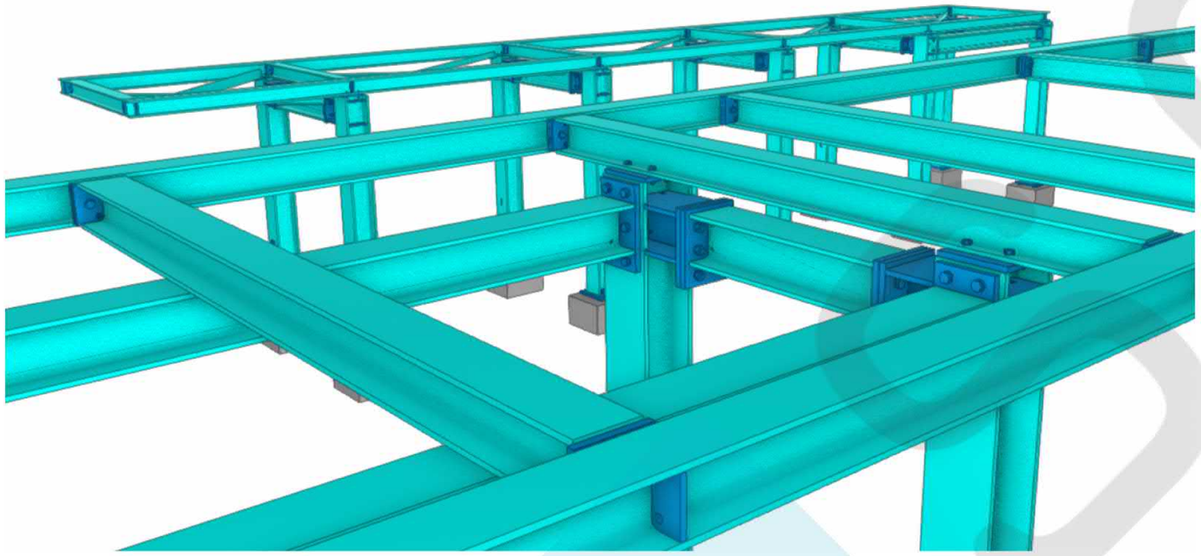
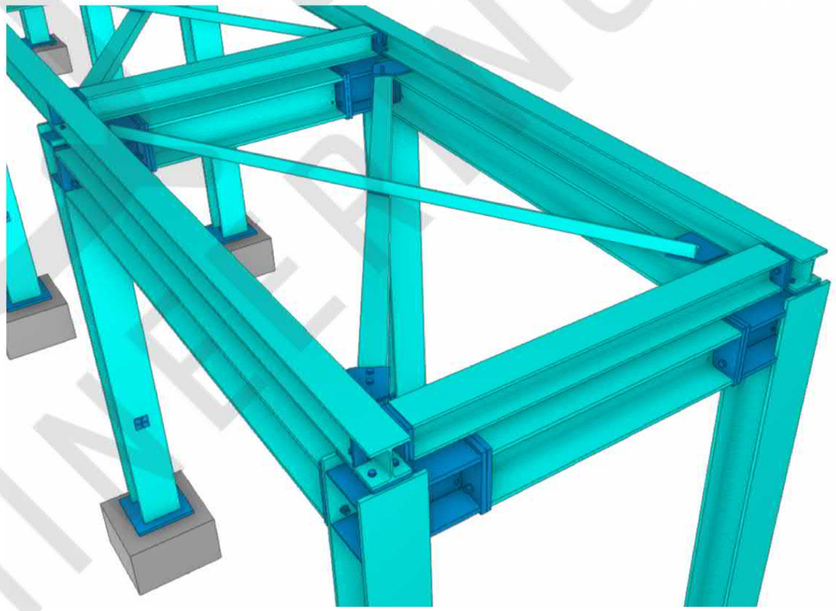
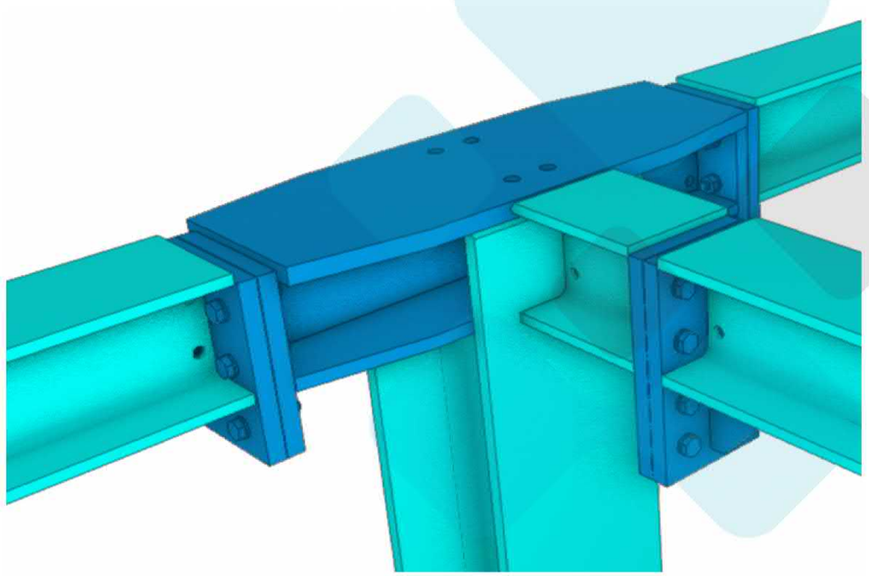
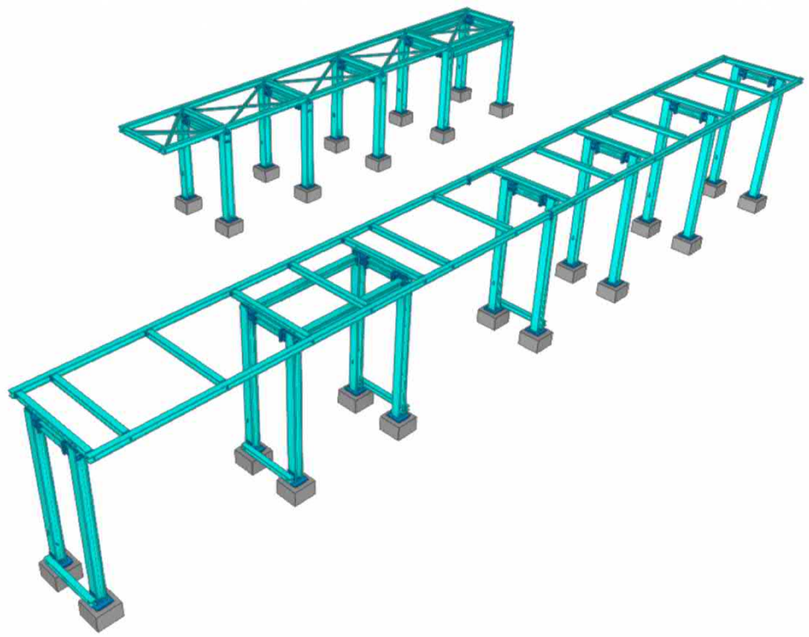
Project: Industrial Pipe Rack [Weight = 13.5t]
Country: Germany
Scope of Work: Primary Structure
- Connection Analysis
- 3D Modeling
- Erection and Fabrication Drawings
- NC Files





