

ABB

ABB První brněnská strojírna Brno, Ltd.



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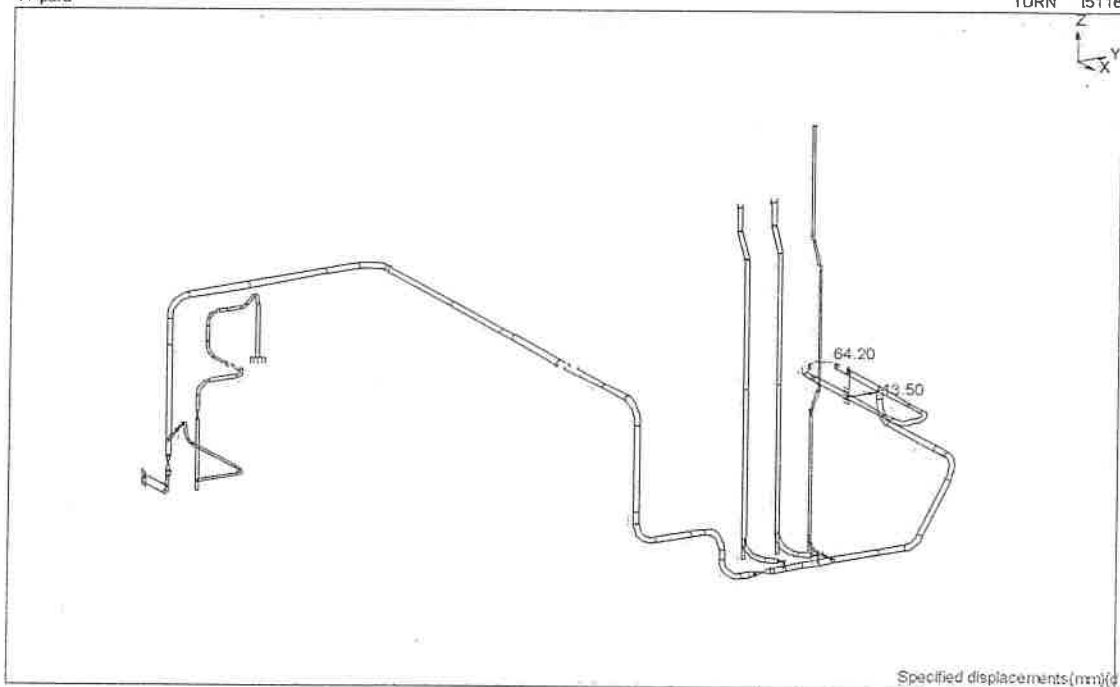
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Název dokumentu / Title:

PEVNOSTNÍ VÝPOČET POTRUBÍ**ABB První brněnská strojírna Brno, s.r.o.****KAUČUK GROUP
Rekonstrukce K1****Potrubí VT páry - výstup z K1****Výpočet č. I5118G**

VT para

TURN I5118G



Rev.	1	3	5
	2	4	6
Vypracoval / Prepared: ing. Karel Horák <i>HW</i>		Zakázka / Order: Kaučuk Group	
Zkontroloval / Checked: ing. Karel Horák <i>HW</i>		Stupeň / Level: RP	
Schválil / Approved: ing. Bohumil Světlík		Datum / Date: 28.2.1997	
		Soubor / System: VT parovod K1	

1. Úvod

Výpočet posuzuje potrubí výstupní páry z kotle od výstupní komory přehříváku po nejbližší rozdělovač.

1.1 Způsob výpočtu

Potrubí bylo počítáno programem CAEPIPE firmy SST Systems, Inc., CA., USA. Program je světovým standardem pro potrubí jaderných a klasických elektráren. Vypočítaná napětí byla hodnocena podle standardu ANSI/ASME B31.1 (1992) - potrubí energetických zařízení.

1.2 Členění výpočtu

Tiskové sestavy výpočtů jsou členěny do těchto částí:

1. Titulní list
2. Vstupní data
3. Hodnocení napětí
4. Tabulky uložení potrubí
5. Hodnocení přírubových spojů
6. Výsledky pro zatížení tíhovým účinkem a vnitřním přetlakem $W1+P1$
7. Zatížení tíhou, tlakem a teplotou $W1+P1+T1$

Každá ze skupin 6. až 7. obsahuje stejnou skupinu výsledků

- zatížení pevných bodů
- zatížení potrubních větví
- dilatace potrubí

2. Vyhodnocení výpočtů.

Základní předpoklady konstrukčního a projekčního řešení:

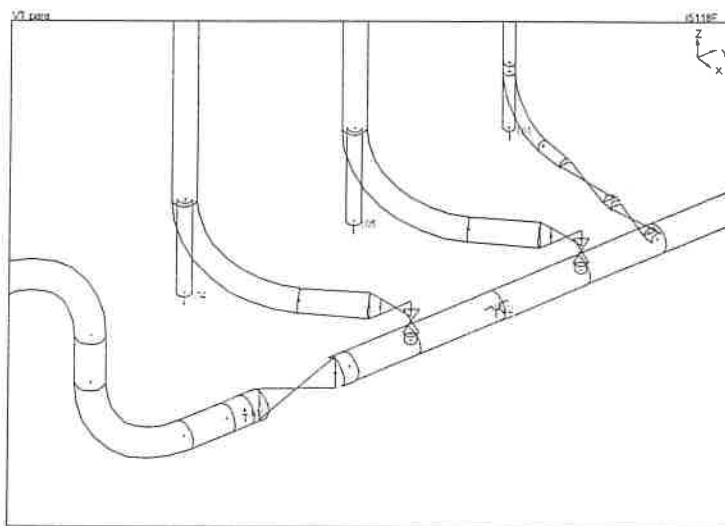
- v úseku mezi kotlem a pojišťovacími ventily (uzel 19 výpočtu) je jednotáhlový pružinový závěs
- hlavní parovod DN250 je v místě pojišťovacích ventilů uložen na podpěře (uzel 22 výpočtu), která umožňuje posuv pouze v ose $+X = \max. 80 \text{ mm}$, což je vodorovný směr kolmý k ose potrubí směřující od osy kotle.
Podpěru je provedena tak, že tření v uložení je $\max. f = 0,1$.
Zatížení uložení je uvedeno v tisku výsledků a je rozdílné pro jednotlivé zatěžovací stavy.
- podpěry (uzel 69 a 24 výpočtu) u armatury kotle jsou provedeny se třením $f = 0,1$.
- komentář k potrubí výfuků vedoucí od pojišťovacích ventilů k tlumičům
 - a) potrubí je podepřeno v ohybu v ose svislého potrubí
 - b) potrubí je zavěšeno ve svislé části na pružinových závěsech, které musí vyhovovat velkým dilatacím potrubí
 - c) potrubí od pojišťovacích ventilů po ohyb včetně má rozměr trubky $219,1 \times 10 \text{ mm}$

Vypracoval / Prepared: ing. Karel Horák <i>dh</i>	Zkontroloval / Checked: ing. Karel Horák <i>dh</i>	Schválil / Approved: ing. Bohumil Světlík	Posl. rev. / Last revision:	Datum / Date: 28.2.1997
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Nad ohybem pokračuje potrubí 219,1 x 6,3mm.

Přechodový kus DN125/DN200 má tloušťku min.10mm.

Rozměr trubky prvního výfuku DN100 (108 x 10mm) zůstává bez úprav.



- hlavní parovod DN250 má rozměr pr.273 x 25. Tloušťka stěny vyhovuje za předpokladu mezních odchylek rozměru trubky dle ČSN 42 5716.

Jako výpočtový tlak byl zvolen tlak nastavení pojišťovacích potrubí $p = 10,1 \text{ Mpa}$.

Uložení potrubí výfuků.

- použité pružinové závěsy jsou specifikovány v tisku výsledků výpočtu.

Závěr:

Potrubí za těchto předpokladů a předpokladů dále uvedených v tisku zadání výpočtu

PEVNOSTNĚ VYHOVUJE.

Příloha: výpočet I5118G

Vypracoval / Prepared: ing. Karel Horák <i>jh</i>	Zkontroloval / Checked: ing. Karel Horák <i>jh</i>	Schválil / Approved: ing. Bohumil Světlík	Posl. rev. / Last revision :	Datum / Date: 28.2.1997
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CAEPIPE
Version 3.74

Client : ABB PBS s.r.o.
Project : Divize elektraren utvar P E T
File Number : KAUCUK GROUP
Report Number : Rekonstrukce K1
Model Name : I5118G
Title : VT para
Subtitle :
Analyzed : Feb 28 1997

Prepared by : *Horak* Date:

Horak

Checked by : *Horak* Date: 12.3.97

Horak

Options

Piping code = B31.1 (1992)
Do not use liberal allowable stresses
Include axial force in stress calculations
Reference temperature = 20 (C)
Number of thermal cycles = 7000
Use modulus at reference temperature
Include hanger stiffness
Include Bourdon effect
Do not use pressure correction for bends
Pressure stress = $PD / 4t$
Peak pressure factor = 1.00
Cut off frequency = 33 Hz
Number of modes = 0
Include missing mass correction
Use friction in dynamic analysis
Vertical direction = Z

#	Node	Type	DX (mm)	DY (mm)	DZ (mm)	Mat	Sec	Load	Data
1	100	From							Anchor
2	2		3300			15	200	200	
3	3		200			15	200	200	User hanger
4	4	Bend	1475			15	201	200	
5	5	Bend		1607	150	15	201	200	
6	6		-2000			15	201	200	User hanger
7	7		-2875			15	201	200	
8	8		-2875			15	201	200	User hanger
9	9	Bend	-2000			15	201	200	
10	10	Bend		-1607	-150	15	201	200	
11	11		1475			15	201	200	User hanger
12	12		200			15	200	200	
13	100					15	200	200	
14	7	From							
15	15	Bend			-1450	15	251	250	
16	16		5375			15	251	250	User hanger
17	17	Bend	2000			15	251	250	
18	18	Bend		-2251	-3900	15	251	250	
19	19			-2000		15	251	250	User hanger
20	20			-2401		15	251	250	Branch conn.
21	21			-800		15	251	250	Branch conn.
22	22			-900		15	251	250	Limit stop
23	22	Location							Limit stop
24	22	Location							Limit stop
25	23			-900		15	251	250	Branch conn.
26	24			-650		15	251	250	Limit stop
27	80			-150		15	251	250	
28	25	Valve		-800		15	251	250	
29	69			-150		15	251	250	Limit stop
30	90			-200		15	251	250	Butt weld
31	26	Bend		-1450		15	250	250	
32	27	Bend			2500	15	250	250	
33	28			-1725		15	250	250	User hanger
34	29	Bend		-2900		15	250	250	
35	30				1590	15	250	250	User hanger

#	Node	Type	DX (mm)	DY (mm)	DZ (mm)	Mat	Sec	Load	Data
36	31	Bend			5310	15	250	250	
37	32		-3100			15	250	250	User hanger
38	33		-4275			15	250	250	User hanger
39	34		-4275			15	250	250	User hanger
40	142		-1100			15	250	250	User hanger
41	35		-4775			15	250	250	User hanger
42	36		-6000			15	250	250	User hanger
43	37	Bend	-1250			15	250	250	
44	38			-2750		15	250	250	User hanger
45	39			-4200		15	250	250	User hanger
46	40	Bend		-4250		15	250	250	
47	41				-2250	15	250	250	User hanger
48	42				-4850	15	250	250	
49	47				-700	15	250	250	
50	48	Valve			-800	15	250	250	
51	43				-200	15	250	250	
52	44	Reducer			-200	15	250	250	
53	45				-600	15	200	250	Limit stop
54	46		-2000			15	350	250	Anchor
55	23	From							
56	50				80	15	80	250	
57	51	Valve			260	15	127	250	
58	52	Valve	-180	-190		15	127	250	
59	103	Reducer	-68	-73		020	204	150	
60	53	Bend	-1098	-1177		020	204	150	
61	54				1000	020	204	150	
62	55				7400	020	202	150	User hanger
63	56				6490	020	203	150	
64	57		-700		1200	020	203	150	
65	58				1200	020	203	150	Guide
66	21	From							
67	67				80	15	80	250	
68	59	Valve			260	15	127	250	
69	60	Valve	-180	-190		15	127	250	
70	102	Reducer	-68	-73		020	127	150	
71	61	Bend	-1098	-1177		020	204	150	
72	62				1000	020	204	150	
73	63				7400	020	202	150	User hanger
74	64				6490	020	203	150	
75	65		-700		1200	020	203	150	
76	66				1200	020	203	150	Guide
77	42	From							
78	70		-750	750		15	100	250	
79	71	Valve	-320	320		15	100	250	
80	72		-220	220		15	100	250	
81	73	Valve	-320	320		15	100	250	
82	74	Bend	-700	700		15	100	250	
83	75	Bend			-1000	15	100	250	
84	76		700			15	100	250	User hanger
85	77		4100			15	100	250	User hanger
86	78	Bend	800			15	100	250	
87	79			-2600		15	100	250	
88	81				-500	15	125	250	
89	79	From							

#	Node	Type	DX (mm)	DY (mm)	DZ (mm)	Mat	Sec	Load	Data
90	82				3050	15	125	250	User hanger
91	83	Valve			500	15	125	250	
92	84	Bend			1350	15	125	250	
93	86	Bend		2600		15	125	250	
94	87		-1900			15	125	250	User hanger
95	88	Bend	-1800			15	125	250	
96	89	Bend			2000	15	125	250	
97	95			1000		15	125	250	User hanger
98	91	Bend		1000		15	125	250	
99	92	Bend	-1700	1700		15	125	250	
100	93				-3275	15	125	250	Anchor
101	62	From							
102	105				-1000	15	125	20	Limit stop
103	54	From							
104	104				-1000	15	125	20	Limit stop
105	20	From							
106	110		-100			15	101	150	
107	112	Valve	-500			15	101	150	
108	114		-100			15	101	150	
109	116	Valve	-650			15	101	150	
110	118	Bend	-825			15	101	150	
111	120				600	15	101	150	
112	121				6000	15	101	150	
113	122	Bend			300	15	101	150	
114	124	Bend	700		1200	15	101	150	
115	126				3900	15	101	150	User hanger
116	128	Bend			2120	15	101	150	
117	130	Bend	-700		1200	15	101	150	
118	132				5700	15	101	150	Guide
119	120	From							
120	134				-700	15	100	20	Limit stop

Bends

Bend Node	Radius (mm)	Thickness (mm)	Int. Node	Angle (deg)	Int. Node	Angle (deg)
4	800.0	U				
5	800.0	U				
9	800.0	U				
10	800.0	U				
15	1000.0	U				
17	1000.0	U				
18	1000.0	U				
26	1000.0	U				
27	1000.0	U				
29	1000.0	U				
31	1000.0	U				
37	1000.0	U				
40	1000.0	U				
53	1000.0	U				
61	1000.0	U				
74	500.0	U				
75	500.0	U				

Bends

Bend Node	Radius (mm)	Thickness (mm)	Int. Node	Angle (deg)	Int. Node	Angle (deg)
78	500.0	U				
84	625.0	U				
86	625.0	U				
88	625.0	U				
89	625.0	U				
91	625.0	U				
92	625.0	U				
118	500.0	U				
122	500.0	U				
124	500.0	U				
128	500.0	U				
130	500.0	U				

Valves

From	To	Weight (kg)	Thick X	Insul Wgt X	Add Wght (kg)	DX (mm)	DY (mm)	DZ (mm)
80	25	1000	3.00	1.75				
47	48	1000	3.00	1.75				
50	51	30	3.00	1.75				
51	52	30	3.00	1.75				
67	59	30	3.00	1.75				
59	60	30	3.00	1.75				
70	71	100	3.00	1.75				
72	73	150	3.00	1.75				
82	83	158	3.00	1.75				
110	112	160	3.00	1.75				
114	116	180	3.00	1.75				

Reducers

From	To	OD1 (mm)	Thk1 (mm)	OD2 (mm)	Thk2 (mm)	Cone Angle (deg)	Knuc kles	Delta (mm)
43	44	273.0	24.0	219.1	20.0	0.00		
52	103	133.0	10.0	219.0	10.0	0.00		
60	102	133.0	10.0	219.0	10.0	0.00		

Anchors

Node	KX	(N/mm) KY	KZ	KXX	(Nm/deg) KYY	KZZ	Releases X Y Z XXYYZZ
100	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	
46	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	
93	Rigid	Rigid	Rigid	Rigid	Rigid	Rigid	

Specified Displacements

Node	Type	Load	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
100	Anchor	T1		13.50	64.20			

Hangers

Node	Type	No. of	Load var(%)	Short Range	SpringRate (N/mm)	HangerLoad (N)	Load type
3	User hanger	1			0	6900	Cold
6	User hanger	1			0	13200	Cold
8	User hanger	1			0	14250	Cold
11	User hanger	1			0	6600	Cold
16	User hanger	1			167	22400.00	Cold
19	User hanger	1			167	16300	Cold
28	User hanger	1			107	9760	Cold
30	User hanger	2			107	9050	Cold
32	User hanger	1			67	9200	Cold
33	User hanger	1			107	9000	Cold
34	User hanger	1			67	5700	Cold
142	User hanger	1			67	5400	Cold
35	User hanger	1			167	14230	Cold
36	User hanger	1			107	10100	Cold
38	User hanger	1			67	7700	Cold
39	User hanger	1			107	10900	Cold
41	User hanger	2			67	8860	Cold
55	User hanger	2			27	2860	Cold
63	User hanger	2			27	2860	Cold
76	User hanger	1			42	4000	Cold
77	User hanger	1			27	2300	Cold
82	User hanger	2			42	3500	Cold
87	User hanger	1			42	3800	Cold
95	User hanger	1			27	2500	Cold
126	User hanger	2			27	3500	Cold

Guides

Node	Friction coefficient	Stiffness (N/mm)
58	0.300	Rigid
66	0.300	Rigid
132	0.300	Rigid

Limit Stops

Node	Cnect Node	Lower Lmt (mm)	Upper Lmt (mm)	X comp	Direction: Y comp	Z comp	Friction Coeff.	Stiffness (N/mm)
22		0.00	None			1.000	0.100	Rigid
22		None	80.00	1.000			0.100	Rigid
22		0.00	0.00		1.000		0.100	Rigid
24		0.00	None			1.000	0.100	Rigid
69		0.00	None			1.000	0.100	Rigid
45		0.00	None			1.000	0.300	Rigid

Limit Stops

Node	Cnect Node	Lower Lmt (mm)	Upper Lmt (mm)	Direction:			Friction Coeff.	Stiffness (N/mm)
				X comp	Y comp	Z comp		
105		0.00	None			1.000	0.100	Rigid
104		0.00	None			1.000	0.100	Rigid
134		0.00	None			1.000	0.100	Rigid

Branch SIFs

Node	Type
20	Branch connection, Branch radius (rp) = 54.0 (mm)
21	Branch connection, Branch radius (rp) = 54.0 (mm)
23	Branch connection, Branch radius (rp) = 54.0 (mm)

