Truss calculation performed with computer program Pamir

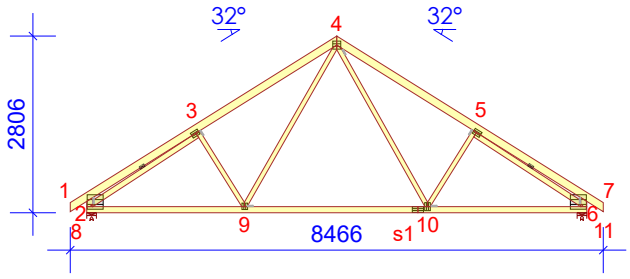
Version: 8.1 SR2 (96816988)
Program developed by: MiTek Europe

Calculation performed by

Ilkeston

Project ID

Project code	:	T01
Client	:	Talo Elements Ltd
	:	Strata 360
	:	Dunstone Road, Chesterfield, Derbyshire, S41 9FG
	:	
Job number	:	Q57951AR
Code type number	:	T01
Drawing number	:	R2 (12 pcs)



General project parameters

Basis of structural design	EN 1990:2002
Design of timber structures	EN 1995-1-1:2004 + A2:2014 + UK-NA + PD6693-1:2012
Dead load and live load	EN 1991-1-1:2004 + UK-NA
Snow load	EN 1991-1-3:2003 + UK-NA
Wind load	EN 1991-1-4:2005 + A1:2010 + UK-NA

Manufacturing inspection	No
Service class	2 = 65% <= RH < 85%
Building category	Domestic
Load sharing factor	1.1
Spacing	1000 mm
Number of plies	1

Deviating parameters that apply to this part of the truss are specified in the "Timber parameters" table.
The shape of the truss is shown in the accompanying drawing.
Forces are calculated according to first order deflection theory.
Effect of shear deformation has been taken into account.

Standard loads

Dead load

Wall	0.150 kN/m²
Roof	0.685 kN/m²
Ceiling	0.300 kN/m²

Live load

ID	Type	Value kN/m²	Joint Number	Offset mm	Joint Number	Offset mm	Distribution mm
LL1	Bottom chord	0.250	11	-97	8	97	7748

Blanket load

Category H imposed load added for roof maintenance 0.600 kN/m²

Snow load

Snow zone:	4
Sk	0.638 kN/m²
Thermal coefficient (Ct)	1
Altitude above sea level	120 m
Overhanging snow load - Left	No
Overhanging snow load - Right	No
Snow fence - Left	No
Snow fence - Right	No

Wind load

Terrain category	Countryside
Basic wind speed	22 m/s
Distance from shore	105 km
qp(z)	0.810 kN/m²
Building width	8000 mm
Building height	7906 mm
Building length	8000 mm

Man load

Nominal top chord man load	0.900 kN
Nominal bottom chord man load	0.900 kN

Tank load

230 litre capacity over 3 frames (450.0N at frame joint)

Support reactions by load case - Vertical

Load case	11 N	8 N
Dead	4592	4592
LL1	969	969
Uniform snow	2017	2017
Snow left (μ1 left, 0μ1 right)	691	2335
Snow left 0.5 permutations	1858	2680
Snow right (μ1 right, 0μ1 left)	2335	691
Snow right 0.5 permutations	2680	1858
Wind gable all permutations	-2505	-2505
Wind front (pressure) all permutations	-2505	-2505
Wind front (suction) all permutations	-959	-959
Wind back (pressure) all permutations	-2505	-2505
Wind back (suction) all permutations	-959	-959
Wind left (pressure) all permutations	13	242
	-1929	-2097
Wind left (uplift)	-1929	-2097
Wind left (suction) all permutations	1558	1787
	-384	-552
Wind right (pressure) all permutations	242	13
	-2097	-1929
Wind right (uplift)	-2097	-1929
Wind right (suction) all permutations	1787	1558
	-552	-384
Man on top chord left	450	916
	-16	
Man on top chord right	916	450
		-16
Man on bottom chord	729	729
Blanket	2370	2370
Tank	449	451
Lifting points	0	0

Support reactions per load duration

Load duration	11 N	8 N
Permanent	4592	4592
Long-term	1417	1420
Medium-term	0	0
Short-term	3130	3596
Instantaneous	1787	1787
Total downward reaction	10926	11395
Total downward reaction (Discounting instantaneous)	9139	9608

Global deflection span

Load case type: Combined

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Ratio L/X	Deflection mm	Ratio %	LC
8-11	Winst	250	31.2	7789	679	11.5	36.9	1106:1
2-4	Wnet,fin	150	30.9	4633	561	8.3	26.8	1012:1:3
4-6	Wnet,fin	150	30.9	4633	583	8	25.8	1012:2:3
8-11	Wnet,fin	250	31.2	7789	436	17.9	57.4	1106:3
1-2	Wnet,fin	75	12	396	895	0.4	3.7	1062:3
6-7	Wnet,fin	75	12	396	903	0.4	3.7	1062:3

Local deflection span

Load case type: Combined

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
6-11	Winst	250	1	57	17345	0	0.4	1062:1
6-10	Winst	250	9.6	2396	3370	0.7	7.5	1086:1:1
9-10	Winst	250	11.6	2903	392	7.4	63.8	1106:1