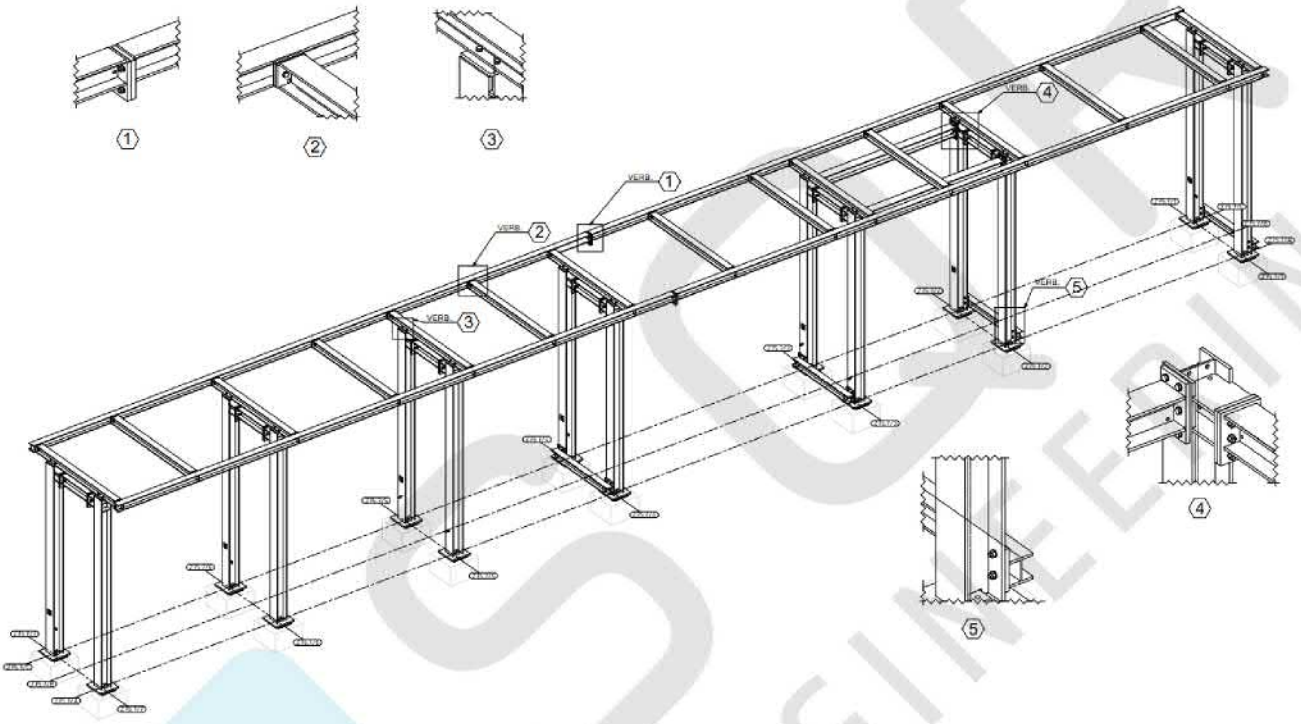




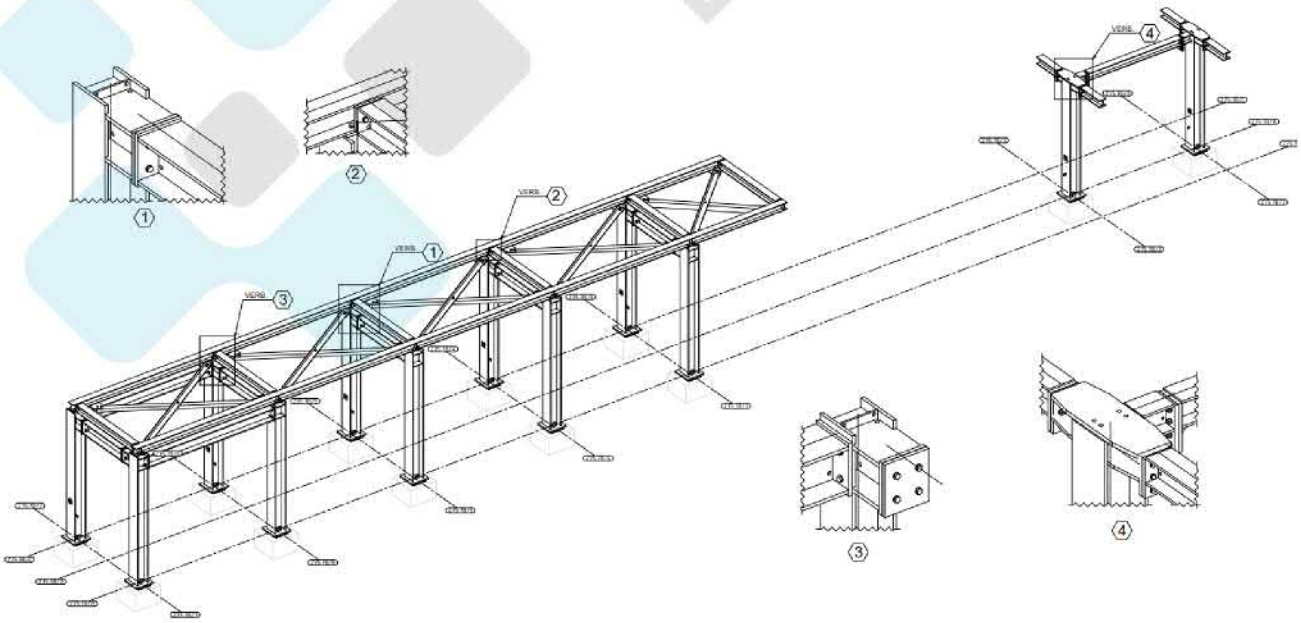
Connection Analysis

2. ANSICHT DER VERBINDUNG

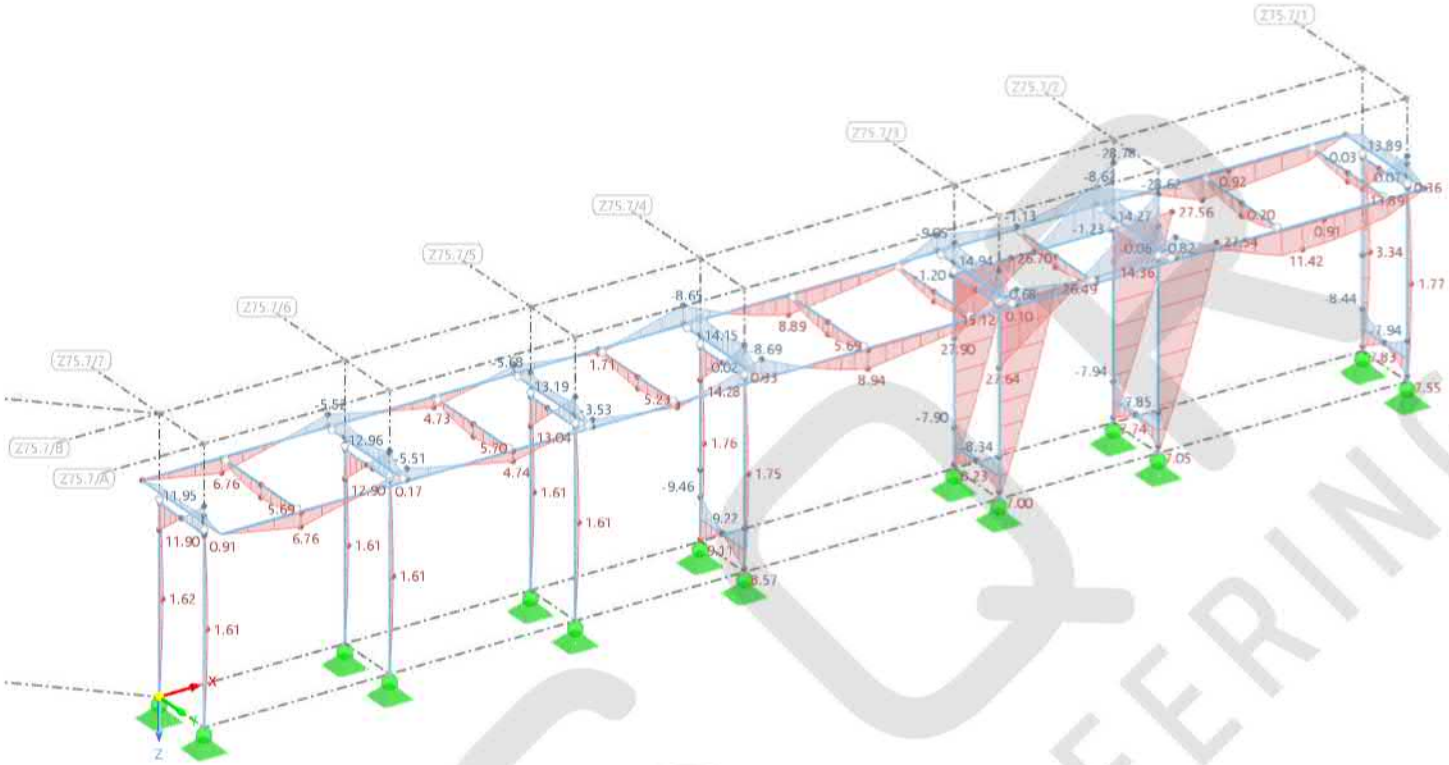
2.1. Z75.7 A



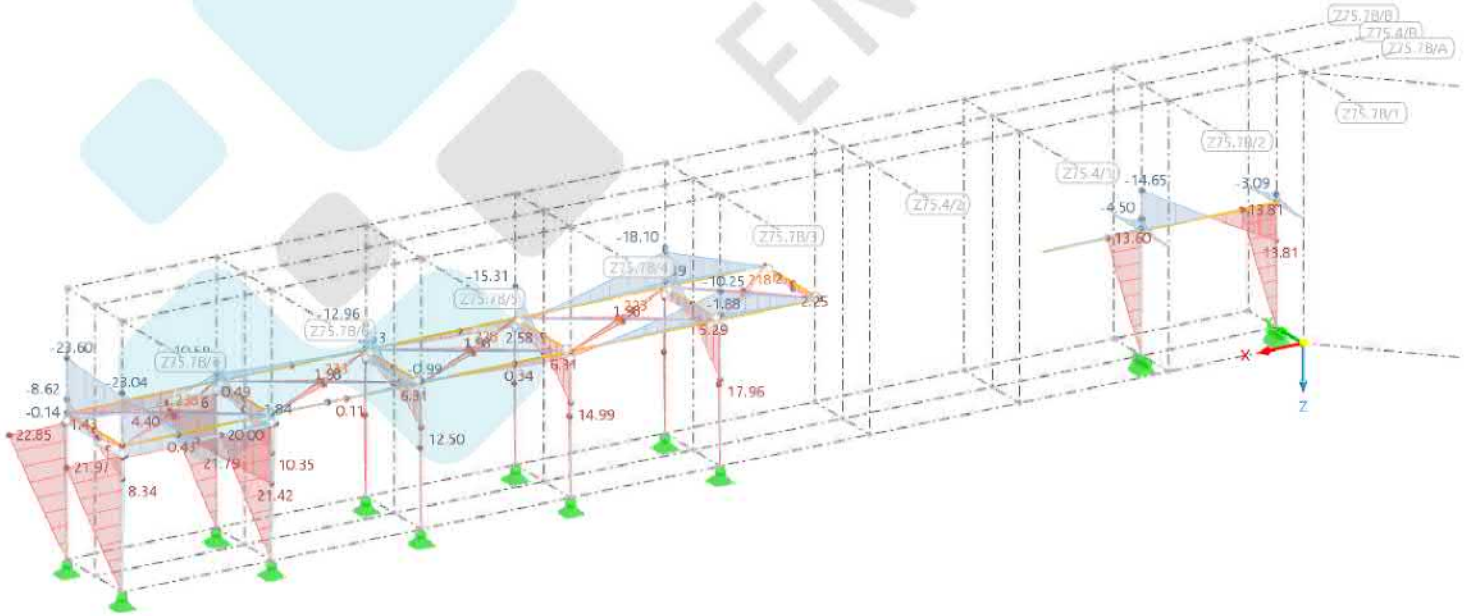
2.2. Z75.7 B



Z75.7 A


Z75.7/1
Z75.7/2
Z75.7/3
Z75.7/4
Z75.7/5
Z75.7/6
Z75.7/7
Z75.7/8
Z75.7/A
Z
X

Z75.7 B

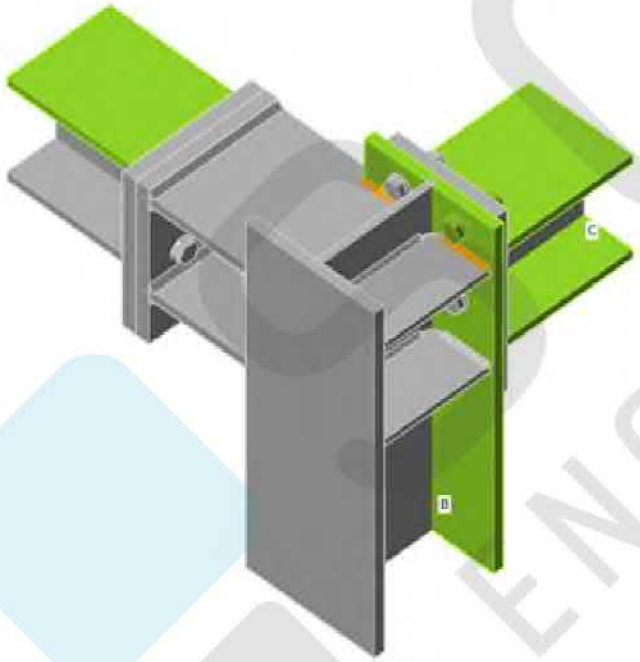

Z75.7B/B
Z75.4/B