Welds

Node	Type
90	Butt weld, $\check{S} = 8.0$ (mm)

Pipe material 15: 15 128.5 /16<tl<=36 bzsv

Density = 7870 (kg/m3), Nu = 0.300, Joint factor = 1.00, Type = CS

Temp (C)	E (MPa)	Alpha (mm/mm/C)	Allowable (MPa)
20	214000	13.60E-6	236.70
100	211000	13.60E-6	226.00
200	208000	13.80E-6	212.70
250	202500	13.95E-6	202.70
300	197000	14.10E-6	196.00
350	192500	14.25E-6	186.00
400	188000	14.40E-6	176.70
425	185500	14.48E-6	170.00
450	183000	14.55E-6	163.30
470	181000	14.61E-6	158.00
475	180500	14.63E-6	154.70
480	180000	14.64E-6	145.30
490	179000	14.67E-6	128.00
500	178000	14.70E-6	112.70
510	176800	14.73E-6	99.30
520	175600	14.76E-6	87.30
525	175000	14.78E-6	82.00
530	174400	14.79E-6	76.70
540	173200	14.82E-6	67.30
550	172000	14.85E-6	59.30
560	170800	14.88E-6	52.00
570	169600	14.91E-6	45.30
575	169000	14.93E-6	42.70
580	168400	14.94E-6	39.00

Pipe material 2: 15 128.5 /tl<=10 bzsvpr

Density = 7870 (kg/m3), Nu = 0.300, Joint factor = 1.00, Type = CS

Temp (C)	E (MPa)	Alpha (mm/mm/C)	Allowable (MPa)
20	214000	13.60E-6	243.30
100	211000	13.60E-6	229.70
200	208000	13.80E-6	212.70
250	202500	13.95E-6	202.70
300	197000	14.10E-6	196.00
350	192500	14.25E-6	186.00
400	188000	14.40E-6	176.70
425	185500	14.48E-6	170.00
450	183000	14.55E-6	163.30
470	181000	14.61E-6	158.00
475	180500	14.63E-6	154.70
480	180000	14.64E-6	145.30
490	179000	14.67E-6	128.00
500	178000	14.70E-6	112.70
510	176800	14.73E-6	99.30
520	175600	14.76E-6	87.30
525	175000	14.78E-6	82.00
530	174400	14.79E-6	76.70
540	173200	14.82E-6	67.30
550	172000	14.85E-6	59.30
560	170800	14.88E-6	52.00
570	169600	14.91E-6	45.30
575	169000	14.93E-6	42.70
580	168400	14.94E-6	39.00

Pipe material 020: 15 020.1 /tl<=12.5 bzsv+bzsvpr

Density = 7850 (kg/m3), Nu = 0.300, Joint factor = 1.00, Type = CS

Temp (C)	E (MPa)	Alpha (mm/mm/C)	Allowable (MPa)
20	211000	12.50E-6	190.00
100	204000	12.50E-6	181.10
200	196000	13.10E-6	170.00
250	191000	13.35E-6	156.70
300	186000	13.60E-6	137.30
350	181500	13.80E-6	124.00
400	177000	14.00E-6	118.00
450	170500	14.20E-6	111.30
460	169200	14.24E-6	108.70
470	167900	14.28E-6	106.00
480	166600	14.32E-6	99.30
490	165300	14.36E-6	83.30
500	164000	14.40E-6	68.70
510	160300	14.43E-6	55.20
520	156600	14.46E-6	44.00
530	152900	14.49E-6	35.20
550	152900	14.49E-6	35.20

Pipe Sections

Name	Nominal Dia.	Sch	O.D. (mm)	Thk (mm)	Cor.Al (mm)	M.Tol (%)	Ins.Dens (kg/m3)	Ins.Th (mm)	Lin.Dens (kg/m3)	Lin.Th (mm)
250	Non Std		273.0	25.0	0.5	10.0	225.0	220.0		
200	Non Std		219.0	28.0	0.5	12.5				
350	Non Std		377.0	36.0	0.5	10.0	225.0	220.0		
150	Non Std		159.0	4.5	0.5	12.5	225.0	220.0		
151	Non Std		159.0	4.5	0.5	12.5				
25	Non Std		32.0	5.6	0.5	12.5				
201	Non Std		219.0	25.0	0.5	12.5	225.0	220.0		
251	Non Std		273.0	32.0	0.5	12.5	225.0	220.0		
100	Non Std		108.0	16.0	0.5	12.5	225.0	140.0		
125	Non Std		133.0	16.0	0.5	12.5	225.0	140.0		
80	Non Std		108.0	14.0	0.5	12.5				
126	Non Std		133.0	4.5	0.5	12.5	225.0	140.0		
202	Non Std		219.0	6.3	0.5	12.5	225.0	140.0		
203	Non Std		219.0	6.3	0.5	12.5				
101	Non Std		108.0	10.0	0.5	12.5	225.0	140.0		
127	Non Std		133.0	10.0	0.5	12.5	225.0	140.0		
204	Non Std		219.1	10.0	0.5	12.5	225.0	140.0		

Loads

Acceleration load: X = 0.00, Y = 0.00, Z = 0.00 (g's)
Acceleration load combination = Square Root of Sum of Squares

Wind velocity = 0.00 (m/s)

Shape factor = 0.60

Wind direction: X comp = 0.000, Y comp = 0.000, Z comp = 0.000

Number of thermal loads = 1

Pipe Loads

Load Name	T1 (C)	P1 (MPa)	T2 (C)	P2 (MPa)	T3 (C)	P3 (MPa)	Specific gravity	Add.Wgt (kg/m)	Wind Load
250	550	10.1							
150	550	1.00							
200	550	10.1							
20	300	0							

B31.1 (1992) Code Compliance (sorted stresses)

Sustained			Expansion			Occasional	
Node	SL (MPa)	SL/SH	Node	SE (MPa)	SE/SA	Node	SL+SO (MPa)
7	39.13	0.66	52	224.68	0.91		SL+SO/ 1.20SH
35	35.54	0.60	60	214.00	0.87		
87	34.79	0.59	50	170.26	0.55		
44	34.27	0.58	67	162.11	0.52		
16	33.55	0.57	23	151.63	0.49		

B31.1 (1992) Code Compliance (sorted stresses)

----- Sustained -----			----- Expansion -----			----- Occasional -----	
Node	SL (MPa)	SL/SH	Node	SE (MPa)	SE/SA	Node	SL+SO (MPa) SL+SO/ 1.20SH
90	33.14	0.56	44	151.63	0.49		
8	32.40	0.55	21	144.38	0.46		
43	32.39	0.55	103	70.80	0.29		
72	32.31	0.54	102	67.43	0.27		
42	31.99	0.54	43	79.13	0.25		
6	31.60	0.53	45	64.80	0.21		
39	31.34	0.53	90	61.84	0.20		
28	31.12	0.52	37A	41.46	0.13		
36	31.00	0.52	31A	41.02	0.13		
71	30.96	0.52	36	40.73	0.13		
48	30.20	0.51	37B	39.28	0.13		
37A	30.10	0.51	48	38.05	0.12		
32	30.01	0.51	31B	36.99	0.12		
73	29.94	0.50	29B	36.60	0.12		
47	29.64	0.50	30	36.02	0.12		
26A	29.61	0.50	47	35.25	0.11		
40A	29.50	0.50	42	33.60	0.11		
142	29.40	0.50	7	33.34	0.11		
76	29.40	0.50	100	32.78	0.11		
37B	29.10	0.49	40B	32.23	0.10		
34	29.09	0.49	69	31.57	0.10		
38	28.93	0.49	38	30.58	0.10		
41	28.84	0.49	26A	30.37	0.10		
30	28.84	0.49	41	29.54	0.10		
26B	28.81	0.49	124B	29.28	0.09		
33	28.76	0.48	40A	27.88	0.09		
27A	28.75	0.48	25	27.80	0.09		
40B	28.66	0.48	29A	27.56	0.09		
29A	28.64	0.48	53A	20.57	0.08		
31B	28.56	0.48	110	25.70	0.08		
31A	28.52	0.48	20	24.89	0.08		
27B	28.43	0.48	124A	24.87	0.08		
29B	28.26	0.48	61A	19.47	0.08		
19	27.74	0.47	35	23.87	0.08		
46	27.37	0.46	74B	23.81	0.08		
45	27.11	0.46	75A	23.81	0.08		
69	26.03	0.44	32	23.17	0.07		
22	25.99	0.44	75B	22.88	0.07		
3	25.93	0.44	27A	21.93	0.07		
70	25.91	0.44	76	21.68	0.07		
77	25.79	0.43	26B	21.48	0.07		
95	25.71	0.43	126	21.25	0.07		
18A	25.65	0.43	15A	21.04	0.07		
11	25.49	0.43	74A	19.93	0.06		
17A	25.32	0.43	122A	19.56	0.06		
17B	25.26	0.43	84A	19.51	0.06		
5B	24.94	0.42	121	19.21	0.06		
9A	24.89	0.42	54	14.89	0.06		
25	24.68	0.42	84B	18.59	0.06		
86A	24.59	0.41	112	18.56	0.06		
100	24.56	0.41	73	18.21	0.06		

B31.1 (1992) Code Compliance (sorted stresses)								
----- Sustained -----			----- Expansion -----			----- Occasional -----		
Node	SL (MPa)	SL/SH	Node	SE (MPa)	SE/SA	Node	SL+SO (MPa)	SL+SO/ 1.20SH
20	24.41	0.41	114	17.13	0.06			
15B	24.22	0.41	83	16.97	0.05			
91B	23.96	0.40	72	16.78	0.05			
93	23.92	0.40	4B	16.26	0.05			
74B	23.86	0.40	5A	16.25	0.05			
75A	23.86	0.40	15B	16.01	0.05			
75B	23.85	0.40	71	15.92	0.05			
84A	23.84	0.40	128A	15.46	0.05			
82	23.81	0.40	122B	15.16	0.05			
4B	23.77	0.40	82	15.14	0.05			
5A	23.77	0.40	27B	14.96	0.05			
10B	23.75	0.40	128B	14.88	0.05			
88A	23.73	0.40	70	14.86	0.05			
83	23.72	0.40	62	11.69	0.05			
9B	23.58	0.40	86A	14.59	0.05			
10A	23.58	0.40	142	14.24	0.05			
4A	23.48	0.40	78A	14.11	0.05			
92B	23.45	0.40	28	13.45	0.04			
89B	23.34	0.39	53B	10.61	0.04			
92A	23.26	0.39	77	13.31	0.04			
18B	23.25	0.39	78B	12.92	0.04			
67	23.19	0.39	34	12.66	0.04			
86B	23.17	0.39	80	12.52	0.04			
84B	23.16	0.39	130A	12.46	0.04			
74A	22.93	0.39	39	12.33	0.04			
21	22.75	0.38	24	12.25	0.04			
15A	22.70	0.38	130B	11.88	0.04			
79	22.65	0.38	5B	10.87	0.03			
78A	22.45	0.38	33	10.74	0.03			
24	22.38	0.38	55	8.51	0.03			
2	22.35	0.38	61B	8.41	0.03			
88B	22.33	0.38	18B	10.61	0.03			
23	22.31	0.38	18A	10.55	0.03			
80	22.29	0.38	86B	10.08	0.03			
91A	22.25	0.38	120	9.03	0.03			
89A	22.22	0.37	19	8.62	0.03			
12	22.00	0.37	63	6.76	0.03			
78B	21.61	0.36	118B	8.27	0.03			
50	21.49	0.36	116	7.85	0.03			
81	20.99	0.35	6	7.84	0.03			
128A	19.11	0.32	4A	7.81	0.03			
116	17.89	0.30	79	7.66	0.02			
56	10.46	0.30	93	7.59	0.02			
64	10.45	0.30	17B	6.64	0.02			
110	16.97	0.29	22	6.54	0.02			
55	9.95	0.28	89A	6.12	0.02			
63	9.95	0.28	88B	6.05	0.02			
62	9.93	0.28	16	6.02	0.02			
54	9.80	0.28	92A	5.36	0.02			
128B	16.22	0.27	11	5.32	0.02			
118A	16.16	0.27	12	5.22	0.02			

B31.1 (1992) Code Compliance (sorted stresses)

Sustained			Expansion			Occasional	
Node	SL (MPa)	SL/SH	Node	SE (MPa)	SE/SA	Node	SL+SO (MPa) SL+SO/ 1.20SH
130B	15.55	0.26	46	5.05	0.02		
126	15.14	0.26	17A	4.86	0.02		
65	8.97	0.25	89B	4.65	0.01		
57	8.97	0.25	8	4.60	0.01		
66	8.69	0.25	10B	4.53	0.01		
58	8.69	0.25	91B	4.50	0.01		
130A	13.38	0.23	88A	4.21	0.01		
120	11.99	0.20	92B	4.19	0.01		
53A	6.96	0.20	9B	4.12	0.01		
103	6.71	0.19	10A	4.12	0.01		
61A	6.70	0.19	9A	4.05	0.01		
114	11.15	0.19	91A	4.02	0.01		
102	6.39	0.18	2	3.51	0.01		
61B	6.35	0.18	95	3.35	0.01		
52	6.20	0.18	3	3.33	0.01		
53B	6.09	0.17	118A	3.23	0.01		
60	5.86	0.17	56	2.20	0.01		
112	8.68	0.15	64	1.69	0.01		
118B	8.08	0.14	87	2.05	0.01		
122B	8.06	0.14	57	1.05	0.00		
122A	7.66	0.13	65	0.81	0.00		
121	7.28	0.12	104	0.85	0.00		
124A	6.12	0.10	134	0.83	0.00		
124B	5.90	0.10	105	0.77	0.00		
132	2.71	0.05	58	0.01	0.00		
134	0.89	0.00	132	0.01	0.00		
104	0.70	0.00	66	0.01	0.00		
105	0.69	0.00	81	0.00	0.00		

B31.1 (1992) Code Compliance

Node	Press (MPa) Allow	Sustained			Expansion			Occasional		
		SL (MPa)	SH (MPa)	SL/ SH	SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH (MPa)	SL+SO/ 1.20SH
100	10.1	23.61	59.30	0.40	32.78	310.70	0.11			
2	15.4	22.35	59.30	0.38	3.51	310.70	0.01			
2	10.1	22.35	59.30	0.38	3.51	310.70	0.01			
3	15.4	23.30	59.30	0.39	3.10	310.70	0.01			
3	10.1	25.93	59.30	0.44	3.33	310.70	0.01			
4A	13.4	23.48	59.30	0.40	7.81	310.70	0.03			
4A	10.1	23.48	59.30	0.40	7.81	310.70	0.03			
4B	13.4	23.77	59.30	0.40	16.26	310.70	0.05			
5A	10.1	23.77	59.30	0.40	16.25	310.70	0.05			
5B	13.4	24.94	59.30	0.42	10.86	310.70	0.03			

Node	Press (MPa) Allow	B31.1 (1992) Code Compliance						Occasional		
		--- SL (MPa)	Sustained SH (MPa)	---- SL/ SH	--- SE (MPa)	Expansion SA (MPa)	---- SE/ SA	SL+SO (MPa)	1.20SH (MPa)	SL+SO/ 1.20SH
5B	10.1	24.94	59.30	0.42	10.87	310.70	0.03			
6	13.4	31.60	59.30	0.53	7.84	310.70	0.03			
6	10.1	31.60	59.30	0.53	7.84	310.70	0.03			
7	13.4	37.12	59.30	0.63	33.34	310.70	0.11			
7	10.1	39.13	59.30	0.66	9.17	310.70	0.03			
8	13.4	32.40	59.30	0.55	4.60	310.70	0.01			
8	10.1	32.40	59.30	0.55	4.60	310.70	0.01			
9A	13.4	24.89	59.30	0.42	4.05	310.70	0.01			
9A	10.1	24.89	59.30	0.42	4.05	310.70	0.01			
9B	13.4	23.58	59.30	0.40	4.12	310.70	0.01			
10A	10.1	23.58	59.30	0.40	4.12	310.70	0.01			
10B	13.4	23.75	59.30	0.40	4.53	310.70	0.01			
10B	10.1	23.75	59.30	0.40	4.53	310.70	0.01			
11	13.4	25.49	59.30	0.43	5.32	310.70	0.02			
11	10.1	22.89	59.30	0.39	4.96	310.70	0.02			
12	15.4	22.00	59.30	0.37	5.22	310.70	0.02			
12	10.1	22.00	59.30	0.37	5.22	310.70	0.02			
100	15.4	24.56	59.30	0.41	10.40	310.70	0.03			
7	10.1	22.93	59.30	0.39	21.60	310.70	0.07			
15A	13.9	22.70	59.30	0.38	21.04	310.70	0.07			
15A	10.1	22.70	59.30	0.38	21.04	310.70	0.07			
15B	13.9	24.22	59.30	0.41	16.01	310.70	0.05			
15B	10.1	24.22	59.30	0.41	16.00	310.70	0.05			
16	13.9	33.55	59.30	0.57	6.02	310.70	0.02			
16	10.1	33.55	59.30	0.57	6.02	310.70	0.02			
17A	13.9	25.32	59.30	0.43	4.86	310.70	0.02			
17A	10.1	25.32	59.30	0.43	4.86	310.70	0.02			
17B	13.9	25.26	59.30	0.43	6.64	310.70	0.02			
17B	10.1	25.26	59.30	0.43	6.64	310.70	0.02			
18A	13.9	25.65	59.30	0.43	10.55	310.70	0.03			
18A	10.1	25.65	59.30	0.43	10.55	310.70	0.03			
18B	13.9	23.25	59.30	0.39	10.61	310.70	0.03			
18B	10.1	23.25	59.30	0.39	10.61	310.70	0.03			
19	13.9	27.74	59.30	0.47	8.62	310.70	0.03			

