-Z M12x155**	**2018413**	**2018431**
M12	177	196	14	20	**HIT-Z M12x196**	**2018415**	**2018433**
M16	132	155	18	12	**HIT-Z M16x155**	**2018416**	**2018434**
M16	152	175	18	12	**HIT-Z M16x175**	**2018417**	**2018435**
M16	182	205	18	12	**HIT-Z M16x205**	**2018418**	**2018436**
M16	217	240	18	12	**HIT-Z M16x240**	**2018419**	**2018437**
M20	188	215	22	6	**HIT-Z M20x215**	**2018420**	**2018438**
M20	223	250	22	6	**HIT-Z M20x250**	**2018421**	**2018439**

1) Užitná délka = délka kotevního šroubu po odečtení tloušťky matice a podložky

Technická data pro použití HIT-HY 200 s kotevním šroubem HIT-V / HIT-C

Data jsou kompatibilní s	ETA 11/0493 (HIT-HY 200-A), ETA 11/0493 (HIT-HY 200-A) a EOTA TR 029								
Základní materiál	Beton > C20/25 (B25), příklepem vrtaný kotevní otvor								
HIT-V/HIT-C šroub		**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Průměr vrtání	d_0 (mm)	10	12	14	18	22	28	30	35
Průměr otvoru v kotevní desce	$d_f \leq$ (mm)	9	12	14	18	22	26	30	33
Efektivní kotevní hloubka	h_{ef} (mm)	80	90	110	125	170	210	240	270
Okrajová vzdálenost	$c_{cr,sp}$ (mm)	170	205	250	285	385	475	545	610
Osová vzdálenost	$s_{cr,sp}$ (mm)	340	410	500	570	770	950	1090	1220
Minimální okrajová vzdálenost	c_{min} (mm)	40	50	60	80	100	120	135	150
Minimální osová vzdálenost	s_{min} (mm)	40	50	60	80	100	120	135	150
Minimální tloušťka betonu	h_{min} (mm)	110	120	140	160	220	270	300	340
Maximální utahovací moment	T_{max} (Nm)	10	20	40	80	150	200	270	300
Orientační spotřeba kotvící hmoty	(ml)	4,4	6,4	9,5	15,1	41,8	63,3	67,2	122,3
Beton bez trhlin									
Dovolené namáhání v tahu	N_{rec} (kN)	8,6	13,8	20,0	33,6	53,3	73,2	89,4	106,7
Dovolené namáhání ve smyku	V_{rec} (kN)	5,1	8,6	12,0	22,3	34,9	50,3	65,7	80,0
Návrhová únosnost v tahu	N_{Rd} [kN]	12,0	19,3	28,0	47,1	74,6	102,5	125,5	149,4
Návrhová únosnost ve smyku	V_{Rd} [kN]	7,2	12,0	16,8	31,2	48,8	70,4	92,0	112,0
Beton s trhlinami									
Dovolené namáhání v tahu	N_{rec} (kN)	7,2	10,1	16,8	24,0	38,0	52,2	63,7	76,1
Dovolené namáhání ve smyku	V_{rec} (kN)	5,1	8,6	12,0	22,3	34,9	50,3	65,7	80,0
Návrhová únosnost v tahu	N_{Rd} [kN]	10,1	14,1	23,5	33,5	53,2	73,0	89,2	106,5
Návrhová únosnost ve smyku	V_{Rd} [kN]	7,2	12,0	16,8	31,2	48,8	70,4	92,0	112,0

Podmínky platnosti: Hodnoty dovoleného namáhání a návrhové únosnosti jsou platné pro jednu samostatnou kotvu bez vlivu vzdáleností od okraje a pro kotevní hloubku a tloušťku základního materiálu, které jsou uvedeny v tabulce. Max. dlouhodobá provozní teplota 24°C, max. krátkodobá provozní teplota 40°C. Příklepem vrtaný otvor v suchém nebo vlhkém betonu. Kotvení šroub HIT-V nebo HIT-C – kvalita oceli 5.8. Pro podrobnější informace použijte Fastening Technology Manual nebo Hilti PROFIS Anchor návrhový software.

Poznámka: portfolio kotevních šroubů HIT-C viz. strany 72-73

Doby pro zpracování a vytvrzení:

	HIT-HY 200-A		HIT-HY 200-R	
Teplota	**Doba pro zpracování T_{gel}**	**Doba pro vytvrzení T_{cure}**	**Doba pro zpracování T_{gel}**	**Doba pro vytvrzení T_{cure}**
-10 °C	1,5 h	7 h	3 h	20 h
0 °C	50 min	4 h	2 h	7 h
+5 °C	25 min	2 h	1 h	3 h
+10 °C	15 min	1 h	40 min	2 h
+20 °C	7 min	30 min	15 min	1 h
+30 °C	4 min	30 min	9 min	1 h
+40 °C	3 min	30 min	6 min	1 h

Postup osazování:

1. Vrtání otvoru dutým vrtákem TE-CD/TE-YD
2. Vytlačení lepicí hmoty HIT-HY 200
3. Osazení kotevního elementu

1. Vrtání otvoru příklepovým vrtákem
2. Vyfoukání
3. Čištění ocelovým kartáčem
4. Vyfoukání
5. Vytlačení lepicí hmoty HIT-HY 200
6. Osazení kotevního elementu

HIT-V kotevní šroub

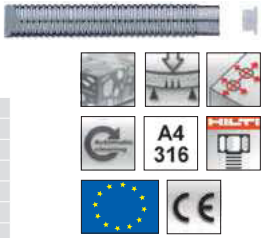
Dodáváno včetně šetihranné matky a podložky
Materiál: galvanický pozink 5.8. resp. 8.8., nerezová ocel A4

Závit	Užitná délka (mm)***	Délka šroubu (mm)	Vrtaný ∅ d_0 (mm)	Baleno ks	Označení	Č. výrobku **HIT-V** galv. pozink	Č. výrobku **HIT-V-F** žárový pozink	Č. výrobku **HIT-V-R** nerez A4
M 6	62	75	8	20	**HIT-V M6x75**	**387 144**		
M 6	92	105	8	20	**HIT-V M6x105**	**387 145**		
M 8	65	80	10	20	**HIT-V M8x80**	**387 054**	**409 548**	**387 074****
M 8	95	110	10	20	**HIT-V M8x110**	**387 055**	**409 549**	**387 075**
M 8	135	150	10	20	**HIT-V M8x150***	**387 056**	**409 550**	**387 076**
M10	78	95	12	10	**HIT-V M10x95**	**387 057**	**409 551**	**387 077**
M10	98	115	12	10	**HIT-V M10x115**	**387 146**	**409 552**	**387 148**
M10	113	130	12	10	**HIT-V M10x130**	**387 058**	**409 553**	**387 078**
M10	173	190	12	10	**HIT-V M10x190***	**387 059**	**409 554**	**387 079**
M12	91	110	14	10	**HIT-V M12x110**	**387 060**	**409 555**	**387 080****
M12	101	120	14	10	**HIT-V M12x120**	**387 147**	**409 556**	**387 149****
M12	131	150	14	10	**HIT-V M12x150**	**387 061**	**409 557**	**387 081**
M12	201	220	14	10	**HIT-V M12x220***	**387 062**	**409 558**	**387 082**
M12	261	280	14	10	**HIT-V M12x280***	**387 063**	**409 559**	**387 083**
M16	127	150	18	5	**HIT-V M16x150**	**387 064**	**409 560**	**387 084**
M16	177	200	18	5	**HIT-V M16x200**	**387 065**	**409 561**	**387 085**
M16	277	300	18	5	**HIT-V M16x300**	**387 066**	**409 562**	**387 086**
M16	357	380	18	5	**HIT-V M16x380***	**387 067**	**409 563**	**387 087**
M20	153	180	22	5	**HIT-V M20x180**	**387 068**	**409 564**	**387 150**
M20	233	260	22	5	**HIT-V M20x260**	**387 069**	**409 565**	**387 088**
M20	353	380	22	10	**HIT-V M20x380**	**387 070**	**409 566**	**387 089****
M20	453	480	22	10	**HIT-V M20x480**	**387 071**	**409 567**	**387 151****
M24	268	300	28	5	**HIT-V M24x300**	**387 072**	**409 568**	**387 152**
M24	418	450	28	5	**HIT-V M24x450**	**387 073**	**409 569**	**387 153****

* Ocel kvality 8.8 ** Dodací lhůta dle dohody *** Užitná délka = délka kotevního šroubu po odečtení tloušťky matice a podložky

Poznámka: Standardní portfolio HIT-V šroubů je do průměru M24. Lze použít i rozšířené portfolio kotevních šroubů označených HIT-C – viz str. 72-73. Také lze použít závitové tyče v metráži. Materiálová kvalita kotevního šroubu HIT-C nebo závitové tyče včetně matice a podložky musí být minimálně na stejné úrovni jako u kotevního šroubu HIT-V, který byl použit v návrhu kotvení, např. dle softwaru PROFIS Anchor – viz příslušné ETA schválení.

Technická data pro použití HIT-HY 200 s pouzdrem s vnitřním závitem HIS-N + šroub kvality 8.8



Data jsou kompatibilní s	ETA 11/0493 (HIT-HY 200-A), ETA 12/0084 (HIT-HY 200-R) EOTA TR 029					
Základní materiál	Beton > C20/25 (B25), příklepem vrtaný kotevní otvor					
HIS-N pouzdro + šroub kv.8.8		**M8**	**M10**	**M12**	**M16**	**M20**
Průměr vrtání	d_0 (mm)	14	18	22	28	32
Průměr otvoru v kotevní desce	$d_f \leq$ (mm)	9	12	14	18	22
Efektivní kotevní hloubka	h_{ef} (mm)	90	110	125	170	205
Vzdálenost od okraje	$c_{cr,sp}$ (mm)	200	240	270	370	460
Osová vzdálenost	$s_{cr,sp}$ (mm)	400	480	540	740	920
Minimální vzdálenost od okraje	c_{min} (mm)	40	45	55	65	90
Minimální osová vzdálenost	s_{min} (mm)	40	45	55	65	90
Minimální tloušťka betonu	h_{min} (mm)	120	150	170	230	270
Maximální utahovací moment	T_{max} (Nm)	10	20	40	80	150
Orientační spotřeba kotvící hmoty	(ml)	4,4	6,4	9,5	15,1	41,8
Beton bez trhlin						
Dovolené namáhání v tahu	N_{rec} (kN)	11,9	21,9	31,9	53,3	55,2
Dovolené namáhání ve smyku	V_{rec} (kN)	16,7	13,1	19,4	36,0	33,1
Návrhová únosnost v tahu	N_{Rd} [kN]	17,5	30,7	44,7	74,6	77,3
Návrhová únosnost ve smyku	V_{Rd} [kN]	10,4	18,4	27,2	50,4	46,4
Beton s trhlinami						
Dovolené namáhání v tahu	N_{rec} (kN)	11,8	19,0	24,0	38,0	50,3
Dovolené namáhání ve smyku	V_{rec} (kN)	7,4	13,1	19,4	36,0	33,1
Návrhová únosnost v tahu	N_{Rd} [kN]	16,5	26,6	33,5	53,2	70,4
Návrhová únosnost ve smyku	V_{Rd} [kN]	10,4	18,4	27,2	50,4	46,4

Podmínky platnosti: Hodnoty dovoleného namáhání a návrhové únosnosti jsou platné pro jednu samostatnou kotvu bez vlivu vzdáleností od okraje a pro kotevní hloubku a tloušťku základního materiálu, které jsou uvedeny v tabulce.
Max. dlouhodobá provozní teplota 24°C, max. krátkodobá provozní teplota 40°C. Příklepem vrtaný otvor v suchém nebo vlhkém betonu. Šroub použitý do pouzdra kvality oceli 8.8. Pro podrobnější informace použijte Fastening Technology Manual nebo Hilti PROFIS Anchor návrhový software.

HIS-N pouzdro s vnitřním závitem

Materiál: ocel galvanicky pozinkovaná 5 – 7 µm, nerezová ocel A4 (1.4401)

Vnitřní závit	Vnější ∅ pouzdra (mm)	Rozsah pro hloubku zašroubování (mm)	Min. hloubka osazení h_{nom} (mm)	∅ vrtáku d_0 (mm)	Baleno ks	Označení	Č. výrobku **HIS-N** galvan. poz.	Č. výrobku **HIS-RN** nerez A4
M 8	12,5	8 – 20	90	14	10	**HIS-N M 8 x 90**	**258 015**	**258 024**
M 10	16,5	10 – 25	110	18	10	**HIS-N M 10 x 110**	**258 016**	**258 025**
M 12	20,5	12 – 30	125	22	5	**HIS-N M 12 x 125**	**258 017**	**258 026**
M 16	25,4	16 – 40	170	28	5	**HIS-N M 16 x 170**	**258 018**	**258 027**
M 20	27,6	20 – 50	210	32	5	**HIS-N M 20 x 205**	**258 019**	**258 028**

Závitové tyče pro kotvení + podložka + matice

Ocel kvality 8.8, galvanický pozink, žárový pozink
Podložka DIN 125, galvanický pozink, žárový pozink
Matice šestihranná DIN 934, galvanický pozink, žárový pozink

Závit	Označení závitová tyč	Č. výrobku galvan. pozinku	Č. výrobku žárového pozinku	Označení podložka	Č. výrobku galvan. pozinku	Č. výrobku žárového pozinku	Označení matice	Č. výrobku galvan. pozinku.	Č. výrobku žárového pozinku
M 6	AM 6x1000 8.8.	**407 495**		A 6,4	**282 849**		SKM-M 6	**216 464**	
M 8	AM 8x1000 8.8.	**407 496**		A 8,4	**282 850**		SKM-M 8	**216 465**	
M10	AM10x1000 8.8.	**407 497**	**419 102**	A 10,5	**282 851**	**304 770**	SKM-M 10	**216 466**	**304 765**
M12	AM12x1000 8.8.	**407 498**	**419 103**	A 13	**282 852**	**304 771**	SKM-M 12	**216 467**	**304 766**
M16	AM16x1000 8.8.	**407 499**	**419 104**	A 17	**282 853**	**304 772**	SKM-M 16	**216 468**	**304 767**
M20	AM20x1000 8.8.	**407 500**	**419 105**	A 21	**282 854**	**2008 399**	SKM-M 20	**216 469**	**304 768**
M24	AM24x1000 8.8.	**407 501**	**419 106**	A 25	**2008 281**	**2008 287**	SKM-M 24	**2008 235**	**2008 236**
M27	AM27x1000 8.8.	**2008 138**	**2008 338**	A 28	**2008 282**	**2008 288**	SKM-M 27	**362 307**	**2008 237**
M30	AM30x1000 8.8.	**2008 139**	**2008 339**	A 31	**2008 283**	**2008 289**	SKM-M 30	**362 309**	**2008 238**

V případě záměny kotevního šroubu HIT-V nebo HIT-C za závitovou tyč, musí být materiálová kvalita závitové tyče včetně matice a podložky minimálně na stejné úrovni jako u kotevního šroubu HIT-V/HIT-C, který byl použit v návrhu kotvení, např. dle softwaru PROFIS Anchor – viz příslušné ETA schválení.

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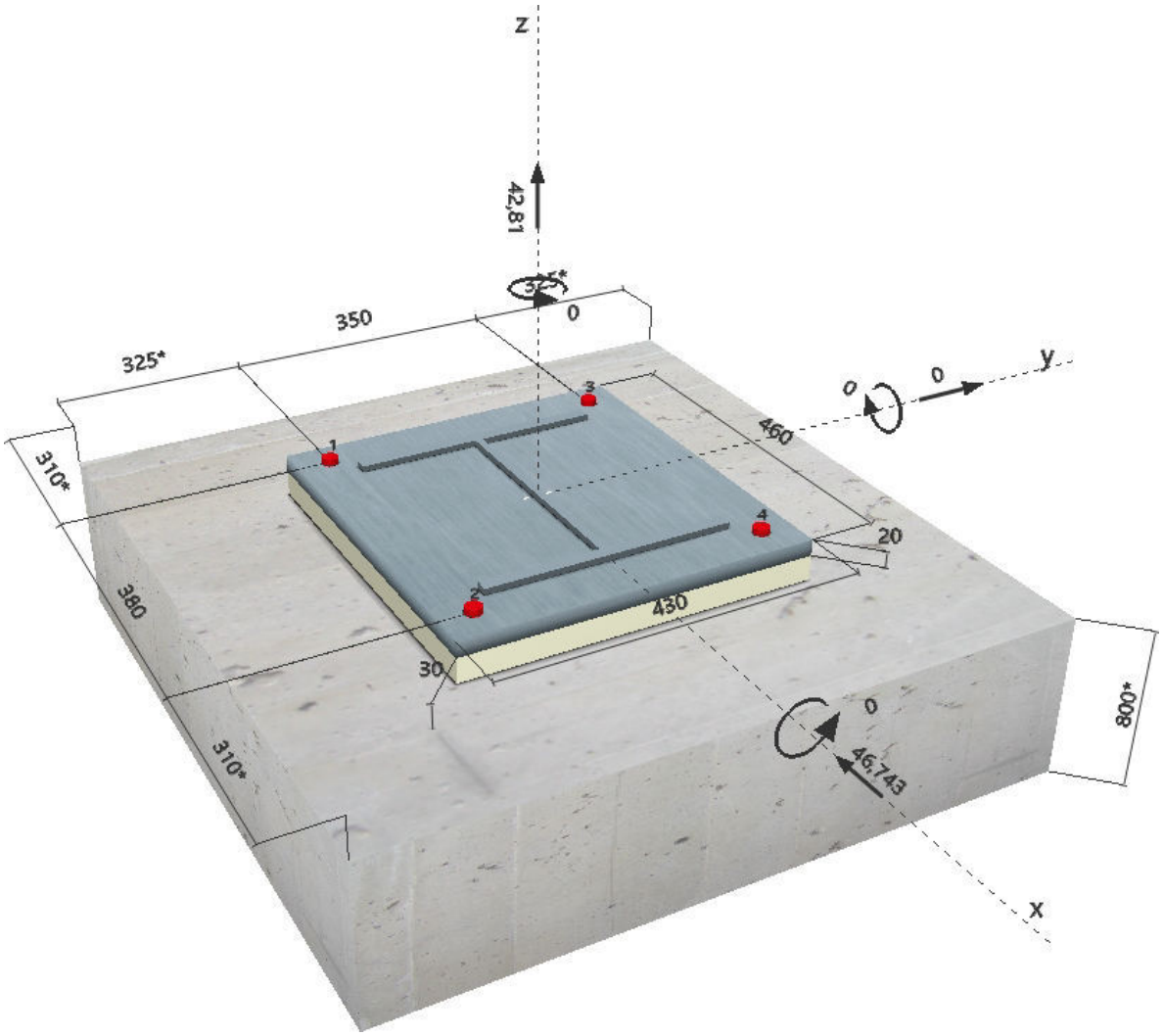
Specifier's comments:

1 Input data

Anchor type and size:	**HIT-HY 200-A + HIT-V (8.8) M20**
Effective embedment depth:	$h_{ef,act}$ = 120 mm ($h_{ef,limit}$ = - mm)
Material:	8.8
Approval No.:	ETA 11/0493
Issued I Valid:	28.07.2017 | -
Proof:	Design method ETAG BOND (EOTA TR 029)
Stand-off installation:	without clamping (anchor); restraint level (baseplate): 2,00; e_b = 30 mm; t = 20 mm
	Hilti Grout: , multipurpose, $f_{c,Grout}$ = 30,00 N/mm^2
Baseplate:	l_x x l_y x t = 460 mm x 430 mm x 20 mm; (Recommended plate thickness: not calculated
Profile:	IPBi/HEA; (L x W x T x FT) = 330 mm x 300 mm x 10 mm x 17 mm
Base material:	uncracked concrete, C20/25, $f_{c,cube}$ = 25,00 N/mm^2; h = 800 mm, Temp. short/long: 40/24 °C
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	No reinforcement or Reinforcement spacing >= 150 mm (any Ø) or >= 100 mm (Ø <= 10 mm)
	no longitudinal edge reinforcement

Geometry [mm] & Loading [kN, kNm]



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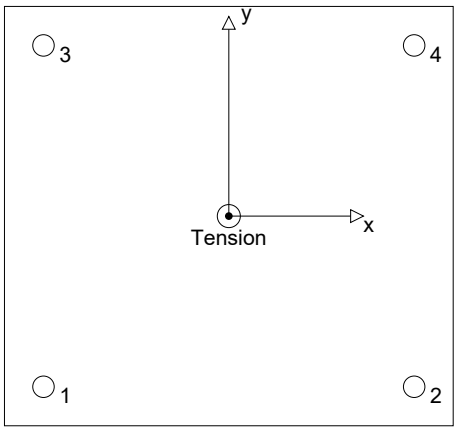
2 Load case/Resulting anchor forces