Z75.7B/A
Z75.7B/1
Z75.7B/2
Z75.4/1
Z75.4/2
Z75.7B/3
Z75.7B/4
Z75.7B/5
Z75.7B/6
Z75.7B/7
Z75.7B/8
Z
X

Bemessungsdaten

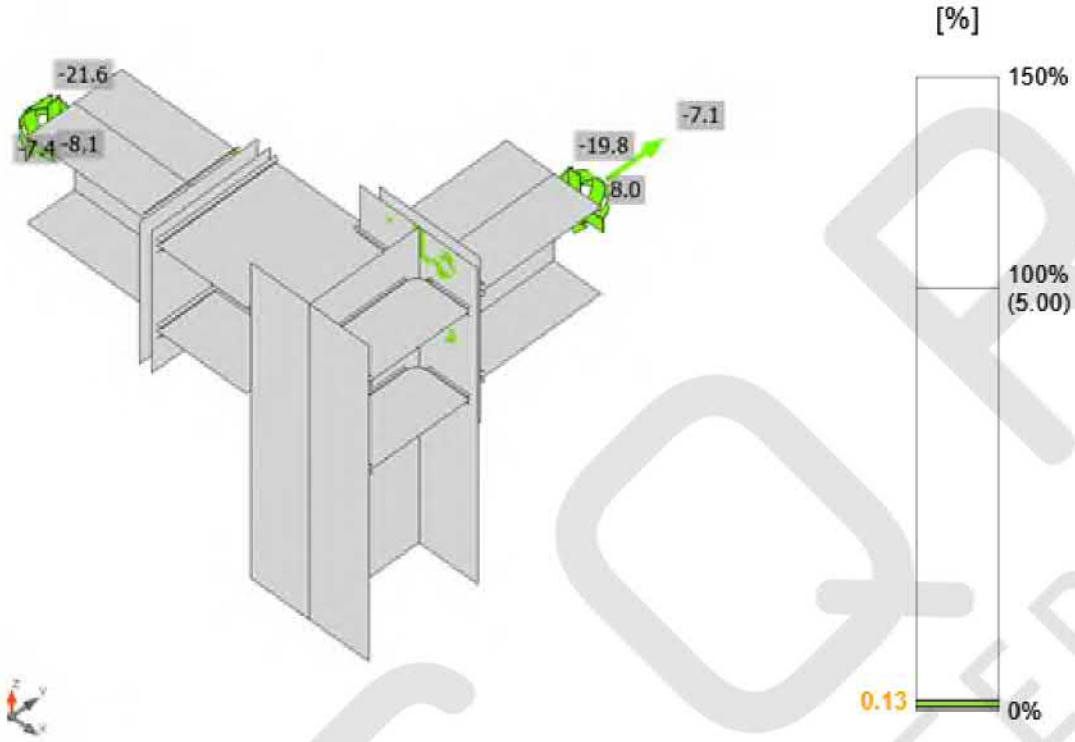
Material	f_y [MPa]	ε_{lim} [%]
S 235	235.0	5.0
S 355	355.0	5.0

Erläuterung von Symbolen

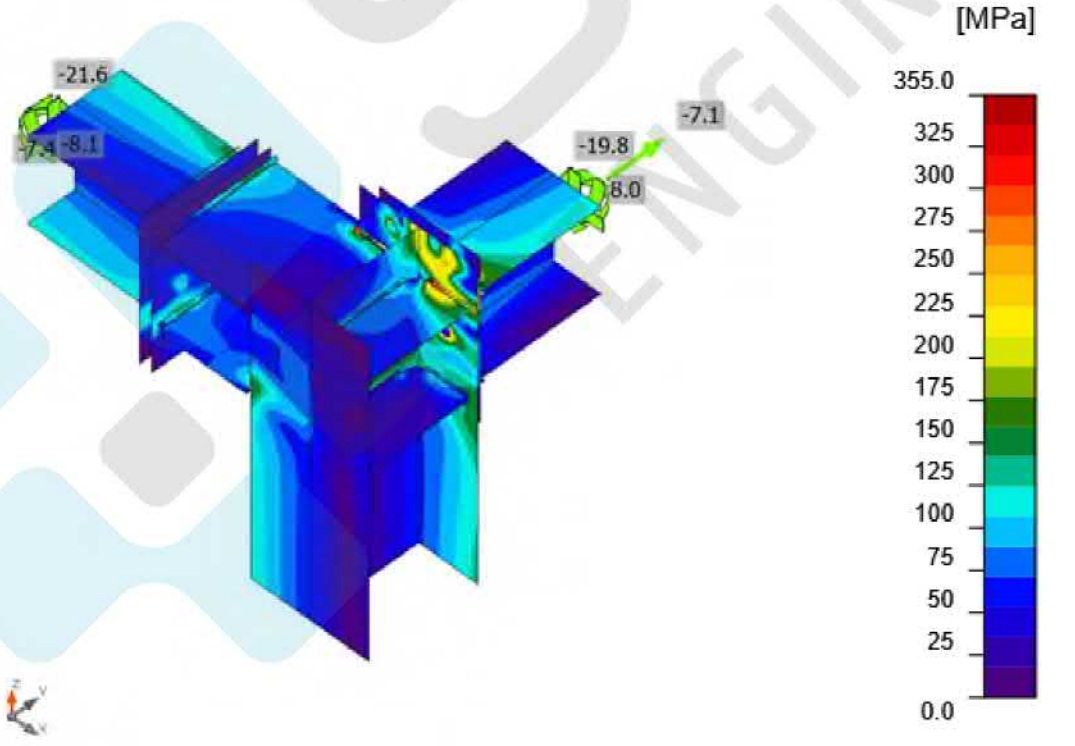
ε_{Pl}	Dehnung
σ_{Ed}	Vergl.-spannung
σc_{Ed}	Kontaktspannung
f_y	Streckgrenze
ε_{lim}	Grenzwert plastische Dehnung