B31.1 (1992) Code Compliance									
Node	Press (MPa) Allow	--- Sustained ---		SL/ SH	--- Expansion ---			--- Occasional ---	
		SL (MPa)	SH (MPa)		SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH SL+SO/ 1.20SH
19	10.1	27.74	59.30	0.47	8.62	310.70	0.03		
20	13.9	24.41	59.30	0.41	7.94	310.70	0.03		
20	10.1	24.14	59.30	0.41	6.62	310.70	0.02		
21	13.9	22.70	59.30	0.38	7.38	310.70	0.02		
21	10.1	22.75	59.30	0.38	6.44	310.70	0.02		
22	13.9	25.99	59.30	0.44	6.53	310.70	0.02		
22	10.1	25.98	59.30	0.44	6.54	310.70	0.02		
23	13.9	22.31	59.30	0.38	5.51	310.70	0.02		
23	10.1	22.29	59.30	0.38	13.10	310.70	0.04		
24	13.9	22.38	59.30	0.38	12.25	310.70	0.04		
24	10.1	22.38	59.30	0.38	12.25	310.70	0.04		
80	13.9	22.29	59.30	0.38	12.52	310.70	0.04		
25	10.1	24.68	59.30	0.42	27.80	310.70	0.09		
69	13.9	26.03	59.30	0.44	31.57	310.70	0.10		
69	10.1	26.03	59.30	0.44	31.53	310.70	0.10		
90	13.9	26.25	59.30	0.44	52.26	310.70	0.17		
90	10.1	33.14	59.30	0.56	61.84	310.70	0.20		
26A	10.8	29.61	59.30	0.50	30.37	310.70	0.10		
26A	10.1	29.61	59.30	0.50	30.37	310.70	0.10		
26B	10.8	28.81	59.30	0.49	21.48	310.70	0.07		
26B	10.1	28.81	59.30	0.49	21.47	310.70	0.07		
27A	10.8	28.75	59.30	0.48	21.93	310.70	0.07		
27A	10.1	28.75	59.30	0.48	21.93	310.70	0.07		
27B	10.8	28.43	59.30	0.48	14.96	310.70	0.05		
27B	10.1	28.43	59.30	0.48	14.96	310.70	0.05		
28	10.8	31.12	59.30	0.52	13.45	310.70	0.04		
28	10.1	31.12	59.30	0.52	13.45	310.70	0.04		
29A	10.8	28.64	59.30	0.48	27.55	310.70	0.09		
29A	10.1	28.64	59.30	0.48	27.56	310.70	0.09		
29B	10.8	28.26	59.30	0.48	36.60	310.70	0.12		
29B	10.1	28.26	59.30	0.48	36.60	310.70	0.12		
30	10.8	28.35	59.30	0.48	36.02	310.70	0.12		
30	10.1	28.84	59.30	0.49	35.84	310.70	0.12		
31A	10.8	28.52	59.30	0.48	41.02	310.70	0.13		

B31.1 (1992) Code Compliance										
Node	Press (MPa) Allow	Sustained		Expansion		Occasional				
		SL (MPa)	SH (MPa)	SL/ SH	SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH (MPa)	SL+SO/ 1.20SH
31A	10.1	28.52	59.30	0.48	41.02	310.70	0.13			
31B	10.8	28.56	59.30	0.48	36.99	310.70	0.12			
31B	10.1	28.56	59.30	0.48	36.98	310.70	0.12			
32	10.8	30.01	59.30	0.51	23.17	310.70	0.07			
32	10.1	30.01	59.30	0.51	23.17	310.70	0.07			
33	10.8	28.76	59.30	0.48	10.74	310.70	0.03			
33	10.1	28.76	59.30	0.48	10.74	310.70	0.03			
34	10.8	29.09	59.30	0.49	12.66	310.70	0.04			
34	10.1	29.09	59.30	0.49	12.66	310.70	0.04			
142	10.8	29.40	59.30	0.50	14.24	310.70	0.05			
142	10.1	29.40	59.30	0.50	14.24	310.70	0.05			
35	10.8	35.54	59.30	0.60	23.87	310.70	0.08			
35	10.1	35.54	59.30	0.60	23.87	310.70	0.08			
36	10.8	31.00	59.30	0.52	40.73	310.70	0.13			
36	10.1	31.00	59.30	0.52	40.73	310.70	0.13			
37A	10.8	30.10	59.30	0.51	41.46	310.70	0.13			
37A	10.1	30.10	59.30	0.51	41.46	310.70	0.13			
37B	10.8	29.10	59.30	0.49	39.28	310.70	0.13			
37B	10.1	29.10	59.30	0.49	39.27	310.70	0.13			
38	10.8	28.93	59.30	0.49	30.58	310.70	0.10			
38	10.1	28.93	59.30	0.49	30.58	310.70	0.10			
39	10.8	31.34	59.30	0.53	12.33	310.70	0.04			
39	10.1	31.34	59.30	0.53	12.33	310.70	0.04			
40A	10.8	29.50	59.30	0.50	27.88	310.70	0.09			
40A	10.1	29.50	59.30	0.50	27.88	310.70	0.09			
40B	10.8	28.66	59.30	0.48	32.23	310.70	0.10			
40B	10.1	28.66	59.30	0.48	32.23	310.70	0.10			
41	10.8	28.76	59.30	0.48	29.13	310.70	0.09			
41	10.1	28.84	59.30	0.49	29.54	310.70	0.10			
42	10.8	28.29	59.30	0.48	33.60	310.70	0.11			
42	10.1	29.55	59.30	0.50	33.13	310.70	0.11			
47	10.8	29.64	59.30	0.50	35.25	310.70	0.11			
48	10.1	30.20	59.30	0.51	38.05	310.70	0.12			
43	10.8	30.22	59.30	0.51	38.80	310.70	0.12			

Node	Press (MPa) Allow	B31.1 (1992) Code Compliance						Occasional		
		--- Sustained --- SL (MPa)	SH (MPa)	---- SL/ SH	--- Expansion --- SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH (MPa)	SL+SO/ 1.20SH
43	10.1	32.39	59.30	0.55	79.13	310.70	0.25			
44		34.27	59.30	0.58	151.63	310.70	0.49			
44	10.1	23.56	59.30	0.40	61.05	310.70	0.20			
45	15.4	23.62	59.30	0.40	64.80	310.70	0.21			
45	10.1	27.11	59.30	0.46	15.32	310.70	0.05			
46	11.4	27.37	59.30	0.46	5.05	310.70	0.02			
23	10.1	21.29	59.30	0.36	151.63	310.70	0.49			
50	15.2	21.49	59.30	0.36	170.26	310.70	0.55			
52	1.00	6.20	35.20	0.18	224.68	246.30	0.91			
103		6.71	35.20	0.19	70.80	246.30	0.29			
103	1.00	6.31	35.20	0.18	35.37	246.30	0.14			
53A	2.80	6.96	35.20	0.20	20.57	246.30	0.08			
53A	1.00	6.96	35.20	0.20	20.57	246.30	0.08			
53B	2.80	6.09	35.20	0.17	10.61	246.30	0.04			
54	1.00	9.80	35.20	0.28	14.89	246.30	0.06			
55	1.66	9.92	35.20	0.28	8.51	246.30	0.03			
55	1.00	9.95	35.20	0.28	7.73	246.30	0.03			
56	1.66	10.46	35.20	0.30	2.20	246.30	0.01			
56	1.00	10.44	35.20	0.30	2.19	246.30	0.01			
57	1.66	8.96	35.20	0.25	1.04	246.30	0.00			
57	1.00	8.97	35.20	0.25	1.05	246.30	0.00			
58	1.66	8.69	35.20	0.25	0.01	246.30	0.00			
21	10.1	22.71	59.30	0.38	144.38	310.70	0.46			
67	15.2	23.19	59.30	0.39	162.11	310.70	0.52			
60	1.00	5.86	35.20	0.17	214.00	246.30	0.87			
102		6.39	35.20	0.18	67.43	246.30	0.27			
102	1.00	6.10	35.20	0.17	33.69	246.30	0.14			
61A	2.80	6.70	35.20	0.19	19.47	246.30	0.08			
61A	1.00	6.70	35.20	0.19	19.47	246.30	0.08			
61B	2.80	6.35	35.20	0.18	8.41	246.30	0.03			
62	1.00	9.93	35.20	0.28	11.69	246.30	0.05			
63	1.66	9.91	35.20	0.28	6.76	246.30	0.03			
63	1.00	9.95	35.20	0.28	5.97	246.30	0.02			
64	1.66	10.45	35.20	0.30	1.69	246.30	0.01			

Node	Press (MPa) Allow	B31.1 (1992) Code Compliance						Occasional		
		--- Sustained SL (MPa)	SH (MPa)	---- SL/ SH	--- Expansion SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH (MPa)	SL+SO/ 1.20SH
64	1.00	10.43	35.20	0.30	1.69	246.30	0.01			
65	1.66	8.96	35.20	0.25	0.81	246.30	0.00			
65	1.00	8.97	35.20	0.25	0.81	246.30	0.00			
66	1.66	8.69	35.20	0.25	0.01	246.30	0.00			
42	10.1	31.99	59.30	0.54	13.64	310.70	0.04			
70	18.0	25.91	59.30	0.44	14.86	310.70	0.05			
71	10.1	30.96	59.30	0.52	15.92	310.70	0.05			
72	18.0	32.31	59.30	0.54	16.78	310.70	0.05			
73	10.1	29.94	59.30	0.50	18.21	310.70	0.06			
74A	18.0	22.93	59.30	0.39	19.93	310.70	0.06			
74A	10.1	22.93	59.30	0.39	19.93	310.70	0.06			
74B	18.0	23.86	59.30	0.40	23.81	310.70	0.08			
75A	10.1	23.86	59.30	0.40	23.81	310.70	0.08			
75B	18.0	23.85	59.30	0.40	22.88	310.70	0.07			
75B	10.1	23.85	59.30	0.40	22.88	310.70	0.07			
76	18.0	29.40	59.30	0.50	21.68	310.70	0.07			
76	10.1	29.40	59.30	0.50	21.68	310.70	0.07			
77	18.0	25.79	59.30	0.43	13.31	310.70	0.04			
77	10.1	25.79	59.30	0.43	13.31	310.70	0.04			
78A	18.0	22.45	59.30	0.38	14.11	310.70	0.05			
78A	10.1	22.45	59.30	0.38	14.11	310.70	0.05			
78B	18.0	21.61	59.30	0.36	12.92	310.70	0.04			
78B	10.1	21.61	59.30	0.36	12.92	310.70	0.04			
79	18.0	19.49	59.30	0.33	7.66	310.70	0.02			
79	10.1	21.05	59.30	0.35	0.00	310.70	0.00			
81	14.0	20.99	59.30	0.35	0.00	310.70	0.00			
79	10.1	22.65	59.30	0.38	4.68	310.70	0.02			
82	14.0	23.81	59.30	0.40	15.14	310.70	0.05			
83	10.1	23.72	59.30	0.40	16.97	310.70	0.05			
84A	14.0	23.84	59.30	0.40	19.50	310.70	0.06			
84A	10.1	23.84	59.30	0.40	19.51	310.70	0.06			
84B	14.0	23.16	59.30	0.39	18.59	310.70	0.06			
84B	10.1	23.16	59.30	0.39	18.59	310.70	0.06			
86A	14.0	24.59	59.30	0.41	14.59	310.70	0.05			

B31.1 (1992) Code Compliance									
Node	Press (MPa) Allow	--- Sustained ---		SL/ SH	--- Expansion ---			--- Occasional ---	
		SL (MPa)	SH (MPa)		SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH SL+SO/ 1.20SH
86A	10.1	24.59	59.30	0.41	14.59	310.70	0.05		
86B	14.0	23.17	59.30	0.39	10.08	310.70	0.03		
86B	10.1	23.17	59.30	0.39	10.08	310.70	0.03		
87	14.0	34.79	59.30	0.59	2.05	310.70	0.01		
87	10.1	34.79	59.30	0.59	2.05	310.70	0.01		
88A	14.0	23.73	59.30	0.40	4.21	310.70	0.01		
88A	10.1	23.73	59.30	0.40	4.21	310.70	0.01		
88B	14.0	22.33	59.30	0.38	6.05	310.70	0.02		
88B	10.1	22.33	59.30	0.38	6.05	310.70	0.02		
89A	14.0	22.22	59.30	0.37	6.12	310.70	0.02		
89A	10.1	22.22	59.30	0.37	6.12	310.70	0.02		
89B	14.0	23.34	59.30	0.39	4.65	310.70	0.01		
89B	10.1	23.34	59.30	0.39	4.65	310.70	0.01		
95	14.0	25.71	59.30	0.43	3.35	310.70	0.01		
95	10.1	25.71	59.30	0.43	3.35	310.70	0.01		
91A	14.0	22.25	59.30	0.38	4.02	310.70	0.01		
91A	10.1	22.25	59.30	0.38	4.02	310.70	0.01		
91B	14.0	23.96	59.30	0.40	4.50	310.70	0.01		
91B	10.1	23.96	59.30	0.40	4.50	310.70	0.01		
92A	14.0	23.26	59.30	0.39	5.36	310.70	0.02		
92A	10.1	23.26	59.30	0.39	5.36	310.70	0.02		
92B	14.0	23.45	59.30	0.40	4.19	310.70	0.01		
92B	10.1	23.45	59.30	0.40	4.19	310.70	0.01		
93	14.0	23.92	59.30	0.40	7.59	310.70	0.02		
62	0	1.57	196.00	0.01	0.77	344.87	0.00		
105	43.3	0.69	196.00	0.00	0.77	344.87	0.00		
54	0	1.45	196.00	0.01	0.85	344.87	0.00		
104	43.3	0.70	196.00	0.00	0.85	344.87	0.00		
20	1.00	20.54	59.30	0.35	24.89	310.70	0.08		
110	10.1	16.97	59.30	0.29	25.70	310.70	0.08		
112	1.00	8.68	59.30	0.15	18.56	310.70	0.06		
114	10.1	11.15	59.30	0.19	17.13	310.70	0.06		
116	1.00	17.89	59.30	0.30	7.85	310.70	0.03		
118A	10.1	16.16	59.30	0.27	3.23	310.70	0.01		

B31.1 (1992) Code Compliance									
Node	Press (MPa) Allow	--- Sustained ---		SL/ SH	--- Expansion ---			--- Occasional ---	
		SL (MPa)	SH (MPa)		SE (MPa)	SA (MPa)	SE/ SA	SL+SO (MPa)	1.20SH SL+SO/ 1.20SH
118A	1.00	16.16	59.30	0.27	3.23	310.70	0.01		
118B	10.1	8.08	59.30	0.14	8.27	310.70	0.03		
118B	1.00	8.08	59.30	0.14	8.27	310.70	0.03		
120	10.1	7.32	59.30	0.12	9.03	310.70	0.03		
120	1.00	11.99	59.30	0.20	6.43	310.70	0.02		
121	10.1	7.28	59.30	0.12	19.21	310.70	0.06		
121	1.00	7.28	59.30	0.12	19.21	310.70	0.06		
122A	10.1	7.66	59.30	0.13	19.56	310.70	0.06		
122A	1.00	7.66	59.30	0.13	19.56	310.70	0.06		
122B	10.1	8.06	59.30	0.14	15.16	310.70	0.05		
122B	1.00	8.06	59.30	0.14	15.16	310.70	0.05		
124A	10.1	6.12	59.30	0.10	24.87	310.70	0.08		
124A	1.00	6.12	59.30	0.10	24.87	310.70	0.08		
124B	10.1	5.90	59.30	0.10	29.28	310.70	0.09		
124B	1.00	5.90	59.30	0.10	29.27	310.70	0.09		
126	10.1	14.60	59.30	0.25	21.25	310.70	0.07		
126	1.00	15.14	59.30	0.26	19.69	310.70	0.06		
128A	10.1	19.11	59.30	0.32	15.46	310.70	0.05		
128A	1.00	19.11	59.30	0.32	15.46	310.70	0.05		
128B	10.1	16.22	59.30	0.27	14.88	310.70	0.05		
128B	1.00	16.22	59.30	0.27	14.88	310.70	0.05		
130A	10.1	13.38	59.30	0.23	12.46	310.70	0.04		
130A	1.00	13.38	59.30	0.23	12.46	310.70	0.04		
130B	10.1	15.55	59.30	0.26	11.88	310.70	0.04		
130B	1.00	15.55	59.30	0.26	11.88	310.70	0.04		
132	10.1	2.71	59.30	0.05	0.01	310.70	0.00		
120	0	3.90	196.00	0.02	3.71	344.87	0.01		
134	54.4	0.89	196.00	0.00	0.83	344.87	0.00		

Hanger Report

Node	No of	Type	Fig No.	Size	Spring rate (N/mm)	Vertical travel (mm)	Horizon travel (mm)	Hot load (N)	Cold load (N)	Var (%)
3	1	User hanger			0	62.25	33.63	6900	6900	0
6	1	User hanger			0	62.40	40.15	13200	13200	0
8	1	User hanger			0	69.05	35.51	14250	14250	0

Hanger Report

Node	No of	Type	Fig No.	Size	Spring rate (N/mm)	Vertical travel (mm)	Horizon travel (mm)	Hot load (N)	Cold load (N)	Var (%)
11	1	User hanger			0	66.34	28.60	6600	6600	0
16	1	User hanger			167	38.43	66.62	15982	22400	40
19	1	User hanger			167	-1.18	58.97	16497	16300	1
28	1	User hanger			107	12.06	89.02	8469	9760	15
30	2	User hanger			107	14.86	113.08	7460	9050	21
32	1	User hanger			67	50.18	83.15	5838	9200	57
33	1	User hanger			107	32.97	30.00	5472	9000	64
34	1	User hanger			67	17.55	37.08	4524	5700	25
142	1	User hanger			67	14.42	50.38	4434	5400	21
35	1	User hanger			167	4.08	104.90	13549	14230	5
36	1	User hanger			107	-7.70	150.85	10924	10100	7
38	1	User hanger			67	11.09	134.35	6957	7700	10
39	1	User hanger			107	45.83	90.16	5996	10900	81
41	2	User hanger			67	58.12	22.78	4966	8860	78
55	2	User hanger			27	60.87	34.13	1216	2860	**
63	2	User hanger			27	60.87	25.62	1216	2860	**
76	1	User hanger			42	2.90	16.90	3878	4000	3
77	1	User hanger			27	-9.52	28.41	2557	2300	10
82	2	User hanger			42	-5.28	55.93	3722	3500	5
87	1	User hanger			42	11.91	39.36	3300	3800	15
95	1	User hanger			27	25.61	24.59	1809	2500	38
126	2	User hanger			27	86.78	84.90	1157	3500	**

Loads on Anchors: Sustained (W+P)

Node	X (N)	Y (N)	Z (N)	XX (Nm)	YY (Nm)	ZZ (Nm)
100	500	-288	-1383	1435	861	-1260
46	-0	-126	-5944	-1199	2508	-74
93	18	46	-3253	-17	306	202

Loads on Hangers: Sustained (W+P)

Node	Type	Load (N)	No. of	Total (N)
3	User hanger	-6900	1	-6900
6	User hanger	-13200	1	-13200
8	User hanger	-14250	1	-14250
11	User hanger	-6600	1	-6600
16	User hanger	-22382	1	-22382
19	User hanger	-16349	1	-16349
28	User hanger	-9785	1	-9785
30	User hanger	-9114	2	-18228
32	User hanger	-9293	1	-9293
33	User hanger	-9233	1	-9233
34	User hanger	-5829	1	-5829
142	User hanger	-5517	1	-5517
35	User hanger	-14417	1	-14417
36	User hanger	-10267	1	-10267
38	User hanger	-7793	1	-7793

Loads on Hangers: Sustained (W+P)

Node	Type	Load (N)	No.of	Total (N)
39	User hanger	-10981	1	-10981
41	User hanger	-8860	2	-17720
55	User hanger	-2860	2	-5720
63	User hanger	-2860	2	-5720
76	User hanger	-3996	1	-3996
77	User hanger	-2292	1	-2292
82	User hanger	-3501	2	-7002
87	User hanger	-3804	1	-3804
95	User hanger	-2502	1	-2502
126	User hanger	-3531	2	-7061

Loads on Guides: Sustained (W+P)