Local deflection span

Load case type: Combined

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
2-9	Winst	250	9.5	2376	3066	0.8	8.2	1085:1:1
2-8	Winst	250	1	57	17339	0	0.4	1062:1
2-3	Wnet,fin	150	13	1944	2077	0.9	7.3	1012:1:3
3-4	Wnet,fin	150	17.9	2690	439	6.1	34.2	1012:1:3
4-5	Wnet,fin	150	17.8	2669	455	5.9	33.0	1012:2:3
5-6	Wnet,fin	150	13.1	1965	1926	1	7.8	1012:2:3
6-11	Wnet,fin	250	1	57	11381	0	0.6	1062:3
6-10	Wnet,fin	250	9.6	2396	2749	0.9	9.1	1062:3
9-10	Wnet,fin	250	11.6	2903	252	11.5	99.3	1106:3
2-9	Wnet,fin	250	9.5	2376	2457	1	10.2	1062:3
2-8	Wnet,fin	250	1	57	11377	0	0.6	1062:3
1-2	Wnet,fin	75	5.3	396	1500	0.3	5.1	1012:1:3
6-7	Wnet,fin	75	5.3	396	1495	0.3	5.1	1012:2:3

Max node deflection

Joints: 4 | Load case type: Combined | Support: No

Situation	Absolute mm	Negative deflection mm	Ratio %	LC
Winst	31.8	-3.7	11.7	1062:1
Wnet,fin	18	-5.7	31.5	1062:3

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	SSI %	LC No	CSI %	LC No	CSI Type
End vertical Left	2-8	35x97	TR26	145	0	1	0	1	Max. combined CSI
End vertical Right	6-11	35x97	TR26	145	0	1	0	1	Max. combined CSI
Top chord Left	1-4	35x122	TR26	300	36	503:1	75	36:2	Max. combined CSI
Bottom chord	8-11	35x97	TR26	Sheeting	48	36:4	97	36:3	Max. combined CSI
Web	4-9	35x72	TR26	None	2	36:3	30	36:3	Max. combined CSI
Web	4-10	35x72	TR26	None	2	36:3	29	36:3	Max. combined CSI
Web	3-8	35x84	TR26	1	9	36:3	80	36:3	Max. combined CSI
Web	5-11	35x84	TR26	1	9	36:3	78	36:3	Max. combined CSI
Top chord Right	4-7	35x122	TR26	300	35	503:2	73	36:4	Max. combined CSI
Web	3-9	35x72	TR26	None	2	36:3	38	503:1	Max. combined CSI
Web	5-10	35x72	TR26	None	2	36:3	39	503:2	Max. combined CSI