Gesamt, LE1



Dehnung, LE1



Vergleichsspannung, LE1

Material

Stahl	S 235, S 355, S 235, S 355

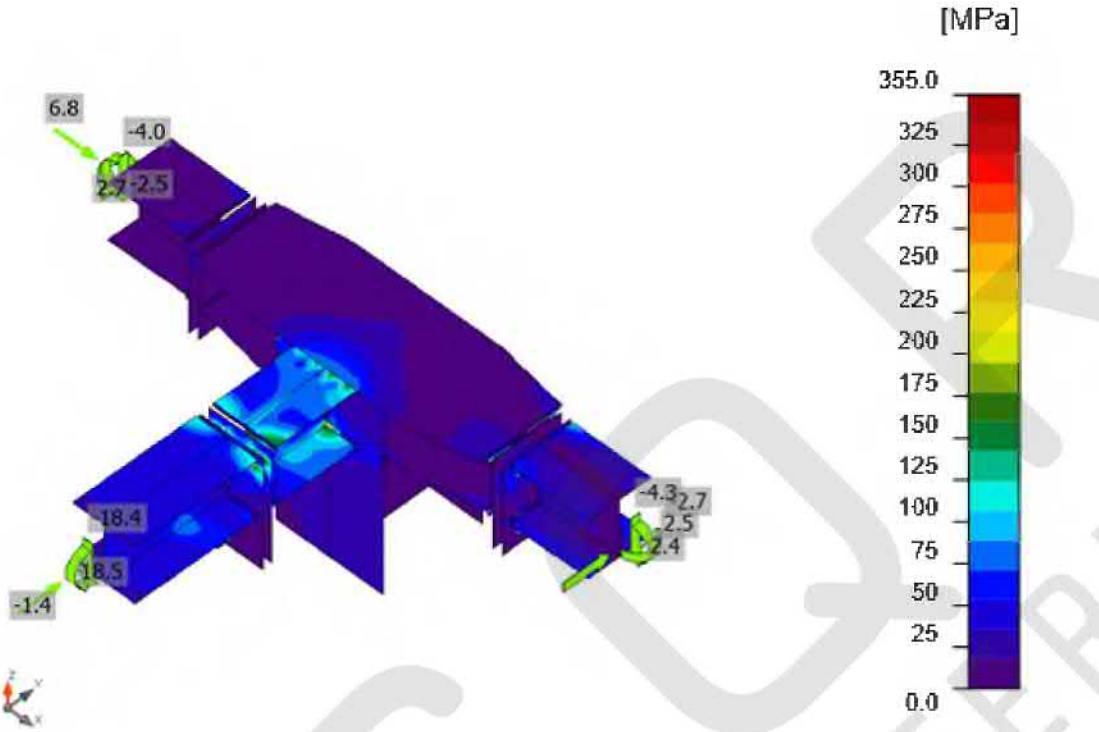
Projektposition Verbindung 4

Bemessung

Name	Verbindung 4
Beschreibung	
Berechnung	Spannung, Dehnung/ Lasten im Gleichgewicht

Träger und Stützen

Name	Querschnitt	β – Rotation [°]	Y - Rotation [°]	α - Rotation [°]	Abstand ex [mm]	Abstand ey [mm]	Abstand ez [mm]	Kräfte in
A	2 - HEB140	0.0	0.0	0.0	0	0	0	Position
B	2 - HEB140	0.0	0.0	0.0	0	0	0	Position
C	2 - HEB140	0.0	0.0	0.0	0	0	0	Position
D	1 - HEB240	0.0	0.0	0.0	0	0	0	Position



Vergleichsspannung, LE1

Schrauben

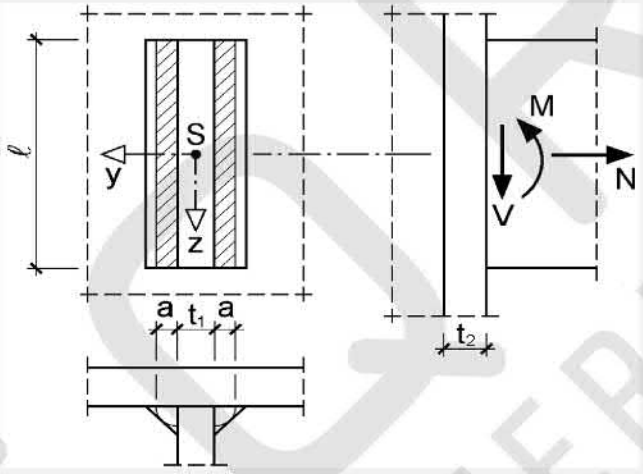
	Name	Klasse	Lasten	$F_{t,Ed}$ [kN]	V [kN]	Ut_t [%]	$F_{b,Rd}$ [kN]	Ut_s [%]	Ut_{ts} [%]	Status
	B2	12 10.9 - 1	LE1	0.0	2.2	0.0	172.8	6.5	6.5	OK
	B3	12 10.9 - 1	LE1	0.0	2.1	0.0	172.8	6.3	6.3	OK
	B5	12 10.9 - 1	LE1	48.0	2.6	79.4	137.4	7.8	64.6	OK
	B6	12 10.9 - 1	LE1	3.7	2.5	6.1	172.8	7.5	11.9	OK
	B8	12 10.9 - 1	LE1	0.0	2.1	0.0	172.8	6.3	6.3	OK
	B9	12 10.9 - 1	LE1	0.0	2.1	0.0	172.8	6.2	6.2	OK
	B11	12 10.9 - 1	LE1	44.9	2.4	74.3	137.4	7.2	60.3	OK
	B12	12 10.9 - 1	LE1	3.8	2.3	6.3	172.8	7.0	11.5	OK
	B14	12 10.9 - 2	LE1	19.1	1.1	31.6	235.2	3.4	26.0	OK
	B16	12 10.9 - 2	LE1	4.3	1.0	7.1	235.2	3.0	8.1	OK
	B18	12 10.9 - 2	LE1	0.0	0.5	0.0	180.9	1.5	1.5	OK
	B20	12 10.9 - 2	LE1	10.6	1.0	17.4	235.2	3.1	15.6	OK
	B22	12 10.9 - 2	LE1	0.6	0.7	0.9	235.2	2.1	2.7	OK
	B24	12 10.9 - 2	LE1	5.2	0.9	8.6	180.9	2.6	8.7	OK
	B26	12 10.9 - 2	LE1	0.0	0.8	0.0	180.9	2.4	2.4	OK
	B28	12 10.9 - 2	LE1	1.3	0.5	2.1	180.9	1.4	3.0	OK
	B30	12 10.9 - 2	LE1	2.1	1.2	3.5	235.2	3.5	6.0	OK
	B32	12 10.9 - 2	LE1	8.8	0.8	14.6	235.2	2.5	12.9	OK
	B34	12 10.9 - 2	LE1	0.0	1.0	0.0	235.2	3.0	3.0	OK
	B36	12 10.9 - 2	LE1	3.2	0.7	5.2	235.2	2.0	5.7	OK

RUBSTAHL-Lehr- und Lernprogramme für Studium und Weiterbildung
Programm Kehlnahtanschlüsse erstellt von A. Wöllhardt, L. Gödde
Ruhr-Universität Bochum • Lehrstuhl für Stahl-, Leicht- und Verbundbau
Prof. Dr. M. Knobloch • www.ruhr-uni-bochum.de/stahlbau

Nachweis von Doppelkehlnähten nach DIN EN 1993-1-8 (EC3) (10/2014)

Kommentar:

System und Belastung



Material: Stahlsorte wählen

Stahlsorte:	S 355	
Bruchspannung f_u =	36.0	kN/cm²
Teilsicherheitsb. γ_{M2} =	1.25	[-]
Schweißbeiwert β_w =	0.80	[-]

Geometrie:

Schweißnahtlänge l =	200	mm
Schweißnahtdicke a =	4.0	mm

Kehlnaht über gesamte Länge voll ausgeführt (einschließlich Nahtenden) ☐

Schweißnahtlänge l_{eff} =	192.0	mm
Blechdicke t_1 =	12.0	mm
Blechdicke t_2 =	15.0	mm

Belastung:

Querkraft V =	5.1	kN
Normalkraft N =	3.2	kN
Moment M =	64	kNcm

Kontrolle der Schweißnahtdicke:

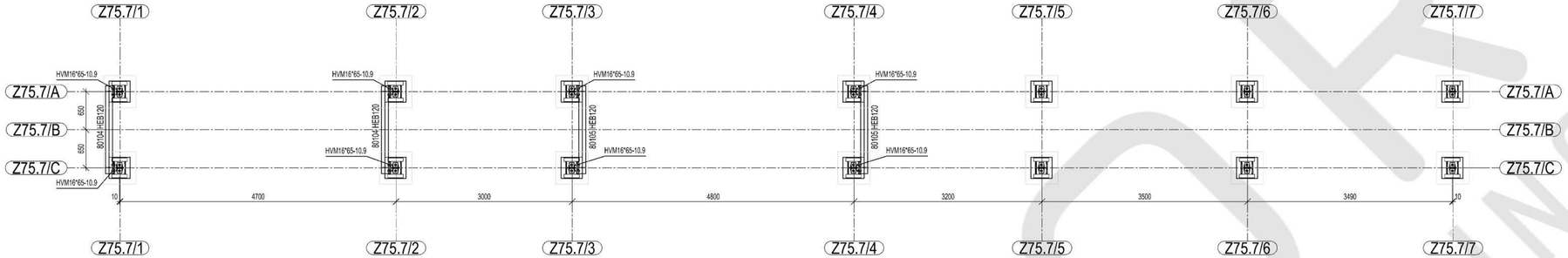
a_{min} = 3.37 mm

$a_{min} \le a$ eingehalten

Structural Drawings

Ebene +1.000 OKG

1:50



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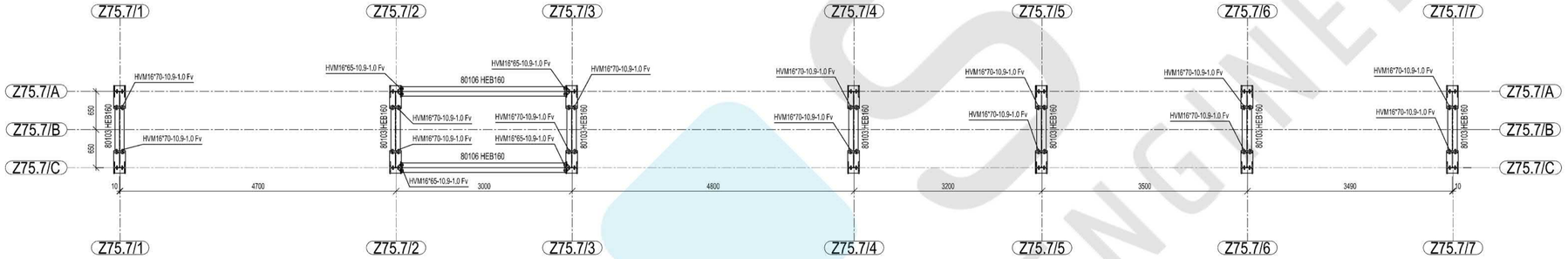

Ebene +3.000 OKG

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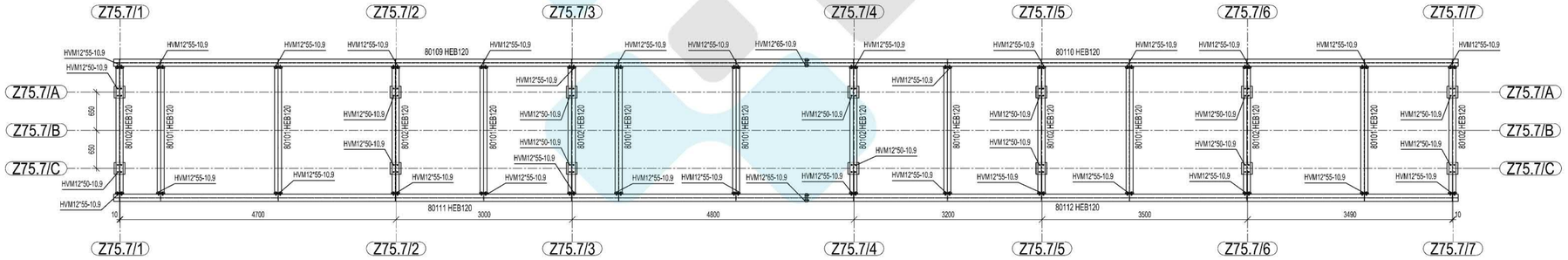

Achse C

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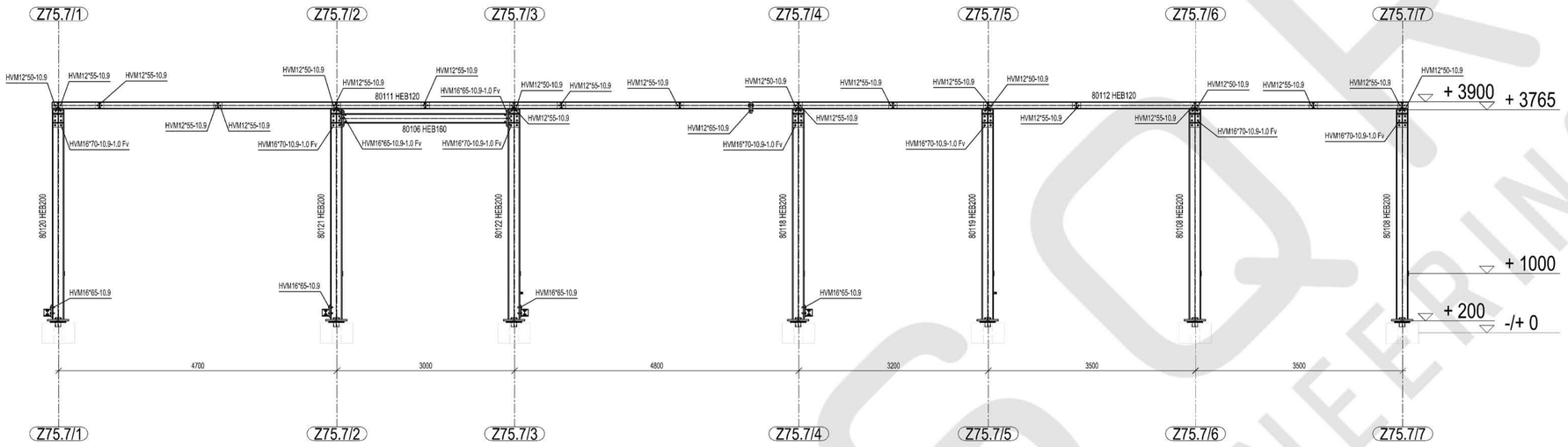