Node	fx (N)	fy (N)	fz (N)	x Xcomp	x Ycomp	x Zcomp
58	-10	1	34			1.000
66	-10	4	35			1.000
132	-45	0	149			1.000

Loads on Limit Stops: Sustained (W+P)

Node	Lower Limit	Upper Limit	Load (N)	Friction Force (N)	X comp	Y comp	Z comp
22	Reached	None	-15159	405			1.000
22	None	Not Reachd			1.000		
22	Not Reachd	Reached	281	28		1.000	
24	Not Reachd	None					1.000
69	Reached	None	-18408	627			1.000
45	Reached	None	-19504	95			1.000
105	Reached	None	-4048	155			1.000
104	Reached	None	-4129	134			1.000
134	Reached	None	-4115	411			1.000

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
100	-346	263	867	-558	2454	1099
2	346	-263	3412	558	1745	-232
2	-346	263	-3412	-558	-1745	232
3	346	-263	3671	558	2453	-180
3	-346	263	3229	-558	-2453	180
4A	346	-263	-1983	558	694	-2
4A	-346	263	1983	-558	-694	2
4B	346	-263	336	943	-245	484

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
5A	-346	263	-336	-943	245	-484
5B	346	-263	2708	-41	-1779	551
5B	-346	263	-2708	41	1780	-551
6	346	-263	4897	-41	-6289	239
6	-346	263	8303	41	6289	-239
7	346	-263	-2998	-41	9957	-516
7	153	-25	-3656	-320	-11307	88
8	-153	25	8961	320	-6830	-15
8	153	-25	5289	-320	6830	15
9A	-153	25	-3074	320	-1812	16
9A	153	-25	3074	-320	1812	-16
9B	-153	25	-755	-955	-38	158
10A	153	-25	755	955	38	-158
10B	-153	25	1617	-877	571	262
10B	153	-25	-1617	877	-571	-262
11	-153	25	2837	-877	2043	245
11	153	-25	3763	877	-2043	-245
12	-153	25	-3504	-877	1317	240
12	153	-25	3504	877	-1317	-240
100	-153	25	516	-877	-3315	161
7	-500	288	6654	361	1351	429
15A	500	-288	-5474	-231	-1126	-429
15A	-500	288	5474	231	1126	429
15B	500	-288	-1356	57	-3478	-141
15B	-500	288	1356	-57	3478	141
16	500	-288	10114	57	15682	1120
16	-500	288	12267	-57	-15682	-1120
17A	500	-288	-9645	57	4726	1408
17A	-500	288	9645	-57	-4726	-1408
17B	500	-288	-5527	-3205	-2991	1446
17B	-500	288	5527	3205	2991	-1446
18A	500	-288	2143	-4950	-1725	715
18A	-500	288	-2143	4950	1725	-715
18B	500	-288	4889	-1639	-1475	283

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
18B	-500	288	-4889	1639	1475	-283
19	500	-288	8618	7968	-1475	-428
19	-500	288	7731	-7968	1475	428
20	500	-288	-1436	-3036	-1475	-1628
20	56	364	-2191	3047	153	1463
21	-56	-364	4288	-455	-153	-1419
21	152	501	-5936	727	133	1376
22	-152	-501	8296	5678	-133	-1239
22	444	-60	6892	-5678	133	1239
23	-444	60	-4532	537	-133	-839
23	557	47	2965	-424	213	859
24	-557	-47	-1261	-949	-213	-497
24	557	47	-384	949	213	497
80	-557	-47	777	-862	-213	-413
80	557	47	-777	862	213	413
25	-557	-47	11637	4103	-213	32
25	557	47	-11637	-4103	213	-32
69	-557	-47	12030	5878	-213	116
69	-65	-34	6378	-5878	213	-116
90	65	34	-5854	4655	-213	103
90	-65	-34	5854	-4655	213	-103
26A	65	34	-4839	2249	-213	74
26A	-65	-34	4839	-2249	213	-74
26B	65	34	-1297	-1269	-278	9
26B	-65	-34	1297	1269	278	-9
27A	65	34	-169	-1252	-310	9
27A	-65	-34	169	1252	310	-9
27B	65	34	3373	868	-375	-56
27B	-65	-34	-3373	-868	375	56
28	65	34	5008	3907	-375	-103
28	-65	-34	4777	-3907	375	103
29A	65	34	-492	-1099	-375	-226
29A	-65	-34	492	1099	375	226
29B	65	34	3050	-270	-439	-290

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
29B	-65	-34	-3050	270	439	290
30	65	34	4381	-250	-478	-290
30	-65	-34	13848	250	478	290
31A	65	34	-4128	-103	-757	-290
31A	-65	-34	4128	103	757	290
31B	65	34	-586	-69	1052	-256
31B	-65	-34	586	69	-1052	256
32	65	34	4150	-69	-2690	-185
32	-65	-34	5143	69	2690	185
33	65	34	4497	-69	-1309	-39
33	-65	-34	4735	69	1309	39
34	65	34	4905	-69	-1671	106
34	-65	-34	923	69	1671	-106
142	65	34	1557	-69	-2020	144
142	-65	-34	3960	69	2020	-144
35	65	34	6808	-69	-8821	306
35	-65	-34	7609	69	8821	-306
36	65	34	5922	-69	-3760	511
36	-65	-34	4346	69	3760	-511
37A	65	34	-3782	-69	-2744	519
37A	-65	-34	3782	69	2744	-519
37B	65	34	-240	-1596	-249	488
37B	-65	-34	240	1596	249	-488
38	65	34	3707	1438	-249	375
38	-65	-34	4086	-1438	249	-375
39	65	34	5385	4165	-249	103
39	-65	-34	5596	-4165	249	-103
40A	65	34	1733	-2112	-249	-108
40A	-65	-34	-1733	2112	249	108
40B	65	34	5276	874	-184	-172
40B	-65	-34	-5275	-874	184	172
41	65	34	8094	832	-103	-172
41	-65	-34	9626	-832	103	172
42	65	34	1311	666	211	-172

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
42	-83	-80	-3626	-1400	-1398	178
47	83	80	5204	1343	1456	-178
47	-83	-80	-5204	-1343	-1456	178
48	83	80	16064	1279	1523	-178
48	-83	-80	-16064	-1279	-1523	178
43	83	80	16515	1263	1539	-178
43	-83	-80	-16515	-1263	-1539	178
44	83	80	16896	1247	1556	-178
44	-83	-80	-16896	-1247	-1556	178
45	83	80	17674	1199	1606	-178
45	-0	-126	1830	-1199	-1606	178
46	0	126	5944	1199	-2508	74
23	-113	-106	1567	-112	-80	-20
50	113	106	-1542	121	71	20
50	-113	-106	1542	-121	-71	-20
51	113	106	-1127	149	42	20
51	-113	-106	1127	-149	-42	-20
52	113	106	-711	-26	207	18
52	-113	-106	711	26	-207	-18
103	113	106	-641	-75	253	17
103	-113	-106	641	75	-253	-17
53A	113	106	-120	-245	411	11
53A	-113	-106	120	245	-411	-11
53B	113	106	1222	130	48	1
54	-34	1	2189	-22	-127	-1
55	34	-1	2788	12	-123	1
55	-34	1	2932	-12	123	-1
56	34	-1	-829	3	-342	1
56	-34	1	829	-3	342	-1
57	34	-1	-379	2	40	0
57	-34	1	379	-2	-40	0
58	34	-1	10	0	-0	-0
21	-96	-137	1648	-271	20	43
67	96	137	-1622	282	-28	-43

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
67	-96	-137	1622	-282	28	43
59	96	137	-1208	318	-53	-43
59	-96	-137	1208	-318	53	43
60	96	137	-792	128	127	-37
60	-96	-137	792	-128	-127	37
102	96	137	-722	73	178	-34
102	-96	-137	722	-73	-178	34
61A	96	137	-201	-133	370	-20
61A	-96	-137	201	133	-370	20
61B	96	137	1141	214	78	3
62	-35	4	2188	-72	-140	-3
63	35	-4	2788	40	-116	3
63	-35	4	2932	-40	116	-3
64	35	-4	-829	11	-340	3
64	-35	4	829	-11	340	-3
65	35	-4	-378	5	41	-0
65	-35	4	378	-5	-41	0
66	35	-4	10	-0	0	-0
42	18	46	2314	733	1187	-5
70	-18	-46	-1680	765	311	-43
70	18	46	1680	-765	-311	43
71	-18	-46	-509	1115	661	-63
71	18	46	509	-1115	-661	63
72	-18	-46	-323	1207	753	-78
72	18	46	323	-1207	-753	78
73	-18	-46	1338	1044	591	-98
73	18	46	-1338	-1044	-591	98
74A	-18	-46	1631	530	76	-121
74A	18	46	-1631	-530	-76	121
74B	-18	-46	2100	-84	-570	-143
75A	18	46	-2100	84	570	143
75B	-18	-46	2570	-61	621	-120
75B	18	46	-2570	61	-621	120
76	-18	-46	2689	-61	1146	-111

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
76	18	46	1307	61	-1146	111
77	-18	-46	1143	-61	810	78
77	18	46	1149	61	-810	-78
78A	-18	-46	-970	-61	492	92
78A	18	46	970	61	-492	-92
78B	-18	-46	-500	-396	93	124
78B	18	46	500	396	-93	-124
79	-18	-46	755	-129	93	162
79	0	0	359	0	0	-0
81	-0	-0	-0	0	-0	0
79	18	46	-1114	129	-93	-162
82	-18	-46	3306	-270	148	162
82	18	46	3696	270	-148	-162
83	-18	-46	-1915	-293	158	162
83	18	46	1915	293	-158	-162
84A	-18	-46	-1393	-326	171	162
84A	18	46	1393	326	-171	-162
84B	-18	-46	-688	235	182	151
84B	18	46	688	-235	-182	-151
86A	-18	-46	283	508	182	126
86A	18	46	-283	-508	-182	-126
86B	-18	-46	988	171	-275	86
86B	18	46	-988	-171	275	-86
87	-18	-46	1905	171	-2120	27
87	18	46	1899	-171	2120	-27
88A	-18	-46	-1054	171	-385	-27
88A	18	46	1054	-171	385	27
88B	-18	-46	-348	142	125	-56
88B	18	46	348	-142	-125	56
89A	-18	-46	191	108	138	-56
89A	18	46	-191	-108	-138	56
89B	-18	-46	897	-321	150	-67
89B	18	46	-897	321	-150	67
95	-18	-46	1166	-708	150	-74

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
95	18	46	1336	708	-150	74
91A	-18	-46	-803	85	150	-88
91A	18	46	803	-85	-150	88
91B	-18	-46	-450	366	254	-104
91B	18	46	450	-366	-254	104
92A	-18	-46	642	263	151	-173
92A	18	46	-642	-263	-151	173
92B	-18	-46	1348	-105	-258	-202
92B	18	46	-1348	105	258	202
93	-18	-46	3253	17	-306	-202
52	-62	-142	-3329	-142	62	-0
105	62	142	4048	-0	-0	0
54	-79	-108	-3410	-108	79	-0
104	79	108	4129	-0	0	0
20	-555	-76	3627	-10	1322	165
110	555	76	-3579	10	-961	-157
110	-555	-76	3579	-10	961	157
112	555	76	-1799	10	383	-119
112	-555	-76	1799	-10	-383	119
114	555	76	-1751	10	561	-112
114	-555	-76	1751	-10	-561	112
116	555	76	288	10	1036	-62
116	-555	-76	-288	-10	-1036	62
118A	555	76	443	10	918	-38
118A	-555	-76	-443	-10	-918	38
118B	555	76	819	48	350	0
118B	-555	-76	-819	-48	-350	-0
120	555	76	867	56	294	0
120	-149	0	2830	-3	-579	-0
121	149	-0	40	2	-316	0
121	-149	0	-40	-2	316	-0
122A	149	-0	119	2	-341	0
122A	-149	0	-119	-2	341	-0
122B	149	-0	245	2	-364	0

Element forces in global coordinates: Sustained (W+P)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
122B	-149	0	-245	-2	364	-0
124A	149	-0	780	2	-219	0
124A	-149	0	-780	-2	219	-0
124B	149	-0	907	2	-201	0
124B	-149	0	-907	-2	201	-0
126	149	-0	2707	1	-762	0
126	-149	0	4354	-1	762	-0
128A	149	-0	-3405	1	-1058	0
128A	-149	0	3405	-1	1058	-0
128B	149	-0	-3278	1	-870	0
128B	-149	0	3278	-1	870	-0
130A	149	-0	-2743	1	683	0
130A	-149	0	2743	-1	-683	-0
130B	149	-0	-2617	1	830	-0
130B	-149	0	2617	-1	-830	0
132	149	-0	45	-0	-0	-0
120	-406	-76	-3696	-53	284	0
134	406	76	4115	0	-0	-0

Displacements: Sustained (W+P)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
100	0.00	0.00	0.00	0.0000	0.0000	0.0000
2	0.00	-0.26	0.73	0.0082	-0.0173	-0.0075
3	0.00	-0.29	0.79	0.0087	-0.0159	-0.0077
4A	0.00	-0.38	0.95	0.0105	-0.0121	-0.0079
4B	0.09	-0.51	1.29	0.0147	-0.0119	-0.0068
5A	0.09	-0.51	1.29	0.0147	-0.0119	-0.0068
5B	0.15	-0.46	1.33	0.0170	-0.0156	-0.0041
6	0.16	-0.39	0.87	0.0168	-0.0322	-0.0023
7	0.16	-0.27	-0.67	0.0162	0.0006	-0.0038
8	0.16	-0.07	1.12	0.0206	0.0376	-0.0043
9A	0.16	0.02	1.68	0.0225	0.0196	-0.0043
9B	0.07	0.11	1.61	0.0211	0.0167	-0.0040
10A	0.07	0.11	1.61	0.0211	0.0167	-0.0040
10B	0.00	0.09	1.10	0.0156	0.0175	-0.0029
11	0.00	0.06	0.89	0.0129	0.0205	-0.0023
12	0.00	0.05	0.81	0.0121	0.0216	-0.0021
15A	0.15	-0.15	-0.67	0.0160	-0.0003	-0.0042
15B	0.18	0.05	-0.62	0.0160	-0.0051	-0.0051
16	0.18	-0.27	0.11	0.0165	0.0074	-0.0019
17A	0.18	-0.29	-0.18	0.0166	0.0224	0.0000

Displacements: Sustained (W+P)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
17B	-0.15	-0.03	-0.74	0.0133	0.0213	0.0039
18A	-0.67	0.10	-0.81	-0.0086	0.0108	0.0083
18B	-0.63	0.00	-0.63	-0.0143	0.0079	0.0089
19	-0.40	0.00	-0.29	-0.0085	0.0038	0.0088
20	-0.10	0.00	-0.17	-0.0042	-0.0030	0.0051
21	-0.04	0.00	-0.09	-0.0064	-0.0033	0.0034
22	0.00	0.00	0.00	-0.0033	-0.0035	0.0016
23	0.01	0.00	0.01	0.0006	-0.0038	0.0002
24	0.01	0.00	0.00	0.0003	-0.0040	-0.0004
80	0.01	0.00	-0.00	0.0000	-0.0041	-0.0006
25	0.00	0.00	0.00	0.0002	-0.0041	-0.0006
69	0.00	0.00	0.00	0.0013	-0.0042	-0.0006
90	-0.00	0.00	-0.01	0.0029	-0.0043	-0.0005
26A	-0.01	0.00	-0.05	0.0056	-0.0045	-0.0005
26B	-0.10	-0.11	-0.16	0.0051	-0.0053	-0.0003
27A	-0.15	-0.15	-0.16	0.0039	-0.0055	-0.0003
27B	-0.25	-0.19	-0.20	0.0020	-0.0067	-0.0002
28	-0.26	-0.19	-0.23	0.0050	-0.0073	-0.0003
29A	-0.28	-0.19	-0.49	0.0074	-0.0089	-0.0009
29B	-0.47	-0.29	-0.60	0.0052	-0.0101	-0.0017
30	-0.57	-0.35	-0.60	0.0049	-0.0106	-0.0021
31A	-1.53	-0.66	-0.61	0.0036	-0.0153	-0.0049
31B	-1.81	-0.62	-0.89	0.0034	-0.0151	-0.0058
32	-1.81	-0.39	-1.39	0.0031	-0.0150	-0.0066
33	-1.81	0.14	-2.17	0.0024	-0.0042	-0.0075
34	-1.81	0.70	-1.92	0.0017	0.0105	-0.0072
142	-1.81	0.83	-1.74	0.0015	0.0074	-0.0070
35	-1.81	1.35	-1.12	0.0008	-0.0022	-0.0051
36	-1.81	1.67	-1.57	-0.0002	0.0028	-0.0008
37A	-1.81	1.67	-1.56	-0.0002	0.0014	-0.0005
37B	-1.80	1.67	-1.54	-0.0030	-0.0017	0.0009
38	-1.75	1.67	-1.39	-0.0050	-0.0027	0.0023
39	-1.51	1.67	-0.76	-0.0088	-0.0051	0.0041
40A	-1.27	1.67	-0.28	-0.0143	-0.0070	0.0040
40B	-1.07	1.40	-0.00	-0.0155	-0.0077	0.0035
41	-0.90	1.08	-0.00	-0.0136	-0.0080	0.0030
42	-0.22	0.21	-0.01	-0.0072	-0.0076	0.0011
47	-0.14	0.13	-0.01	-0.0055	-0.0058	0.0008
48	-0.06	0.06	-0.00	-0.0051	-0.0054	0.0007
43	-0.04	0.04	-0.00	-0.0047	-0.0049	0.0006
44	-0.03	0.03	-0.00	-0.0040	-0.0040	0.0005
45	0.00	0.00	0.00	-0.0015	-0.0008	0.0000
46	0.00	0.00	0.00	0.0000	0.0000	0.0000
50	0.01	-0.00	0.01	0.0011	-0.0034	0.0003
51	-0.01	-0.01	0.01	0.0014	-0.0033	0.0004
52	-0.01	-0.01	-0.01	0.0016	-0.0030	0.0004
103	-0.00	-0.01	-0.01	0.0015	-0.0026	0.0004
53A	-0.00	-0.01	-0.04	0.0008	-0.0008	0.0005
53B	0.07	0.01	-0.00	-0.0014	0.0045	0.0008
54	0.07	0.01	-0.00	-0.0014	0.0045	0.0008
55	0.89	0.09	-0.00	0.0000	0.0047	0.0010
56	0.59	0.04	-0.01	0.0006	-0.0125	0.0010