Load case: Design loads



Anchor reactions [kN]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	10,703	11,686	-11,686	0,000
2	10,703	11,686	-11,686	0,000
3	10,703	11,686	-11,686	0,000
4	10,703	11,686	-11,686	0,000

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [N/mm^2]
resulting tension force in (x/y)=(0/0): 42,810 [kN]
resulting compression force in (x/y)=(0/0): 0,000 [kN]

3 Tension load (EOTA TR 029, Section 5.2.2)

	Load [kN]	Capacity [kN]	Utilisation β_N [%]	Status
Steel failure*	10,703	130,667	9	OK
Combined pullout-concrete cone failure**	42,810	356,885	12	OK
Concrete cone failure**	42,810	174,565	25	OK
Splitting failure**	N/A	N/A	N/A	N/A

* most unfavourable anchor **anchor group (anchors in tension)

3.1 Steel failure

$N_{Rk,s}$ [kN]	$\gamma_{M,s}$	$N_{Rd,s}$ [kN]	N_{Sd} [kN]
196,000	1,500	130,667	10,703

3.2 Combined pullout-concrete cone failure

$A_{p,N}$ [mm^2]	$A^0_{p,N}$ [mm^2]	$\tau_{Rk,ucr,25}$ [N/mm^2]	$s_{cr,Np}$ [mm]	$c_{cr,Np}$ [mm]	c_{min} [mm]
511200	129600	18,00	360	180	310

ψ_c	$\tau_{Rk,ucr}$ [N/mm^2]	k	$\psi^0_{g,Np}$	$\psi_{g,Np}$
1,000	18,00	3,200	1,000	1,000

$e_{c1,N}$ [mm]	$\psi_{ec1,Np}$	$e_{c2,N}$ [mm]	$\psi_{ec2,Np}$	$\psi_{s,Np}$	$\psi_{re,Np}$
0	1,000	0	1,000	1,000	1,000

$N^0_{Rk,p}$ [kN]	$N_{Rk,p}$ [kN]	$\gamma_{M,p}$	$N_{Rd,p}$ [kN]	N_{Sd} [kN]
135,717	535,327	1,500	356,885	42,810

3.3 Concrete cone failure

$A_{c,N}$ [mm^2]	$A^0_{c,N}$ [mm^2]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]
511200	129600	180	360

$e_{c1,N}$ [mm]	$\psi_{ec1,N}$	$e_{c2,N}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1,000	0	1,000	1,000	1,000

k_1	$N^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$N_{Rd,c}$ [kN]	N_{Sd} [kN]
10,100	66,384	1,500	174,565	42,810

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4 Shear load (EOTA TR 029, Section 5.2.3)

	Load [kN]	Capacity [kN]	Utilisation β_V [%]	Status
Steel failure (without lever arm)*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	11,686	15,248	77	OK
Pryout failure**	46,743	349,131	14	OK
Concrete edge failure in direction x-**	46,743	67,867	69	OK

* most unfavourable anchor **anchor group (relevant anchors)

4.1 Steel failure (with lever arm)

l [mm]	α_M
50	2,00

N_{Sd} / $N_{Rd,s}$	1 - N_{Sd} / $N_{Rd,s}$	$M^0_{Rk,s}$ [kNm]	$M_{Rk,s} = M^0_{Rk,s}$ (1 - $N_{Sd}/N_{Rd,s}$) [kNm]
0,082	0,918	0,519	0,476

$V^M_{Rk,s} = \alpha_M * M_{Rk,s}$ / l [kN]	$\gamma_{Ms,b,V}$	$V^M_{Rd,s}$ [kN]	V_{Sd} [kN]
19,060	1,250	15,248	11,686

4.2 Pryout failure (concrete cone relevant)

$A_{c,N}$ [mm²]	$A^0_{c,N}$ [mm²]	$c_{cr,N}$ [mm]	$s_{cr,N}$ [mm]	k-factor	k_1
511200	129600	180	360	2,000	10,100

$e_{c1,V}$ [mm]	$\psi_{ec1,N}$	$e_{c2,V}$ [mm]	$\psi_{ec2,N}$	$\psi_{s,N}$	$\psi_{re,N}$
0	1,000	0	1,000	1,000	1,000

$N^0_{Rk,c}$ [kN]	$\gamma_{M,c,p}$	$V_{Rd,cp}$ [kN]	V_{Sd} [kN]
66,384	1,500	349,131	46,743

4.3 Concrete edge failure in direction x-

h_{ef} [mm]	d_{nom} [mm]	k_1	α	β
120	20,0	2,400	0,062	0,058

c_1 [mm]	$A_{c,V}$ [mm²]	$A^0_{c,V}$ [mm²]
310	465000	432450

$\psi_{s,V}$	$\psi_{h,V}$	$\psi_{\alpha,V}$	$e_{c,V}$ [mm]	$\psi_{ec,V}$	$\psi_{re,V}$
0,910	1,000	1,000	0	1,000	1,000

$V^0_{Rk,c}$ [kN]	$\gamma_{M,c}$	$V_{Rd,c}$ [kN]	V_{Sd} [kN]
104,075	1,500	67,867	46,743

5 Combined tension and shear loads (EOTA TR 029, Section 5.2.4)

β_N	β_V	α	Utilisation $\beta_{N,V}$ [%]	Status
0,245	0,766	1,500	80	OK

$\beta_N^\alpha + \beta_V^\alpha \leq 1,0$

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6 Displacements (highest loaded anchor)

Short term loading:

N_{Sk}	=	7,928 [kN]	δ_N	=	0,063 [mm]
V_{Sk}	=	17,312 [kN]	δ_V	=	0,692 [mm]
			δ_{NV}	=	0,695 [mm]

Long term loading:

N_{Sk}	=	7,928 [kN]	δ_N	=	0,105 [mm]
V_{Sk}	=	17,312 [kN]	δ_V	=	1,039 [mm]
			δ_{NV}	=	1,044 [mm]

Comments: Tension displacements are valid with half of the required installation torque moment for uncracked concrete! Shear displacements are valid without friction between the concrete and the baseplate! The gap due to the drilled hole and clearance hole tolerances are not included in this calculation!

The acceptable anchor displacements depend on the fastened construction and must be defined by the designer!

7 Warnings

- The anchor design methods in PROFIS Anchor require rigid anchor plates per current regulations (ETAG 001/Annex C, EOTA TR029, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Anchor calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid base plate assumption is valid is not carried out by PROFIS Anchor. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Checking the transfer of loads into the base material is required in accordance with EOTA TR 029, Section 7!
- The design is only valid if the clearance hole in the fixture is not larger than the value given in Table 4.1 of EOTA TR029! For larger diameters of the clearance hole see Chapter 1.1. of EOTA TR029!
- The accessory list in this report is for the information of the user only. In any case, the instructions for use provided with the product have to be followed to ensure a proper installation.
- Drilled hole cleaning must be performed according to instructions for use (blow twice with oil-free compressed air (min. 6 bar), brush twice, blow twice with oil-free compressed air (min. 6 bar)).
- Characteristic bond resistances depend on short- and long-term temperatures.
- Please contact Hilti to check feasibility of HIT-V rod supply.
- Edge reinforcement is not required to avoid splitting failure

Fastening meets the design criteria!

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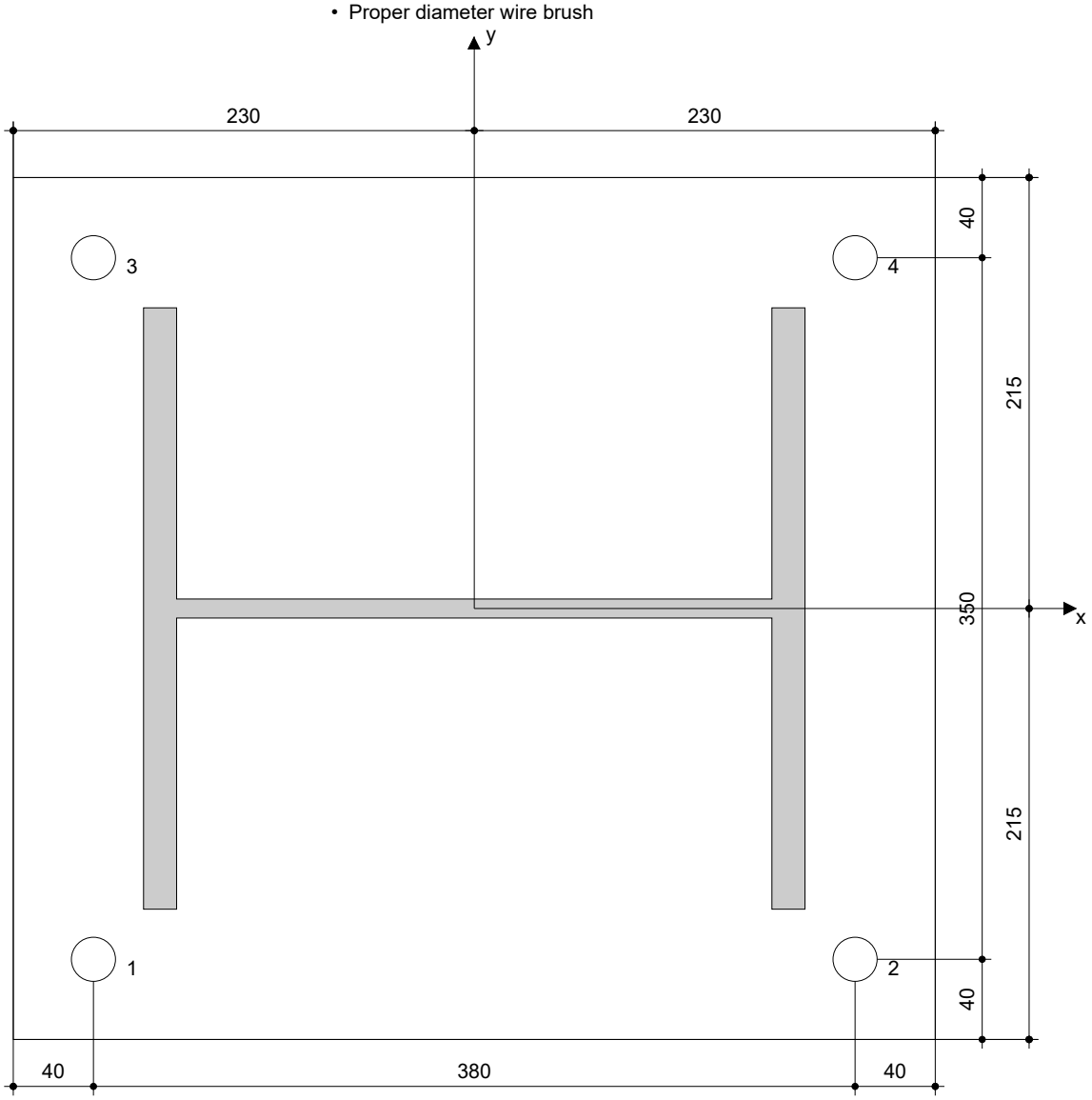
8 Installation data

Baseplate, steel: -
Profile: IPBi/HEA; 330 x 300 x 10 x 17 mm
Hole diameter in the fixture: d_f = 22 mm
Plate thickness (input): 20 mm
Recommended plate thickness: not calculated
Drilling method: Hammer drilled
Anchor type and size: HIT-HY 200-A + HIT-V (8.8) M20
Installation torque: 0,150 kNm
Hole diameter in the base material: 22 mm
Hole depth in the base material: 120 mm
Minimum thickness of the base material: 164 mm
Cleaning: Compressed air cleaning of the drilled hole according to instructions for use is required

8.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Compressed air with required accessories to blow from the bottom of the hole • Proper diameter wire brush	• Dispenser including cassette and mixer • Torque wrench



Coordinates Anchor [mm]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-190	-175	310	690	325	675
2	190	-175	690	310	325	675
3	-190	175	310	690	675	325
4	190	175	690	310	675	325

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9 Remarks; Your Cooperation Duties

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Material

Steel	S 355

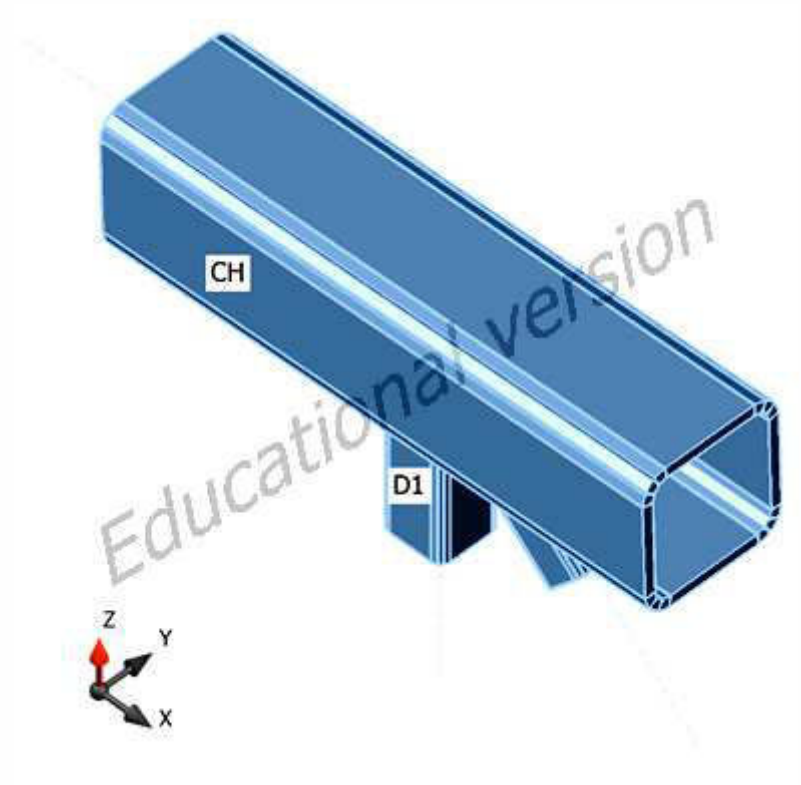
Project item C1

Design

Name	C1
Description	Truss connection
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	4 - SHS180/180/12.5	0,0	-1,7	0,0	0	0	0
D1	5 - SHS80/80/5.0	0,0	90,0	0,0	0	0	0
D2	3 - SHS70/70/5.0	0,0	43,1	0,0	0	0	0



Cross-sections

Name	Material
4 - SHS180/180/12.5	S 355
5 - SHS80/80/5.0	S 355
3 - SHS70/70/5.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	D1	End	0	-319,2	0,0	0,0	0,0	0,0	0,0
	D2	End	0	406,4	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	1,6 < 5%	OK
Welds	99,7 < 100%	OK
Buckling	Not calculated	

Plates

Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	12,5	LE1	355,7	32,2	OK
D1	5,0	LE1	355,2	9,7	OK
D2	5,0	LE1	358,3	156,1	OK

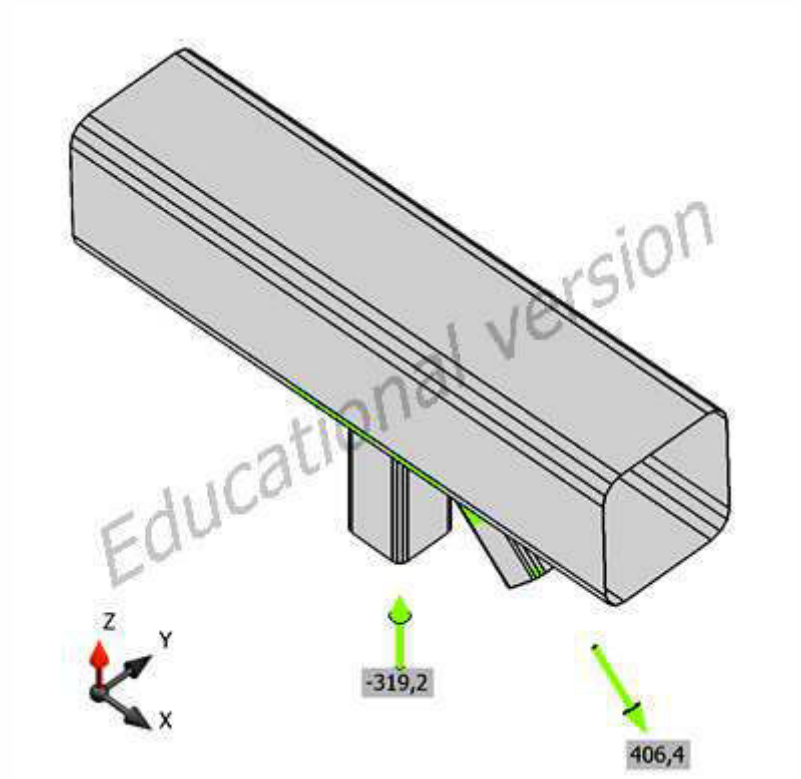
Design data

Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

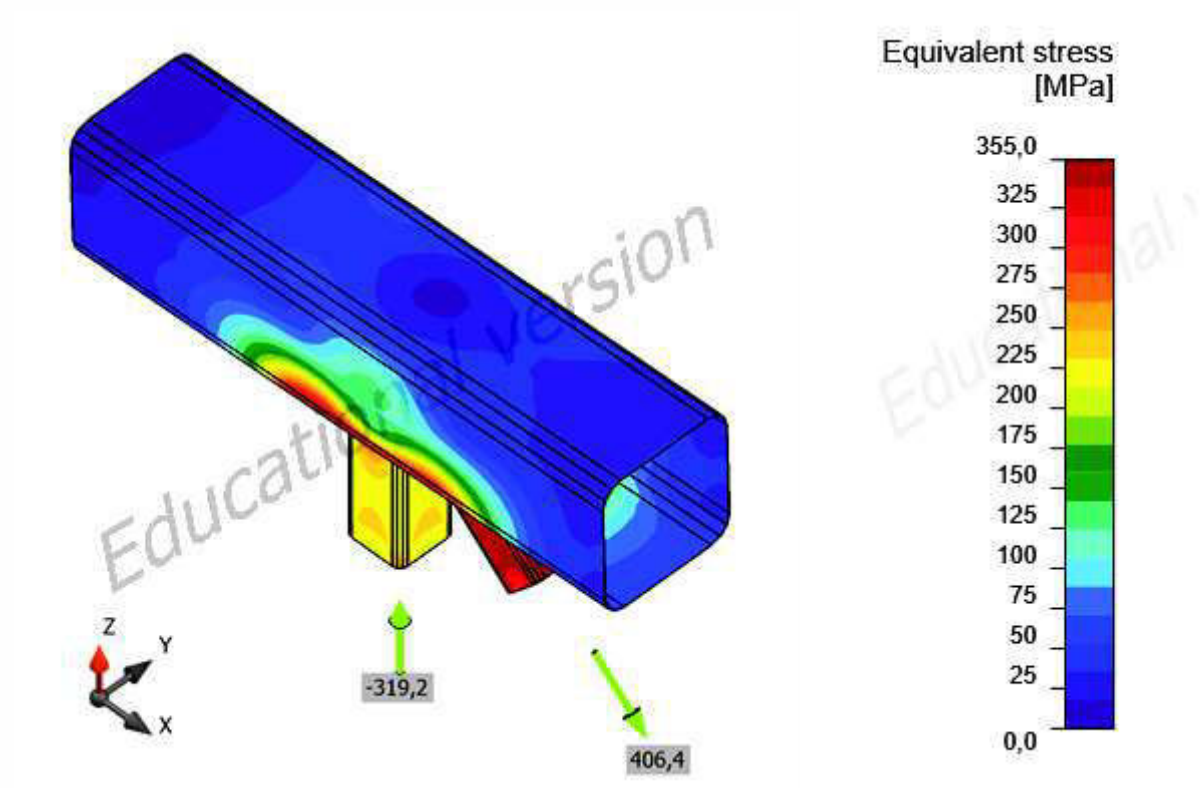
Symbol explanation

ε_{Pl}	Strain
σ_{Ed}	Eq. stress

Overall check, LE1



Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 1	D1	◢4,0	282	LE1	434,3	4,3	-342,5	34,8	150,2	99,7	97,5	OK
CH-w 1	D2	◢7,0	293	LE1	427,7	0,5	94,5	-186,5	-152,4	98,2	72,3	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Material

