

Angle- tension tower type 1TAS-L2 explanatory note

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1 Field suspension support

This document includes specifications for designing parameters, manufacturing, installation for 110 kV 1TAS-L2-type angle tension.

Support 1TAS-L2 is angle tension support. It can be used as normal tension support for line angles up to 90° or dead-end or anti cascade support for line angles up to 90°.

Support heights to lowest 110 kV crossarm are 9; 14; 19; 24 meters. Weight of highest tower is 9,5 t.

Support designation is done according to the following rules:

- Voltage
 - o 1- 110 kV
- Support type
 - o T - tension
- Support geometry
 - o A-type support – A
 - o S - support
- Separator
- L2 – lattice and tower strength classification
- 110 kV crossarm height
- Separator

Example: 1TAS-L2_24

1.1 Support 1TAS maximum span lengths and line angles

Line angle 0°	1TAS-L2 all heights
Ruling span	350 m
Wind span	350 m
Weight span	395 m

2 Design parameters

2.1 Designing standards

Overhead electrical lines exceeding AC 1 kV - Part 1: General requirements - Common specifications EVS-EN 50341-1:2013

Overhead electrical lines exceeding AC 1 kV - Part 2-20: National Normative Aspects (NNA) for ESTONIA (based on EN 50341-1:2012) EVS-EN 50341-2-20:2015

Elering AS design requirements 701 „Projekteerimine“

Elering AS construction requirements 702 „Ehitamine“

Elering AS materials requirements 703 „Materjalid“

2.2 Technical parameters for designing

Reliability class	2
Terrain type	II
Reference wind speed V_b	21 m/s
Reference ice thickness T_{ice}	10 mm
Ice density ρ_{ice}	900 kg/m ³

2.3 Security loads

Supports all security load / broken conductor loads are calculated according to the Elering AS design requirements (701 „Projekteerimine“).

On a normal angle tension support wires of one phases or earth wire are broken in one span and all other phases and earth wires are intact.

On an anti-cascade support wires of all phases and earth wires are broken in one span and all phases and earth wires in second span are intact.

2.4 Temperatures

Reference temperature	+5 °C
Maximum ambient temperature	+35 °C
Maximum conductor temperature	+80 °C
Maximum earth wire temperature	+40 °C
Minimum temperature	-40 °C
Temperature at construction cases	-15 °C
Temperature at security cases	-5 °C
Temperature at all other cases	-5 °C

2.5 Phase conductors and earth wires

Phase conductor types:

- 110 kV 3x2x 242-AL1/39-ST1A "Hawk" EDS up to 65 N/mm²

Earth wire type:

- ASLH-V(2S)bb 96 SMF (AL3/A20SA 138/26) EDS up to 90 N/mm²

3 Material and quality requirements for supports

3.1 General

Manufacturer of the support structures shall have factory production control system (FPC) according to the EVS-EN 1090-1 incorporated into the production.

The manufacturing of the steel structures shall be carried out according to the rules set out in the standard EVS-EN 1090-2 and in the reference standards (EN ISO) listed in EVS-EN 1090-2 related to material procurement, execution of works and inspection.

Required execution class for the structures is EXC2. Corresponding requirements for execution can be found in EVS-EN 1090-2 Annex A.3.

3.2 Steel grades

The steel grades and qualities used in the structures shall comply with the standard EVS-EN 10025 for plates and profiles the normal grade is S355.

The steel qualities are:

- Angle bars: S355J0,
- Plates: S355J2.

3.3 Surface finishing

The galvanizing shall be made according to standard EVS-EN ISO 1461.

- Details with thickness of 3 to 6 mm – minimum 85 µm, average 95±5 µm,
- Details with thickness more than 6 mm - minimum 100 µm, average 115±5 µm.

3.4 Bolts, nuts and washers

Structural bolting assemblies for non-preloaded joints shall conform to EN 15048-1.