Displacements: Sustained (W+P)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
57	0.30	0.01	-0.19	0.0007	-0.0145	0.0011
58	0.00	0.00	-0.19	0.0007	-0.0142	0.0011
67	-0.04	0.01	-0.09	-0.0052	-0.0034	0.0031
59	-0.06	0.03	-0.09	-0.0046	-0.0035	0.0030
60	-0.05	0.02	-0.09	-0.0041	-0.0033	0.0029
102	-0.05	0.02	-0.09	-0.0039	-0.0030	0.0029
61A	-0.02	-0.00	-0.08	-0.0039	-0.0015	0.0027
61B	0.06	0.06	-0.00	-0.0044	0.0037	0.0030
62	0.06	0.06	-0.00	-0.0044	0.0037	0.0030
63	0.83	0.30	-0.00	0.0003	0.0047	0.0033
64	0.58	0.14	-0.01	0.0021	-0.0121	0.0036
65	0.29	0.05	-0.18	0.0023	-0.0140	0.0036
66	0.00	0.00	-0.18	0.0023	-0.0138	0.0036
70	-0.23	0.20	-0.52	-0.0002	-0.0339	0.0000
71	-0.23	0.20	-0.70	0.0029	-0.0325	-0.0001
72	-0.23	0.20	-0.76	0.0232	-0.0219	-0.0013
73	-0.22	0.21	-0.73	0.0269	-0.0200	-0.0016
74A	-0.20	0.23	-0.58	0.0493	-0.0129	-0.0044
74B	0.01	0.76	-0.34	0.0563	-0.0274	-0.0096
75A	0.01	0.76	-0.34	0.0563	-0.0274	-0.0096
75B	0.31	1.12	-0.02	0.0536	-0.0338	-0.0158
76	0.31	1.06	0.09	0.0527	-0.0245	-0.0171
77	0.31	-0.53	0.30	0.0355	0.0063	-0.0207
78A	0.31	-0.64	0.24	0.0343	0.0166	-0.0193
78B	0.16	-0.79	-0.21	0.0245	0.0276	-0.0147
79	-0.10	-0.79	-0.03	-0.0293	0.0410	0.0012
81	-0.45	-1.05	-0.03	-0.0293	0.0410	0.0012
82	2.32	1.14	-0.03	-0.0452	0.0506	0.0181
83	2.77	1.54	-0.03	-0.0458	0.0509	0.0185
84A	3.43	2.15	-0.03	-0.0516	0.0540	0.0225
84B	3.76	2.74	-0.63	-0.0543	0.0597	0.0276
86A	3.05	2.74	-1.73	-0.0374	0.0680	0.0325
86B	2.68	2.37	-1.33	-0.0284	0.0688	0.0353
87	2.68	1.56	-0.08	-0.0210	0.0322	0.0371
88A	2.68	0.79	0.11	-0.0142	-0.0037	0.0372
88B	2.62	0.51	0.05	-0.0093	-0.0047	0.0354
89A	2.58	0.62	0.05	-0.0068	-0.0021	0.0340
89B	2.21	0.68	-0.02	-0.0076	0.0021	0.0326
95	2.00	0.68	-0.08	-0.0126	0.0040	0.0319
91A	1.59	0.68	-0.30	-0.0180	0.0077	0.0303
91B	1.36	0.59	-0.40	-0.0149	0.0104	0.0291
92A	0.86	0.09	-0.20	0.0022	0.0217	0.0236
92B	0.46	-0.04	-0.00	0.0031	0.0195	0.0182
93	0.00	0.00	0.00	0.0000	0.0000	0.0000
105	0.00	0.00	0.00	-0.0026	0.0029	0.0030
104	0.00	0.00	0.00	0.0000	0.0035	0.0008
110	-0.10	-0.01	-0.19	-0.0041	-0.0112	0.0039
112	-0.10	-0.04	-0.30	-0.0040	-0.0126	0.0030
114	-0.10	-0.04	-0.32	-0.0039	-0.0092	0.0022
116	-0.10	-0.06	-0.39	-0.0038	-0.0016	0.0015
118A	-0.10	-0.07	-0.33	-0.0035	0.0213	0.0003
118B	0.32	-0.04	-0.00	-0.0019	0.0575	-0.0006

Displacements: Sustained (W+P)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
120	0.42	-0.04	-0.00	-0.0015	0.0598	-0.0006
121	13.01	0.06	-0.02	-0.0005	0.1164	-0.0006
122A	13.34	0.06	-0.02	-0.0005	0.1125	-0.0006
122B	13.82	0.07	-0.14	-0.0004	0.1057	-0.0006
124A	15.37	0.06	-1.05	-0.0003	0.0803	-0.0006
124B	15.72	0.07	-1.14	-0.0002	0.0765	-0.0006
126	17.31	0.07	-1.13	0.0002	-0.0535	-0.0006
128A	13.34	0.06	-1.14	0.0003	-0.1830	-0.0006
128B	12.49	0.06	-1.38	0.0004	-0.2020	-0.0006
130A	8.85	0.05	-3.50	0.0004	-0.2074	-0.0006
130B	7.97	0.05	-3.75	0.0004	-0.1925	-0.0006
132	0.00	0.00	-3.76	0.0006	-0.0270	-0.0006
134	-0.26	-0.05	0.00	-0.0005	0.0545	-0.0006

Loads on Anchors: Operating (W+P1+T1)

Node	X (N)	Y (N)	Z (N)	XX (Nm)	YY (Nm)	ZZ (Nm)
100	-4020	5730	-3583	3574	16870	29024
46	-6339	-3907	-42998	-4367	24376	10864
93	-330	486	-3423	-575	-780	172

Loads on Hangers: Operating (W+P1+T1)

Node	Type	Load (N)	No.of	Total (N)
3	User hanger	-6900	1	-6900
6	User hanger	-13200	1	-13200
8	User hanger	-14250	1	-14250
11	User hanger	-6600	1	-6600
16	User hanger	-15982	1	-15982
19	User hanger	-16497	1	-16497
28	User hanger	-8469	1	-8469
30	User hanger	-7460	2	-14921
32	User hanger	-5838	1	-5838
33	User hanger	-5472	1	-5472
34	User hanger	-4524	1	-4524
142	User hanger	-4434	1	-4434
35	User hanger	-13549	1	-13549
36	User hanger	-10924	1	-10924
38	User hanger	-6957	1	-6957
39	User hanger	-5996	1	-5996
41	User hanger	-4966	2	-9932
55	User hanger	-1216	2	-2433
63	User hanger	-1216	2	-2433
76	User hanger	-3878	1	-3878
77	User hanger	-2557	1	-2557
82	User hanger	-3722	2	-7443
87	User hanger	-3300	1	-3300
95	User hanger	-1809	1	-1809
126	User hanger	-1157	2	-2314

Loads on Guides: Operating (W+P1+T1)

Node	fx (N)	fy (N)	fz (N)	x Xcomp	x Ycomp	x Zcomp
58	66	-207	78			1.000
66	53	-152	87			1.000
132	0	4	9			1.000

Loads on Limit Stops: Operating (W+P1+T1)

Node	Lower Limit	Upper Limit	Load (N)	Friction Force (N)	X comp	Y comp	Z comp
22	Reached	None	-36121	3612			1.000
22	None	Not Reachd			1.000		
22	Not Reachd	Reached	230	23		1.000	
24	Not Reachd	None					1.000
69	Reached	None	-69982	6998			1.000
45	Not Reachd	None					1.000
105	Not Reachd	None					1.000
104	Not Reachd	None					1.000
134	Reached	None	-6891	689			1.000

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
100	1800	-6420	4019	350	-8684	-22821
2	-1800	6420	260	-350	2481	1636
2	1800	-6420	-260	350	-2481	-1636
3	-1800	6420	519	-350	2559	352
3	1800	-6420	6381	350	-2559	-352
4A	-1800	6420	-5135	-350	-1327	-3981
4A	1800	-6420	5135	350	1327	3981
4B	-1800	6420	-2816	3041	-4627	-10551
5A	1800	-6420	2816	-3041	4627	10551
5B	-1801	6418	-444	5118	-3433	-6786
5B	1800	-6420	444	-5117	3435	6787
6	-1800	6420	1745	5117	-4206	827
6	1800	-6420	11455	-5117	4206	-827
7	-1800	6420	-6150	5117	21101	19284
7	-2220	-690	-2704	1099	-5986	2705
8	2220	690	8010	-1099	-9416	-721
8	-2220	-690	6240	1099	9416	721
9A	2220	690	-4026	-1099	-3256	107

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
9A	-2220	-690	4026	1099	3256	-107
9B	2220	690	-1707	-3181	-544	-1109
10A	-2220	-690	1707	3181	544	1109
10B	2221	690	665	-3925	-530	-3470
10B	-2220	-690	-665	3924	530	3470
11	2220	690	1885	-3924	313	-3926
11	-2220	-690	4715	3924	-313	3926
12	2220	690	-4455	-3924	-604	-4064
12	-2220	-690	4455	3924	604	4064
100	2220	690	-436	-3924	-8185	-6203
7	4020	-5730	8854	-6216	-15116	-21989
15A	-4020	5730	-7674	3637	13306	21989
15A	4020	-5730	7674	-3637	-13306	-21989
15B	-4020	5730	-3556	-2093	4234	16259
15B	4020	-5730	3556	2093	-4234	-16259
16	-4020	5730	7914	-2093	13768	-8808
16	4020	-5730	8068	2093	-13768	8808
17A	-4020	5730	-5446	-2093	7011	-14538
17A	4020	-5730	5446	2093	-7011	14538
17B	-4020	5730	-1328	-8467	-421	-18258
17B	4020	-5730	1328	8467	421	18258
18A	-4020	5730	6342	-19318	-10607	-12378
18A	4020	-5730	-6342	19318	10607	12378
18B	-4020	5730	9088	-15379	-12618	-8896
18B	4020	-5730	-9088	15379	12618	8896
19	-4020	5730	12817	201	-12618	-3177
19	4020	-5730	3680	-201	12618	3177
20	-4020	5730	2615	-1076	-12618	6476
20	3375	-5950	-8258	1146	7389	-5996
21	-3375	5950	10355	6299	-7389	8696
21	3462	-5798	-21757	5304	-4905	-8882
22	-3462	5798	24116	15339	4905	11998
22	-174	-6028	12005	-15339	-4905	-11998
23	174	6028	-9645	5597	4905	11842

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
23	-95	-5821	-2336	5881	-18142	-12152
24	95	5821	4041	-3809	18142	12090
24	-95	-5821	-38864	3809	-18142	-12090
80	95	5821	39258	2051	18142	12076
80	-95	-5821	-39258	-2051	-18142	-12076
25	95	5821	50117	37800	18142	11999
25	-95	-5821	-50117	-37800	-18142	-11999
69	95	5821	50510	45348	18142	11985
69	-95	-5821	-50510	-45348	-18142	-11985
90	6669	3421	-18947	41506	18142	10651
90	-6669	-3421	19472	-45348	-18142	-11985
26A	6669	3421	-17933	33208	18142	7650
26A	-6669	-3421	18947	-41506	-18142	-10651
26B	6669	3421	-14390	19983	11473	981
26B	-6669	-3421	17933	-33208	-18142	-7650
27A	6669	3421	-13263	21693	8138	981
27A	-6669	-3421	14390	-19983	-11473	-981
27B	6669	3421	-9720	14106	1469	-5688
27B	-6669	-3421	13263	-21693	-8138	-981
28	6669	3421	-8086	7652	1469	-10523
28	-6669	-3421	9720	-14106	-1469	5688
29A	6669	3421	-12270	-19732	1469	-23194
29A	-6669	-3421	16555	-7652	-1469	10523
29B	6669	3421	-8728	-27294	-5200	-29863
29B	-6669	-3421	12270	19732	-1469	23194
30	6669	3421	-7397	-25276	-9135	-29863
30	-6669	-3421	8728	27294	5200	29863
31A	6669	3421	-12599	-10533	-37878	-29863
31A	-6669	-3421	22318	25276	9135	29863
31B	6669	3421	-9056	-7112	-34204	-26442
31B	-6669	-3421	12599	10533	37878	29863
32	6669	3421	-4321	-7112	-20158	-19259
32	-6669	-3421	9056	7112	34204	26442
33	6669	3421	-518	-7112	2664	-4635
33	-6669	-3421	10159	7112	20158	19259

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
33	-6669	-3421	5990	7112	-2664	4635
34	6669	3421	3650	-7112	7665	9989
34	-6669	-3421	873	7112	-7665	-9989
142	6669	3421	1607	-7112	7262	13752
142	-6669	-3421	2827	7112	-7262	-13752
35	6669	3421	7941	-7112	-4950	30086
35	-6669	-3421	5608	7112	4950	-30086
36	6669	3421	7923	-7112	-11896	50611
36	-6669	-3421	3001	7112	11896	-50611
37A	6669	3421	-2437	-7112	-11216	51466
37A	-6669	-3421	2437	7112	11216	-51466
37B	6669	3421	1105	-7294	-10066	48218
37B	-6669	-3421	-1105	7294	10066	-48218
38	6669	3421	5052	-1907	-10066	36547
38	-6669	-3421	1906	1907	10066	-36547
39	6669	3421	7566	9980	-10066	8537
39	-6669	-3421	-1570	-9980	10066	-8537
40A	6669	3421	8899	26992	-10066	-13137
40A	-6669	-3421	-8899	-26992	10066	13137
40B	6669	3421	12441	33757	-3397	-19806
40B	-6669	-3421	-12441	-33757	3397	19806
41	6669	3421	15260	29481	4940	-19806
41	-6669	-3421	-5328	-29481	-4940	19806
42	6669	3421	16265	12890	37284	-19806
42	-6339	-3907	-19019	-14135	-37998	18678
47	6339	3907	20597	11400	42435	-18678
47	-6339	-3907	-20597	-11400	-42435	18678
48	6339	3907	31457	8274	47507	-18678
48	-6339	-3907	-31457	-8274	-47507	18678
43	6339	3907	31908	7493	48774	-18678
43	-6339	-3907	-31908	-7493	-48774	18678
44	6339	3907	32289	6712	50042	-18678
44	-6339	-3907	-32289	-6712	-50042	18678
45	6339	3907	33067	4367	53846	-18678

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
45	-6339	-3907	-35224	-4367	-53846	18678
46	6339	3907	42998	4367	-24376	-10864
23	-78	-207	11981	-11478	13237	310
50	78	207	-11956	11495	-13243	-310
50	-78	-207	11956	-11495	13243	310
51	78	207	-11541	11548	-13263	-310
51	-78	-207	11541	-11548	13263	310
52	78	207	-11126	9395	-11223	-288
52	-78	-207	11126	-9395	11223	288
103	78	207	-11055	8585	-10469	-280
103	-78	-207	11055	-8585	10469	280
53A	78	207	-10534	3773	-5980	-229
53A	-78	-207	10534	-3773	5980	229
53B	78	207	-9192	-3366	795	-145
54	-78	-207	5552	3366	-795	145
55	78	207	-576	-1837	218	-145
55	-78	-207	3009	1837	-218	145
56	78	207	-905	-496	-289	-145
56	-78	-207	905	496	289	145
57	78	207	-455	-248	94	0
57	-78	-207	455	248	-94	-0
58	78	207	-66	-0	-0	0
21	-87	-152	11402	-11603	12294	187
67	87	152	-11376	11615	-12300	-187
67	-87	-152	11376	-11615	12300	187
59	87	152	-10961	11655	-12323	-187
59	-87	-152	10961	-11655	12323	187
60	87	152	-10546	9611	-10387	-176
60	-87	-152	10546	-9611	10387	176
102	87	152	-10475	8844	-9673	-172
102	-87	-152	10475	-8844	9673	172
61A	87	152	-9954	4291	-5425	-147
61A	-87	-152	9954	-4291	5425	147
61B	87	152	-8613	-2479	946	-107

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
62	-87	-152	5538	2479	-946	107
63	87	152	-562	-1353	304	-107
63	-87	-152	2995	1353	-304	107
64	87	152	-892	-365	-258	-107
64	-87	-152	892	365	258	107
65	87	152	-441	-183	104	0
65	-87	-152	441	183	-104	-0
66	87	152	-53	0	0	0
42	-330	486	2753	1245	713	1128
70	330	-486	-2120	582	1114	-1246
70	-330	486	2120	-582	-1114	1246
71	330	-486	-948	1073	1605	-1296
71	-330	486	948	-1073	-1605	1296
72	330	-486	-762	1261	1793	-1330
72	-330	486	762	-1261	-1793	1330
73	330	-486	899	1240	1771	-1380
73	-330	486	-899	-1240	-1771	1380
74A	330	-486	1192	877	1409	-1434
74A	-330	486	-1192	-877	-1409	1434
74B	330	-486	1661	639	1092	-1490
75A	-330	486	-1661	-639	-1092	1490
75B	330	-486	2131	882	2237	-1246
75B	-330	486	-2131	-882	-2237	1246
76	330	-486	2250	882	2675	-1149
76	-330	486	1628	-882	-2675	1149
77	330	-486	822	882	1022	845
77	-330	486	1735	-882	-1022	-845
78A	330	-486	-1556	882	529	990
78A	-330	486	1556	-882	-529	-990
78B	330	-486	-1086	253	-164	1069
78B	-330	486	1086	-253	164	-1069
79	330	-486	169	-710	-164	376
79	0	0	359	0	0	-0
81	-0	-0	0	0	-0	0

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
79	-330	486	-528	710	164	-376
82	330	-486	2720	-2194	-1170	376
82	-330	486	4723	2194	1170	-376
83	330	-486	-2942	-2437	-1335	376
83	-330	486	2942	2437	1335	-376
84A	330	-486	-2421	-2789	-1574	376
84A	-330	486	2421	2789	1574	-376
84B	330	-486	-1715	-1861	-1780	582
84B	-330	486	1715	1861	1780	-582
86A	330	-486	-744	-201	-1780	1027
86A	-330	486	744	201	1780	-1027
86B	330	-486	-39	104	-1596	930
86B	-330	486	39	-104	1596	-930
87	330	-486	878	104	-2131	310
87	-330	486	2422	-104	2131	-310
88A	330	-486	-1577	104	219	-262
88A	-330	486	1577	-104	-219	262
88B	330	-486	-872	-200	839	-566
88B	-330	486	872	200	-839	566
89A	330	-486	-333	-565	591	-566
89A	-330	486	333	565	-591	566
89B	330	-486	373	-942	385	-360
89B	-330	486	-373	942	-385	360
95	330	-486	643	-1132	385	-236
95	-330	486	1166	1132	-385	236
91A	330	-486	-633	-465	385	9
91A	-330	486	633	465	-385	-9
91B	330	-486	-280	-259	459	65
91B	-330	486	280	259	-459	-65
92A	330	-486	812	-545	173	-103
92A	-330	486	-812	545	-173	103
92B	330	-486	1518	-714	-94	-172
92B	-330	486	-1518	714	94	172
93	330	-486	3423	575	780	-172