Steel	S 355

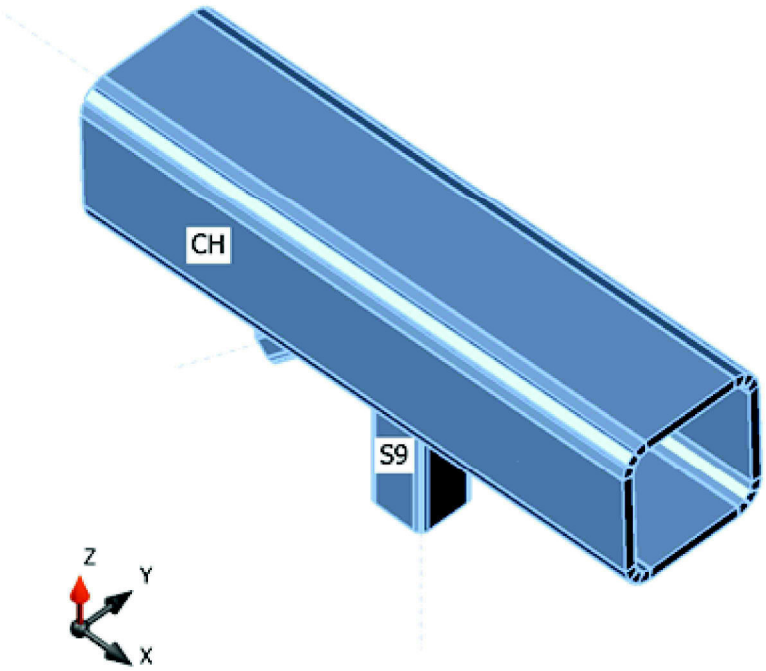
Project item C4

Design

Name	C4
Description	Truss connection
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	4 - SHS180/180/12.5	0,0	-1,7	0,0	0	0	0
S9	5 - SHS70/70/3.6	0,0	90,0	0,0	0	0	0
D9	3 - SHS40/40/4.0	180,0	45,0	0,0	0	0	0



Cross-sections

Name	Material
4 - SHS180/180/12.5	S 355
5 - SHS70/70/3.6	S 355
3 - SHS40/40/4.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	S9	End	0	-161,6	0,0	0,0	0,0	0,0	0,0
	D9	End	0	152,4	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,3 < 5%	OK
Welds	98,2 < 100%	OK
Buckling	Not calculated	

Plates

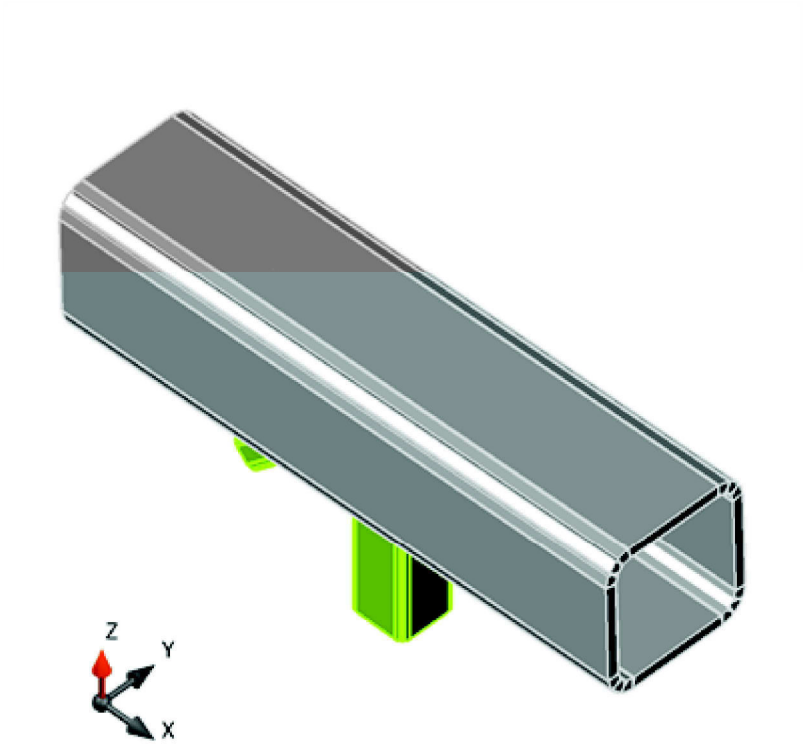
Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	12,5	LE1	339,3	0,0	OK
S9	3,6	LE1	355,6	28,4	OK
D9	4,0	LE1	355,4	19,2	OK

Design data

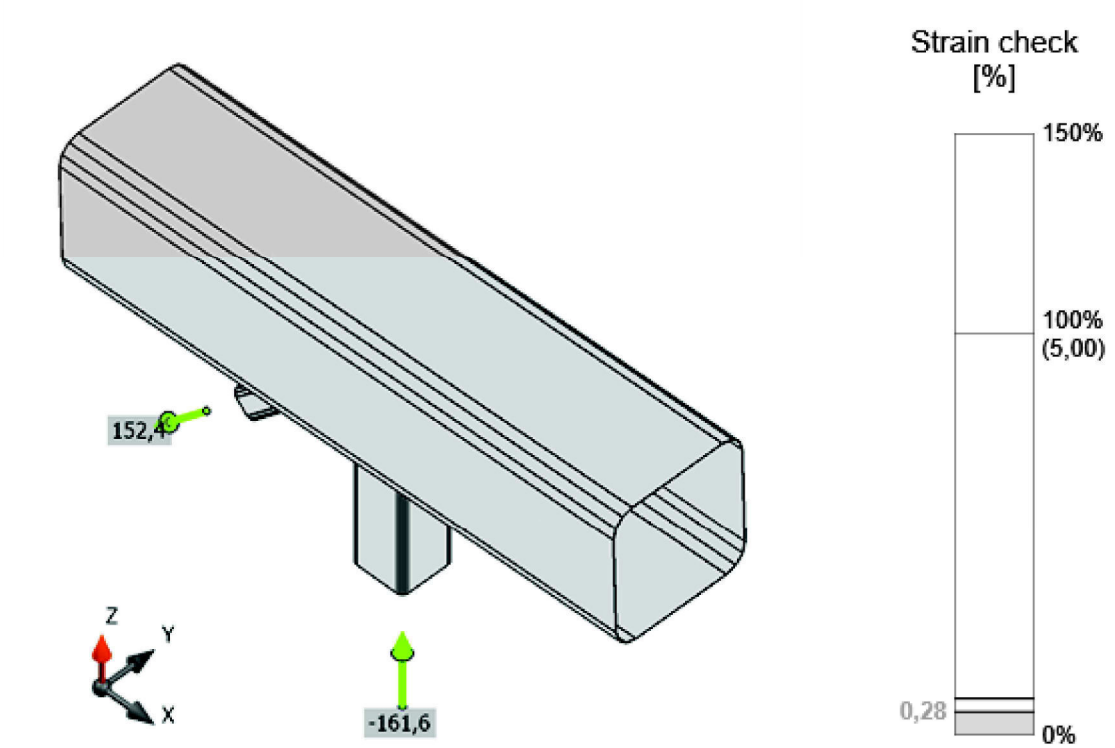
Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

Symbol explanation

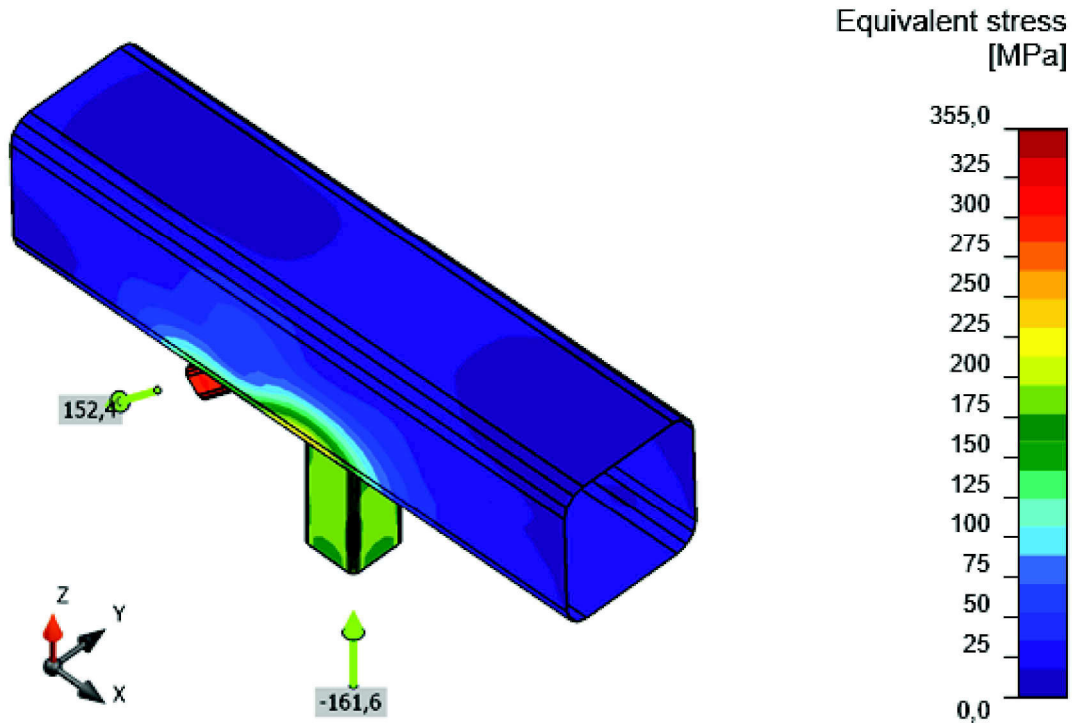
ε_{Pl}	Strain
σ_{Ed}	Eq. stress



Overall check, LE1



Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 1	S9	◢4,0	253	LE1	427,9	0,6	-276,6	140,8	125,3	98,2	63,5	OK
CH-w 1	D9	◢5,0	160	LE1	427,0	0,1	186,3	10,9	-221,6	98,0	71,6	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Material

Steel	S 355

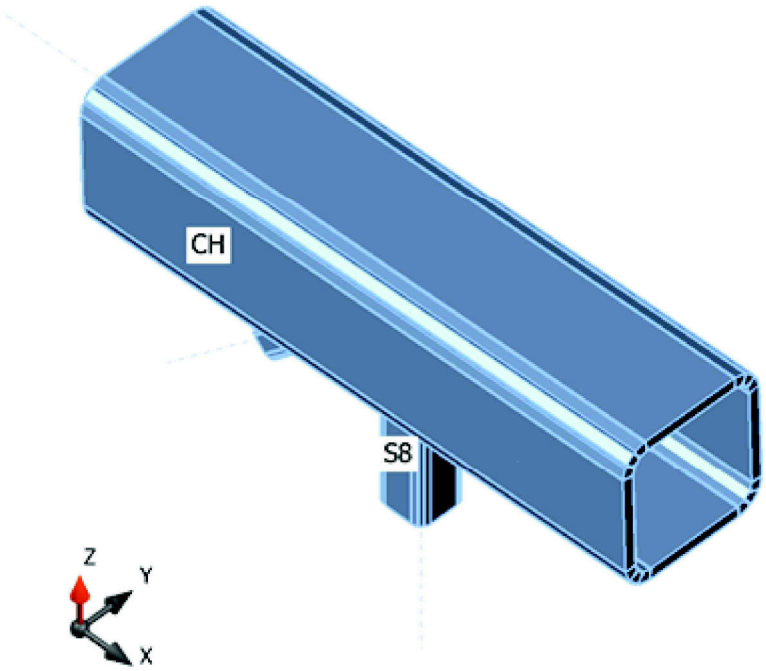
Project item C3

Design

Name	C3
Description	Truss connection
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	4 - SHS180/180/12.5	0,0	-1,7	0,0	0	0	0
S8	5 - SHS60/60/5.0	0,0	90,0	0,0	0	0	0
D8	3 - SHS40/40/4.0	180,0	44,2	0,0	0	0	0



Cross-sections

Name	Material
4 - SHS180/180/12.5	S 355
5 - SHS60/60/5.0	S 355
3 - SHS40/40/4.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	S8	End	0	-114,3	0,0	0,0	0,0	0,0	0,0
	D8	End	0	90,6	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,0 < 5%	OK
Welds	98,1 < 100%	OK
Buckling	Not calculated	

Plates

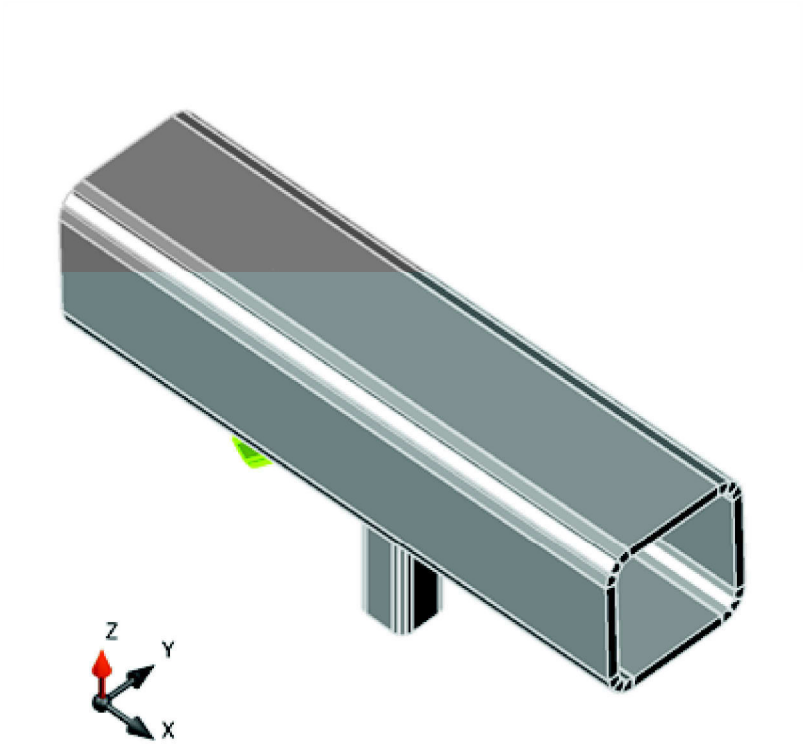
Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	12,5	LE1	287,8	0,0	OK
S8	5,0	LE1	283,3	0,0	OK
D8	4,0	LE1	326,3	0,8	OK

Design data

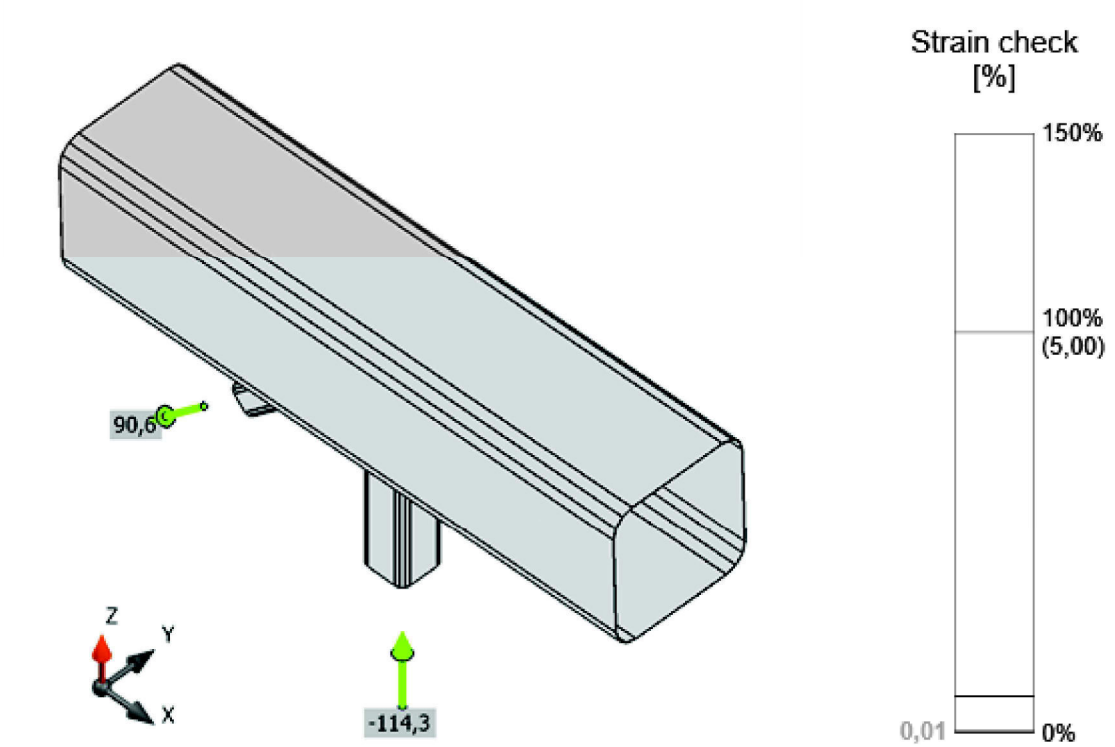
Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

Symbol explanation

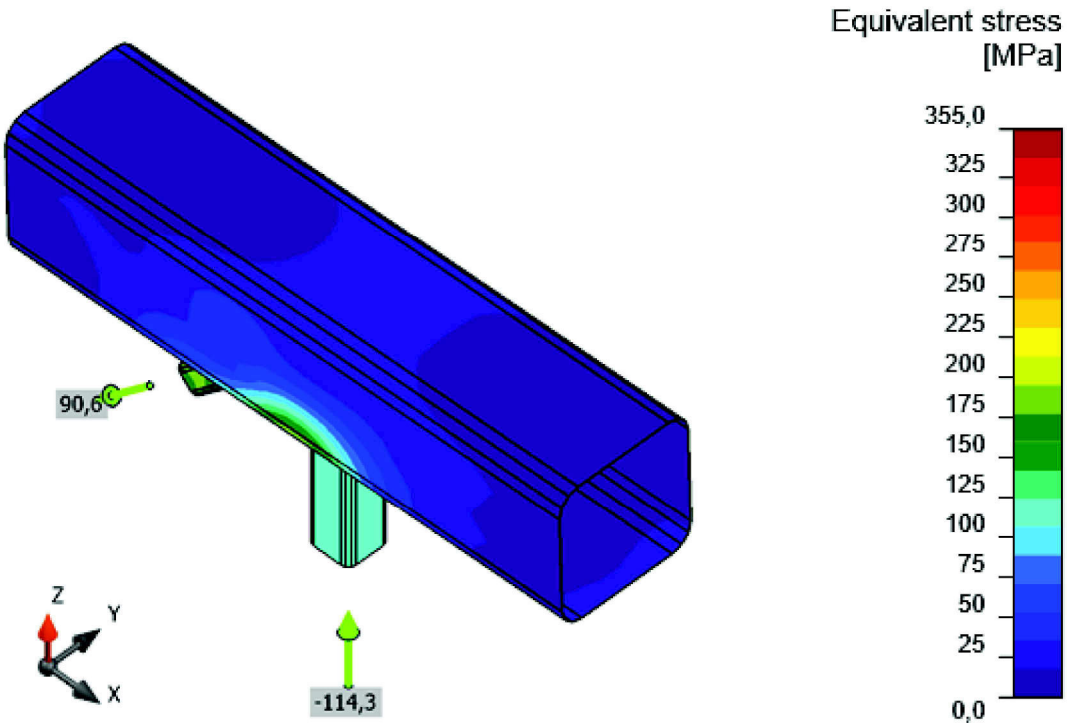
ε_{Pl}	Strain
σ_{Ed}	Eq. stress



Overall check, LE1



Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 1	S8	◢4,0	202	LE1	427,2	0,2	-285,9	-127,0	132,1	98,1	72,1	OK
CH-w 1	D8	◢4,0	161	LE1	427,0	0,1	194,6	75,7	-205,9	98,0	59,0	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Material

Steel	S 355

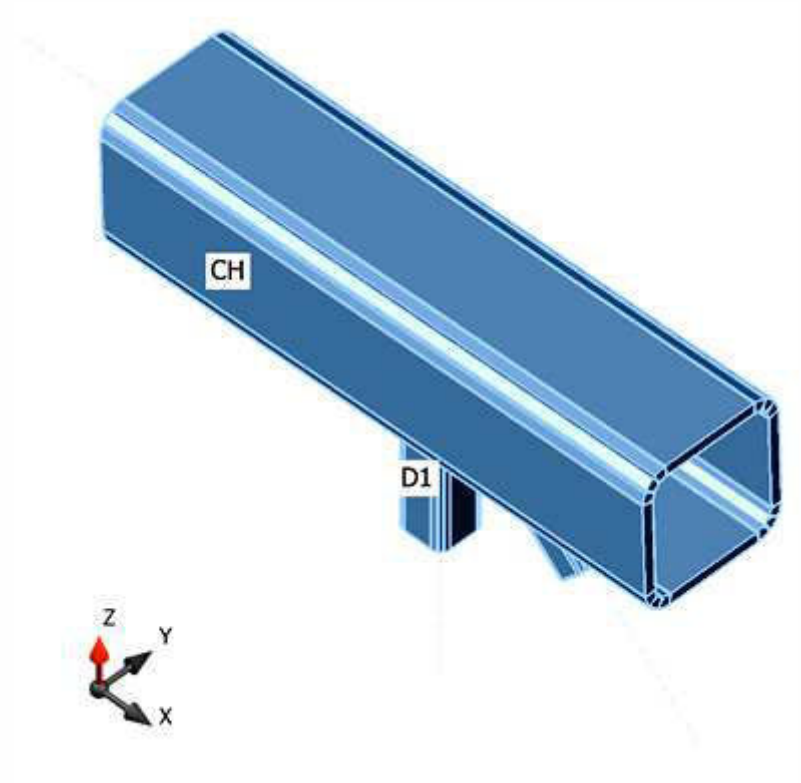
Project item C2

Design

Name	C2
Description	Truss connection
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	4 - SHS180/180/12.5	0,0	-1,7	0,0	0	0	0
D1	5 - SHS60/60/5.0	0,0	90,0	0,0	0	0	0
D2	3 - SHS50/50/4.0	0,0	43,1	0,0	0	0	0