Nuts and bolt heads shall be of hexagonal type. The dimensions of the hexagonal bolts (except U-bolts) shall be in accordance with EVS-EN ISO 4014 or DIN 7990. In shear connections the shear force is transmitted through the unthreaded shank of the bolt.

The bolts shall have the minimum mechanical properties specified for property class 8.8 in EVS-EN ISO 898-1.

The dimensions of the nuts shall be in accordance with EVS-EN ISO 4032. The mechanical properties of the nuts shall meet the minimum requirements specified for property class 8 in EVS-EN ISO 898-2 and shall be also in conformity with the strength of the bolt material.

All bolts, nuts and washers shall be hot dip galvanized in accordance with EVS-EN ISO 10684. The minimum thickness of the zinc layer is 45±5 µm (375 g/m²).

3.5 Welding

The weldings shown on drawings shall fulfill requirements of welding class C standard EVS-EN ISO 5817 unless marked otherwise.

3.6 Tolerances

Tolerances are not marked on drawings but following principles shall be followed:

- Following tolerances can be used:
 - Nominal distance 0 – 2000 mm $\pm 1,0$ mm
 - Nominal distance 2000 – 4000 mm $\pm 1,5$ mm
 - Nominal distance >4000 mm $\pm 2,0$ mm

4 Installation

4.1 Installation materials

Installation materials are typically normal guy ropes, perfomed guy clamps, wedge type clamps, thimbles, bolts, nuts and washers.

Materials used on the structures shall comply with following specifications:

- Steel guy ropes shall be according standard EVS-EN 50189.
- Hexagonal bolts shall be of grade 8.8, nuts shall comply with this.

4.2 Pre-tightening of bolts

The pre-tightening of bolts of property class 8.8 must be carried out in normal bolted connections using torque M_v .

Table 2. Tightening torques of bolts

Bolt	Torque M_v , Nm	Tolerance, Nm
M12	55	± 10
M16	135	± 20
M20	260	± 30
M22	350	± 30
M24	440	± 40
M27	645	± 40
M30	880	± 50

In bolts or studs going through hollow sections, the tightening torque of the nuts is 20 Nm with double nuts.

Methods used for locking the bolts:

- The bolted connection must always be locked by either breaking the thread by hitting at the base of the nut or by using an extra nut.
- With bolts in tension the locking must always be carried out by using two standard nuts.

4.3 Tower erection

TSupports are designed to be erected by crane. Depending on the available equipment the support may be lifted as a whole or in multiple sections.