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
62	-0	-0	3074	-0	0	0
105	0	0	-2355	0	-0	-0
54	0	-0	3640	-0	-0	0
104	-0	0	-2921	-0	0	-0
20	646	221	5643	-70	5230	-480
110	-646	-221	-5595	70	-4668	458
110	646	221	5595	-70	4668	-458
112	-646	-221	-3815	70	-2315	348
112	646	221	3815	-70	2315	-348
114	-646	-221	-3767	70	-1936	325
114	646	221	3767	-70	1936	-325
116	-646	-221	-1728	70	-150	182
116	646	221	1728	-70	150	-182
118A	-646	-221	-1573	70	387	110
118A	646	221	1573	-70	-387	-110
118B	-646	-221	-1197	-40	1428	0
118B	646	221	1197	40	-1428	-0
120	-646	-221	-1150	-62	1492	0
120	-9	4	7622	-89	-1034	-0
121	9	-4	-4752	63	982	0
121	-9	4	4752	-63	-982	-0
122A	9	-4	-4673	62	981	0
122A	-9	4	4673	-62	-981	-0
122B	9	-4	-4547	61	666	0
122B	-9	4	4547	-61	-666	-0
124A	9	-4	-4012	57	-1755	3
124A	-9	4	4012	-57	1755	-3
124B	9	-4	-3885	56	-2028	3
124B	-9	4	3885	-56	2028	-3
126	9	-4	-2085	39	-2060	3
126	-9	4	4399	-39	2060	-3
128A	9	-4	-3449	31	-2078	3
128A	-9	4	3449	-31	2078	-3
128B	9	-4	-3323	30	-1851	3

Element forces in global coordinates: Operating (W+P1+T1)

Node	FX (N)	FY (N)	FZ (N)	MX (Nm)	MY (Nm)	MZ (Nm)
128B	-9	4	3323	-30	1851	-3
130A	9	-4	-2788	25	-136	0
130A	-9	4	2788	-25	136	-0
130B	9	-4	-2662	24	48	-0
130B	-9	4	2662	-24	-48	0
132	9	-4	-0	-0	0	-0
120	654	216	-6472	151	-458	-0
134	-654	-216	6891	-0	-0	0

Displacements: Operating (W+P1+T1)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
100	0.00	13.50	64.20	0.0000	0.0000	0.0000
2	26.08	18.65	62.42	-0.0051	0.0497	0.1381
3	27.66	19.14	62.25	-0.0054	0.0515	0.1387
4A	32.99	20.77	61.62	-0.0066	0.0528	0.1342
4B	37.89	28.75	61.43	-0.0038	0.0343	0.0864
5A	37.89	28.75	61.43	-0.0038	0.0343	0.0864
5B	30.58	34.48	62.34	0.0230	0.0106	0.0286
6	21.21	34.10	62.40	0.0520	-0.0051	0.0156
7	-1.53	31.49	63.56	0.1222	0.0976	0.1218
8	-24.26	25.93	69.05	0.1071	0.0929	0.1037
9A	-33.75	23.78	70.65	0.1008	0.0659	0.1023
9B	-38.83	16.23	69.61	0.0901	0.0587	0.0896
10A	-38.83	16.23	69.61	0.0901	0.0587	0.0896
10B	-31.31	11.01	67.00	0.0700	0.0582	0.0662
11	-26.08	11.73	66.34	0.0576	0.0577	0.0572
12	-24.50	11.92	66.13	0.0541	0.0576	0.0545
15A	-2.34	32.47	60.01	0.1255	0.1071	0.1410
15B	3.46	37.78	49.84	0.1206	0.1389	0.1953
16	38.04	54.69	38.43	0.1028	0.1704	0.2197
17A	45.95	58.39	35.30	0.0987	0.1857	0.2022
17B	52.62	59.19	24.38	0.0901	0.1807	0.1631
18A	48.25	50.36	2.77	0.0252	0.1460	0.0779
18B	48.03	43.66	-1.37	0.0041	0.1214	0.0574
19	49.26	32.42	-1.18	-0.0130	0.0865	0.0445
20	51.12	13.44	-0.52	-0.0191	0.0276	0.0504
21	51.88	7.11	-0.26	-0.0162	0.0161	0.0592
22	52.91	0.00	0.00	-0.0097	0.0247	0.0733
23	54.19	-7.11	0.02	0.0042	0.0333	0.0893
24	55.27	-12.25	0.00	-0.0006	0.0562	0.1011
80	55.54	-13.44	0.01	-0.0008	0.0615	0.1038
25	57.00	-19.73	0.01	0.0027	0.0658	0.1060
69	57.28	-20.92	0.00	0.0120	0.0711	0.1087
90	57.67	-22.50	-0.07	0.0250	0.0781	0.1121
26A	58.59	-26.06	-0.40	0.0547	0.0969	0.1194
26B	63.06	-35.90	5.97	0.1366	0.1473	0.1258

Displacements: Operating (W+P1+T1)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
27A	64.39	-37.17	9.92	0.1550	0.1559	0.1269
27B	69.42	-48.09	14.64	0.1954	0.1682	0.1219
28	70.91	-53.83	12.06	0.2092	0.1707	0.1115
29A	73.80	-68.87	5.21	0.1866	0.1771	0.0548
29B	77.45	-79.44	10.19	0.1293	0.1816	-0.0339
30	79.29	-80.62	14.86	0.1019	0.1741	-0.0744
31A	87.05	-82.42	48.96	-0.0347	-0.0052	-0.3706
31B	78.44	-74.15	55.73	-0.0541	-0.0978	-0.4609
32	61.82	-55.61	50.18	-0.0884	-0.1957	-0.5458
33	27.98	-10.81	32.97	-0.1584	-0.2359	-0.6362
34	-5.86	36.61	17.55	-0.2283	-0.1709	-0.6159
142	-14.56	48.23	14.42	-0.2463	-0.1559	-0.5928
35	-52.36	90.90	4.08	-0.3245	-0.1099	-0.4076
36	-99.86	113.07	-7.70	-0.4227	-0.1275	0.0209
37A	-101.84	112.93	-8.27	-0.4268	-0.1326	0.0435
37B	-107.53	103.42	-3.04	-0.4530	-0.1675	0.1729
38	-100.14	89.57	11.09	-0.4691	-0.2080	0.3041
39	-70.40	56.32	45.83	-0.4637	-0.3053	0.4717
40A	-43.40	30.59	69.93	-0.3688	-0.3806	0.4585
40B	-28.68	17.04	68.01	-0.2936	-0.4101	0.4000
41	-19.71	11.42	58.12	-0.2236	-0.4084	0.3430
42	9.19	1.21	19.73	-0.0418	-0.2272	0.1220
47	11.68	0.81	14.19	-0.0259	-0.1774	0.0919
48	14.08	0.47	7.90	-0.0234	-0.1658	0.0856
43	14.63	0.39	6.32	-0.0206	-0.1487	0.0771
44	15.10	0.33	4.74	-0.0167	-0.1218	0.0638
45	15.83	0.22	0.00	-0.0054	-0.0151	0.0140
46	0.00	0.00	0.00	0.0000	0.0000	0.0000
50	54.19	-7.16	0.65	0.0569	-0.0275	0.0875
51	54.01	-7.47	2.69	0.0792	-0.0531	0.0867
52	52.88	-9.23	2.18	0.0989	-0.0777	0.0861
103	52.47	-9.90	1.94	0.1119	-0.0946	0.0857
53A	49.93	-13.94	0.09	0.1385	-0.1341	0.0845
53B	42.82	-23.06	3.95	0.1253	-0.1667	0.0779
54	42.82	-23.06	3.95	0.1253	-0.1667	0.0779
55	24.57	-23.69	60.87	-0.0941	-0.1240	0.0620
56	10.73	-7.20	110.80	-0.1803	-0.1266	0.0481
57	2.67	-3.93	118.48	-0.1865	-0.1278	0.0475
58	0.00	0.00	127.71	-0.1882	-0.1271	0.0475
67	51.86	7.10	0.37	0.0371	-0.0403	0.0581
59	51.63	6.88	2.42	0.0596	-0.0641	0.0577
60	50.40	5.20	1.94	0.0799	-0.0866	0.0573
102	49.95	4.58	1.71	0.0935	-0.1021	0.0570
61A	47.19	0.74	-0.05	0.1226	-0.1378	0.0563
61B	39.73	-7.93	3.95	0.1244	-0.1655	0.0521
62	39.73	-7.93	3.95	0.1244	-0.1655	0.0521
63	22.35	-12.53	60.87	-0.0372	-0.1128	0.0404
64	10.07	-4.02	110.80	-0.1008	-0.1111	0.0302
65	2.33	-2.22	118.67	-0.1053	-0.1119	0.0297
66	0.00	0.00	127.90	-0.1066	-0.1112	0.0297
70	2.10	5.97	15.96	-0.0627	-0.2092	0.0551
71	-0.71	8.19	14.45	-0.0604	-0.2049	0.0514

Displacements: Operating (W+P1+T1)

Node	X (mm)	Y (mm)	Z (mm)	XX(deg)	YY(deg)	ZZ(deg)
72	-2.61	9.77	13.52	-0.0424	-0.1754	0.0297
73	-5.28	12.14	12.33	-0.0388	-0.1699	0.0258
74A	-8.06	14.83	11.29	-0.0131	-0.1262	-0.0109
74B	-9.89	17.88	6.70	0.0150	-0.0656	-0.0829
75A	-9.89	17.88	6.70	0.0150	-0.0656	-0.0829
75B	-5.56	16.98	2.96	0.0590	0.0071	-0.1536
76	-3.98	16.42	2.90	0.0712	0.0332	-0.1663
77	28.40	0.74	-9.52	0.3208	0.2535	-0.1995
78A	30.77	-0.27	-10.88	0.3391	0.2658	-0.1849
78B	33.40	-5.67	-16.40	0.3704	0.2658	-0.1311
79	30.31	-22.25	-29.39	0.3205	0.2421	-0.0506
81	28.20	-19.46	-33.34	0.3205	0.2421	-0.0506
82	42.14	-36.76	-5.28	0.2048	0.1889	-0.0116
83	43.78	-38.53	-1.34	0.2003	0.1865	-0.0107
84A	45.97	-40.76	4.39	0.1508	0.1590	-0.0014
84B	47.49	-37.23	10.57	0.0974	0.1096	0.0075
86A	47.01	-26.56	12.36	0.0649	0.0280	0.0359
86B	41.61	-22.13	13.01	0.0697	-0.0220	0.0519
87	31.54	-23.55	11.91	0.0742	-0.0808	0.0725
88A	22.25	-25.08	9.84	0.0784	-0.1076	0.0733
88B	16.17	-26.71	13.62	0.0796	-0.1006	0.0596
89A	14.95	-27.71	19.55	0.0721	-0.0866	0.0452
89B	13.67	-23.53	25.22	0.0635	-0.0745	0.0317
95	13.47	-20.57	25.61	0.0534	-0.0696	0.0287
91A	13.12	-14.71	26.19	0.0386	-0.0599	0.0265
91B	11.48	-11.29	26.29	0.0335	-0.0529	0.0218
92A	2.57	-3.21	26.00	0.0171	-0.0322	0.0211
92B	-0.79	0.24	20.94	0.0048	-0.0238	0.0155
93	0.00	0.00	0.00	0.0000	0.0000	0.0000
105	42.62	-5.76	0.00	0.1244	-0.1655	0.0521
104	45.73	-20.87	0.00	0.1253	-0.1667	0.0779
110	50.33	13.35	-0.51	-0.0185	-0.0079	0.0538
112	46.40	12.87	-0.69	-0.0179	-0.0301	0.0564
114	45.61	12.76	-0.76	-0.0172	-0.0453	0.0588
116	40.49	12.08	-1.34	-0.0164	-0.0532	0.0610
118A	37.93	11.73	-1.64	-0.0143	-0.0503	0.0644
118B	33.80	11.26	1.97	-0.0124	0.0030	0.0666
120	33.82	11.28	2.76	-0.0128	0.0134	0.0666
121	58.13	10.81	49.95	0.0199	0.4471	0.0666
122A	59.43	10.75	51.25	0.0206	0.4587	0.0666
122B	62.02	10.74	52.67	0.0218	0.4748	0.0667
124A	74.37	10.99	55.66	0.0269	0.4291	0.0675
124B	76.72	10.95	57.15	0.0280	0.3929	0.0676
126	84.46	8.66	86.78	0.0408	-0.1588	0.0687
128A	73.86	7.16	102.40	0.0458	-0.4532	0.0692
128B	71.25	6.87	103.81	0.0464	-0.4906	0.0693
130A	57.68	5.39	106.09	0.0487	-0.5683	0.0691
130B	54.64	5.09	107.40	0.0492	-0.5690	0.0691
132	0.00	0.00	151.21	0.0540	-0.5593	0.0691
134	33.58	11.10	0.00	-0.0156	0.0219	0.0666

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Center of Gravity (mm)

X = -2887.73 Y = -12292.96 Z = -27.22

Total weight = 31736.61 (kg)

Bill of Materials

Materials

15	15	128.5	/16<tl<=36 bzsv
2	15	128.5	/tl<=10 bzsvpr
020	15	020.1	/tl<=12.5 bzsv+bzsvpr

Pipes

Material	OD (mm)	Thk (mm)	Total length (mm)	Total weight (kg)
15	108.0	10.0	20342.09	492.89
15	108.0	14.0	160	5.21
15	108.0	16.0	9261.74	337.07
15	133.0	16.0	16111.39	745.70
15	219.0	25.0	9472.03	1135.82
15	219.0	28.0	7400	978.47
15	273.0	25.0	47450	7273.65
15	273.0	32.0	16324.13	3112.59
15	377.0	36.0	2000	607.03
020	219.0	6.3	32958.49	1089.17
020	219.1	10.0	1219.28	62.87

Bends

Material	OD (mm)	Thk (mm)	Radius (mm)	Angle (deg)	Count	Total weight (kg)
15	108.0	10.0	500.0	30.26	4	25.59
15	108.0	10.0	500.0	90.00	1	19.03
15	108.0	16.0	500.0	90.00	3	85.75
15	133.0	16.0	625.0	45.00	1	22.72
15	133.0	16.0	625.0	90.00	5	227.20
15	219.0	25.0	800.0	90.00	4	602.75
15	273.0	25.0	1000.0	90.00	6	1444.73
15	273.0	32.0	1000.0	60.01	1	199.70
15	273.0	32.0	1000.0	90.00	2	599.02
020	219.1	10.0	1000.0	90.00	2	162

Reducers

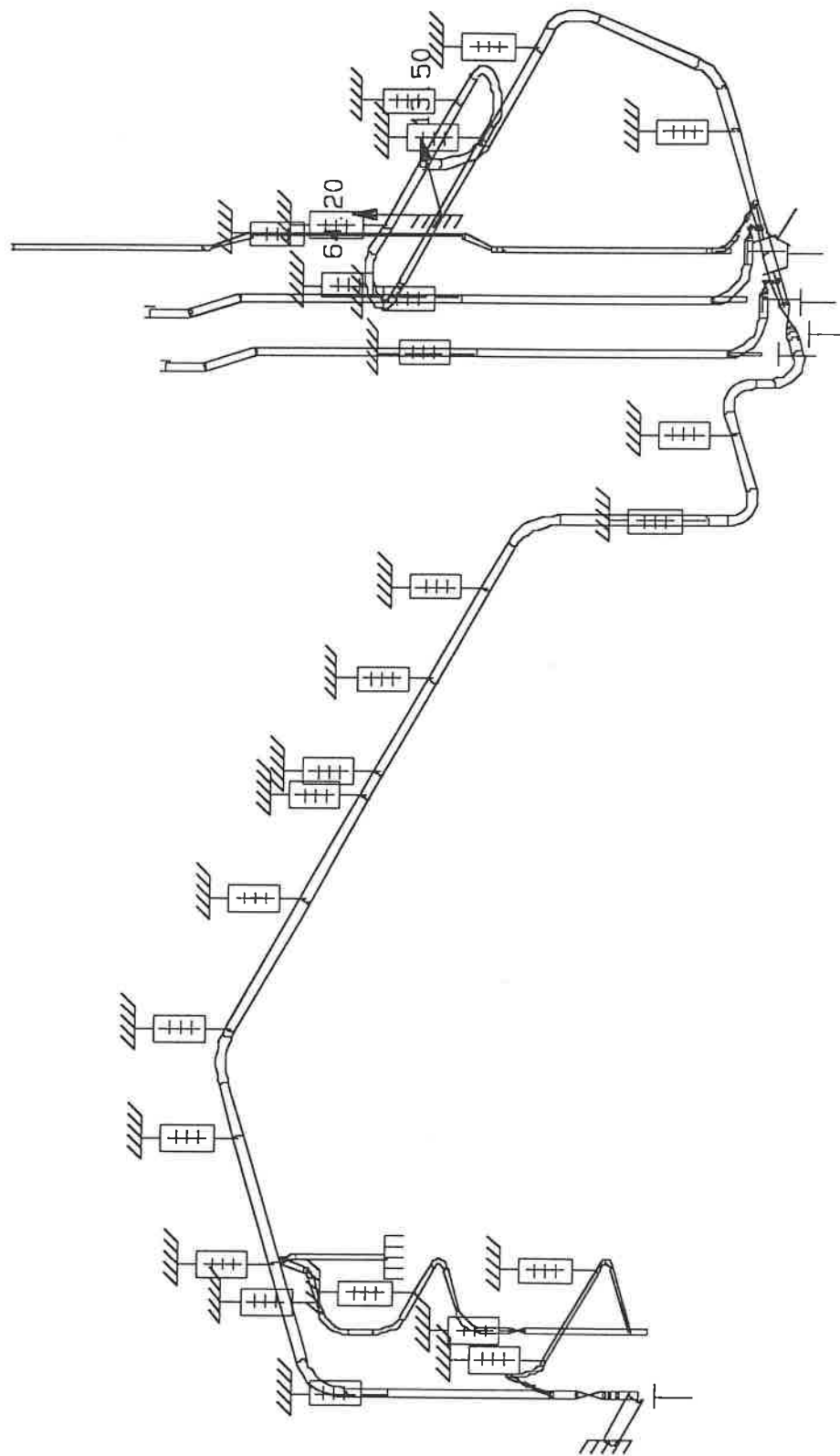
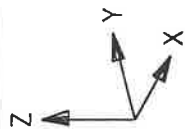
Material	OD1 (mm)	Thk1 (mm)	OD2 (mm)	Thk2 (mm)	Count	Total weight (kg)
15	273.0	24.0	219.1	20.0	1	24.37
020	219.0	10.0	133.0	10.0	2	8.17