Cross-sections

Name	Material
4 - SHS180/180/12.5	S 355
5 - SHS60/60/5.0	S 355
3 - SHS50/50/4.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	D1	End	0	-203,7	0,0	0,0	0,0	0,0	0,0
	D2	End	0	214,4	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,5 < 5%	OK
Welds	99,1 < 100%	OK
Buckling	Not calculated	

Plates

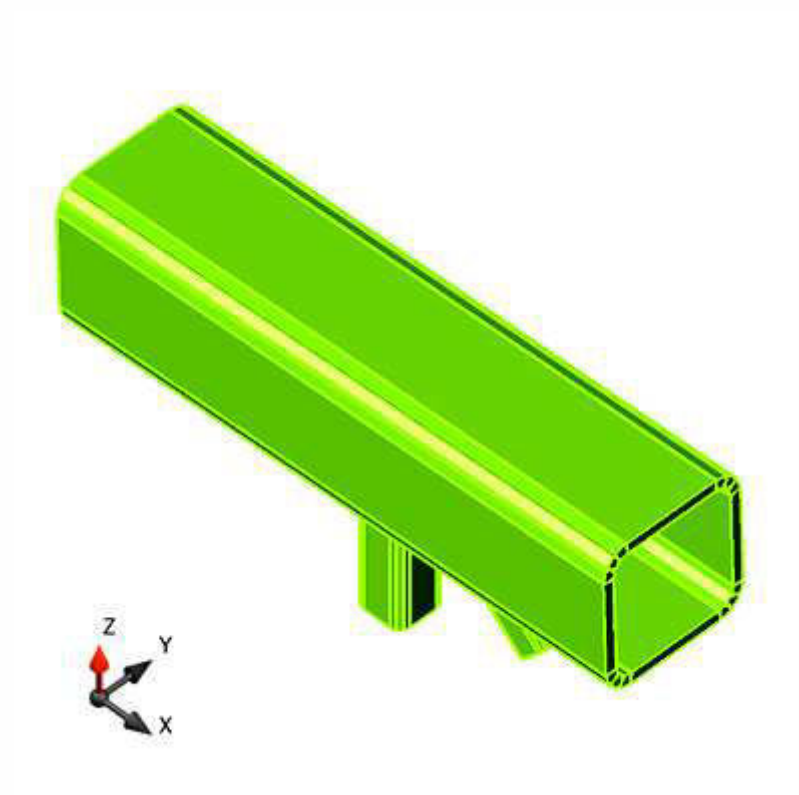
Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	12,5	LE1	355,5	22,7	OK
D1	5,0	LE1	345,0	7,3	OK
D2	4,0	LE1	356,1	54,7	OK

Design data

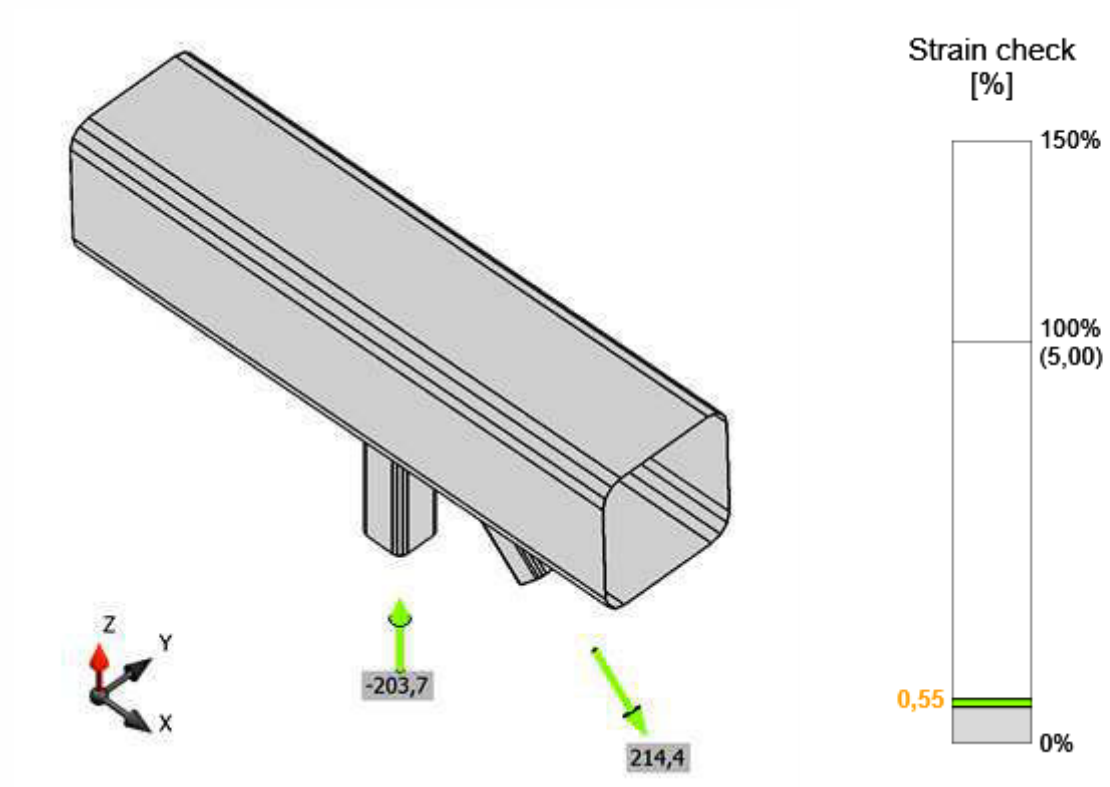
Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

Symbol explanation

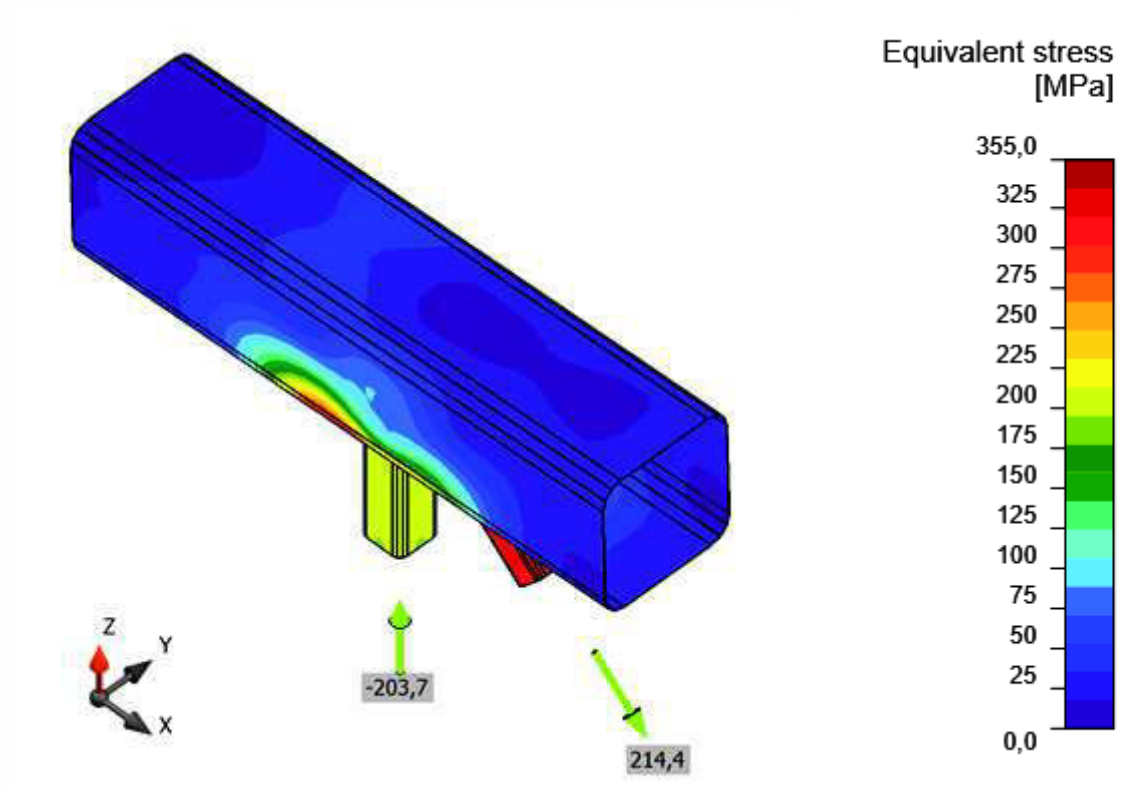
ε_{Pl}	Strain
σ_{Ed}	Eq. stress



Overall check, LE1



Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 1	D1	◢4,0	202	LE1	429,6	1,6	-303,6	128,8	119,2	98,6	96,0	OK
CH-w 1	D2	◢4,0	206	LE1	431,7	2,8	208,0	-131,7	-174,2	99,1	92,3	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Material

Steel	S 355

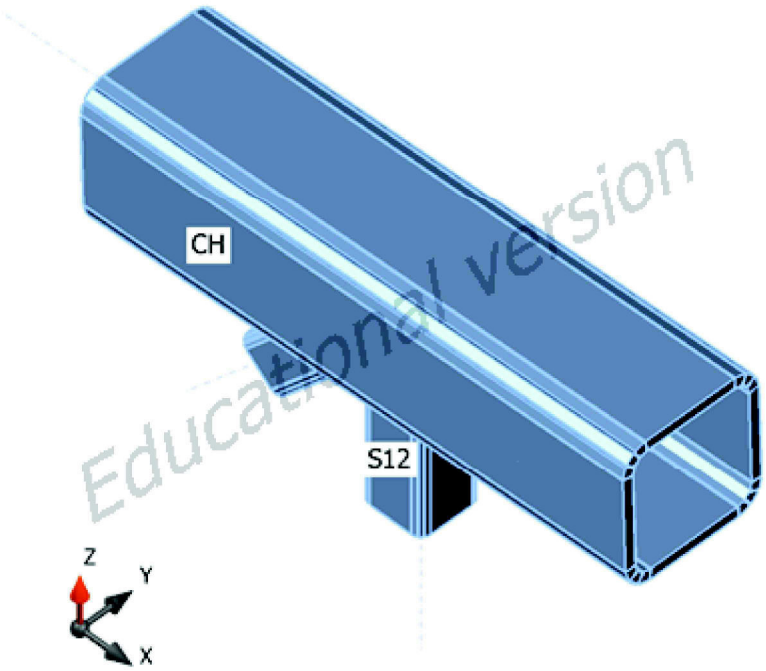
Project item C5

Design

Name	C5
Description	Truss connection
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	4 - SHS180/180/12.5	0,0	-1,7	0,0	0	0	0
S12	5 - SHS80/80/5.0	0,0	90,0	0,0	0	0	0
D12	3 - SHS70/70/5.0	180,0	48,1	0,0	0	0	0



Cross-sections

Name	Material
4 - SHS180/180/12.5	S 355
5 - SHS80/80/5.0	S 355
3 - SHS70/70/5.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	S12	End	0	-338,4	0,0	0,0	0,0	0,0	0,0
	D12	End	0	384,8	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	0,9 < 5%	OK
Welds	99,6 < 100%	OK
Buckling	Not calculated	

Plates

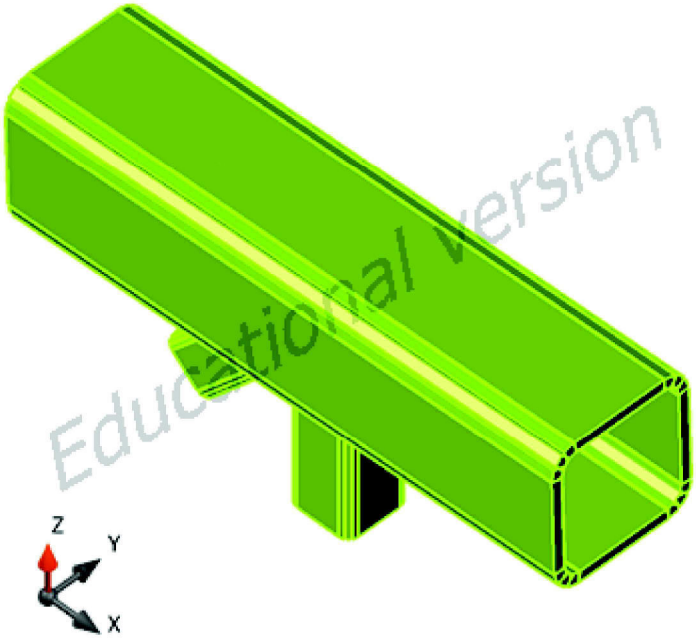
Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	12,5	LE1	355,5	23,8	OK
S12	5,0	LE1	355,5	22,0	OK
D12	5,0	LE1	356,9	88,6	OK

Design data

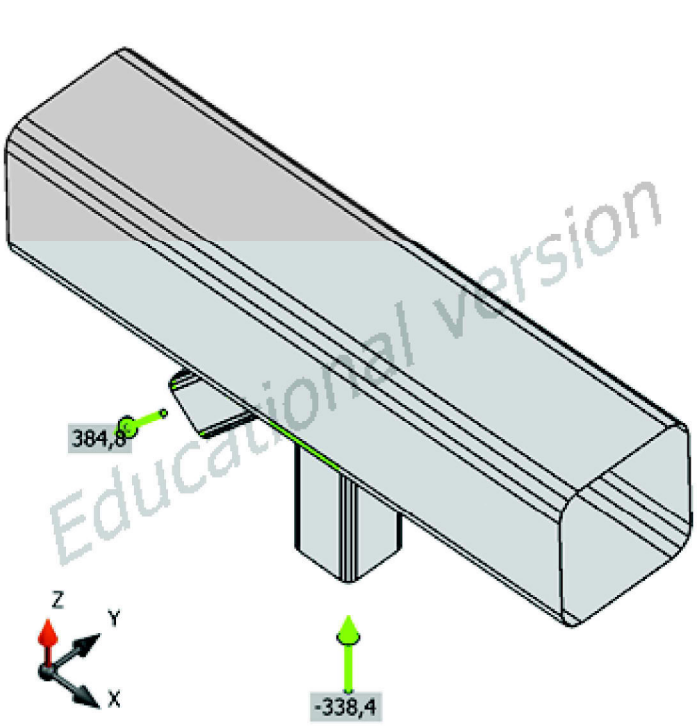
Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

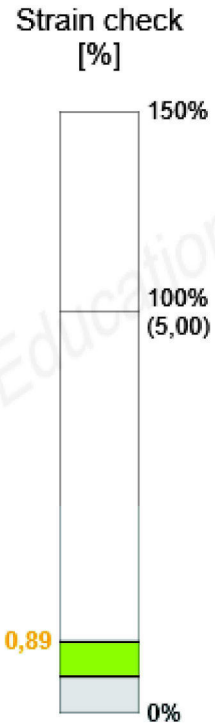
Symbol explanation

ε_{Pl}	Strain
σ_{Ed}	Eq. stress

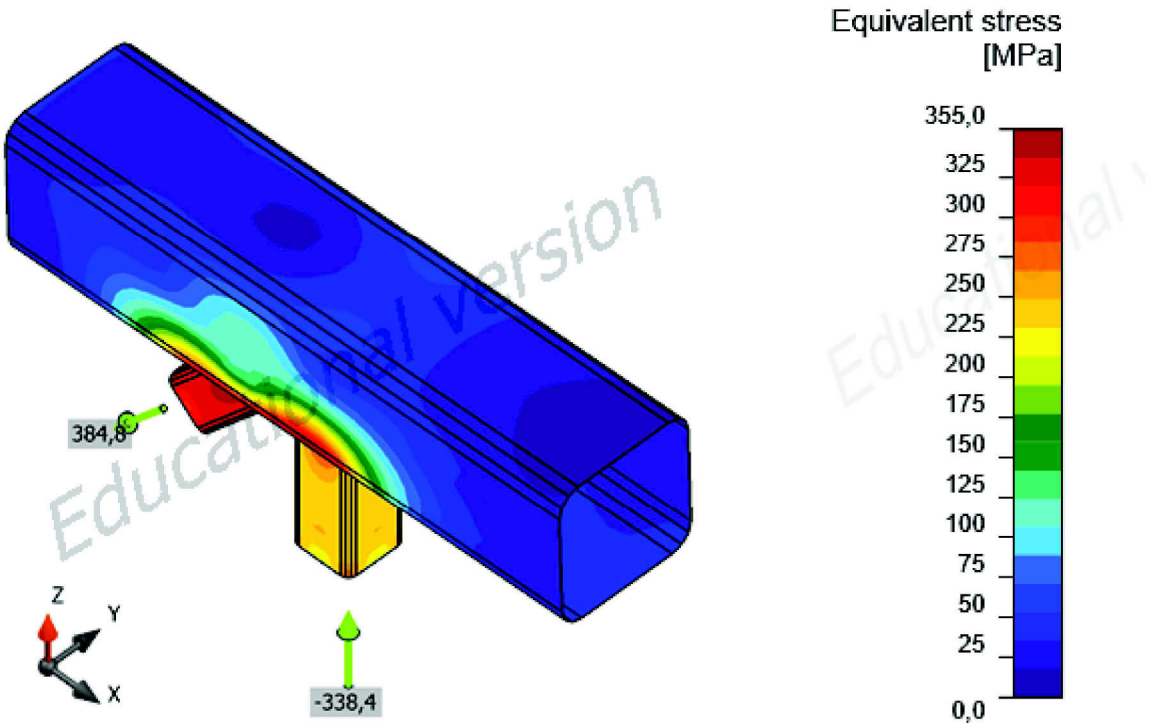


Overall check, LE1





Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 1	S12	◢5,0	282	LE1	430,4	2,1	-318,3	-84,6	144,4	98,8	87,7	OK
CH-w 1	D12	◢5,0	289	LE1	433,7	3,9	156,4	-102,0	-210,1	99,6	94,3	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Material

Steel	S 355

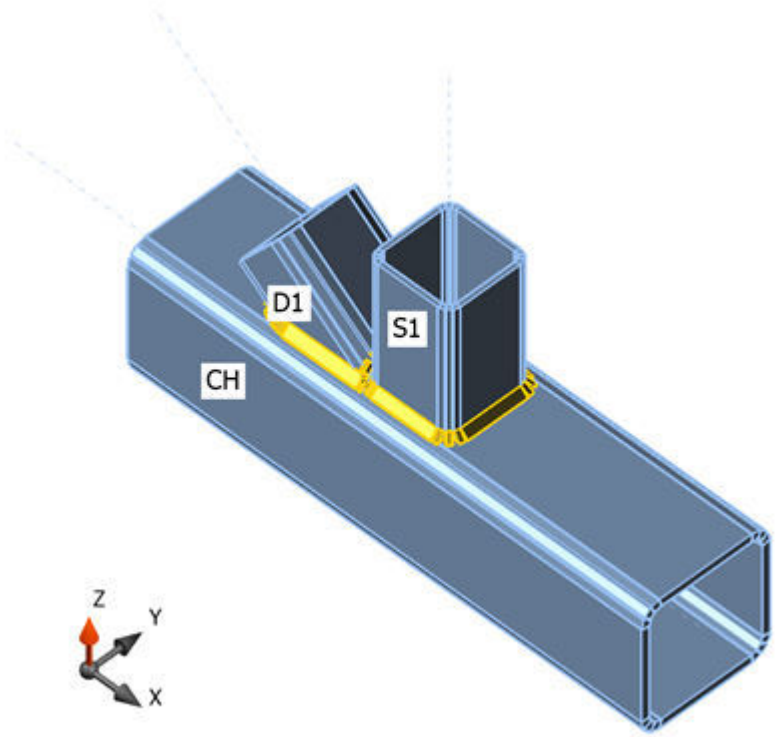
Project item C6

Design

Name	C6
Description	
Analysis	Stress, strain/ simplified loading

Beams and columns

Name	Cross-section	β – Direction [°]	γ - Pitch [°]	α - Rotation [°]	Offset ex [mm]	Offset ey [mm]	Offset ez [mm]
CH	6 - SHS140/140/8.0	0,0	0,0	0,0	0	0	0
S1	8 - SHS90/90/5.0	0,0	-90,0	0,0	0	0	0
D1	9 - SHS90/90/8.0	180,0	-38,4	0,0	0	0	0