Achse A

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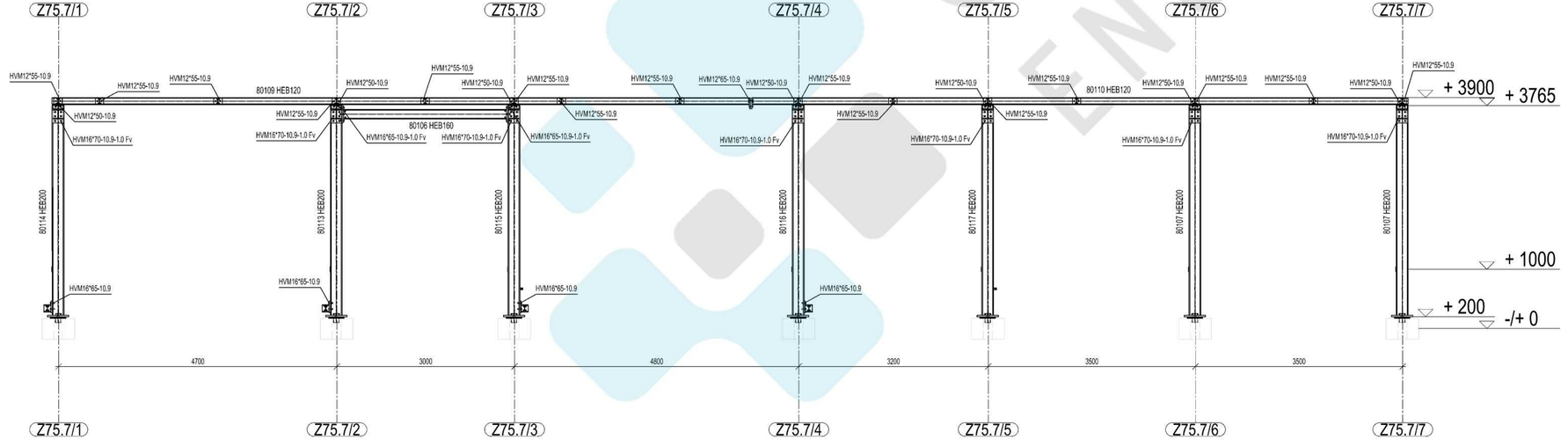
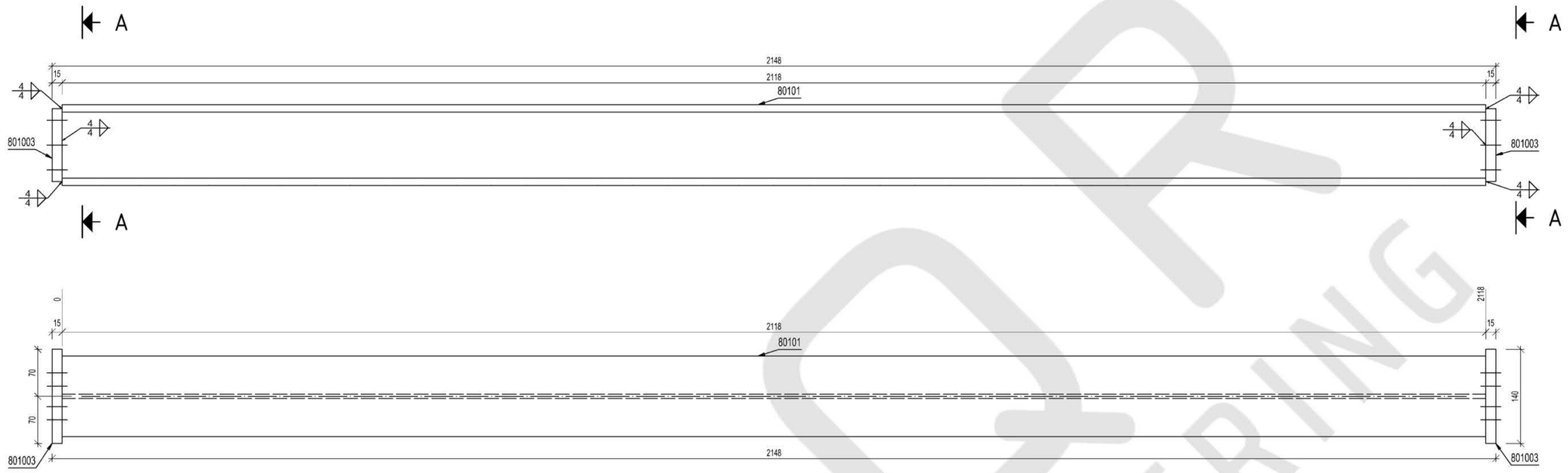
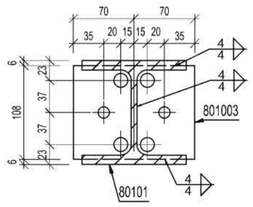
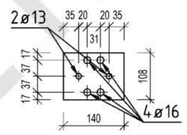






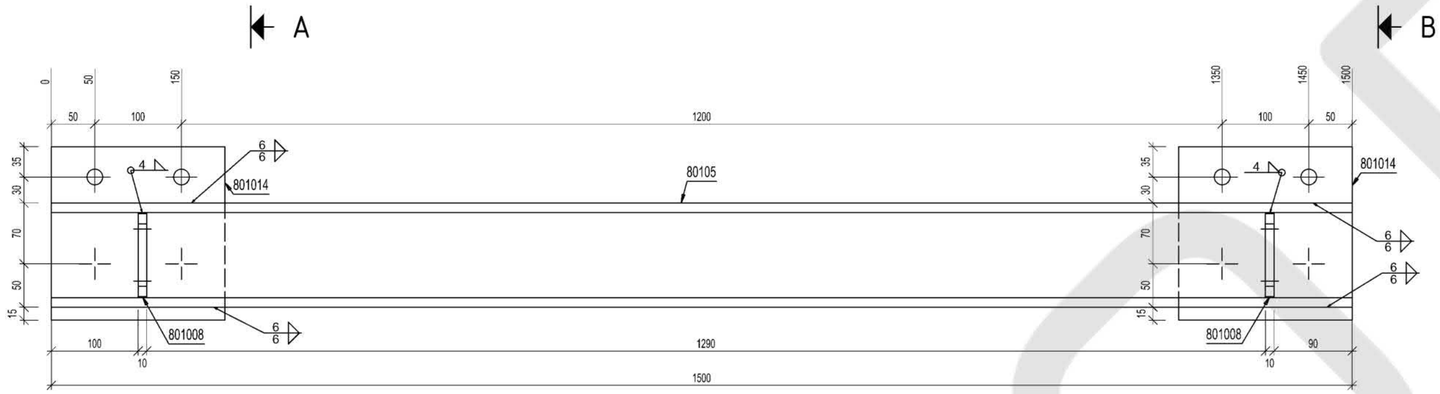
Schnitt 80101, A - A, M:1:5

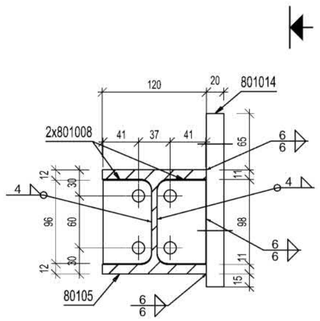
Pos. 80101 HEB120
L=2118 S235JR
M 1:10



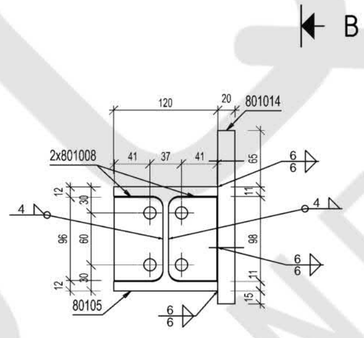
Pos. 801003 BL 15x108x140
L=140 S235JR
M 1:10

Spezifikation							
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80101		8	HEB120				
	80101	8	HEB120	2118	56.55	452.4	S235JR
	801003	16	BL 15x108x140	140	1.78	28.49	S355J2
				pro Baugruppe:	60.11	480.89	
				Insgesamt:		480.89	