Valves

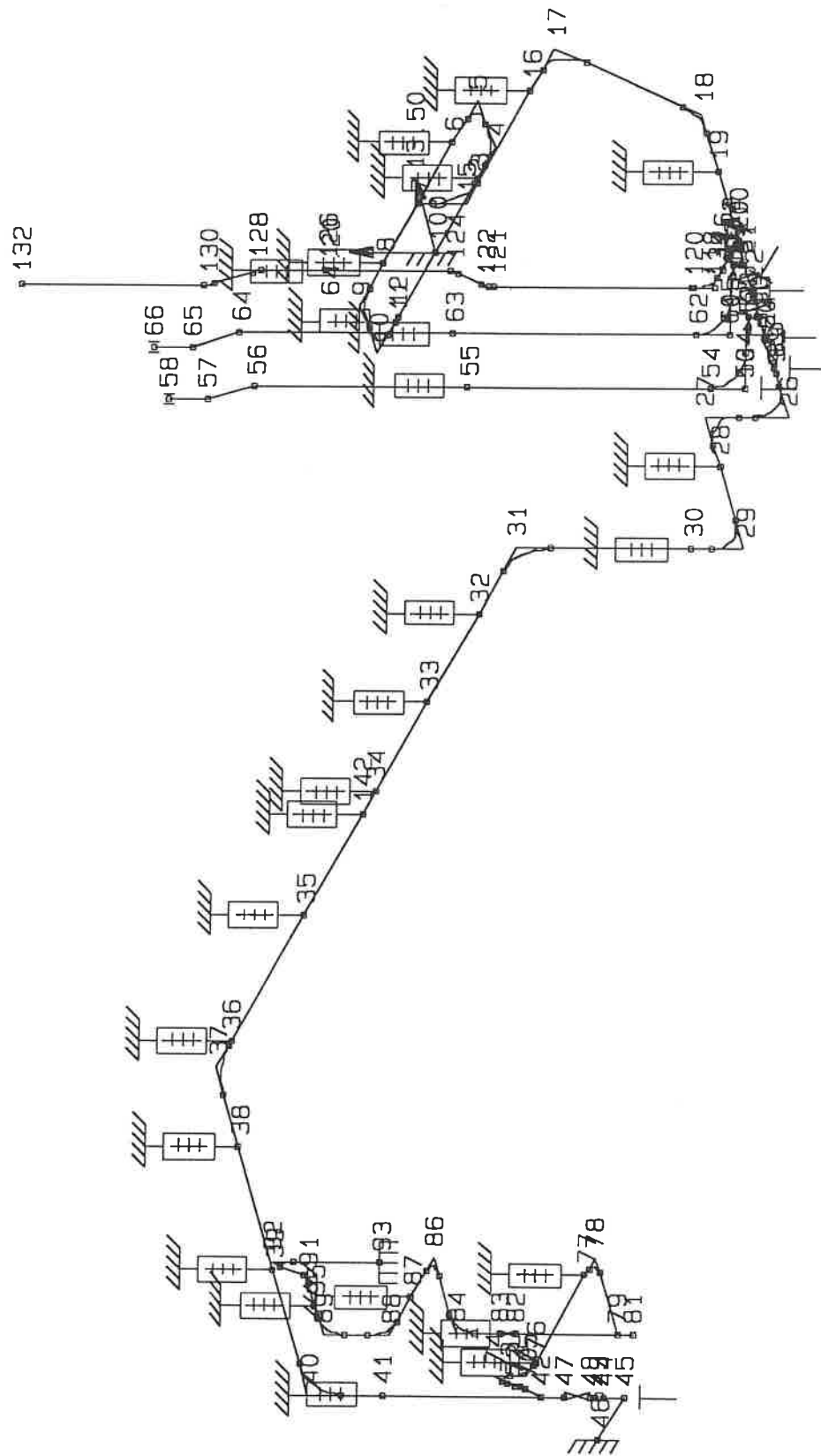
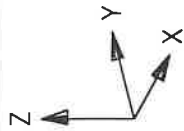
OD (mm)	Thk (mm)	Weight (kg)	Count	Total weight (kg)
108.0	10.0	160	1	160
108.0	10.0	180	1	180
108.0	16.0	100	1	100
108.0	16.0	150	1	150
133.0	10.0	30	4	120
133.0	16.0	158	1	158
273.0	25.0	1000	1	1000
273.0	32.0	1000	1	1000

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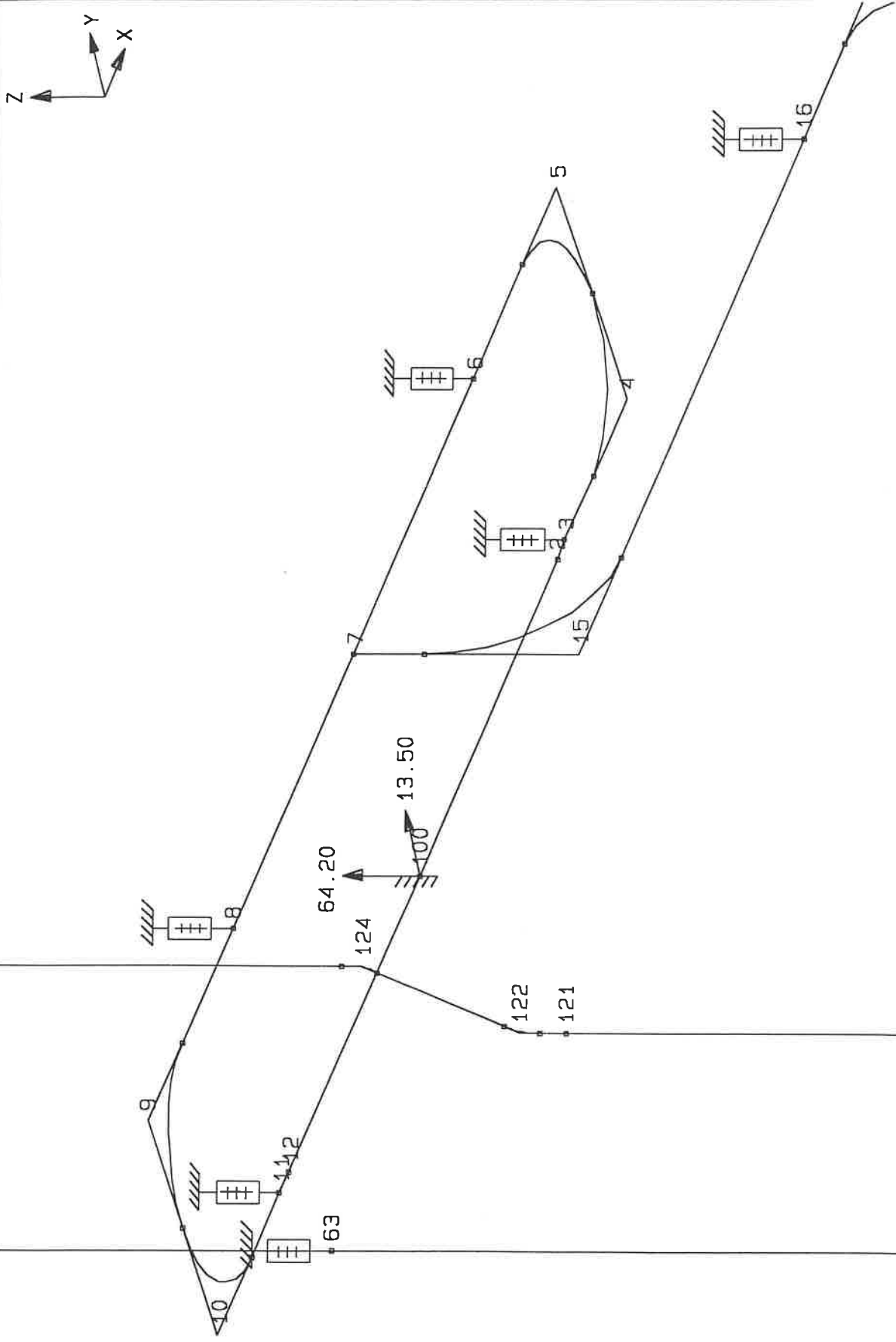
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Specified displacements (mm) (deg)



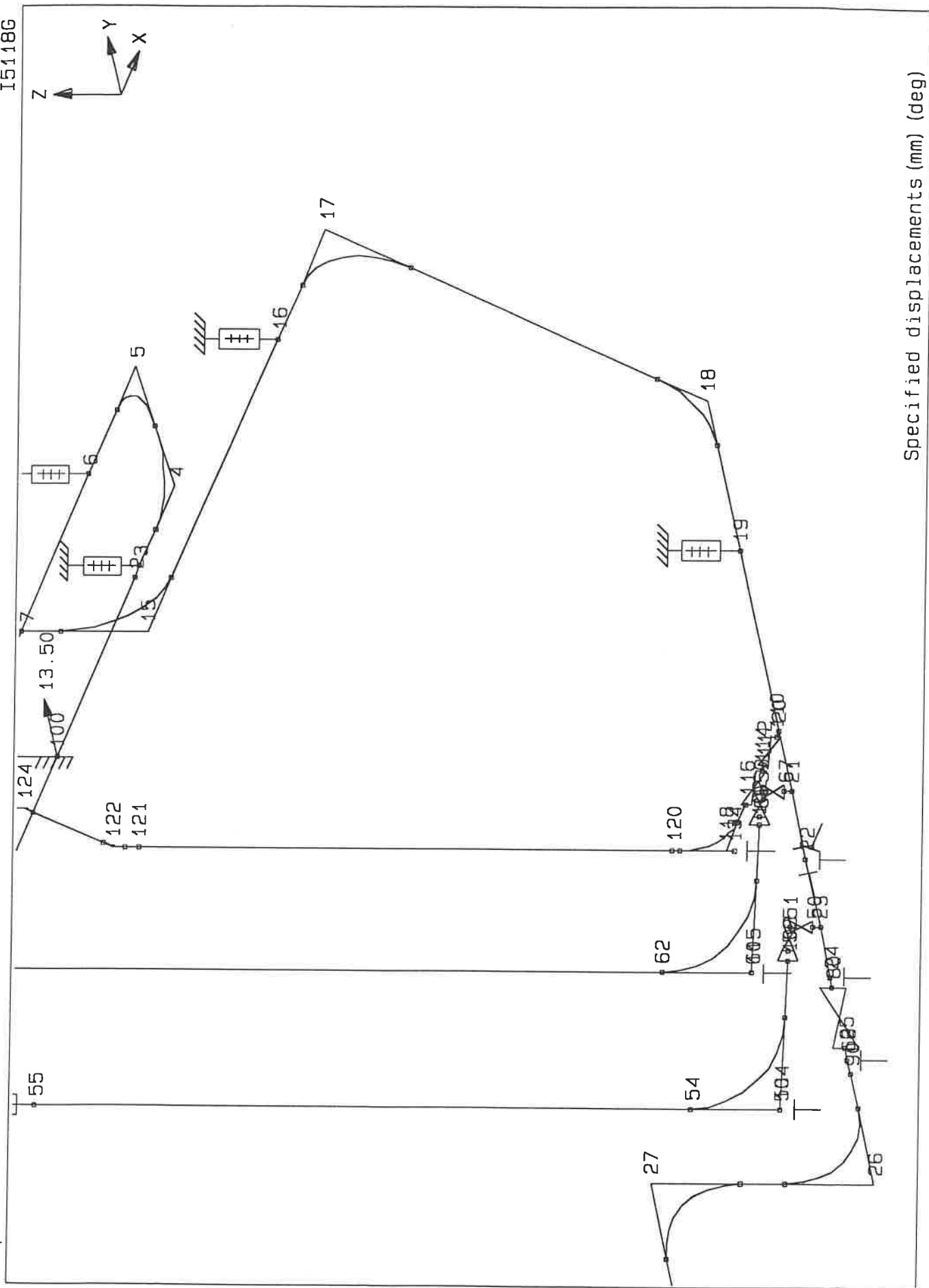
Specified displacements (mm) (deg)



Specified displacements (mm) (deg)

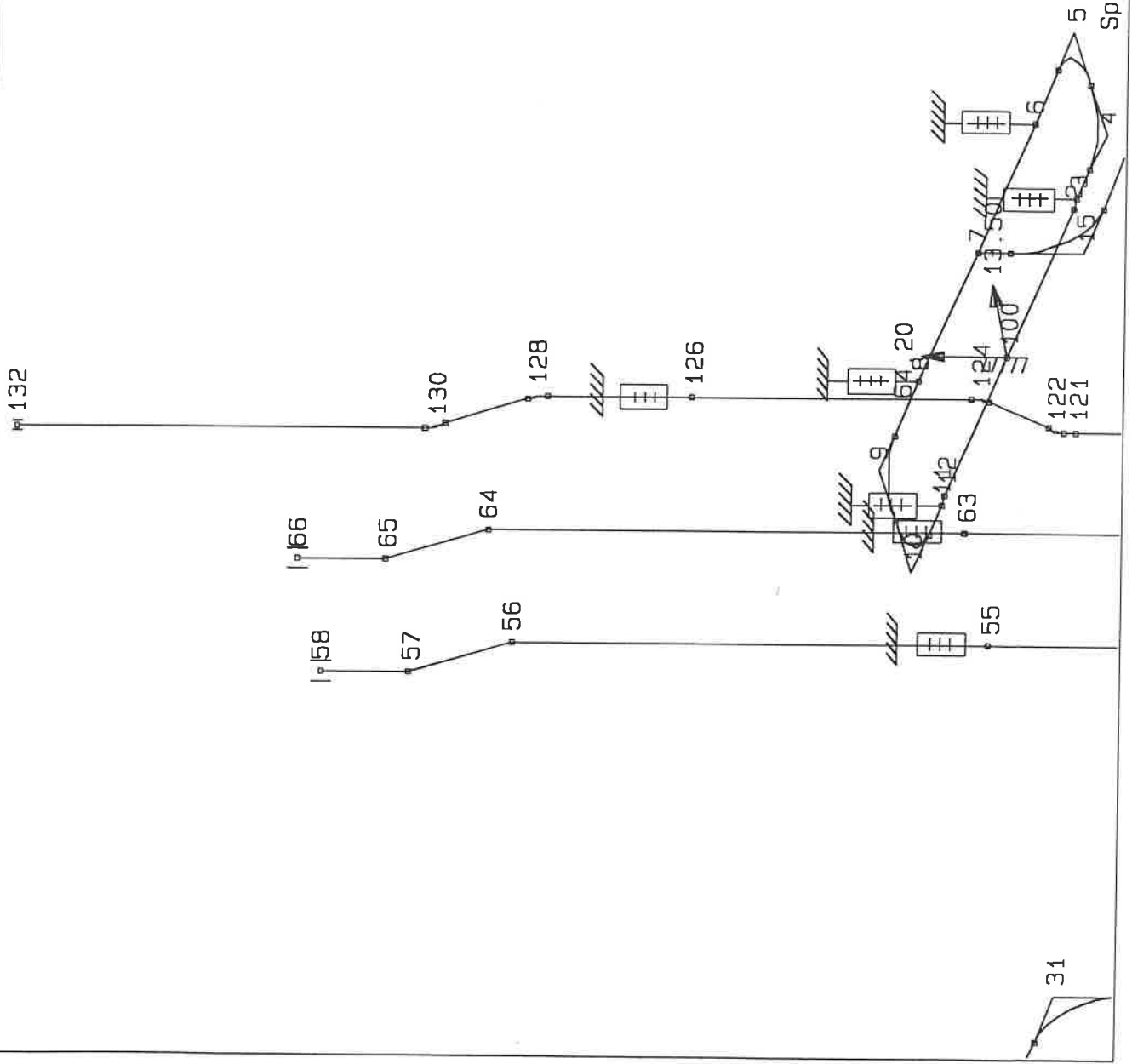
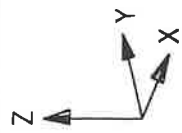
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151186