Cross-sections

Name	Material
6 - SHS140/140/8.0	S 355
8 - SHS90/90/5.0	S 355
9 - SHS90/90/8.0	S 355

Load effects (equilibrium not required)

Name	Member	Pos.	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
LE1	S1	End	0	-319,4	0,0	0,0	0,0	0,0	0,0
	D1	End	0	513,4	0,0	0,0	0,0	0,0	0,0

Check

Summary

Name	Value	Check status
Analysis	100,0%	OK
Plates	2,4 < 5%	OK
Welds	99,8 < 100%	OK
Buckling	Not calculated	

Plates

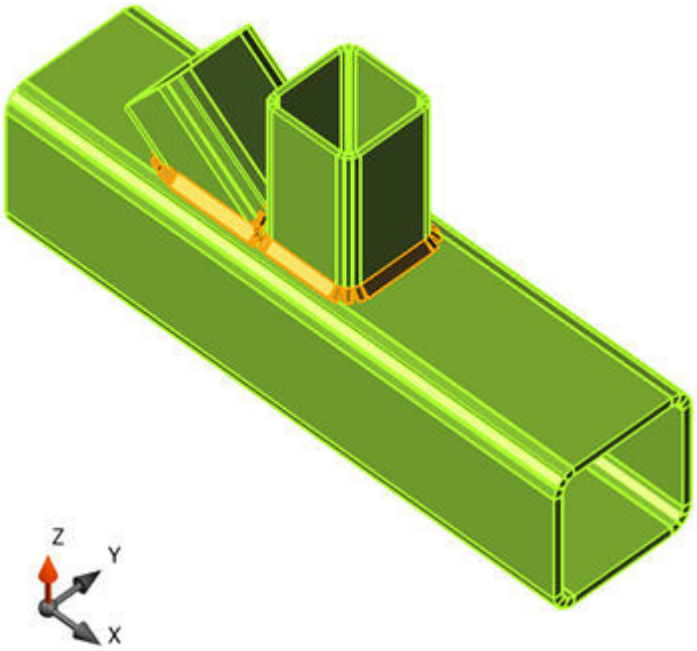
Name	Thickness [mm]	Loads	σ_{Ed} [MPa]	ε_{Pl} [1e-4]	Check status
CH	8,0	LE1	358,5	168,4	OK
S1	5,0	LE1	360,1	240,9	OK
D1	8,0	LE1	357,3	107,4	OK

Design data

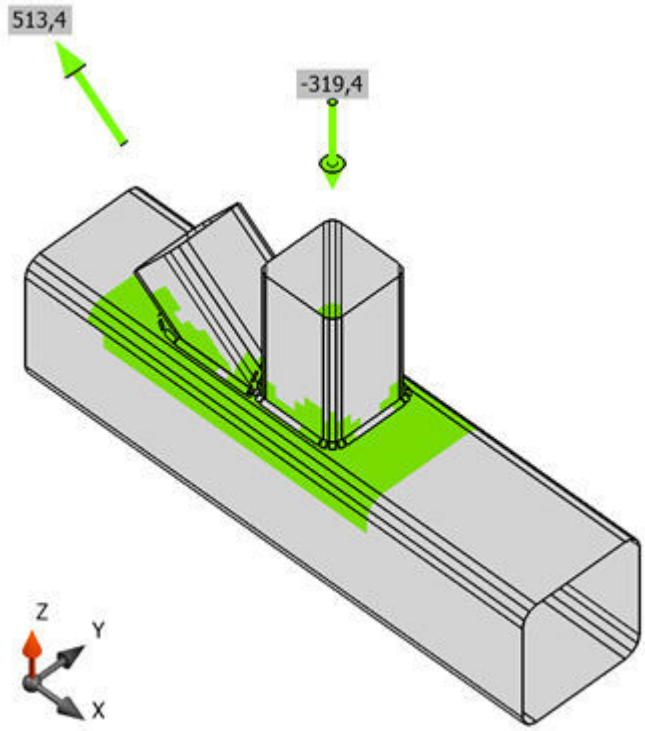
Material	fy [MPa]	ε_{lim} [1e-4]
S 355	355,0	500,0

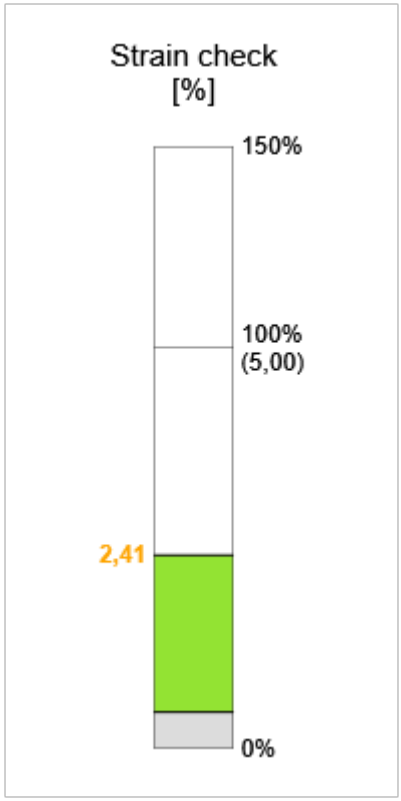
Symbol explanation

ε_{Pl}	Strain
σ_{Ed}	Eq. stress

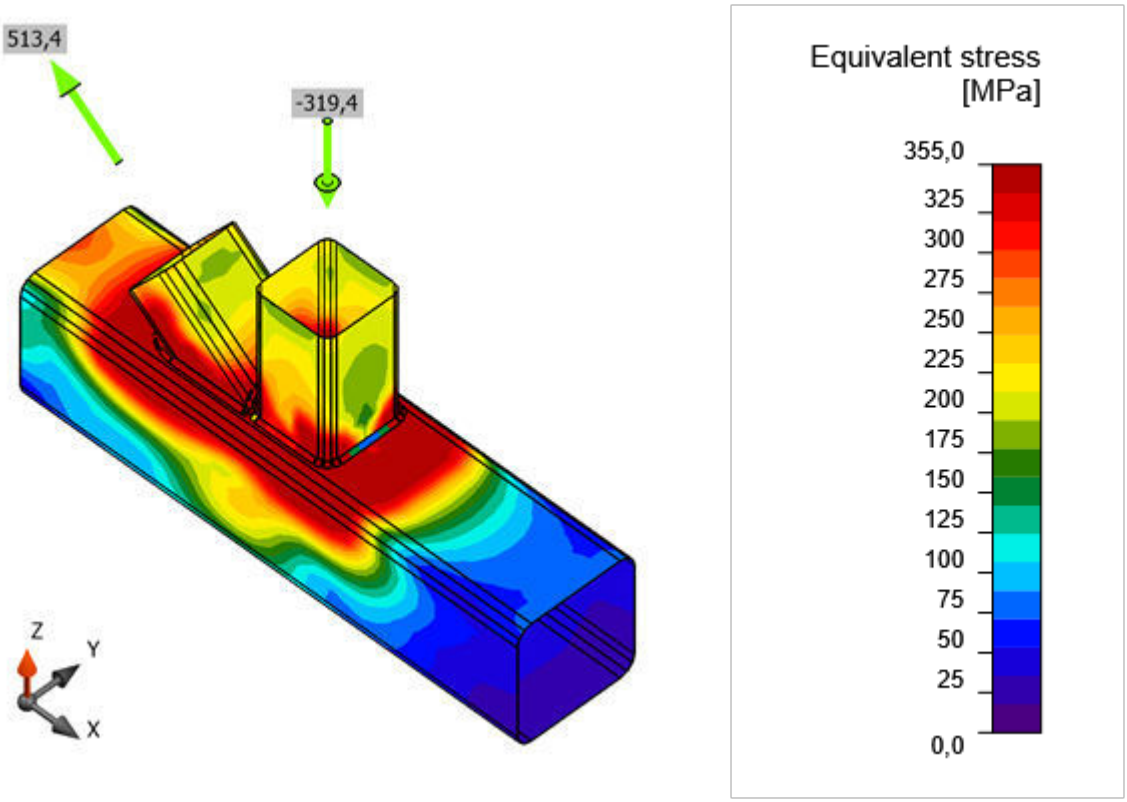


Overall check, LE1





Strain check, LE1



Equivalent stress, LE1

Welds (Plastic redistribution)

Item	Edge	Throat th. [mm]	Length [mm]	Loads	$\sigma_{w,Ed}$ [MPa]	ε_{Pl} [%]	$\sigma_{\perp}$ [MPa]	$\tau_{\parallel}$ [MPa]	$\tau_{\perp}$ [MPa]	Ut [%]	Ut_c [%]	Status
CH-w 3	S1	◢6,0	322	LE1	429,1	1,3	-262,5	181,8	73,0	98,5	69,0	OK
CH-w 3	D1	◢6,5	283	LE1	429,6	1,6	287,8	-183,6	-13,8	98,6	95,6	OK
S1-w 3	D1	◢6,0	102	LE1	434,5	4,4	113,2	112,1	-214,7	99,8	98,9	OK

Design data

	β_w [-]	$\sigma_{w,Rd}$ [MPa]	0.9 σ [MPa]
S 355	0,90	435,6	352,8

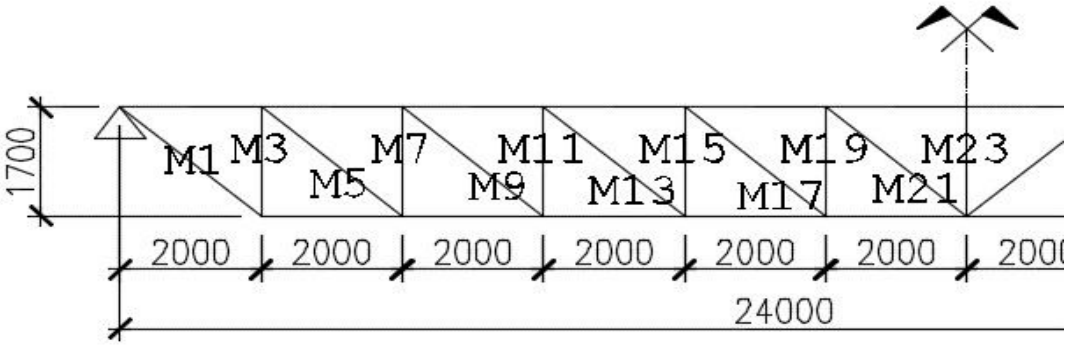
Symbol explanation

ε_{Pl}	Strain
$\sigma_{w,Ed}$	Equivalent stress
$\sigma_{w,Rd}$	Equivalent stress resistance
$\sigma_{\perp}$	Perpendicular stress
$\tau_{\parallel}$	Shear stress parallel to weld axis
$\tau_{\perp}$	Shear stress perpendicular to weld axis
0.9 σ	Perpendicular stress resistance - 0.9*fu/γM2
β_w	Corelation factor EN 1993-1-8 tab. 4.1
Ut	Utilization
Utc	Weld capacity utilization

Buckling

Buckling analysis was not calculated.

Member	Truss 24m	length	q=20 kN/m	q=23,328 kN/m	q=30 kN/m
No.		L [m]	N_{Ed} [kN]	N_{Ed} [kN]	N_{Ed} [kN]
1	M 1	2,625	345,054	402,47	517,581
3	M 3	2,625	-222,891	-259,98	-334,336
5	M 5	2,625	274,462	320,13	411,693
7	M 7	2,625	-178,191	-207,84	-267,286
9	M 9	2,625	215,374	251,21	323,062
11	M 11	2,625	-139,521	-162,74	-209,282
13	M 13	2,625	153,753	179,34	230,63
15	M 15	2,625	-99,35	-115,88	-149,025
17	M 17	2,625	90,895	106,02	136,343
19	M 19	2,625	-60,311	-70,35	-90,466
21	M 21	2,625	36,957	43,11	55,435
23	M 23	2,625	-45,666	-53,27	-68,499
L	Lower chord	20	822,543	959,41	1233,815
middle	Upper chord	24	-217,767	-254,00	-326,65
edge	Upper chord	24	370,025	431,60	555,038
		G (S355) [kg]=	1272,0	1552,83	1948,6
		G (S460) [kg]=	1053,4	1261,14	1417,5
		G (S690) [kg]=	891,4	1048,91	1078,6



Tensile members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	345,054	2,625	2,363	355	6,65	80x4	1200	426	0,81 OK	49,403
5	M5	274,462	2,625	2,363	355	6,65	60x4	879	312,05	0,88 OK	36,225
9	M9	215,374	2,625	2,363	355	6,65	50x4	719	255,25	0,84 OK	29,61
13	M13	153,753	2,625	2,363	355	6,65	40x4	559	198,45	0,77 OK	23,048
17	M17	90,895	2,625	2,363	355	6,65	40x4	559	198,45	0,46 OK	23,048
21	M21	36,957	2,625	2,363	355	6,65	40x4	559	198,45	0,19 OK	23,048
L	Lower chord	822,543	20	18,000	355	50,70	100x8	2880	1022,4	0,80 OK	452
edge	Upper chord	370,025	24	21,600	355	60,85	120x6	2700	958,5	0,39 OK	508,8

Tensile members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	345,054	2,625	2,363	460	5,14	50x5	873	401,58	0,86 OK	35,963
5	M5	274,462	2,625	2,363	460	5,14	50x4	719	330,74	0,83 OK	29,61
9	M9	215,374	2,625	2,363	460	5,14	40x4	559	257,14	0,84 OK	23,048
13	M13	153,753	2,625	2,363	460	5,14	40x4	559	257,14	0,60 OK	23,048
17	M17	90,895	2,625	2,363	460	5,14	40x4	559	257,14	0,35 OK	23,048
21	M21	36,957	2,625	2,363	460	5,14	40x4	559	257,14	0,14 OK	23,048
L	Lower chord	822,543	20	18,000	460	39,13	100x6	2220	1021,2	0,81 OK	348
edge	Upper chord	370,025	24	21,600	460	46,96	120x5	2270	1044,2	0,45 OK	427,2

Tensile members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	Web 1	345,054	2,625	2,363	690	3,42	40x4	559	385,71	0,89 OK	23,048
5	Web 5	274,462	2,625	2,363	690	3,42	40x4	559	385,71	0,71 OK	23,048
9	Web 9	215,374	2,625	2,363	690	3,42	40x4	559	385,71	0,56 OK	23,048
13	Web 13	153,753	2,625	2,363	690	3,42	40x4	559	385,71	0,40 OK	23,048
17	Web 17	90,895	2,625	2,363	690	3,42	40x4	559	385,71	0,24 OK	23,048
21	Web 21	36,957	2,625	2,363	690	3,42	40x4	559	385,71	0,10 OK	23,048
L	Lower chor	822,543	20	18,000	690	26,09	90x4	1360	938,4	0,88 OK	214
edge	Upper chor	370,025	24	21,600	690	31,30	120x5	2270	1566,3	0,34 OK	427,2

Pressure members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-222,891	1,7	1,530	70x4	1040	0,747	57,1	0,695	355	256,71	0,868 OK	26,8	0,913	27,7
7	M7	-178,191	1,7	1,530	60x4	879	0,882	67,4	0,611	355	190,62	0,935 OK	22,7	1,056	23,5
11	M11	-139,521	1,7	1,530	60x4	879	0,882	67,4	0,611	355	190,62	0,732 OK	22,7	1,056	23,5
15	M15	-99,35	1,7	1,530	60x4	879	0,882	67,4	0,611	355	190,62	0,521 OK	22,7	1,056	23,5
19	M19	-60,311	1,7	1,530	50x4	719	1,077	82,3	0,497	355	126,82	0,476 OK	18,6	1,294	19,2
23	M23	-45,666	1,7	1,530	50x4	719	1,077	82,3	0,497	355	126,82	0,360 OK	18,6	1,294	9,6
y direction	Upper chord	-217,767	2	1,800	120x6	2700	0,509	38,9	0,838	355	803,28	0,371 OK	46,3	0,705	
z direction	Upper chord	-217,767	6	5,400	120x6	2700	1,526	116,6	0,306	355	293,43	0,842 OK	46,3	1,990	

Pressure members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-222,891	1,7	1,530	70x4	1040	0,851	57,1	0,631	460	301,64	0,739 OK	27	1,021	27,7
7	M7	-178,191	1,7	1,530	60x4	879	1,004	67,4	0,538	460	217,35	0,820 OK	23	1,201	23,5
11	M11	-139,521	1,7	1,530	60x4	879	1,004	67,4	0,538	460	217,35	0,642 OK	23	1,201	23,5
15	M15	-99,35	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,712 OK	19	1,502	19,2
19	M19	-60,311	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,432 OK	19	1,502	19,2
23	M23	-45,666	1,7	1,530	40x4	559	1,572	105,5	0,292	460	75,165	0,608 OK	15	2,072	7,5
y direction	Upper chord	-217,767	2	1,800	120x5	2270	0,573	38,5	0,801	460	836,69	0,360 OK	47	0,756	
z direction	Upper chord	-217,767	6	5,400	120x5	2270	1,719	115,4	0,253	460	264,27	0,924 OK	47	2,350	

Pressure members

Member	Truss 24m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	Web 3	-222,891	1,7	1,530	70x4	1040	1,042	57,1	0,516	690	370,3944	0,602 OK	26,8	1,249	27,7
7	Web 7	-178,191	1,7	1,530	60x4	879	1,230	67,4	0,420	690	254,6139	0,700 OK	22,7	1,508	23,5
11	Web 11	-139,521	1,7	1,530	50x4	719	1,501	82,3	0,314	690	155,9039	0,895 OK	18,6	1,945	19,2
15	Web 15	-99,35	1,7	1,530	50x4	719	1,501	82,3	0,314	690	155,9039	0,637 OK	18,6	1,945	19,2
19	Web 19	-60,311	1,7	1,530	40x4	559	1,925	105,5	0,209	690	80,76218	0,747 OK	14,5	2,776	14,9
23	Web 23	-45,666	1,7	1,530	40x4	559	1,925	105,5	0,209	690	80,76218	0,565 OK	14,5	2,776	7,5
y direction	Upper chor	-217,767	2	1,800	120x5	2270	0,702	38,5	0,724	690	1133,368	0,292 OK	46,8	0,869	
z direction	Upper chor	-217,767	6	5,400	120x5	2270	2,105	115,4	0,180	690	281,1957	0,874 OK	46,8	3,183	

Tensile members

Member	Truss 24m	q=23,328 kN/	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	402,47	2,625	2,363	355	6,65	80x4	1200	426	0,94 OK	49,403
5	M5	320,13	2,625	2,363	355	6,65	60x6	1260	447,3	0,72 OK	51,818
9	M9	251,21	2,625	2,363	355	6,65	60x6	1260	447,3	0,56 OK	51,818
13	M13	179,34	2,625	2,363	355	6,65	60x6	1260	447,3	0,40 OK	51,818
17	M17	106,02	2,625	2,363	355	6,65	50x4	719	255,25	0,42 OK	29,61
21	M21	43,11	2,625	2,363	355	6,65	50x4	719	255,25	0,17 OK	29,61
	Lower chord	959,41	20	18,000	355	50,70	100x8	2880	1022,4	0,94 OK	452
edge	Upper chord	431,60	24	21,600	355	60,85	120x8	3520	1249,6	0,45 OK	662,4

Tensile members

Member	Truss 24m	q=23,328 kN	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	402,471	2,625	2,363	460	5,14	70x4	1040	478,4	0,84 OK	42,788
5	M5	320,132	2,625	2,363	460	5,14	60x4	879	404,34	0,79 OK	36,225
9	M9	251,213	2,625	2,363	460	5,14	50x4	719	330,74	0,76 OK	29,61
13	M13	179,338	2,625	2,363	460	5,14	40x4	559	257,14	0,70 OK	23,048
17	M17	106,02	2,625	2,363	460	5,14	40x4	559	257,14	0,41 OK	23,048
21	M21	43,106	2,625	2,363	460	5,14	40x4	559	257,14	0,17 OK	23,048
L	Lower chord	959,414	20	18,000	460	39,13	100x8	2880	1324,8	0,72 OK	452
edge	Upper chord	431,597	24	21,600	460	46,96	120x6	2700	1242	0,45 OK	508,8