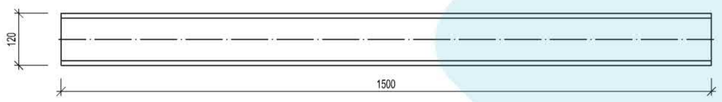




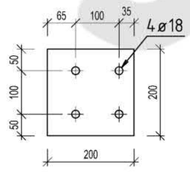
Schnitt 80105, A - A, M:1:5



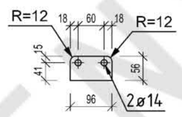
Schnitt 80105, B - B, M:1:5



Pos. 80105 HEB120
L=1500 S235JR
M 1:10

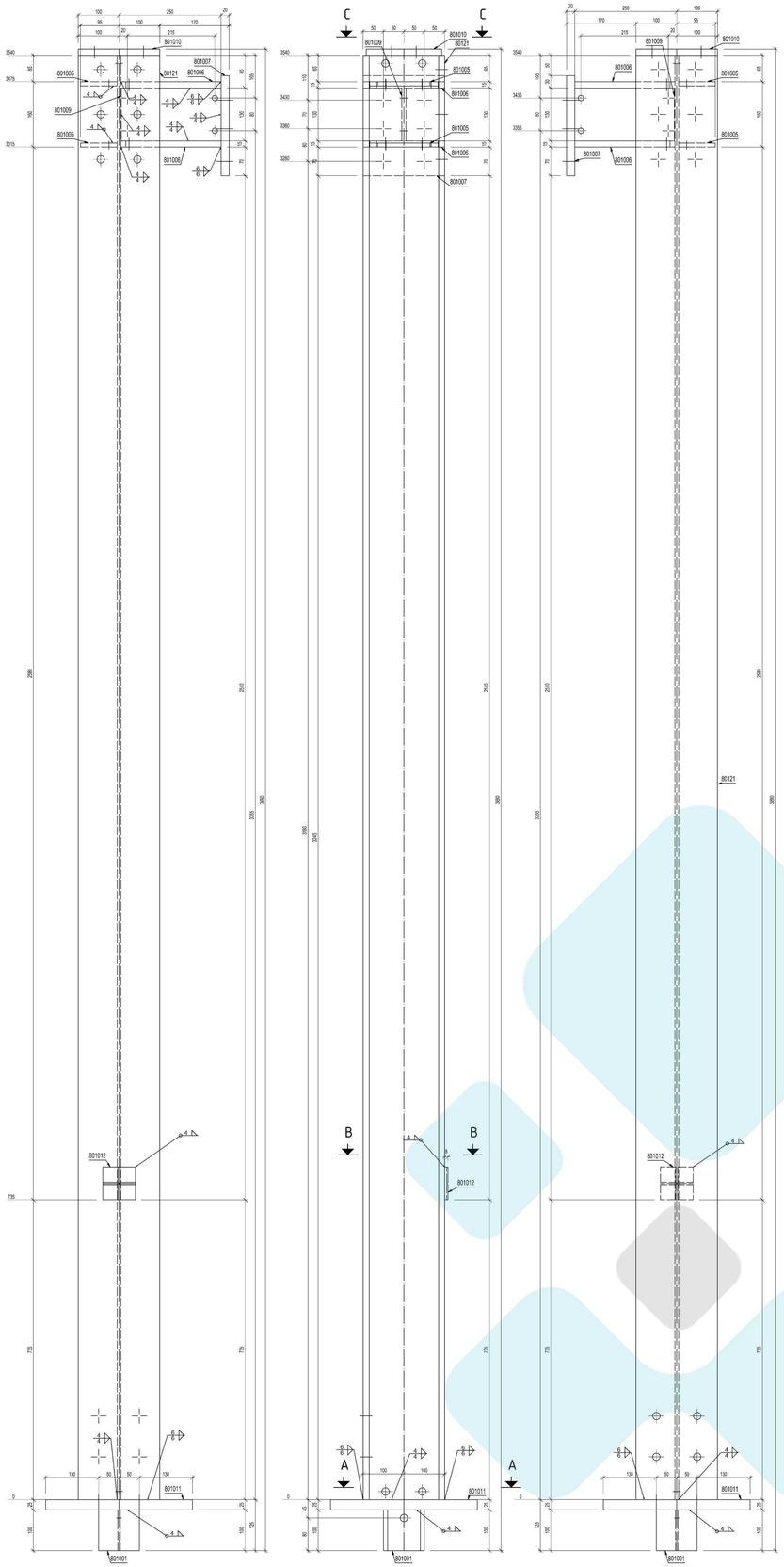


Pos. 801014 BL 20x200x200
L=200 S235JR
M 1:10

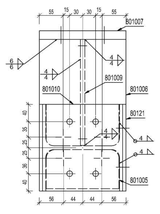


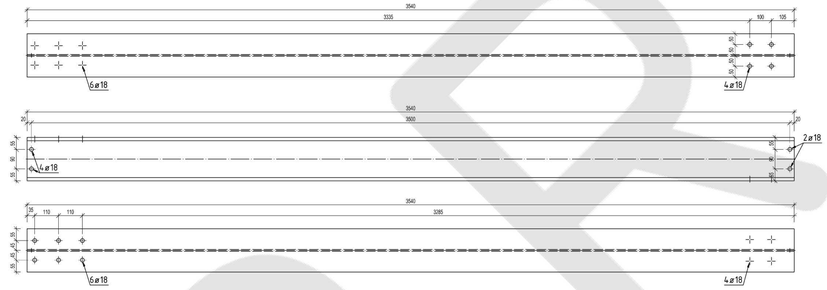
Pos. 801008 BL 10x56x96
L=96 S235JR
M 1:10

Spezifikation							
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80105		2	HEB120				
	80105	2	HEB120	1500	40.05	80.1	S235JR
	801014	4	BL 20x200x200	200	6.28	25.12	S355J2
	801008	8	BL 10x56x96	96	0.42	3.32	S355JR
				pro Baugruppe:	54.27	108.54	
				Insgesamt:		108.54	

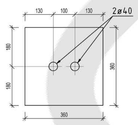


Schnitt 80121, C - C, M:1:5

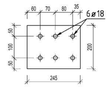




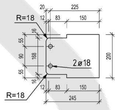
Pos. 80121 HEB200
L=3540 S235JR
M 1:10



Pos. 801011 BL 25x360x360
L=360 S235JR
M 1:10

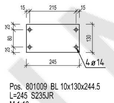


Pos. 801007 BL 20x200x245
L=245 S235JR
M 1:10



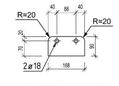
Pos. 801006 BL 15x200x245.5
L=245 S235JR
M 1:10

Pos. 801010 BL 15x185x200
L=200 S235JR
M 1:10



Pos. 801009 BL 10x130x244.5
L=245 S235JR
M 1:10

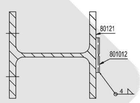
Pos. 801001 HEB100
L=100 S235JR
M 1:10



Pos. 801005 BL 10x90x168
L=168 S235JR
M 1:10

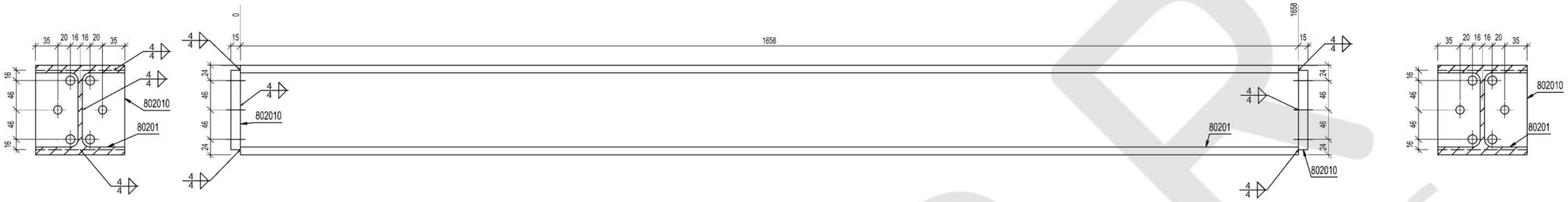
Pos. 801012 BL 8x80x80
L=80 S235JR
M 1:10

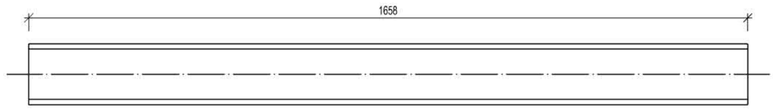
Schnitt 80121, A - A, M:1:5



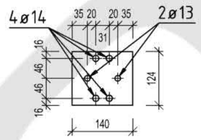
Schnitt 80121, B - B, M:1:5

Spezifikation							
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80121		1	HEB200				
	80121	1	HEB200	3540	217	217	S235JR
	801011	1	BL 25x360x360	360	25.43	25.43	S355J2
	801007	1	BL 20x200x245	245	7.69	7.69	S355J2
	801006	2	BL 15x200x245.5	245	5.56	11.13	S355J2
	801010	1	BL 15x185x200	200	4.36	4.36	S355J2
	801009	1	BL 10x130x244.5	245	2.5	2.5	S355J2
	801001	1	HEB100	100	2.04	2.04	S235JR
	801005	2	BL 10x90x168	168	1.17	2.34	S355J2
	801012	1	BL 8x80x80	80	0.4	0.4	S355J2
			pro Baugruppe:		272.89	272.89	
				Insgesamt:		272.89	