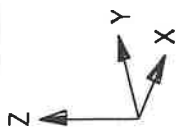
VT para

I51186



VT para

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62

120

118

134

605

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102 60

116

59

112

119

21

22

23

103 52

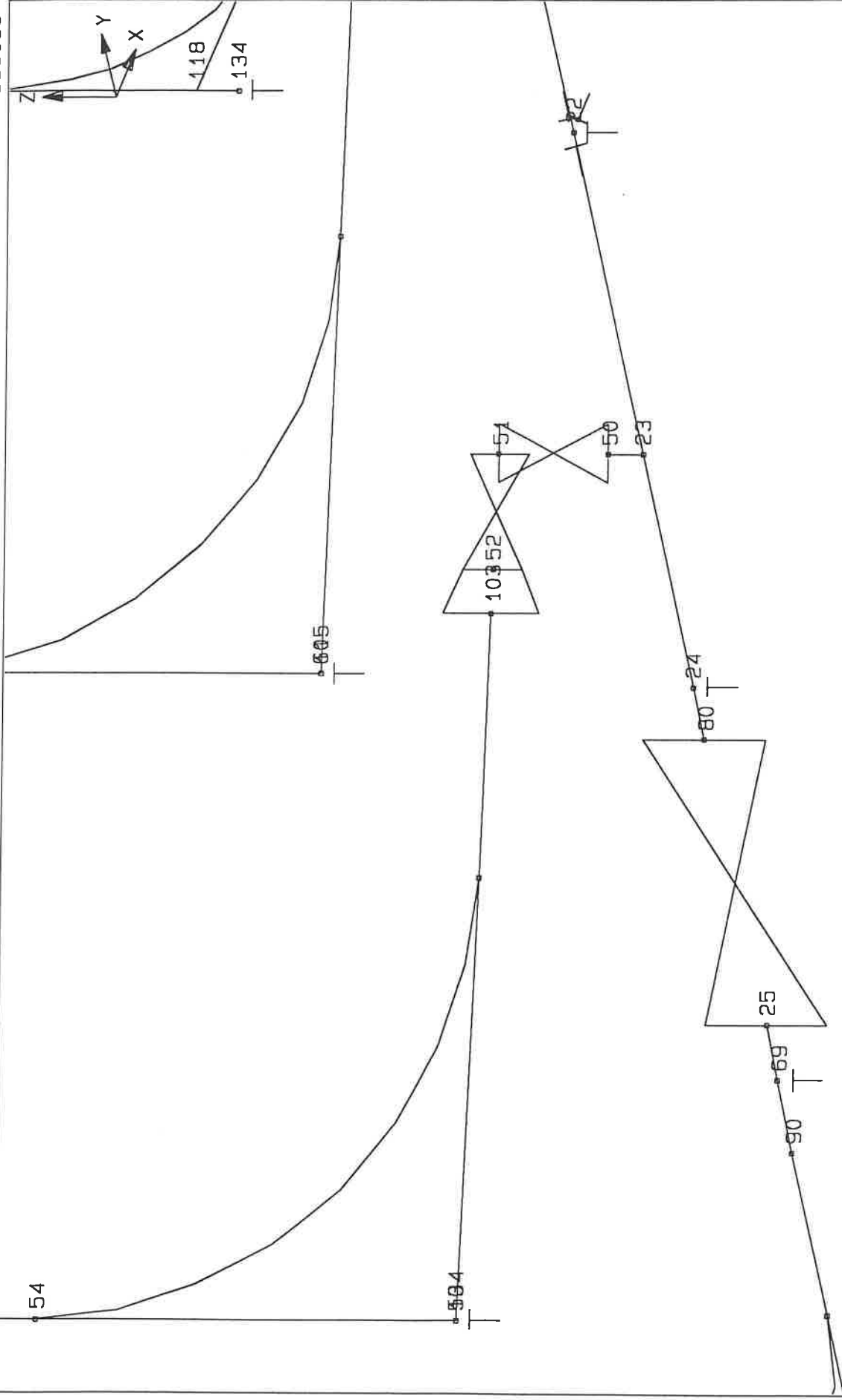
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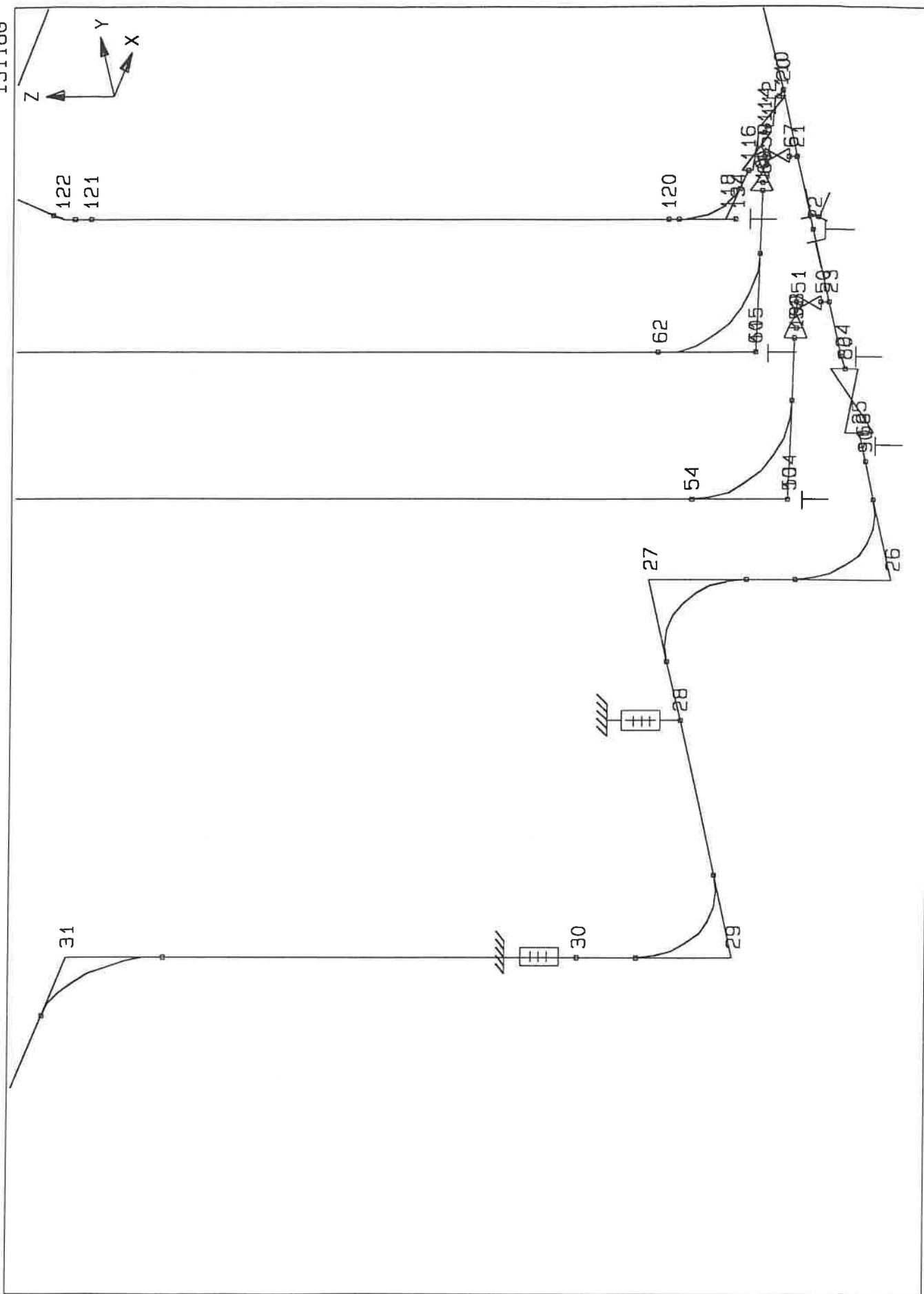
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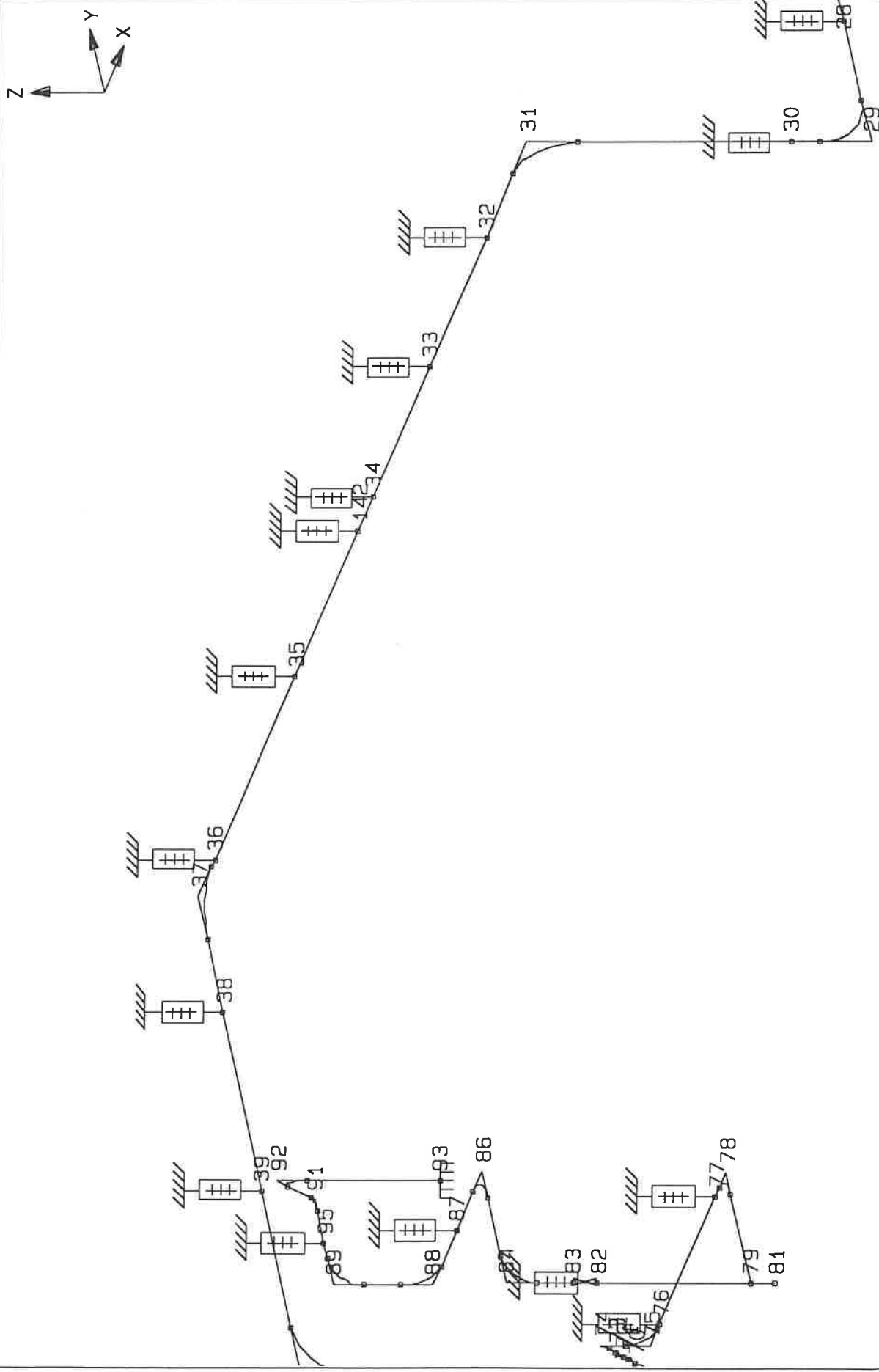
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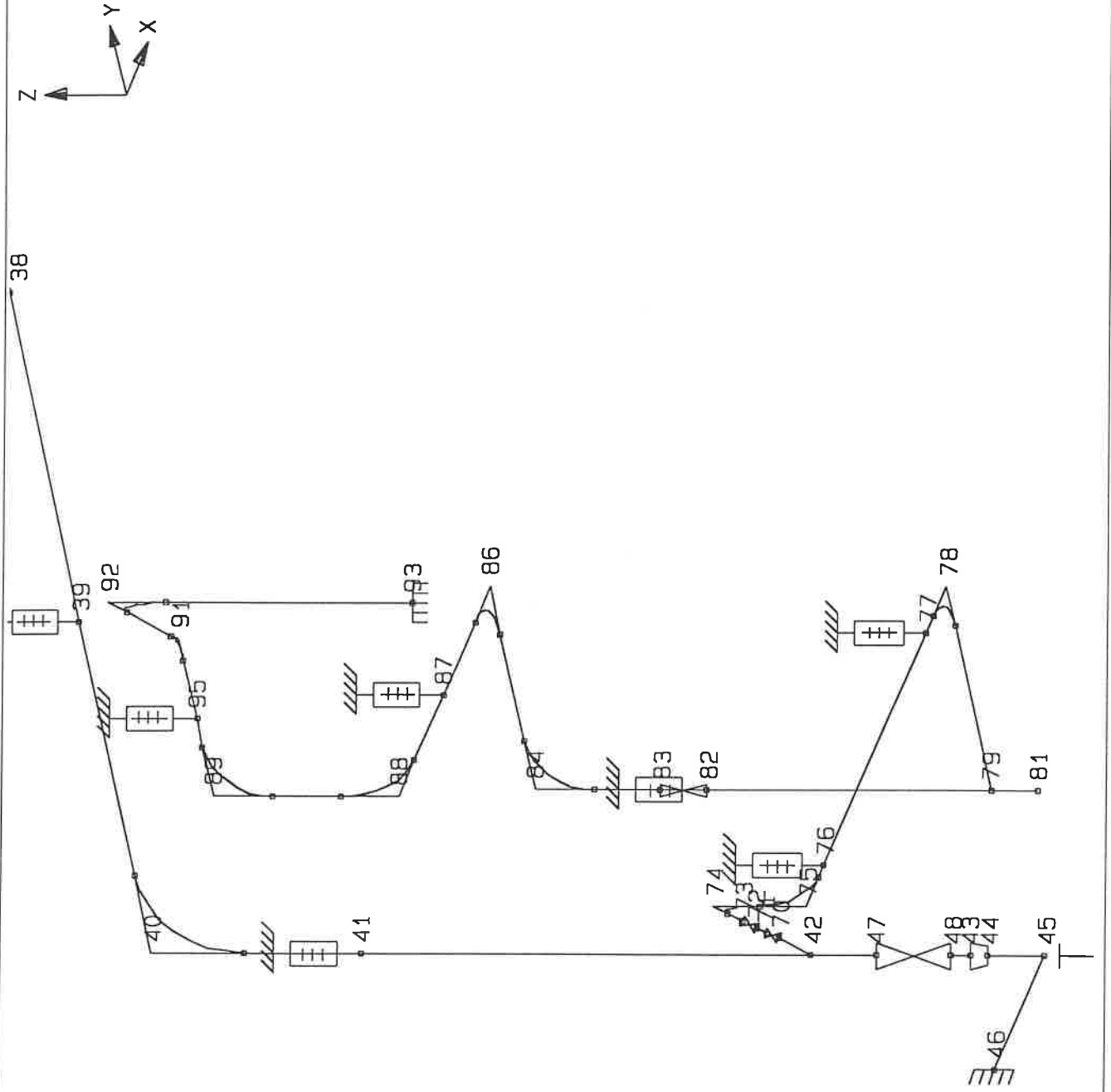
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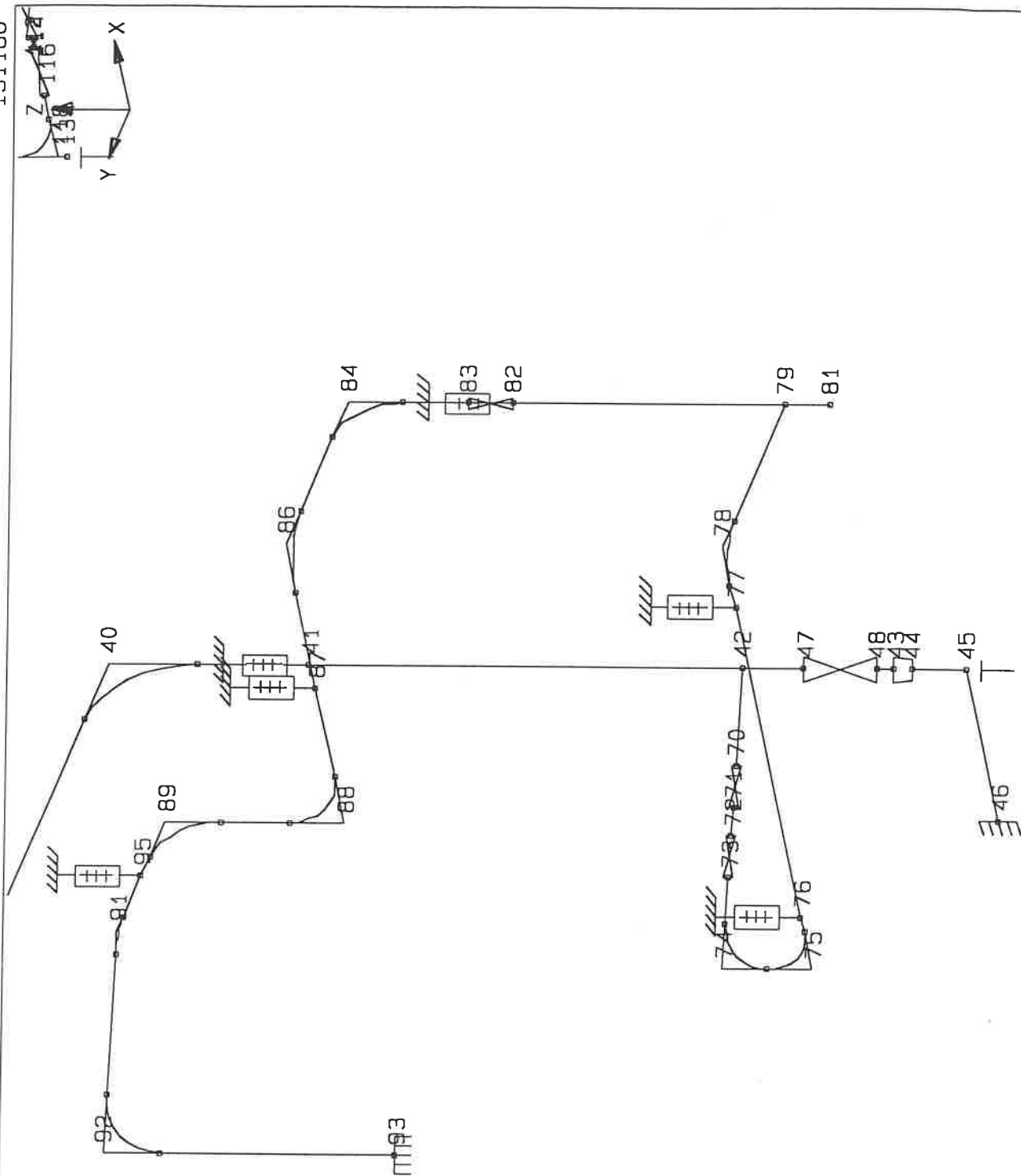
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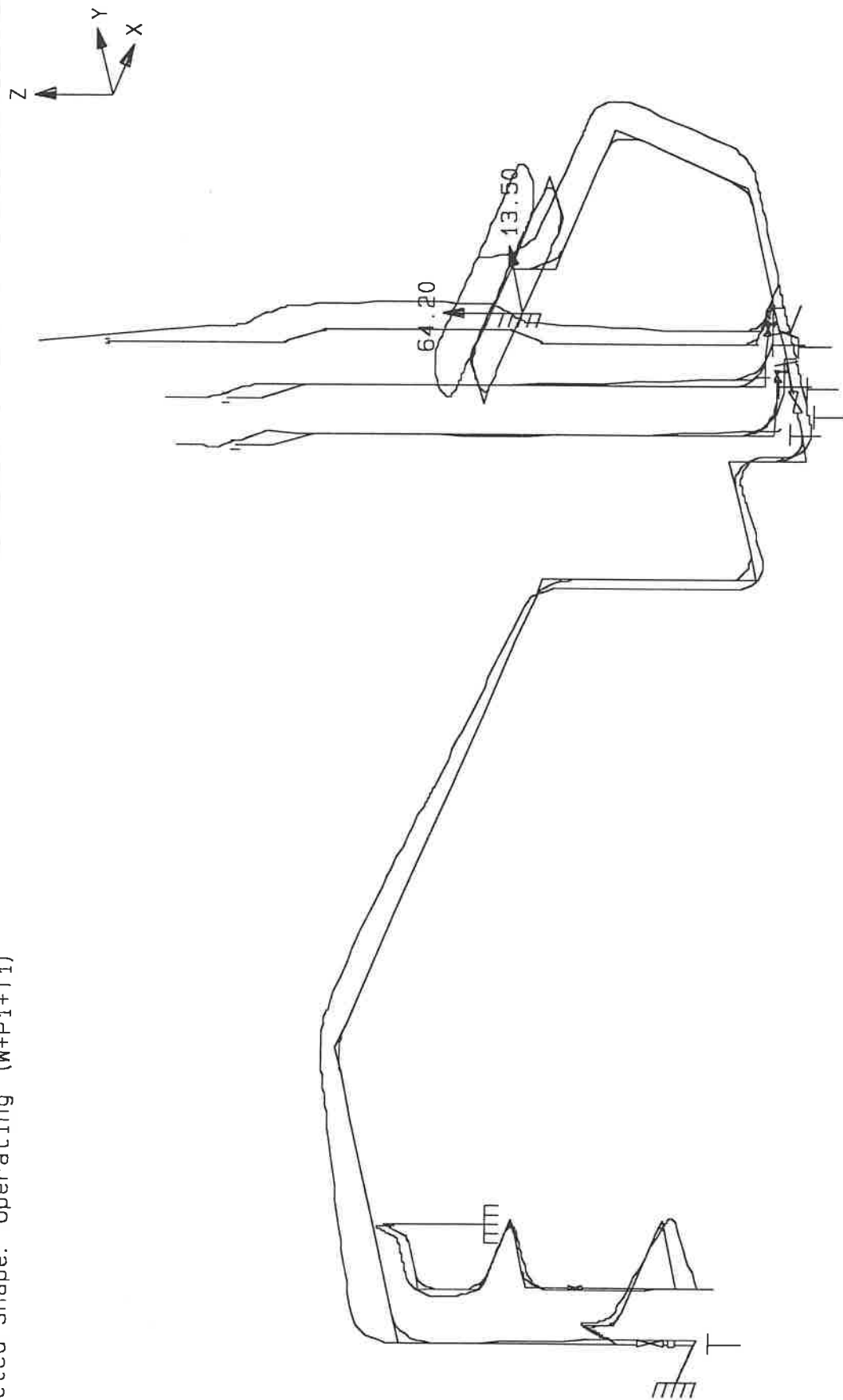
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VT para

Deflected shape: Operating (W+P1+T1)

TURN I51186



Specified displacements (mm) (deg)