Tensile members

Member	Truss 24m	q=23,328 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	Web 1	402,471	2,625	2,363	690	3,42	50x4	719	496,11	0,81 OK	29,61
5	Web 5	320,132	2,625	2,363	690	3,42	40x4	559	385,71	0,83 OK	23,048
9	Web 9	251,213	2,625	2,363	690	3,42	40x4	559	385,71	0,65 OK	23,048
13	Web 13	179,338	2,625	2,363	690	3,42	40x4	559	385,71	0,46 OK	23,048
17	Web 17	106,02	2,625	2,363	690	3,42	40x4	559	385,71	0,27 OK	23,048
21	Web 21	43,106	2,625	2,363	690	3,42	40x4	559	385,71	0,11 OK	23,048
L	Lower chor	959,414	20	18,000	690	26,09	90x5	1670	1152,3	0,83 OK	262
edge	Upper chor	431,597	24	21,600	690	31,30	120x6	2700	1863	0,33 OK	508,8

Pressure members

Member	Truss 24m	q=23,328 kN/	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-259,98	1,7	1,530	80x5	1470	0,657	50,2	0,751	355	392,12	0,663 OK	30,5	0,827	39,4
7	M7	-207,84	1,7	1,530	80x5	1470	0,657	50,2	0,751	355	392,12	0,530 OK	30,5	0,827	39,4
11	M11	-162,74	1,7	1,530	70x5	1270	0,758	58,0	0,688	355	310,29	0,524 OK	26,4	0,924	34,0
15	M15	-115,88	1,7	1,530	60x5	1070	0,898	68,6	0,601	355	228,33	0,508 OK	22,3	1,074	28,6
19	M19	-70,35	1,7	1,530	50x5	873	1,100	84,1	0,484	355	150,04	0,469 OK	18,2	1,326	23,3
23	M23	-53,27	1,7	1,530	50x4	719	1,077	82,3	0,497	355	126,82	0,420 OK	18,6	1,294	9,6
y direction	Upper chord	-254,00	2	1,800	120x8	3520	0,518	39,6	0,833	355	1040,9	0,344 OK	45,5	0,712	
z direction	Upper chord	-254,00	6	5,400	120x8	3520	1,553	118,7	0,298	355	372,25	0,782 OK	45,5	2,038	

Pressure members

Member	Truss 24m	q=23,328 kN	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-259,98	1,7	1,530	70x4	1040	0,851	57,1	0,631	460	301,64	0,862 OK	27	1,021	27,7
7	M7	-207,842	1,7	1,530	60x4	879	1,004	67,4	0,538	460	217,35	0,956 OK	23	1,201	23,5
11	M11	-162,737	1,7	1,530	60x4	879	1,004	67,4	0,538	460	217,35	0,749 OK	23	1,201	23,5
15	M15	-115,882	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,831 OK	19	1,502	19,2
19	M19	-70,346	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,504 OK	19	1,502	19,2
23	M23	-53,265	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,382 OK	19	1,502	9,6
y direction	Upper chord	-254,003	2	1,800	120x6	2700	0,579	38,9	0,798	460	990,69	0,356 OK	46	0,761	
z direction	Upper chord	-254,003	6	5,400	120x6	2700	1,738	116,6	0,249	460	308,82	0,922 OK	46	2,386	

Pressure members

Member	Truss 24m	q=23,328 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	Web 3	-259,98	1,7	1,530	80x4	1200	0,903	49,5	0,598	690	494,9119	0,525 OK	30,9	1,080	32,0
7	Web 7	-207,84	1,7	1,530	80x4	1200	0,903	49,5	0,598	690	494,9119	0,420 OK	30,9	1,080	32,0
11	Web 11	-162,74	1,7	1,530	60x4	879	1,230	67,4	0,420	690	254,6139	0,639 OK	22,7	1,508	23,5
15	Web 15	-115,88	1,7	1,530	50x4	719	1,501	82,3	0,314	690	155,9039	0,743 OK	18,6	1,945	19,2
19	Web 19	-70,35	1,7	1,530	50x4	719	1,501	82,3	0,314	690	155,9039	0,451 OK	18,6	1,945	19,2
23	Web 23	-53,27	1,7	1,530	40x4	559	1,925	105,5	0,209	690	80,76218	0,660 OK	14,5	2,776	7,5
y direction	Upper chor	-254,00	2	1,800	120x6	2700	0,709	38,9	0,719	690	1339,304	0,290 OK	46,3	0,876	
z direction	Upper chor	-254,00	6	5,400	120x6	2700	2,128	116,6	0,176	690	328,2637	0,874 OK	46,3	3,237	

Tensile members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	517,581	2,625	2,363	355	6,65	80x6	1740	617,7	0,84 OK	71,4
5	M5	411,693	2,625	2,363	355	6,65	60x6,3	1310	465,05	0,89 OK	54,075
9	M9	323,062	2,625	2,363	355	6,65	60x6,3	1310	465,05	0,69 OK	54,075
13	M13	230,63	2,625	2,363	355	6,65	60x6,3	1310	465,05	0,50 OK	54,075
17	M17	136,343	2,625	2,363	355	6,65	50x5	873	309,92	0,44 OK	35,963
21	M21	55,435	2,625	2,363	355	6,65	50x5	873	309,92	0,18 OK	35,963
L	Lower chord	1233,815	20	18,000	355	50,70	120x10	4290	1523	0,81 OK	674
edge	Upper chord	555,038	24	21,600	355	60,85	120x10	4290	1523	0,46 OK	808,8

Tensile members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	M1	517,581	2,625	2,363	460	5,14	80x4	1200	552	0,94 OK	49,403
5	M5	411,693	2,625	2,363	460	5,14	80x4	1200	552	0,75 OK	49,403
9	M9	323,062	2,625	2,363	460	5,14	60x4	879	404,34	0,80 OK	36,225
13	M13	230,63	2,625	2,363	460	5,14	50x4	719	330,74	0,70 OK	29,61
17	M17	136,343	2,625	2,363	460	5,14	50x4	719	330,74	0,41 OK	29,61
21	M21	55,435	2,625	2,363	460	5,14	50x4	719	330,74	0,17 OK	29,61
L	Lower chord	1233,815	20	18,000	460	39,13	100x8	2880	1324,8	0,93 OK	452
edge	Upper chord	555,038	24	21,600	460	46,96	140x6	3180	1462,8	0,48 OK	597,6

Tensile members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd		G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd	kg
1	Web 1	517,581	2,625	2,363	690	3,42	60x4	879	606,51	0,85 OK	36,225
5	Web 5	411,693	2,625	2,363	690	3,42	50x5	873	602,37	0,68 OK	35,963
9	Web 9	323,062	2,625	2,363	690	3,42	40x4	559	385,71	0,84 OK	23,048
13	Web 13	230,63	2,625	2,363	690	3,42	40x4	559	385,71	0,60 OK	23,048
17	Web 17	136,343	2,625	2,363	690	3,42	40x4	559	385,71	0,35 OK	23,048
21	Web 21	55,435	2,625	2,363	690	3,42	40x4	559	385,71	0,14 OK	23,048
L	Lower chor	1233,815	20	18,000	690	26,09	100x5	1870	1290,3	0,96 OK	294
edge	Upper chor	555,038	24	21,600	690	31,30	140x5	2670	1842,3	0,40 OK	504

Pressure members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-334,336	1,7	1,530	80x5	1470	0,657	50,2	0,751	355	392,12	0,853 OK	30,5	0,827	39,4
7	M7	-267,286	1,7	1,530	70x5	1270	0,758	58,0	0,688	355	310,29	0,861 OK	26,4	0,924	34,0
11	M11	-209,282	1,7	1,530	60x5	1070	0,898	68,6	0,601	355	228,33	0,917 OK	22,3	1,074	28,6
15	M15	-149,025	1,7	1,530	50x5	873	1,100	84,1	0,484	355	150,04	0,993 OK	18,2	1,326	23,3
19	M19	-90,466	1,7	1,530	50x5	873	1,100	84,1	0,484	355	150,04	0,603 OK	18,2	1,326	23,3
23	M23	-68,499	1,7	1,530	50x5	873	1,100	84,1	0,484	355	150,04	0,457 OK	18,2	1,326	11,6
y direction	Upper chord	-326,65	2	1,800	120x10	4290	0,528	40,4	0,827	355	1259,6	0,359 OK	44,6	0,720	
z direction	Upper chord	-326,65	6	5,400	120x10	4290	1,585	121,1	0,289	355	439,58	0,843 OK	44,6	2,095	

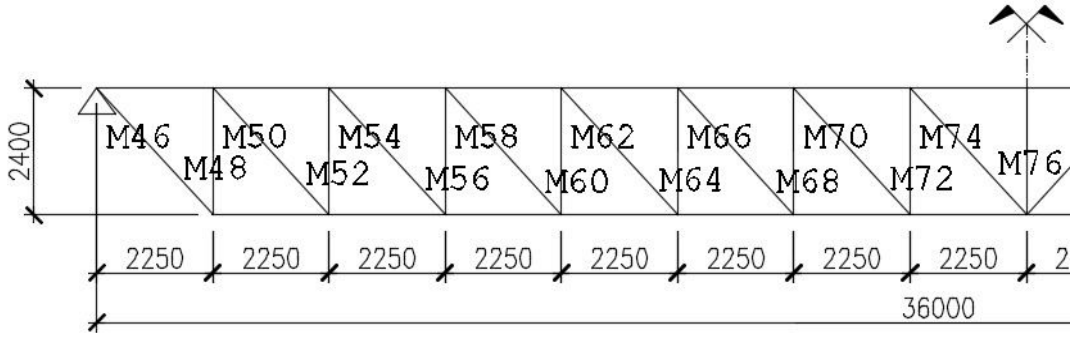
Pressure members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	M3	-334,336	1,7	1,530	90x4	1360	0,651	43,7	0,755	460	472,09	0,708 OK	35	0,823	36,4
7	M7	-178,191	1,7	1,530	70x4	1040	0,851	57,1	0,631	460	301,64	0,591 OK	27	1,021	27,7
11	M11	-139,521	1,7	1,530	70x4	1040	0,851	57,1	0,631	460	301,64	0,463 OK	27	1,021	27,7
15	M15	-99,35	1,7	1,530	60x4	879	1,004	67,4	0,538	460	217,35	0,457 OK	23	1,201	23,5
19	M19	-60,311	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,432 OK	19	1,502	19,2
23	M23	-45,666	1,7	1,530	50x4	719	1,225	82,3	0,422	460	139,51	0,327 OK	19	1,502	9,6
y direction	Upper chord	-326,65	2	1,800	140x6	3180	0,492	33,0	0,847	460	1239,6	0,364 OK	55	0,693	
z direction	Upper chord	-326,65	6	5,400	140x6	3180	1,476	99,1	0,322	460	471,61	0,793 OK	55	1,902	

Pressure members

Member	Truss 24m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd				G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd	i=	Φ	kg
3	Web 3	-334,336	1,7	1,530	70x4	1040	1,042	57,1	0,516	690	370,3944	0,903 OK	26,8	1,249	27,7
7	Web 7	-178,191	1,7	1,530	60x4	879	1,230	67,4	0,420	690	254,6139	0,700 OK	22,7	1,508	23,5
11	Web 11	-139,521	1,7	1,530	60x4	879	1,230	67,4	0,420	690	254,6139	0,548 OK	22,7	1,508	23,5
15	Web 15	-99,35	1,7	1,530	50x4	719	1,501	82,3	0,314	690	155,9039	0,637 OK	18,6	1,945	19,2
19	Web 19	-60,311	1,7	1,530	40x4	559	1,925	105,5	0,209	690	80,76218	0,747 OK	14,5	2,776	14,9
23	Web 23	-45,666	1,7	1,530	40x4	559	1,925	105,5	0,209	690	80,76218	0,565 OK	14,5	2,776	7,5
y direction	Upper chor	-326,65	2	1,800	140x5	2670	0,597	32,7	0,787	690	1450,037	0,325 OK	55	0,776	
z direction	Upper chor	-326,65	6	5,400	140x5	2670	1,791	98,2	0,236	690	435,4954	0,850 OK	55	2,494	

Member	Truss 36m	length	q=20 kN/r	q=23,328 kN	q=30 kN/m
No.		L [m]	N_{Ed} [kN]	N_{Ed} [kN]	N_{Ed} [kN]
46	M 46	3,29	469,025	547,07	696,82
48	M 48	3,29	-341,635	-398,483	-512,431
50	M 50	3,29	397,923	464,137	591,281
52	M 52	3,29	-290,483	-338,819	-435,794
54	M 54	3,29	338,637	394,986	503,198
56	M 56	3,29	-247,082	-288,196	-370,66
58	M 58	3,29	276,621	322,651	411,042
60	M 60	3,29	-201,871	-235,462	-302,842
62	M 62	3,29	215,213	251,024	319,798
64	M 64	3,29	-157,145	-183,294	-235,738
66	M 66	3,29	153,879	179,485	228,641
68	M 68	3,29	-112,005	-130,643	-168,042
70	M 70	3,29	91,583	106,823	136,153
72	M 72	3,29	-68,343	-79,715	-102,443
74	M 74	3,29	34,102	39,776	50,393
76	M 76	3,29	-47,439	-55,333	-70,959
L	Lower chord	31,5	1328,82	1549,931	1952,74
middle	Upper chord	36	-369,629	-431,135	-543,057
edge	Upper chord	36	661,725	771,836	972,432
		G (S355) [kg	3074,8	3311,55	3946,2
		G (S460) [kg	2781,9	2959,70	3539,1
		G (S690) [kg	2374,1	2104,06	2656,4



Tensile members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	469,03	3,29	2,961	355	8,34	80x5	1470	521,85	0,90	OK	76,328
50	M50	397,92	3,29	2,961	355	8,34	60x6	1260	447,3	0,89	OK	64,945
54	M54	338,64	3,29	2,961	355	8,34	60x6	1260	447,3	0,76	OK	64,945
58	M58	276,62	3,29	2,961	355	8,34	60x6	1260	447,3	0,62	OK	64,945
62	M62	215,21	3,29	2,961	355	8,34	50x4	719	255,25	0,84	OK	37,111
66	M66	153,88	3,29	2,961	355	8,34	50x4	719	255,25	0,60	OK	37,111
70	M70	91,58	3,29	2,961	355	8,34	50x5	873	309,92	0,30	OK	45,073
74	M74	34,10	3,29	2,961	355	8,34	50x6	1020	362,1	0,09	OK	52,574
L	Lower chord	1328,82	31,5	28,350	355	79,86	120x10	4290	1523	0,87	OK	1061,6
edge	Upper chord	661,73	36	32,400	355	91,27	120x10	4290	1523	0,53	OK	1213,2

Tensile members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	469,03	3,29	2,961	460	6,44	70x5	1270	584,2	0,80	OK	65,734
50	M50	397,92	3,29	2,961	460	6,44	60x5	1070	492,2	0,81	OK	55,404
54	M54	338,64	3,29	2,961	460	6,44	60x5	1070	492,2	0,69	OK	55,404
58	M58	276,62	3,29	2,961	460	6,44	50x4	719	330,74	0,84	OK	37,111
62	M62	215,21	3,29	2,961	460	6,44	50x4	719	330,74	0,65	OK	37,111
66	M66	153,88	3,29	2,961	460	6,44	50x4	719	330,74	0,47	OK	37,111
70	M70	91,58	3,29	2,961	460	6,44	50x5	873	401,58	0,23	OK	45,073
74	M74	34,10	3,29	2,961	460	6,44	50x6	1020	469,2	0,07	OK	52,574
L	Lower chord	1328,82	31,5	28,350	460	61,63	120x8	3520	1619,2	0,82	OK	869,4
edge	Upper chord	661,73	36	32,400	460	70,43	120x10	4290	1973,4	0,44	OK	1213,2

Tensile members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	469,03	3,29	2,961	690	4,29	50x4	719	496,11	0,95	OK	37,111
50	M50	397,92	3,29	2,961	690	4,29	50x4	719	496,11	0,80	OK	37,111
54	M54	338,64	3,29	2,961	690	4,29	40x4	559	385,71	0,88	OK	28,886
58	M58	276,62	3,29	2,961	690	4,29	40x4	559	385,71	0,72	OK	28,886
62	M62	215,21	3,29	2,961	690	4,29	40x4	559	385,71	0,56	OK	28,886
66	M66	153,88	3,29	2,961	690	4,29	40x4	559	385,71	0,40	OK	28,886
70	M70	91,58	3,29	2,961	690	4,29	40x4	559	385,71	0,24	OK	28,886
74	M74	34,10	3,29	2,961	690	4,29	40x4	559	385,71	0,09	OK	28,886
L	Lower chord	1328,82	31,5	28,350	690	41,09	120x8	3520	2428,8	0,55	OK	869,4
edge	Upper chord	661,73	36	32,400	690	46,96	120x8	3520	2428,8	0,37	OK	993,6

Pressure members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-341,64	2,4	2,160	90x5	1670	0,819	62,6	0,650	355	385,35	0,887	OK	34,5	0,987	62,9
52	M52	-290,48	2,4	2,160	80x5	1470	0,927	70,8	0,583	355	304,46	0,954	OK	30,5	1,108	55,7
56	M56	-247,08	2,4	2,160	80x5	1470	0,927	70,8	0,583	355	304,46	0,812	OK	30,5	1,108	55,7
60	M60	-201,87	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,895	OK	26,4	1,287	48,0
64	M64	-157,15	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,697	OK	26,4	1,287	48,0
68	M68	-112,01	2,4	2,160	60x5	1070	1,268	96,9	0,403	355	152,99	0,732	OK	22,3	1,565	40,4
72	M72	-68,34	2,4	2,160	50x5	873	1,553	118,7	0,298	355	92,322	0,740	OK	18,2	2,038	32,9
76	M76	-47,44	2,4	2,160	50x4	719	1,520	116,1	0,308	355	78,666	0,603	OK	18,6	1,978	13,5
y direction	Upper chord	-369,63	2,25	2,025	120x10	4290	0,594	45,4	0,789	355	1201,3	0,408	OK	44,6	0,773	
z direction	Upper chord	-369,63	6	5,400	120x10	4290	1,585	121,1	0,289	355	439,58	0,941	OK	44,6	2,095	

Pressure members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-341,64	2,4	2,160	90x5	1670	0,933	62,6	0,580	460	445,45	0,767	OK	35	1,115	62,9
52	M52	-290,48	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,845	OK	31	1,266	55,7
56	M56	-247,08	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,718	OK	31	1,266	55,7
60	M60	-201,87	2,4	2,160	70x5	1270	1,219	81,8	0,425	460	248,2	0,813	OK	26	1,492	48,0
64	M64	-157,15	2,4	2,160	70x5	1270	1,219	81,8	0,425	460	248,2	0,633	OK	26	1,492	48,0
68	M68	-112,01	2,4	2,160	60x4	879	1,418	95,2	0,343	460	138,6	0,808	OK	23	1,803	16,6
72	M72	-68,34	2,4	2,160	50x4	719	1,730	116,1	0,250	460	82,824	0,825	OK	19	2,371	13,5
76	M76	-47,44	2,4	2,160	50x4	719	1,730	116,1	0,250	460	82,824	0,573	OK	19	2,371	13,5
y direction	Upper chord	-369,63	2,25	2,025	120x10	4290	0,676	45,4	0,739	460	1458,8	0,353	OK	45	0,845	
z direction	Upper chord	-369,63	6	5,400	120x10	4290	1,804	121,1	0,234	460	461,18	0,901	OK	45	2,520	

Pressure members

Member	Truss 36m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-341,64	2,4	2,160	90x4	1360	1,126	61,7	0,471	690	441,5936	0,774	OK	35	1,361	51,4
52	M52	-290,48	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,878	OK	30,9	1,577	45,2
56	M56	-247,08	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,747	OK	30,9	1,577	45,2
60	M60	-201,87	2,4	2,160	70x4	1040	1,471	80,6	0,324	690	232,693	0,868	OK	26,8	1,893	39,1
64	M64	-157,15	2,4	2,160	70x4	1040	1,471	80,6	0,324	690	232,693	0,675	OK	26,8	1,893	39,1
68	M68	-112,01	2,4	2,160	60x4	879	1,736	95,2	0,249	690	151,0027	0,742	OK	22,7	2,384	16,6
72	M72	-68,34	2,4	2,160	50x4	719	2,119	116,1	0,178	690	88,07451	0,776	OK	18,6	3,215	13,5
76	M76	-47,44	2,4	2,160	50x4	719	2,119	116,1	0,178	690	88,07451	0,539	OK	18,6	3,215	13,5
y direction	Upper chord	-369,63	2,25	2,025	120x8	3520	0,812	44,5	0,655	690	1589,876	0,332	OK	45,5	0,980	
z direction	Upper chord	-369,63	6	5,400	120x8	3520	2,165	118,7	0,171	690	415,1252	0,990	OK	45,5	3,326	