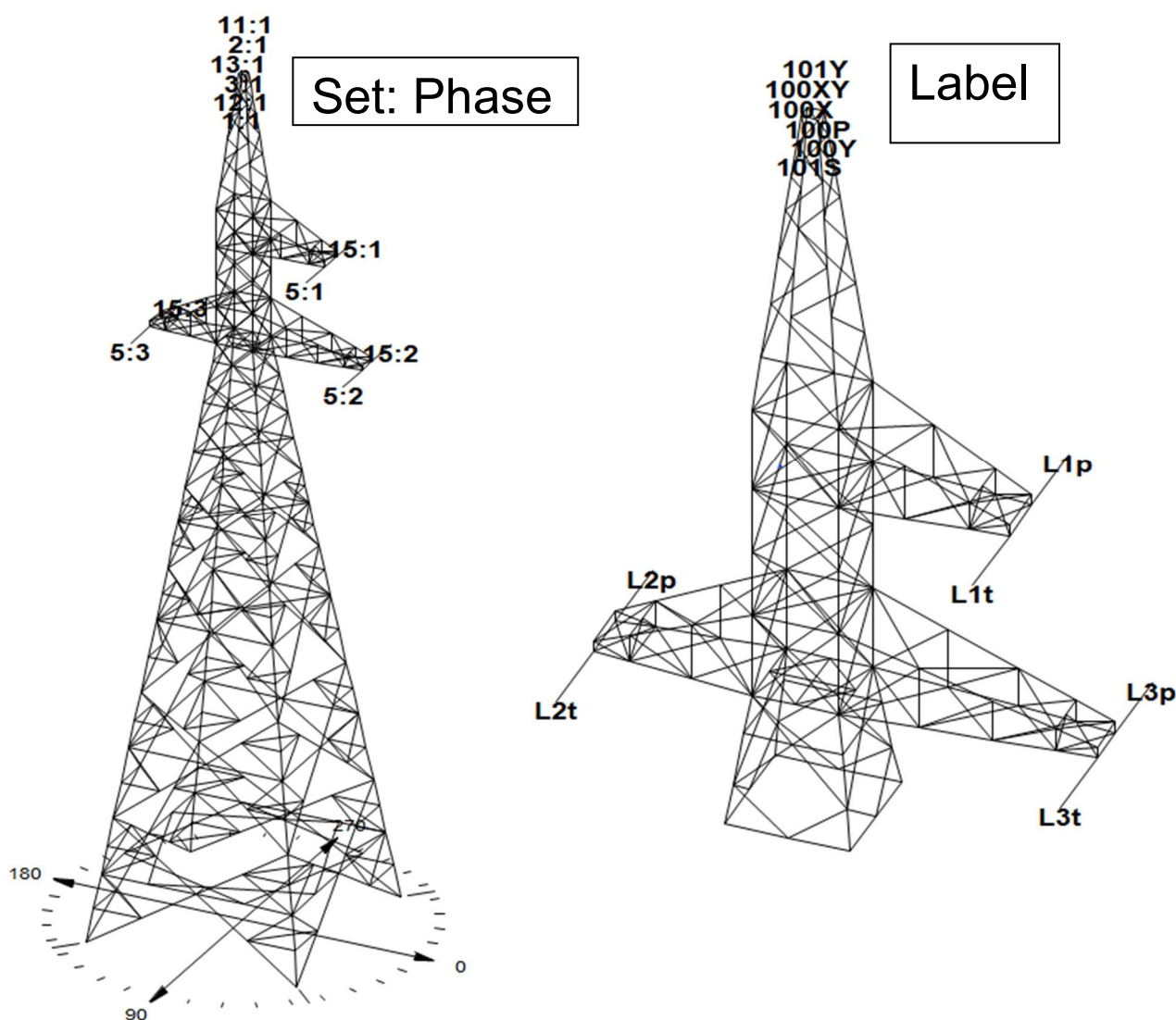
6 Calculation results

6.1 Design software

The conductor tension analyses were made by using the computer program PLSCAD, which was developed in Power Line Systems. The program is designed for the design and analyses of transmission line towers.

Tower modeling and strength analyses were made by using the computer program PLS Tower version 21.01, which was developed in Power Line Systems. The program is designed for the design and analyses of steel towers. Load cases