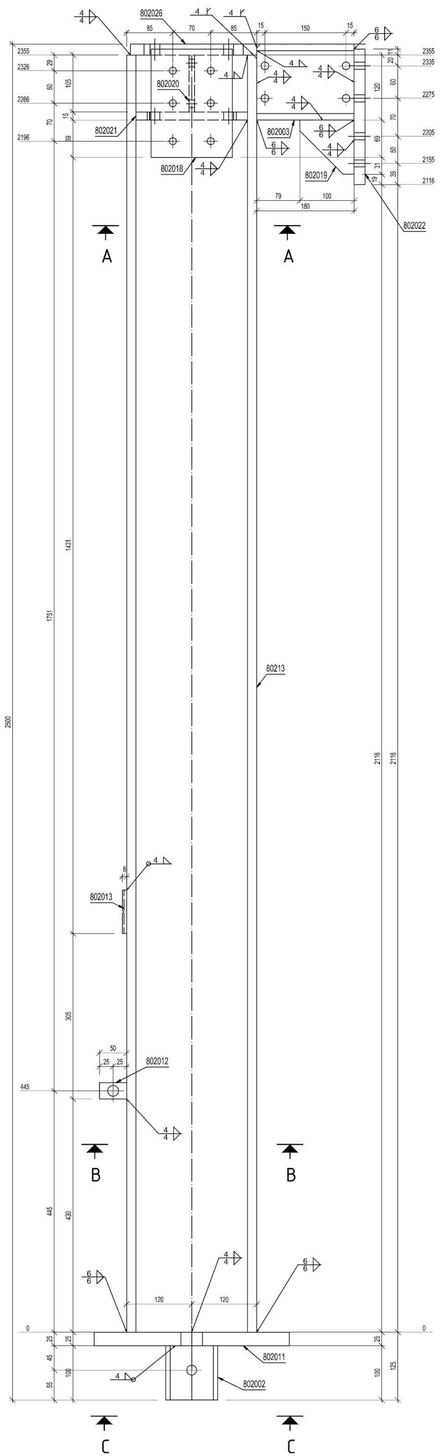


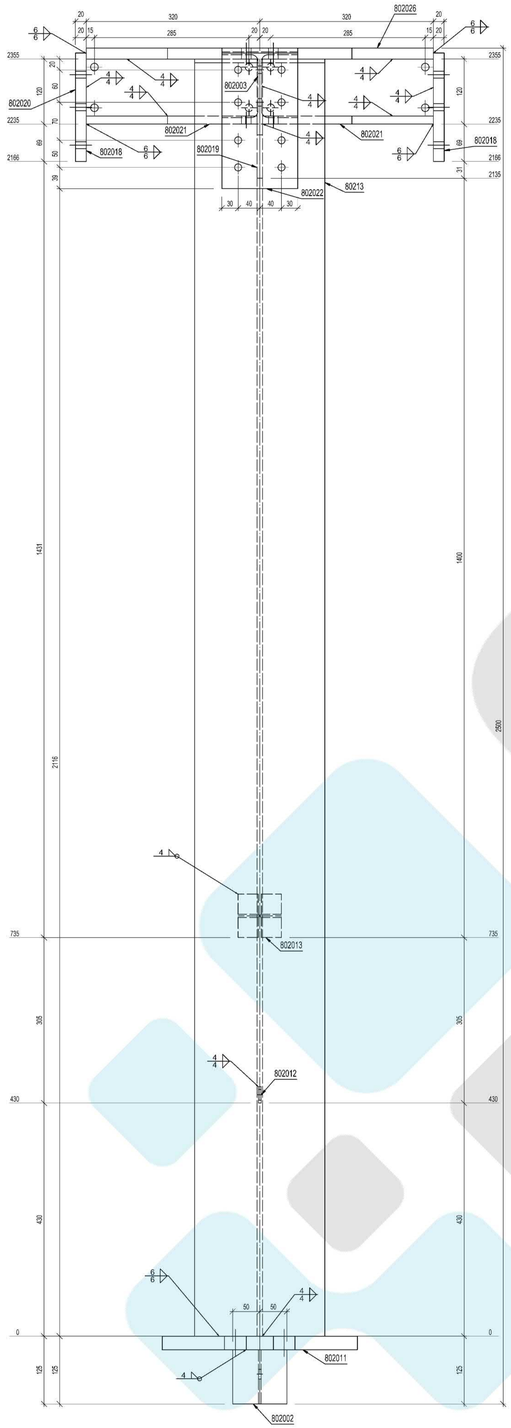
Pos. 80201 HEB140
L=1658 S235JR
M 1:10

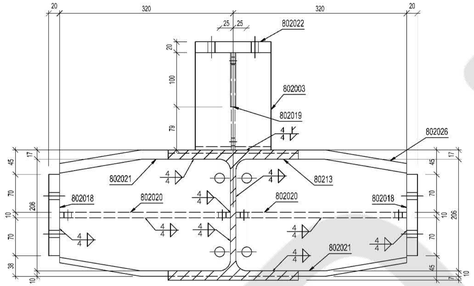


Pos. 802010 BL 15x124x140
L=140 S235JR
M 1:10

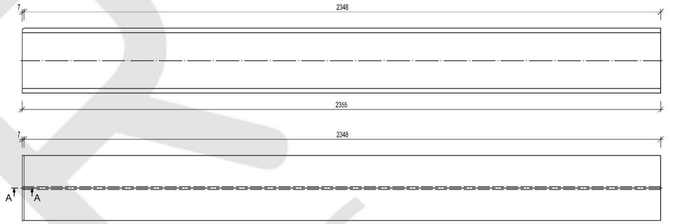
Spezifikation							
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80201		6	HEB140				
	80201	6	HEB140	1658	55.87	335.25	S235JR
	802010	12	BL 15x124x140	140	2.04	24.53	S355JR
				pro Baugruppe:	59.96	359.78	
				Insgesamt:		359.78	



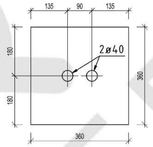




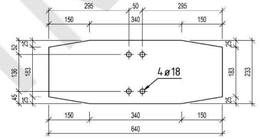
Schnitt 80213, A - A, M:1:5



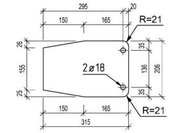
Pos. 80213 HEB240
L=2355 S235JR
M 1:10



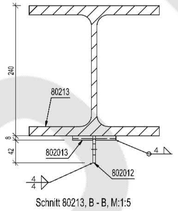
Pos. 802011 BL 25x360x360
L=360 S235JR
M 1:10



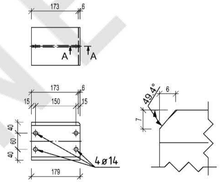
Pos. 802026 BL 20x233x639.99
L=640 S235JR
M 1:10



Pos. 802021 BL 15x206x315
L=315 S235JR
M 1:10



Schnitt 80213, B - B, M:1:5

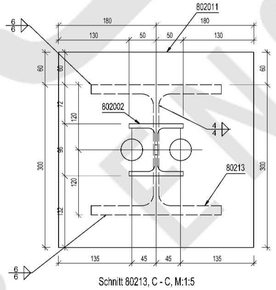


Pos. 802003 HEB140
L=179 S235JR
M 1:10

Pos. 802022 BL 20x140x250
L=250 S235JR
M 1:10

Pos. 802018 BL 20x150x200
L=200 S235JR
M 1:10

Pos. 802020 BL 10x105x315
L=315 S235JR
M 1:10



Schnitt 80213, C - C, M:1:5

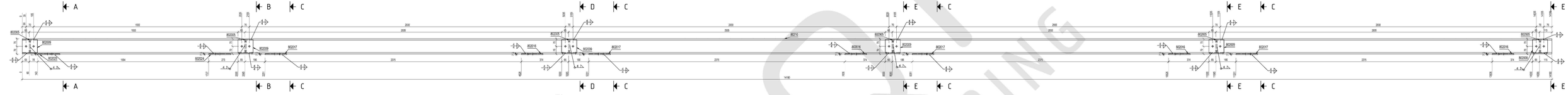
Pos. 802002 HEA100
L=100 S235JR
M 1:10

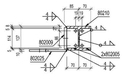
Pos. 802019 BL 10x100x100
L=100 S235JR
M 1:10

Pos. 802013 BL 8x80x80
L=80 S235JR
M 1:10

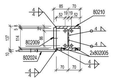
Pos. 802012 BL 5x30x50
L=50 S235JR
M 1:10

Spezifikation							
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80213		1	HEB240				
	80213	1	HEB240	2355	195.94	195.94	S235JR
	802011	1	BL 25x360x360	360	25.43	25.43	S355J2
	802026	1	BL 20x233x639.99	640	22.23	22.23	S355J2
	802021	2	BL 15x206x315	315	7.17	14.33	S355J2
	802003	1	HEB140	179	6.05	6.05	S235JR
	802022	1	BL 20x140x250	250	5.49	5.49	S355J2
	802018	2	BL 20x150x200	200	4.71	9.42	S355J2
	802020	2	BL 10x105x315	315	2.6	5.19	S355J2
	802002	1	HEA100	100	1.67	1.67	S235JR
	802019	1	BL 10x100x100	100	0.53	0.53	S355J2
	802013	1	BL 8x80x80	80	0.4	0.4	S355J2
	802012	1	BL 5x30x50	50	0.06	0.06	S355J2
				pro Baugruppe:	286.76	286.76	
				Insgesamt:		286.76	

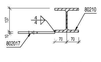




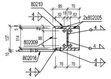
Schnitt 80210, A - A, M 1:10



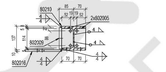
Schnitt 80210, B - B, M 1:10



Schnitt 80210, C - C, M 1:10



Schnitt 80210, D - D, M 1:10



Schnitt 80210, E - E, M 1:10

Pos. 80210 HEB140
L=14180 S235JR
M 1:10

Pos. 802024 BL 10x205.93x218.87
L=219 S235JR
M 1:10

Pos. 802025 BL 10x205.93x218.87
L=219 S235JR
M 1:10

Pos. 802016 BL 10x200.97x214.09
L=214 S235JR
M 1:10

Pos. 802017 BL 10x200.97x214.09
L=214 S235JR
M 1:10

Pos. 802009 BL 15x124x140
L=140 S235JR
M 1:10

Pos. 802005 BL 10x66.5x114
L=114 S235JR
M 1:10

Spezifikation						
Baugruppe	Pos.	Stk.	Profil	Länge	Gewicht [kg]		Material
					pro Stück	Gesamt	
80210		1	HEB140				
	80210	1	HEB140	14180	477.87	477.87	S235JR
	802024	1	BL 10x205.93x218.87	219	2.7	2.7	S355JR
	802025	1	BL 10x205.93x218.87	219	2.7	2.7	S355JR
	802016	4	BL 10x200.97x214.09	214	2.65	10.61	S355JR
	802017	4	BL 10x200.97x214.09	214	2.65	10.61	S355JR
	802009	6	BL 15x124x140	140	2.04	12.26	S355JR
	802005	12	BL 10x66.5x114	114	0.59	7.06	S355JR
				pro Baugruppe:		523.83	
				Insgesamt:		523.83	