Tensile members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	547,07	3,29	2,961	355	8,34	90x5	1670	592,85	0,92	OK	86,198
50	M50	464,14	3,29	2,961	355	8,34	80x5	1470	521,85	0,89	OK	76,328
54	M54	394,99	3,29	2,961	355	8,34	60x6	1260	447,3	0,88	OK	64,945
58	M58	322,65	3,29	2,961	355	8,34	60x6	1260	447,3	0,72	OK	64,945
62	M62	251,02	3,29	2,961	355	8,34	50x4	719	255,25	0,98	OK	37,111
66	M66	179,49	3,29	2,961	355	8,34	50x4	719	255,25	0,70	OK	37,111
70	M70	106,82	3,29	2,961	355	8,34	50x5	873	309,92	0,34	OK	45,073
74	M74	39,78	3,29	2,961	355	8,34	50x6	1020	362,1	0,11	OK	52,574
L	Lower chord	1549,93	31,5	28,350	355	79,86	140x10	5090	1807	0,86	OK	1260
edge	Upper chord	771,84	36	32,400	355	91,27	140x8	4160	1476,8	0,62	OK	1173,6

Tensile members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	547,07	3,29	2,961	460	6,44	70x5	1270	584,2	0,94	OK	65,734
50	M50	464,14	3,29	2,961	460	6,44	60x5	1070	492,2	0,94	OK	55,404
54	M54	394,99	3,29	2,961	460	6,44	60x5	1070	492,2	0,80	OK	55,404
58	M58	322,65	3,29	2,961	460	6,44	50x4	719	330,74	0,98	OK	37,111
62	M62	251,02	3,29	2,961	460	6,44	50x4	719	330,74	0,76	OK	37,111
66	M66	179,49	3,29	2,961	460	6,44	50x4	719	330,74	0,54	OK	37,111
70	M70	106,82	3,29	2,961	460	6,44	50x5	873	401,58	0,27	OK	45,073
74	M74	39,78	3,29	2,961	460	6,44	50x6	1020	469,2	0,08	OK	52,574
L	Lower chord	1549,93	31,5	28,350	460	61,63	120x10	4290	1973,4	0,79	OK	1061,6
edge	Upper chord	771,84	36	32,400	460	70,43	140x8	4160	1913,6	0,50	OK	1173,6

Tensile members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	547,07	3,29	2,961	690	4,29	60x4	879	606,51	0,90	OK	45,402
50	M50	464,14	3,29	2,961	690	4,29	50x4	719	496,11	0,94	OK	37,111
54	M54	394,99	3,29	2,961	690	4,29	50x4	719	496,11	0,80	OK	37,111
58	M58	322,65	3,29	2,961	690	4,29	40x4	559	385,71	0,84	OK	28,886
62	M62	251,02	3,29	2,961	690	4,29	40x4	559	385,71	0,65	OK	28,886
66	M66	179,49	3,29	2,961	690	4,29	40x4	559	385,71	0,47	OK	28,886
70	M70	106,82	3,29	2,961	690	4,29	40x4	559	385,71	0,28	OK	28,886
74	M74	39,78	3,29	2,961	690	4,29	40x4	559	385,71	0,10	OK	28,886
L	Lower chord	1549,93	31,5	28,350	690	41,09	120x6	2700	1863	0,83	OK	667,8
edge	Upper chord	771,84	36	32,400	690	46,96	140x6	3180	2194,2	0,45	OK	896,4

Pressure members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-398,48	2,4	2,160	90x6	1980	0,829	63,3	0,644	355	452,64	0,880	OK	34,1	0,998	74,4
52	M52	-338,82	2,4	2,160	90x6	1980	0,829	63,3	0,644	355	452,64	0,749	OK	34,1	0,998	74,4
56	M56	-288,20	2,4	2,160	90x6	1980	0,829	63,3	0,644	355	452,64	0,637	OK	34,1	0,998	74,4
60	M60	-235,46	2,4	2,160	80x5	1470	0,927	70,8	0,583	355	304,46	0,773	OK	30,5	1,108	55,7
64	M64	-183,29	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,813	OK	26,4	1,287	48,0
68	M68	-130,64	2,4	2,160	60x5	1070	1,268	96,9	0,403	355	152,99	0,854	OK	22,3	1,565	40,4
72	M72	-79,72	2,4	2,160	50x5	873	1,553	118,7	0,298	355	92,322	0,863	OK	18,2	2,038	32,9
76	M76	-55,33	2,4	2,160	50x4	719	1,520	116,1	0,308	355	78,666	0,703	OK	18,6	1,978	13,5
y direction	Upper chord	-431,14	2,4	2,160	140x8	4160	0,527	40,3	0,828	355	1222,1	0,453	OK	53,6	0,719	
z direction	Upper chord	-431,14	6	5,400	140x8	4160	1,318	100,7	0,381	355	562,81	0,866	OK	53,6	1,643	

Pressure members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-398,48	2,4	2,160	90x5	1670	0,933	62,6	0,580	460	445,45	0,895	OK	35	1,115	62,9
52	M52	-338,82	2,4	2,160	90x5	1670	0,933	62,6	0,580	460	445,45	0,761	OK	35	1,115	62,9
56	M56	-288,20	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,838	OK	31	1,266	55,7
60	M60	-235,46	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,685	OK	31	1,266	55,7
64	M64	-183,29	2,4	2,160	70x5	1270	1,219	81,8	0,425	460	248,2	0,739	OK	26	1,492	48,0
68	M68	-130,64	2,4	2,160	60x5	1070	1,443	96,9	0,334	460	164,26	0,795	OK	22	1,846	20,2
72	M72	-79,72	2,4	2,160	60x5	1070	1,443	96,9	0,334	460	164,26	0,485	OK	22	1,846	20,2
76	M76	-55,33	2,4	2,160	50x4	719	1,730	116,1	0,250	460	82,824	0,668	OK	19	2,371	13,5
y direction	Upper chord	-431,14	2,4	2,160	140x8	4160	0,600	40,3	0,785	460	1502,5	0,387	OK	54	0,778	
z direction	Upper chord	-431,14	6	5,400	140x8	4160	1,501	100,7	0,314	460	601,34	0,817	OK	54	1,945	

Pressure members

Member	Truss 36m	q=23,328 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-398,48	2,4	2,160	90x4	1360	1,126	61,7	0,471	690	441,5936	0,902	OK	35	1,361	51,4
52	M52	-338,82	2,4	2,160	90x4	1360	1,126	61,7	0,471	690	441,5936	0,767	OK	35	1,361	51,4
56	M56	-288,20	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,872	OK	30,9	1,577	45,2
60	M60	-235,46	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,712	OK	30,9	1,577	45,2
64	M64	-183,29	2,4	2,160	70x4	1040	1,471	80,6	0,324	690	232,693	0,788	OK	26,8	1,893	39,1
68	M68	-130,64	2,4	2,160	60x4	879	1,736	95,2	0,249	690	151,0027	0,865	OK	22,7	2,384	16,6
72	M72	-79,72	2,4	2,160	50x4	719	2,119	116,1	0,178	690	88,07451	0,905	OK	18,6	3,215	13,5
76	M76	-55,33	2,4	2,160	50x4	719	2,119	116,1	0,178	690	88,07451	0,628	OK	18,6	3,215	13,5
y direction	Upper chord	-431,14	2,4	2,160	140x6	3180	0,723	39,6	0,710	690	1558,577	0,377	OK	54,5	0,890	
z direction	Upper chord	-431,14	6	5,400	140x6	3180	1,808	99,1	0,233	690	510,8432	0,944	OK	54,5	2,528	

Tensile members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	696,82	3,29	2,961	355	8,34	100x6	2220	788,1	0,88	OK	114,49
50	M50	591,28	3,29	2,961	355	8,34	90x6	1980	702,9	0,84	OK	101,99
54	M54	503,20	3,29	2,961	355	8,34	70x6	1500	532,5	0,94	OK	77,644
58	M58	411,04	3,29	2,961	355	8,34	60x6	1260	447,3	0,92	OK	64,945
62	M62	319,80	3,29	2,961	355	8,34	60x6	1260	447,3	0,71	OK	64,945
66	M66	228,64	3,29	2,961	355	8,34	50x4	719	255,25	0,90	OK	37,111
70	M70	136,15	3,29	2,961	355	8,34	50x5	873	309,92	0,44	OK	45,073
74	M74	50,39	3,29	2,961	355	8,34	50x6	1020	362,1	0,14	OK	52,574
L	Lower chord	1952,74	31,5	28,350	355	79,86	140x12	5990	2126,5	0,92	OK	1480,5
edge	Upper chord	972,43	36	32,400	355	91,27	140x10	5090	1807	0,64	OK	1440

Tensile members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	696,82	3,29	2,961	460	6,44	90x5	1670	768,2	0,91	OK	86,198
50	M50	591,28	3,29	2,961	460	6,44	80x5	1470	676,2	0,87	OK	76,328
54	M54	503,20	3,29	2,961	460	6,44	70x5	1270	584,2	0,86	OK	65,734
58	M58	411,04	3,29	2,961	460	6,44	60x5	1070	492,2	0,84	OK	55,404
62	M62	319,80	3,29	2,961	460	6,44	50x5	873	401,58	0,80	OK	45,073
66	M66	228,64	3,29	2,961	460	6,44	50x5	873	401,58	0,57	OK	45,073
70	M70	136,15	3,29	2,961	460	6,44	50x5	873	401,58	0,34	OK	45,073
74	M74	50,39	3,29	2,961	460	6,44	50x5	873	401,58	0,13	OK	45,073
L	Lower chord	1952,74	31,5	28,350	460	61,63	120x12	5030	2313,8	0,84	OK	1244,3
edge	Upper chord	972,43	36	32,400	460	70,43	140x10	5090	2341,4	0,52	OK	1440

Tensile members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
46	M46	696,82	3,29	2,961	690	4,29	80x4	1200	828	0,84	OK	61,918
50	M50	591,28	3,29	2,961	690	4,29	70x4	1040	717,6	0,82	OK	53,627
54	M54	503,20	3,29	2,961	690	4,29	60x4	879	606,51	0,83	OK	45,402
58	M58	411,04	3,29	2,961	690	4,29	50x4	719	496,11	0,83	OK	37,111
62	M62	319,80	3,29	2,961	690	4,29	40x4	559	385,71	0,83	OK	28,886
66	M66	228,64	3,29	2,961	690	4,29	40x4	559	385,71	0,59	OK	28,886
70	M70	136,15	3,29	2,961	690	4,29	40x4	559	385,71	0,35	OK	28,886
74	M74	50,39	3,29	2,961	690	4,29	40x4	559	385,71	0,13	OK	28,886
L	Lower chord	1952,74	31,5	28,350	690	41,09	120x8	3520	2428,8	0,80	OK	869,4
edge	Upper chord	972,43	36	32,400	690	46,96	140x8	4160	2870,4	0,44	OK	1173,6

Pressure members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-512,43	2,4	2,160	100x6	2220	0,740	56,5	0,700	355	551,5	0,929	OK	38,2	0,906	83,5
52	M52	-435,79	2,4	2,160	100x5	1870	0,732	56,0	0,705	355	467,73	0,932	OK	38,6	0,899	70,6
56	M56	-370,66	2,4	2,160	90x6	1980	0,829	63,3	0,644	355	452,64	0,819	OK	34,1	0,998	74,4
60	M60	-302,84	2,4	2,160	90x5	1670	0,819	62,6	0,650	355	385,35	0,786	OK	34,5	0,987	62,9
64	M64	-235,74	2,4	2,160	80x5	1470	0,927	70,8	0,583	355	304,46	0,774	OK	30,5	1,108	55,7
68	M68	-168,04	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,745	OK	26,4	1,287	48,0
72	M72	-102,44	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,454	OK	26,4	1,287	48,0
76	M76	-70,96	2,4	2,160	70x5	1270	1,071	81,8	0,500	355	225,43	0,315	OK	26,4	1,287	24,0
y direction	Upper chord	-543,06	2,25	2,025	140x10	5090	0,503	38,4	0,841	355	1520,3	0,457	OK	52,7	0,701	
z direction	Upper chord	-543,06	6	5,400	140x10	5090	1,341	102,5	0,372	355	672,1	0,908	OK	52,7	1,679	

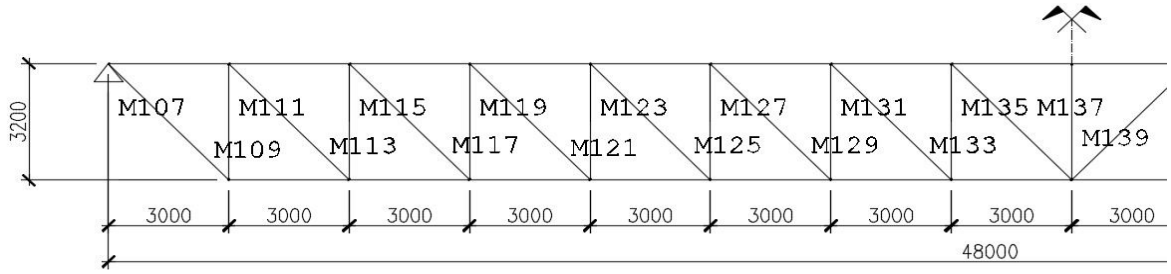
Pressure members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-512,43	2,4	2,160	120x5	2270	0,688	46,2	0,732	460	764,73	0,670	OK	47	0,856	85,4
52	M52	-435,79	2,4	2,160	100x5	1870	0,834	56,0	0,641	460	551,43	0,790	OK	39	1,003	70,6
56	M56	-370,66	2,4	2,160	90x5	1670	0,933	62,6	0,580	460	445,45	0,832	OK	35	1,115	62,9
60	M60	-302,84	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,880	OK	31	1,266	55,7
64	M64	-235,74	2,4	2,160	80x5	1470	1,055	70,8	0,509	460	343,97	0,685	OK	31	1,266	55,7
68	M68	-168,04	2,4	2,160	70x5	1270	1,219	81,8	0,425	460	248,2	0,677	OK	26	1,492	24,0
72	M72	-102,44	2,4	2,160	60x5	1070	1,443	96,9	0,334	460	164,26	0,624	OK	22	1,846	20,2
76	M76	-70,96	2,4	2,160	50x5	873	1,768	118,7	0,242	460	97,018	0,731	OK	18	2,447	16,4
y direction	Upper chord	-543,06	2,25	2,025	140x10	5090	0,572	38,4	0,802	460	1876,9	0,389	OK	53	0,755	
z direction	Upper chord	-543,06	6	5,400	140x10	5090	1,527	102,5	0,306	460	716,69	0,858	OK	53	1,990	

Pressure members

Member	Truss 36m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
48	M48	-512,43	2,4	2,160	100x4	1520	1,008	55,2	0,535	690	561,4598	0,913	OK	39,1	1,206	57,1
52	M52	-435,79	2,4	2,160	90x4	1360	1,126	61,7	0,471	690	441,5936	0,987	OK	35	1,361	51,4
56	M56	-370,66	2,4	2,160	90x4	1360	1,126	61,7	0,471	690	441,5936	0,839	OK	35	1,361	51,4
60	M60	-302,84	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,916	OK	30,9	1,577	45,2
64	M64	-235,74	2,4	2,160	80x4	1200	1,275	69,9	0,399	690	330,6611	0,713	OK	30,9	1,577	45,2
68	M68	-168,04	2,4	2,160	70x4	1040	1,471	80,6	0,324	690	232,693	0,722	OK	26,8	1,893	19,6
72	M72	-102,44	2,4	2,160	60x4	879	1,736	95,2	0,249	690	151,0027	0,678	OK	22,7	2,384	16,6
76	M76	-70,96	2,4	2,160	50x4	719	2,119	116,1	0,178	690	88,07451	0,806	OK	18,6	3,215	13,5
y direction	Upper chord	-543,06	2,25	2,025	140x8	4160	0,689	37,8	0,731	690	2099,08	0,359	OK	53,6	0,857	
z direction	Upper chord	-543,06	6	5,400	140x8	4160	1,838	100,7	0,226	690	649,9026	0,936	OK	53,6	2,591	

Member	Truss 48m	length	q=20 kN/m	q=23,328 kN/m	q=30 kN/m
No.		L [m]	N_{Ed} [kN]	N_{Ed} [kN]	N_{Ed} [kN]
107	M 107	4,386	625,068	729,079	937,601
109	M 109	4,386	-455,003	-530,716	-682,504
111	M 111	4,386	530,16	618,378	795,24
113	M 113	4,386	-387,26	-451,7	-580,89
115	M 115	4,386	451,256	526,345	676,883
117	M 117	4,386	-329,212	-383,993	-493,818
119	M 119	4,386	368,621	429,959	552,931
121	M 121	4,386	-269,044	-313,813	-403,566
123	M 123	4,386	286,79	334,512	430,185
125	M 125	4,386	-209,414	-244,26	-314,12
127	M 127	4,386	205,031	239,148	307,546
129	M 129	4,386	-149,273	-174,112	-223,909
131	M 131	4,386	122,114	142,434	183,171
133	M 133	4,386	-91,204	-106,381	-136,807
135	M 135	4,386	45,694	53,297	68,54
137	M 137	4,386	-63,452	-74,011	-95,178
L	Lower chord	42	1770,75	2065,4	2656,13
middle	Upper chord	48	-492,727	-574,717	-739,091
edge	Upper chord	48	881,765	1028,491	1322,648
		G (S355) [kg]=	4693,7	5705,69	6591,1
		G (S460) [kg]=	4210,8	4873,23	5475,5
		G (S690) [kg]=	3371,1	3847,48	4887,6



Tensile members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	625,07	4,386	3,947	355	11,12	90x6	1980	702,9	0,89	OK	135,97
111	M111	530,16	4,386	3,947	355	11,12	90x5	1670	592,85	0,89	OK	114,91
115	M115	451,26	4,386	3,947	355	11,12	90x4	1360	482,8	0,93	OK	93,86
119	M119	368,62	4,386	3,947	355	11,12	70x5	1270	450,85	0,82	OK	87,632
123	M123	286,79	4,386	3,947	355	11,12	60x4	879	312,05	0,92	OK	60,527
127	M127	205,03	4,386	3,947	355	11,12	50x4	719	255,25	0,80	OK	49,474
131	M131	122,11	4,386	3,947	355	11,12	50x5	873	309,92	0,39	OK	60,088
135	M135	45,69	4,386	3,947	355	11,12	50x6	1020	362,1	0,13	OK	70,088
L	Lower chord	1770,75	42	37,800	355	106,48	140x10	5090	1807	0,98	OK	1680
edge	Upper chord	881,77	48	43,200	355	121,69	140x8	4160	1476,8	0,70	OK	1564,8

Tensile members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Strengt	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	625,07	4,386	3,947	460	8,58	80x5	1470	676,2	0,92	OK	101,76
111	M111	530,16	4,386	3,947	460	8,58	70x5	1270	584,2	0,91	OK	87,632
115	M115	451,26	4,386	3,947	460	8,58	60x5	1070	492,2	0,92	OK	73,86
119	M119	368,62	4,386	3,947	460	8,58	50x5	873	401,58	0,92	OK	60,088
123	M123	286,79	4,386	3,947	460	8,58	50x5	873	401,58	0,71	OK	60,088
127	M127	205,03	4,386	3,947	460	8,58	50x5	873	401,58	0,51	OK	60,088
131	M131	122,11	4,386	3,947	460	8,58	50x5	873	401,58	0,30	OK	60,088
135	M135	45,69	4,386	3,947	460	8,58	50x5	873	401,58	0,11	OK	60,088
L	Lower chord	1770,75	42	37,800	460	82,17	120x10	4290	1973,4	0,90	OK	1415,4
edge	Upper chord	881,77	48	43,200	460	93,91	140x8	4160	1913,6	0,56	OK	1564,8

Tensile members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	625,07	4,386	3,947	690	5,72	60x5	1070	738,3	0,85	OK	73,86
111	M111	530,16	4,386	3,947	690	5,72	50x5	873	602,37	0,88	OK	60,088
115	M115	451,26	4,386	3,947	690	5,72	50x5	873	602,37	0,75	OK	60,088
119	M119	368,62	4,386	3,947	690	5,72	50x5	873	602,37	0,61	OK	60,088
123	M123	286,79	4,386	3,947	690	5,72	50x5	873	602,37	0,48	OK	60,088
127	M127	205,03	4,386	3,947	690	5,72	50x5	873	602,37	0,34	OK	60,088
131	M131	122,11	4,386	3,947	690	5,72	50x5	873	602,37	0,20	OK	60,088
135	M135	45,69	4,386	3,947	690	5,72	50x5	873	602,37	0,08	OK	60,088
L	Lower chor	1770,75	42	37,800	690	54,78	120x6,3	2820	1945,8	0,91	OK	932,4
edge	Upper chor	881,77	48	43,200	690	62,61	150x6,3	3580	2470,2	0,46	OK	1348,8