6.2 Force location points



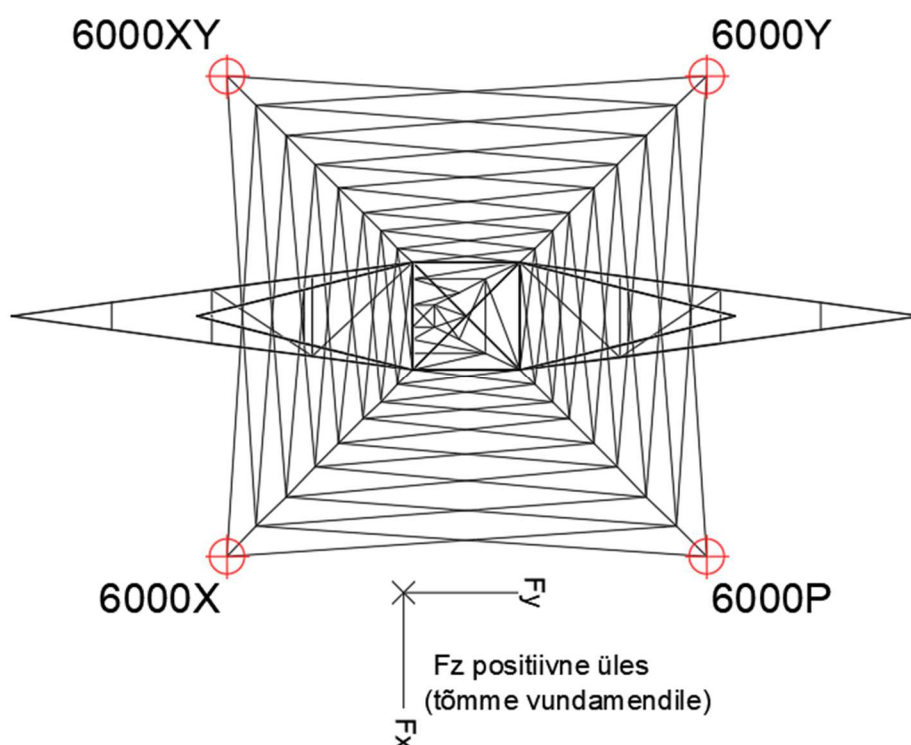
6.3 Elements group usage

Row #	Group Label	Group Desc.	Angle Type	Angle Size	Max Usage %
1	BS1_K1	Leg	EA	80x80x8	63.81
2	BS1_K2	Leg	EA	90x90x9	63.79
3	BS1_P1	Bracing	EA	50x50x5	53.94
4	BS1_P2	Bracing	EA	60x60x6	82.15
5	BS1_R1	Bracing	EA	50x50x5	49.17
6	BS1_R2	Bracing	EA	70x70x7	75.53
7	BS1_T1	Diaphragm	EA	60x60x6	72.45
8	BS1_T2	Diaphragm	EA	60x60x6	24.73
9	BS1_T3	Diaphragm	EA	50x50x5	55.25
10	BS1_T4	Diaphragm	EA	60x60x6	53.63
11	BS1_T5	Diaphragm	EA	80x80x8	68.15
12	BS1_T6	Diaphragm	EA	60x60x6	53.29
13	EW_K	Leg	EA	70x70x7	43.49
14	EW_FBr	Bracing	EA	50x50x5	64.71
15	EW_TBr	Bracing	EA	50x50x5	13.49
16	BS2_K	Leg	EA	100x100x10	90.86
17	BS2_P0	Bracing	EA	90x90x9	90.23
18	BS2_P1	Bracing	EA	80x80x8	94.97
19	BS2_P2	Bracing	EA	70x70x7	68.40
20	BS2_R0	Bracing	EA	90x90x9	62.81
21	BS2_R1	Bracing	EA	80x80x8	77.87
22	BS2_R2	Bracing	EA	70x70x7	62.67
23	BS2_PR1	Redundant	EA	50x50x5	24.48
24	BS2_RR1	Redundant	EA	50x50x5	30.36
25	BS2_T1	Diaphragm	EA	60x60x6	6.54
26	BS2_T2	Diaphragm	EA	50x50x5	1.98
27	CA1_BB	Bottom beam	EA	70x70x7	76.31
28	CA1_TB	Top beam	EA	60x60x6	57.61
29	CA1_BBr1	Bottom bracing	EA	50x50x5	77.77
30	CA1_BBr2	Bottom bracing	EA	50x50x5	12.07
31	CA1_TBr1	Top bracing	EA	60x60x6	46.24
32	CA1_TBr2	Top bracing	EA	60x60x6	61.05
33	CA1_TBr3	Top bracing	EA	50x50x5	59.02