3371,1

Pressure members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-455,00	3,2	2,880	100x8	2880	1,010	77,2	0,534	355	545,83	0,834	OK	37,3	1,209	144,6
113	M113	-451,70	3,2	2,880	100x8	2880	1,010	77,2	0,534	355	545,83	0,828	OK	37,3	1,209	144,6
117	M117	-383,99	3,2	2,880	100x6	2220	0,987	75,4	0,548	355	431,64	0,890	OK	38,2	1,180	111,4
121	M121	-313,81	3,2	2,880	100x6	2220	0,987	75,4	0,548	355	431,64	0,727	OK	38,2	1,180	111,4
125	M125	-244,26	3,2	2,880	90x6	1980	1,105	84,5	0,481	355	338,39	0,722	OK	34,1	1,333	99,2
129	M129	-174,11	3,2	2,880	80x5	1470	1,236	94,4	0,417	355	217,64	0,800	OK	30,5	1,517	74,2
133	M133	-106,38	3,2	2,880	70x5	1270	1,428	109,1	0,339	355	152,9	0,696	OK	26,4	1,820	63,9
137	M137	-74,01	3,2	2,880	60x5	1070	1,690	129,1	0,260	355	98,823	0,749	OK	22,3	2,293	26,9
y direction	Upper chord	-492,73	3	2,700	140x8	4160	0,659	50,4	0,750	355	1107,2	0,545	OK	53,6	0,830	
z direction	Upper chord	-492,73	6	5,400	140x8	4160	1,318	100,7	0,381	355	562,81	0,975	OK	53,6	1,643	

Pressure members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-455,00	3,2	2,880	100x6	2220	1,123	75,4	0,472	460	482,07	0,944	OK	38	1,357	111,4
113	M113	-451,70	3,2	2,880	100x6	2220	1,123	75,4	0,472	460	482,07	0,937	OK	38	1,357	111,4
117	M117	-383,99	3,2	2,880	100x6	2220	1,123	75,4	0,472	460	482,07	0,797	OK	38	1,357	111,4
121	M121	-313,81	3,2	2,880	90x5	1670	1,244	83,5	0,413	460	317,63	0,988	OK	35	1,529	83,8
125	M125	-244,26	3,2	2,880	90x5	1670	1,244	83,5	0,413	460	317,63	0,769	OK	35	1,529	83,8
129	M129	-174,11	3,2	2,880	80x5	1470	1,407	94,4	0,347	460	234,46	0,743	OK	31	1,785	74,2
133	M133	-106,38	3,2	2,880	70x5	1270	1,625	109,1	0,277	460	161,94	0,657	OK	26	2,170	63,9
137	M137	-74,01	3,2	2,880	60x5	1070	1,924	129,1	0,210	460	103,17	0,717	OK	22	2,773	26,9
y direction	Upper chord	-492,73	3	2,700	140x8	4160	0,750	50,4	0,693	460	1326,6	0,471	OK	54	0,916	
z direction	Upper chord	-492,73	6	5,400	140x8	4160	1,501	100,7	0,314	460	601,34	0,919	OK	54	1,945	

Pressure members

Member	Truss 48m	q=20 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-455,00	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,969	OK	38,6	1,711	94,1
113	M113	-451,70	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,962	OK	38,6	1,711	94,1
117	M117	-383,99	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,818	OK	38,6	1,711	94,1
121	M121	-313,81	3,2	2,880	90x5	1670	1,523	83,5	0,307	690	353,9333	0,887	OK	34,5	1,984	83,8
125	M125	-244,26	3,2	2,880	80x5	1470	1,723	94,4	0,252	690	255,7395	0,955	OK	30,5	2,357	74,2
129	M129	-174,11	3,2	2,880	80x5	1470	1,723	94,4	0,252	690	255,7395	0,681	OK	30,5	2,357	74,2
133	M133	-106,38	3,2	2,880	60x5	1070	2,356	129,1	0,147	690	108,7046	0,979	OK	22,3	3,805	53,9
137	M137	-74,01	3,2	2,880	60x5	1070	2,356	129,1	0,147	690	108,7046	0,681	OK	22,3	3,805	26,9
y direction	Upper chor	-492,73	3	2,700	150x6,3	3580	0,842	46,2	0,636	690	1570,423	0,414	OK	58,5	1,012	
z direction	Upper chor	-492,73	6	5,400	150x6,3	3580	1,684	92,3	0,262	690	646,3662	0,862	OK	58,5	2,282	

Tensile members

Member	Truss 48m	q=23,328 kN/	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	729,08	4,386	3,947	355	11,12	100x6	2220	788,1	0,93	OK	152,63
111	M111	618,38	4,386	3,947	355	11,12	100x5	1870	663,85	0,93	OK	128,95
115	M115	526,35	4,386	3,947	355	11,12	90x5	1670	592,85	0,89	OK	114,91
119	M119	429,96	4,386	3,947	355	11,12	70x5	1270	450,85	0,95	OK	87,632
123	M123	334,51	4,386	3,947	355	11,12	60x5	1070	379,85	0,88	OK	73,86
127	M127	239,15	4,386	3,947	355	11,12	50x4	719	255,25	0,94	OK	49,474
131	M131	142,43	4,386	3,947	355	11,12	50x4	719	255,25	0,56	OK	49,474
135	M135	53,30	4,386	3,947	355	11,12	50x4	719	255,25	0,21	OK	49,474
L	Lower chord	2065,40	42	37,800	355	106,48	140x12	5990	2126,5	0,97	OK	1974
edge	Upper chord	1028,49	48	43,200	355	121,69	140x12	5990	2126,5	0,58	OK	2256

Tensile members

Member	Truss 48m	q=23,328 kN	length	L_{cr}	Strengt	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	729,08	4,386	3,947	460	8,58	90x5	1670	768,2	0,95	OK	114,91
111	M111	618,38	4,386	3,947	460	8,58	80x5	1470	676,2	0,91	OK	101,76
115	M115	526,35	4,386	3,947	460	8,58	70x5	1270	584,2	0,90	OK	87,632
119	M119	429,96	4,386	3,947	460	8,58	60x5	1070	492,2	0,87	OK	73,86
123	M123	334,51	4,386	3,947	460	8,58	50x5	873	401,58	0,83	OK	60,088
127	M127	239,15	4,386	3,947	460	8,58	50x5	873	401,58	0,60	OK	60,088
131	M131	142,43	4,386	3,947	460	8,58	50x5	873	401,58	0,35	OK	60,088
135	M135	53,30	4,386	3,947	460	8,58	50x5	873	401,58	0,13	OK	60,088
L	Lower chord	2065,40	42	37,800	460	82,17	140x10	5090	2341,4	0,88	OK	1680
edge	Upper chord	1028,49	48	43,200	460	93,91	140x10	5090	2341,4	0,54	OK	1920

Tensile members

Member	Truss 48m	q=23,328 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	729,08	4,386	3,947	690	5,72	60x5	1070	738,3	0,99	OK	73,86
111	M111	618,38	4,386	3,947	690	5,72	60x5	1070	738,3	0,84	OK	73,86
115	M115	526,35	4,386	3,947	690	5,72	50x5	873	602,37	0,87	OK	60,088
119	M119	429,96	4,386	3,947	690	5,72	50x5	873	602,37	0,71	OK	60,088
123	M123	334,51	4,386	3,947	690	5,72	50x5	873	602,37	0,56	OK	60,088
127	M127	239,15	4,386	3,947	690	5,72	50x5	873	602,37	0,40	OK	60,088
131	M131	142,43	4,386	3,947	690	5,72	50x5	873	602,37	0,24	OK	60,088
135	M135	53,30	4,386	3,947	690	5,72	50x5	873	602,37	0,09	OK	60,088
L	Lower chor	2065,40	42	37,800	690	54,78	120x8	3520	2428,8	0,85	OK	1159,2
edge	Upper chor	1028,49	48	43,200	690	62,61	140x8	4160	2870,4	0,46	OK	1564,8

2255,7

Pressure members

Member	Truss 48m	q=23,328 kN/	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-530,72	3,2	2,880	100x8	2880	1,010	77,2	0,534	355	545,83	0,972	OK	37,3	1,209	144,6
113	M113	-451,70	3,2	2,880	100x8	2880	1,010	77,2	0,534	355	545,83	0,828	OK	37,3	1,209	144,6
117	M117	-383,99	3,2	2,880	90x8	2560	1,135	86,7	0,466	355	423,33	0,907	OK	33,2	1,374	128,6
121	M121	-313,81	3,2	2,880	90x6	1980	1,105	84,5	0,481	355	338,39	0,927	OK	34,1	1,333	99,2
125	M125	-244,26	3,2	2,880	80x6	1740	1,256	96,0	0,408	355	251,87	0,970	OK	30	1,548	87,0
129	M129	-174,11	3,2	2,880	80x5	1470	1,236	94,4	0,417	355	217,64	0,800	OK	30,5	1,517	74,2
133	M133	-106,38	3,2	2,880	70x5	1270	1,428	109,1	0,339	355	152,9	0,696	OK	26,4	1,820	63,9
137	M137	-74,01	3,2	2,880	60x5	1070	1,690	129,1	0,260	355	98,823	0,749	OK	22,3	2,293	26,9
y direction	Upper chord	-574,72	3	2,700	140x12	5990	0,682	52,1	0,736	355	1564,4	0,467	OK	51,8	0,851	
z direction	Upper chord	-574,72	6	5,400	140x12	5990	1,364	104,2	0,363	355	771,39	0,845	OK	51,8	1,716	

Pressure members

Member	Truss 48m	q=23,328 kN	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-530,72	3,2	2,880	120x5	2270	0,917	61,5	0,590	460	615,61	0,862	OK	47	1,096	113,9
113	M113	-451,70	3,2	2,880	120x5	2270	0,917	61,5	0,590	460	615,61	0,734	OK	47	1,096	113,9
117	M117	-383,99	3,2	2,880	100x5	1870	1,112	74,6	0,478	460	411,3	0,934	OK	39	1,341	94,1
121	M121	-313,81	3,2	2,880	90x5	1670	1,244	83,5	0,413	460	317,63	0,988	OK	35	1,529	83,8
125	M125	-244,26	3,2	2,880	90x5	1670	1,244	83,5	0,413	460	317,63	0,769	OK	35	1,529	83,8
129	M129	-174,11	3,2	2,880	80x5	1470	1,407	94,4	0,347	460	234,46	0,743	OK	31	1,785	74,2
133	M133	-106,38	3,2	2,880	70x5	1270	1,625	109,1	0,277	460	161,94	0,657	OK	26	2,170	63,9
137	M137	-74,01	3,2	2,880	60x5	1070	1,924	129,1	0,210	460	103,17	0,717	OK	22	2,773	26,9
y direction	Upper chord	-574,72	3	2,700	140x10	5090	0,763	51,2	0,685	460	1604,4	0,458	OK	53	0,929	
z direction	Upper chord	-574,72	6	5,400	140x10	5090	1,527	102,5	0,306	460	716,69	0,902	OK	53	1,990	

Pressure members

Member	Truss 48m	q=23,328 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-530,72	3,2	2,880	120x5	2270	1,123	61,5	0,472	690	739,6787	0,717	OK	46,8	1,356	113,9
113	M113	-451,70	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,962	OK	38,6	1,711	94,1
117	M117	-383,99	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,818	OK	38,6	1,711	94,1
121	M121	-313,81	3,2	2,880	90x5	1670	1,523	83,5	0,307	690	353,9333	0,887	OK	34,5	1,984	83,8
125	M125	-244,26	3,2	2,880	80x5	1470	1,723	94,4	0,252	690	255,7395	0,955	OK	30,5	2,357	74,2
129	M129	-174,11	3,2	2,880	80x5	1470	1,723	94,4	0,252	690	255,7395	0,681	OK	30,5	2,357	74,2
133	M133	-106,38	3,2	2,880	60x5	1070	2,356	129,1	0,147	690	108,7046	0,979	OK	22,3	3,805	53,9
137	M137	-74,01	3,2	2,880	60x5	1070	2,356	129,1	0,147	690	108,7046	0,681	OK	22,3	3,805	26,9
y direction	Upper chor	-574,72	3	2,700	140x8	4160	0,919	50,4	0,588	690	1688,192	0,440	OK	53,6	1,099	
z direction	Upper chor	-574,72	6	5,400	140x8	4160	1,838	100,7	0,226	690	649,9026	0,984	OK	53,6	2,591	

Tensile members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	937,60	4,386	3,947	355	11,12	100x8	2880	1022,4	0,92	OK	198,25
111	M111	795,24	4,386	3,947	355	11,12	100x8	2880	1022,4	0,78	OK	198,25
115	M115	676,88	4,386	3,947	355	11,12	100x6	2220	788,1	0,86	OK	152,63
119	M119	552,93	4,386	3,947	355	11,12	80x6	1740	617,7	0,90	OK	119,3
123	M123	430,19	4,386	3,947	355	11,12	70x5	1270	450,85	0,95	OK	87,632
127	M127	307,55	4,386	3,947	355	11,12	70x5	1270	450,85	0,68	OK	87,632
131	M131	183,17	4,386	3,947	355	11,12	50x5	873	309,92	0,59	OK	60,088
135	M135	68,54	4,386	3,947	355	11,12	50x6	1020	362,1	0,19	OK	70,088
L	Lower chord	2656,13	42	37,800	355	106,48	180x12	7910	2808,1	0,95	OK	2608,2
edge	Upper chord	1322,65	48	43,200	355	121,69	160x10	5890	2091	0,73	OK	2222,4

Tensile members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Strengt	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	937,60	4,386	3,947	460	8,58	120x5	2270	1044,2	0,90	OK	156,14
111	M111	795,24	4,386	3,947	460	8,58	100x5	1870	860,2	0,92	OK	128,95
115	M115	676,88	4,386	3,947	460	8,58	90x5	1670	768,2	0,88	OK	114,91
119	M119	552,93	4,386	3,947	460	8,58	70x5	1270	584,2	0,95	OK	87,632
123	M123	430,19	4,386	3,947	460	8,58	70x5	1270	584,2	0,74	OK	87,632
127	M127	307,55	4,386	3,947	460	8,58	50x5	873	401,58	0,77	OK	60,088
131	M131	183,17	4,386	3,947	460	8,58	50x5	873	401,58	0,46	OK	60,088
135	M135	68,54	4,386	3,947	460	8,58	50x5	873	401,58	0,17	OK	60,088
L	Lower chord	2656,13	42	37,800	460	82,17	160x10	5890	2709,4	0,98	OK	1944,6
edge	Upper chord	1322,65	48	43,200	460	93,91	150x10	5490	2525,4	0,62	OK	2068,8

Tensile members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Strength	Amin,req	Profile	A	Nt,Rd			G
No.		N_{Ed} [kN]	L [m]	[m]	fy [MPa]	[mm]	SHS	[mm]	[kN]	Ned<NRd		kg
107	M107	937,60	4,386	3,947	690	5,72	90x5	1670	1152,3	0,81	OK	114,91
111	M111	795,24	4,386	3,947	690	5,72	80x5	1470	1014,3	0,78	OK	101,76
115	M115	676,88	4,386	3,947	690	5,72	70x5	1270	876,3	0,77	OK	87,632
119	M119	552,93	4,386	3,947	690	5,72	70x5	1270	876,3	0,63	OK	87,632
123	M123	430,19	4,386	3,947	690	5,72	70x5	1270	876,3	0,49	OK	87,632
127	M127	307,55	4,386	3,947	690	5,72	50x5	873	602,37	0,51	OK	60,088
131	M131	183,17	4,386	3,947	690	5,72	50x5	873	602,37	0,30	OK	60,088
135	M135	68,54	4,386	3,947	690	5,72	50x5	873	602,37	0,11	OK	60,088
L	Lower chor	2656,13	42	37,800	690	54,78	150x8	4480	3091,2	0,86	OK	1474,2
edge	Upper chor	1322,65	48	43,200	690	62,61	150x10	5490	3788,1	0,45	OK	2068,8

Pressure members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-682,50	3,2	2,880	140x5	2670	0,685	52,4	0,734	355	695,5	0,981	OK	55	0,854	134,4
113	M113	-580,89	3,2	2,880	120x6	2700	0,814	62,2	0,653	355	626,21	0,928	OK	46,3	0,982	135,7
117	M117	-493,82	3,2	2,880	120x5	2270	0,805	61,5	0,659	355	530,88	0,930	OK	46,8	0,973	113,9
121	M121	-403,57	3,2	2,880	120x5	2270	0,805	61,5	0,659	355	530,88	0,760	OK	46,8	0,973	113,9
125	M125	-314,12	3,2	2,880	90x6	1980	1,105	84,5	0,481	355	338,39	0,928	OK	34,1	1,333	99,2
129	M129	-223,91	3,2	2,880	80x6	1740	1,256	96,0	0,408	355	251,87	0,889	OK	30	1,548	87,0
133	M133	-136,81	3,2	2,880	70x6	1500	1,455	111,2	0,329	355	175,45	0,780	OK	25,9	1,866	75,5
137	M137	-95,18	3,2	2,880	60x5	1070	1,690	129,1	0,260	355	98,823	0,963	OK	22,3	2,293	26,9
y direction	Upper chord	-739,09	3	3	160x10	5890	0,645	49,3	0,759	355	1586,2	0,566	OK	60,9	0,817	
z direction	Upper chord	-739,09	6	5,400	160x10	5890	1,160	88,7	0,453	355	947,36	0,880	OK	60,9	1,409	

Pressure members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-682,50	3,2	2,880	120x6	2700	0,927	62,2	0,584	460	724,74	0,942	OK	46	1,107	135,7
113	M113	-580,89	3,2	2,880	120x5	2270	0,917	61,5	0,590	460	615,61	0,944	OK	47	1,096	113,9
117	M117	-493,82	3,2	2,880	120x5	2270	0,917	61,5	0,590	460	615,61	0,802	OK	47	1,096	113,9
121	M121	-403,57	3,2	2,880	100x5	1870	1,112	74,6	0,478	460	411,3	0,981	OK	39	1,341	94,1
125	M125	-314,12	3,2	2,880	90x5	1670	1,244	83,5	0,413	460	317,63	0,989	OK	35	1,529	83,8
129	M129	-223,91	3,2	2,880	80x5	1470	1,407	94,4	0,347	460	234,46	0,955	OK	31	1,785	74,2
133	M133	-136,81	3,2	2,880	70x5	1270	1,625	109,1	0,277	460	161,94	0,845	OK	26	2,170	63,9
137	M137	-95,18	3,2	2,880	60x5	1070	1,924	129,1	0,210	460	103,17	0,923	OK	22	2,773	26,9
y direction	Upper chord	-739,09	3	2,700	150x10	5490	0,708	47,5	0,720	460	1817,3	0,507	OK	57	0,875	
z direction	Upper chord	-739,09	6	5,400	150x10	5490	1,416	95,1	0,343	460	866,8	0,953	OK	57	1,801	

Pressure members

Member	Truss 48m	q=30 kN/m	length	L_{cr}	Profile	A	λ_{rel}	λ	χ	fy	Nb,Rd					G
No.		N_{Ed} [kN]	L [m]	[m]	SHS	[mm]	[-]	[-]	[-]	[MPa]	[kN]	Ned/NRd		i=	Φ	kg
109	M109	-682,50	3,2	2,880	120x5	2270	1,123	61,5	0,472	690	739,6787	0,923	OK	46,8	1,356	113,9
113	M113	-580,89	3,2	2,880	120x5	2270	1,123	61,5	0,472	690	739,6787	0,785	OK	46,8	1,356	113,9
117	M117	-493,82	3,2	2,880	120x5	2270	1,123	61,5	0,472	690	739,6787	0,668	OK	46,8	1,356	113,9
121	M121	-403,57	3,2	2,880	100x5	1870	1,361	74,6	0,364	690	469,5573	0,859	OK	38,6	1,711	94,1
125	M125	-314,12	3,2	2,880	90x5	1670	1,523	83,5	0,307	690	353,9333	0,888	OK	34,5	1,984	83,8
129	M129	-223,91	3,2	2,880	80x5	1470	1,723	94,4	0,252	690	255,7395	0,876	OK	30,5	2,357	74,2
133	M133	-136,81	3,2	2,880	70x5	1270	1,990	109,1	0,198	690	173,3331	0,789	OK	26,4	2,920	63,9
137	M137	-95,18	3,2	2,880	60x5	1070	2,356	129,1	0,147	690	108,7046	0,876	OK	22,3	3,805	26,9
y direction	Upper chor	-739,09	3	2,700	150x10	5490	0,867	47,5	0,620	690	2348,747	0,415	OK	56,8	1,040	
z direction	Upper chor	-739,09	6	5,400	150x10	5490	1,735	95,1	0,249	690	944,491	0,883	OK	56,8	2,380	