34	CA1_EB	End beam	EA	100x100x10	61.26
35	CA1_FBr1	Front bracing	EA	50x50x5	29.42
36	CA1_Br	Diagonal bracing	EA	50x50x5	40.00
37	CA2_BB	Bottom beam	EA	80x80x8	80.88
38	CA2_TB	Top beam	EA	70x70x7	26.51
39	CA2_BBr1	Bottom bracing	EA	50x50x5	67.35
40	CA2_BBr2	Bottom bracing	EA	50x50x5	0.00
41	CA2_TBr1	Top bracing	EA	60x60x6	2.79
42	CA2_TBr2	Top bracing	EA	60x60x6	2.02
43	CA2_TBr3	Top bracing	EA	50x50x5	1.76
44	CA2_EB	End beam	EA	100x100x10	58.53
45	CA2_FBr1	Front bracing	EA	50x50x5	27.34
46	CA2_Br	Diagonal bracing	EA	50x50x5	1.81
47	BS3_K	Leg	EA	120x120x10	87.87
48	BS3_P1	Bracing	EA	70x70x7	67.06
49	BS3_P2	Bracing	EA	70x70x7	41.64
50	BS3_R1	Bracing	EA	70x70x7	60.09
51	BS3_R2	Bracing	EA	70x70x7	42.46
52	BS3_PR1	Redundant	EA	50x50x5	24.23
53	BS3_PR2	Redundant	EA	60x60x6	22.65
54	BS3_RR1	Redundant	EA	50x50x5	27.99
55	BS3_RR2	Redundant	EA	60x60x6	23.99
56	BS3_T1	Diaphragm	EA	50x50x5	0.00
57	BS3_T2	Diaphragm	EA	60x60x6	1.70
58	BS3_T3	Diaphragm	EA	50x50x5	0.00
59	BS3_T4	Diaphragm	EA	70x70x7	0.80
60	BS4_K	Leg	EA	120x120x10	90.15
61	BS4_P1	Bracing	EA	80x80x8	37.83
62	BS4_R1	Bracing	EA	80x80x8	26.20
63	BS4_PR1	Redundant	EA	50x50x5	24.56
64	BS4_PR2	Redundant	EA	60x60x6	9.18
65	BS4_RR1	Redundant	EA	50x50x5	30.03
66	BS4_RR2	Redundant	EA	60x60x6	8.43

67	BS4_T1	Diaphragm	EA	60x60x6	6.66
68	BS4_T3	Diaphragm	EA	60x60x6	1.79

6.4 Foundation forces



Row #	Load Case	Foundation Description	Axial Force (kN)	Shear Force (kN)	Resultant Force (kN)
1	Tmin,S NA+	6000P	- 291.15	66.15	298.57
2	Tmin,S NA+	6000X	353.36	83.93	363.19
3	Tmin,S NA+	6000XY	353.34	83.93	363.17
4	Tmin,S NA+	6000Y	- 291.18	66.15	298.60
5	R2 Piirtuulekoormus/Extreme wind load(1a)NA+,S NA+	6000P	- 272.87	57.95	278.95

6	R2 Piirtuulekoormus/Extreme wind load(1a)NA+,S NA+	6000X	335.38	75.79	343.84
7	R2 Piirtuulekoormus/Extreme wind load(1a)NA+,S NA+	6000XY	335.53	75.82	343.99
8	R2 Piirtuulekoormus/Extreme wind load(1a)NA+,S NA+	6000Y	- 272.72	57.92	278.81
9	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000P	- 400.72	90.39	410.79
10	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000X	476.83	111.42	489.67
11	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000XY	477.03	111.47	489.88
12	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000Y	- 400.52	90.34	410.58
13	R2 Suur tuulekoormus+nimijätekoormus/High wind load with nominal icel...,S NA+	6000P	- 316.01	69.10	323.48

14	R2 Suur tuulekoormus+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000X	382.35	87.85	392.31
15	R2 Suur tuulekoormus+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000XY	382.51	87.89	392.48
16	R2 Suur tuulekoormus+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000Y	- 315.85	69.07	323.31
17	R2 Piirtuulekoormus/Extreme wind load(1a)NA-,S NA-	6000P	- 452.40	107.53	465.00
18	R2 Piirtuulekoormus/Extreme wind load(1a)NA-,S NA-	6000X	514.98	125.39	530.02
19	R2 Piirtuulekoormus/Extreme wind load(1a)NA-,S NA-	6000XY	515.06	125.41	530.11
20	R2 Piirtuulekoormus/Extreme wind load(1a)NA-,S NA-	6000Y	- 452.32	107.51	464.92
21	R2 Piirjäitekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000P	- 486.62	112.93	499.56
22	R2 Piirjäitekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000X	562.76	133.97	578.49

23	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000XY	562.93	134.01	578.66
24	R2 Piirjätekoormus+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000Y	- 486.45	112.89	499.38
25	R2 Suur tuulekoormus+nimijätekoormus/High wind load with nominal icel...,S NA-	6000P	- 461.66	108.42	474.22
26	R2 Suur tuulekoormus+nimijätekoormus/High wind load with nominal icel...,S NA-	6000X	528.05	127.17	543.15
27	R2 Suur tuulekoormus+nimijätekoormus/High wind load with nominal icel...,S NA-	6000XY	528.16	127.20	543.26
28	R2 Suur tuulekoormus+nimijätekoormus/High wind load with nominal icel...,S NA-	6000Y	- 461.55	108.39	474.10
29	TA R2E Broken Ahead/Back earthwire 11.1 NA+,S NA+	6000P	- 247.19	57.19	253.72
30	TA R2E Broken Ahead/Back earthwire 11.1 NA+,S NA+	6000X	357.74	85.09	367.73
31	TA R2E Broken Ahead/Back earthwire 11.1 NA+,S NA+	6000XY	312.28	75.65	321.31

32	TA R2E Broken Ahead/Back earthwire 11.1 NA+,S NA+	6000Y	- 292.65	66.64	300.14
33	TA R2E Broken Ahead/Back Set 15.1 NA+,S NA+	6000P	- 190.17	43.85	195.16
34	TA R2E Broken Ahead/Back Set 15.1 NA+,S NA+	6000X	358.27	85.30	368.29
35	TA R2E Broken Ahead/Back Set 15.1 NA+,S NA+	6000XY	253.17	61.49	260.53
36	TA R2E Broken Ahead/Back Set 15.1 NA+,S NA+	6000Y	- 295.23	67.14	302.77
37	TA R2E Broken Ahead/Back Set 15.2 NA+,S NA+	6000P	- 205.60	45.90	210.66
38	TA R2E Broken Ahead/Back Set 15.2 NA+,S NA+	6000X	358.77	85.45	368.81
39	TA R2E Broken Ahead/Back Set 15.2 NA+,S NA+	6000XY	268.67	63.57	276.09
40	TA R2E Broken Ahead/Back Set 15.2 NA+,S NA+	6000Y	- 295.81	67.83	303.49
41	TA R2E Broken Ahead/Back Set 15.3 NA+,S NA+	6000P	- 202.88	45.06	207.82
42	TA R2E Broken Ahead/Back Set 15.3 NA+,S NA+	6000X	355.34	84.76	365.31
43	TA R2E Broken Ahead/Back Set 15.3 NA+,S NA+	6000XY	265.93	63.20	273.34
44	TA R2E Broken Ahead/Back Set 15.3 NA+,S NA+	6000Y	- 292.25	66.73	299.77

45	TA R2E Broken ahead/back earthwire 1.1 NA+,S NA+	6000P	- 292.72	66.65	300.21
46	TA R2E Broken ahead/back earthwire 1.1 NA+,S NA+	6000X	312.21	75.63	321.24
47	TA R2E Broken ahead/back earthwire 1.1 NA+,S NA+	6000XY	357.81	85.11	367.80
48	TA R2E Broken ahead/back earthwire 1.1 NA+,S NA+	6000Y	- 247.12	57.17	253.64
49	TA R2E Broken Ahead/Back Set 5.1 NA+,S NA+	6000P	- 295.30	67.15	302.84
50	TA R2E Broken Ahead/Back Set 5.1 NA+,S NA+	6000X	253.11	61.48	260.47
51	TA R2E Broken Ahead/Back Set 5.1 NA+,S NA+	6000XY	358.35	85.32	368.36
52	TA R2E Broken Ahead/Back Set 5.1 NA+,S NA+	6000Y	- 190.10	43.84	195.09
53	TA R2E Broken Ahead/Back Set 5.2 NA+,S NA+	6000P	- 295.90	67.85	303.57
54	TA R2E Broken Ahead/Back Set 5.2 NA+,S NA+	6000X	268.61	63.56	276.03
55	TA R2E Broken Ahead/Back Set 5.2 NA+,S NA+	6000XY	358.86	85.48	368.90
56	TA R2E Broken Ahead/Back Set 5.2 NA+,S NA+	6000Y	- 205.54	45.88	210.59

57	TA R2E Broken Ahead/Back Set 5.3 NA+,S NA+	6000P	- 292.26	66.74	299.78
58	TA R2E Broken Ahead/Back Set 5.3 NA+,S NA+	6000X	265.83	63.18	273.23
59	TA R2E Broken Ahead/Back Set 5.3 NA+,S NA+	6000XY	355.34	84.77	365.31
60	TA R2E Broken Ahead/Back Set 5.3 NA+,S NA+	6000Y	- 202.79	45.04	207.73
61	TA R2E Broken Ahead/Back earthwire 11.1 NA-,S NA-	6000P	- 247.19	57.19	253.72
62	TA R2E Broken Ahead/Back earthwire 11.1 NA-,S NA-	6000X	357.74	85.09	367.73
63	TA R2E Broken Ahead/Back earthwire 11.1 NA-,S NA-	6000XY	312.28	75.65	321.31
64	TA R2E Broken Ahead/Back earthwire 11.1 NA-,S NA-	6000Y	- 292.65	66.64	300.14
65	TA R2E Broken Ahead/Back Set 15.1 NA-,S NA-	6000P	- 190.17	43.85	195.16
66	TA R2E Broken Ahead/Back Set 15.1 NA-,S NA-	6000X	358.27	85.30	368.29
67	TA R2E Broken Ahead/Back Set 15.1 NA-,S NA-	6000XY	253.17	61.49	260.53
68	TA R2E Broken Ahead/Back Set 15.1 NA-,S NA-	6000Y	- 295.23	67.14	302.77

69	TA R2E Broken Ahead/Back Set 15.2 NA-,S NA-	6000P	- 205.60	45.90	210.66
70	TA R2E Broken Ahead/Back Set 15.2 NA-,S NA-	6000X	358.77	85.45	368.81
71	TA R2E Broken Ahead/Back Set 15.2 NA-,S NA-	6000XY	268.67	63.57	276.09
72	TA R2E Broken Ahead/Back Set 15.2 NA-,S NA-	6000Y	- 295.81	67.83	303.49
73	TA R2E Broken Ahead/Back Set 15.3 NA-,S NA-	6000P	- 202.88	45.06	207.82
74	TA R2E Broken Ahead/Back Set 15.3 NA-,S NA-	6000X	355.34	84.76	365.31
75	TA R2E Broken Ahead/Back Set 15.3 NA-,S NA-	6000XY	265.93	63.20	273.34
76	TA R2E Broken Ahead/Back Set 15.3 NA-,S NA-	6000Y	- 292.25	66.73	299.77
77	TA R2E Broken Ahead/Back earthwire 1.1 NA-,S NA-	6000P	- 292.72	66.65	300.21
78	TA R2E Broken Ahead/Back earthwire 1.1 NA-,S NA-	6000X	312.21	75.63	321.24
79	TA R2E Broken Ahead/Back earthwire 1.1 NA-,S NA-	6000XY	357.81	85.11	367.80
80	TA R2E Broken Ahead/Back earthwire 1.1 NA-,S NA-	6000Y	- 247.12	57.17	253.64

81	TA R2E Broken Ahead/Back Set 5.1 NA-,S NA-	6000P	- 295.30	67.15	302.84
82	TA R2E Broken Ahead/Back Set 5.1 NA-,S NA-	6000X	253.11	61.48	260.47
83	TA R2E Broken Ahead/Back Set 5.1 NA-,S NA-	6000XY	358.35	85.32	368.36
84	TA R2E Broken Ahead/Back Set 5.1 NA-,S NA-	6000Y	- 190.10	43.84	195.09
85	TA R2E Broken Ahead/Back Set 5.2 NA-,S NA-	6000P	- 295.90	67.85	303.57
86	TA R2E Broken Ahead/Back Set 5.2 NA-,S NA-	6000X	268.61	63.56	276.03
87	TA R2E Broken Ahead/Back Set 5.2 NA-,S NA-	6000XY	358.86	85.48	368.90
88	TA R2E Broken Ahead/Back Set 5.2 NA-,S NA-	6000Y	- 205.54	45.88	210.59
89	TA R2E Broken Ahead/Back Set 5.3 NA-,S NA-	6000P	- 292.26	66.74	299.78
90	TA R2E Broken Ahead/Back Set 5.3 NA-,S NA-	6000X	265.83	63.18	273.23
91	TA R2E Broken Ahead/Back Set 5.3 NA-,S NA-	6000XY	355.34	84.77	365.31
92	TA R2E Broken Ahead/Back Set 5.3 NA-,S NA-	6000Y	- 202.79	45.04	207.73
93	E2 Tmin,S NA+	6000P	- 291.15	66.15	298.57
94	E2 Tmin,S NA+	6000X	353.36	83.93	363.19
95	E2 Tmin,S NA+	6000XY	353.34	83.93	363.17
96	E2 Tmin,S NA+	6000Y	- 291.18	66.15	298.60

97	E2 Piirtuul/Extreme wind load(1a)NA+,S NA+	6000P	115.74	33.41	120.47
98	E2 Piirtuul/Extreme wind load(1a)NA+,S NA+	6000X	371.47	84.35	380.93
99	E2 Piirtuul/Extreme wind load(1a)NA+,S NA+	6000XY	-60.72	21.55	64.43
100	E2 Piirtuul/Extreme wind load(1a)NA+,S NA+	6000Y	- 316.49	69.74	324.08
101	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000P	76.58	24.46	80.39
102	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000X	498.75	116.98	512.29
103	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000XY	-14.73	13.61	20.05
104	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA+	6000Y	- 436.95	99.86	448.22
105	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000P	101.40	29.59	105.63
106	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000X	416.50	96.09	427.44

107	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000XY	-44.46	17.63	47.82
108	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA+	6000Y	- 359.60	80.58	368.52
109	E2 Piirtuule/Extreme wind load(1a)NA-,S NA-	6000P	-55.71	21.43	59.69
110	E2 Piirtuule/Extreme wind load(1a)NA-,S NA-	6000X	475.04	116.87	489.21
111	E2 Piirtuule/Extreme wind load(1a)NA-,S NA-	6000XY	110.73	31.77	115.20
112	E2 Piirtuule/Extreme wind load(1a)NA-,S NA-	6000Y	- 420.06	100.17	431.84
113	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000P	-6.62	15.19	16.57
114	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000X	533.30	127.78	548.40
115	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000XY	68.47	21.46	71.75
116	E2 Piirjäte+nimituulekoormus/Extreme iceload with nominal wind...,S NA-	6000Y	- 471.50	109.98	484.16

117	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA-	6000P	-38.58	17.69	42.44
118	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA-	6000X	489.01	118.82	503.24
119	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA-	6000XY	95.52	27.55	99.41
120	E2 Suur tuule+nimijäitekoormus/High wind load with nominal icel...,S NA-	6000Y	- 432.11	101.88	443.96