Partial results from design in worst load combination

γM: 1.3 | kcr: 0.67

Member Joints	Load comb.	Dist. mm	Dist. %	Depth mm	kh	Grade	kmod	Buckling length mm	Torsion length mm	Lateral buckling factor	Bending capacity factor	kv	kc	Moment kNm	Axial force N	Shear force N	Bending CSI %	Axial CSI %	Shear CSI %	Torsion CSI %	Equ.	Max CSI %
1-2	31:1	336	85	122	1.04	TR26	0.9	716x	125	-	1.19	1	-	-0.11	851	-1361	4.7	1.5	23.5	0.0	6.13	23.5
	31:1	396	100		1.04		0.9	716x	125	-	1.19	-	-	-0.19	878	-1405	8.2	1.6	0.0	0.0	6.17	9.7
10-5	36:3	1387	98	72	1.16	TR26	0.9	0	-	-	1	1	-	0.02	-2028	63	2.7	7.4	1.9	0.0	6.13	1.9
	503:2	377	27		1.16		0.9	1271y	1271	1	1	-	0.19	0.05	-2756	23	4.6	34.1	0.7	34.6	6.24	38.7
10-6	36:6	2396	100	97	1.09	TR26	0.9	153x	153	-	1.26	-	-	0.84	12063	-1405	51.9	25.2	0.0	0.0	6.17	77.1
	37:6	42	2		1.09		0.9	0	-	-	1.19	1	-	0.54	11534	1442	35.3	24.1	31.3	0.0	6.13	31.3
11-6	1	59	40	97	1.09	TR26	0.6	114x	145	-	-	-	-	0	12	0	0.0	0.1	0.0	0.0	6.1	0.1
	36:3	145	100		1.09		0.9	30x	145	-	-	-	-	0	0	0	0.0	0.0	0.0	0.0	-	0.0
2-3	36:3	0	0	122	1.04	TR26	0.9	777x	680	-	1.28	-	0.98	-1.06	-5837	1880	42.4	8.2	0.0	0.0	6.23	50.5
	36:3	27	1		1.04		0.9	0	-	-	1.28	1	-	-1.01	-5814	1844	40.3	8.2	31.8	0.0	6.13	31.8
2-9	36:3	2376	100	97	1.09	TR26	0.9	2826x	-	-	1	-	-	0.68	12133	-894	53.1	25.3	0.0	0.0	6.17	78.4
	37:1	2331	98		1.09		0.9	0	-	-	1.17	1	-	0.58	11580	-1472	38.6	24.2	31.9	0.0	6.13	31.9
3-4	36:2	1350	49	122	1.04	TR26	0.9	941y	941	0.98	1	1	0.33	0.51	-13317	31	18.2	55.9	0.6	63.0	6.24	74.1
	503:1	64	2		1.04		0.9	0	-	-	1.3	1	-	-0.77	-12350	2043	30.6	17.1	35.2	0.0	6.13	35.2
3-9	37:3	25	2	72	1.16	TR26	0.9	0	-	-	1	1	-	-0.02	-1817	-49	2.6	6.6	1.5	0.0	6.13	1.5
	503:1	1027	73		1.16		0.9	1259y	1259	1	1	-	0.19	-0.04	-2734	-16	4.0	33.3	0.5	33.6	6.24	37.3
4-10	36:3	66	2	72	1.16	TR26	0.9	0	-	-	1	1	-	-0.04	5529	51	5.4	14.7	1.5	0.0	6.13	1.5
	36:3	2900	99		1.16		0.9	2648x	2648	-	1	1	-	0.1	5529	51	13.7	14.7	1.5	0.0	6.17	28.3
4-5	36:4	1367	51	122	1.04	TR26	0.9	934y	934	0.98	1	1	0.33	0.49	-13293	-30	17.8	55.1	0.6	61.7	6.24	72.8
	503:2	2643	98		1.04		0.9	0	-	-	1.3	1	-	-0.77	-12283	-2028	30.4	17.0	35.0	0.0	6.13	35.0
5-11	36:3	41	2	84	1.12	TR26	0.9	0	-	-	1	1	-	0.26	-9710	-340	26.3	40.2	8.5	0.0	6.13	8.5
	36:3	1904	95		1.12		0.9	1801x	900	-	1	1	0.48	-0.37	-9710	-340	37.4	40.2	8.5	0.0	6.23	77.5
5-6	36:3	1938	99	122	1.04	TR26	0.9	0	-	-	1.28	1	-	-1	-6003	-1839	39.9	8.4	31.7	0.0	6.13	31.7
	36:4	1965	100		1.04		0.9	765x	688	-	1.28	-	0.98	-1.04	-6305	-1872	41.7	8.8	0.0	0.0	6.23	50.4
6-11	36:3	133	100	97	1.09	TR26	0.9	153x	153	-	-	-	-	0	0	18	0.0	0.0	0.0	0.0	-	0.0
	36:6	0	0		1.09		0.9	153x	153	-	1	-	-	-0.69	0	-12045	53.2	0.0	0.0	0.0	6.11	53.2
6-7	32:5	0	0	122	1.04	TR26	0.9	716x	125	-	1.19	-	-	-0.19	878	1405	8.2	1.6	0.0	0.0	6.17	9.7
	32:5	60	15		1.04		0.9	716x	125	-	1.19	1	-	-0.11	851	1361	4.7	1.5	23.5	0.0	6.13	23.5
8-2↓	36:1	133	100	97	1.09	TR26	0.9	153x	153	-	1	-	-	-0.69	0	12050	53.2	0.0	0.0	0.0	6.11	53.2
	36:3	133	100		1.09		0.9	153x	153	-	1	-	-	-0.66	0	11633	51.3	0.0	0.0	0.0	6.11	0.0
8-2←	1	59	40	97	1.09	TR26	0.6	114x	145	-	-	-	-	0	12	0	0.0	0.1	0.0	0.0	6.1	0.1
	36:3	0	0		1.09		0.9	114x	145	-	-	-	-	0	0	0	0.0	0.0	0.0	0.0	-	0.0
8-3	36:3	97	5	84	1.12	TR26	0.9	1782x	891	-	1	1	0.49	0.38	-9995	354	38.6	40.7	8.9	0.0	6.23	79.3
	36:3	1939	98		1.12		0.9	0	-	-	1	1	-	-0.27	-9995	354	27.0	40.7	8.9	0.0	6.13	8.9
9-10	36:3	1449	50	97	1.09	TR26	0.9	2039x	-	1	1	1	-	-1.02	8380	-648	79.1	17.5	14.1	79.1	6.17	96.5
	36:4	2861	99		1.09		0.9	0	-	-	1	1	-	0.3	8278	-2196	23.1	17.3	47.6	0.0	6.13	47.6
9-4	36:3	2889	98	72	1.16	TR26	0.9	0	-	-	1	1	-	0.04	5618	-54	5.6	14.9	1.6	0.0	6.13	1.6
	36:3	40	1		1.16		0.9	2659x	2659	-	1	1	-	-0.11	5618	-54	15.1	14.9	1.6	0.0	6.17	29.9

Fastener

Fastener Type	Make	Standard Approval Certificate
M20	MiTek United Kingdom	TRADA TE//F08550-M20 V1

Max tolerance for fastener position: 5 mm

Joint Number	Fastener Type	Size Width	Length	CSI %
2	M20	230.1	254	93
3	M20	89.7	127	91
4	M20	127.8	127	91
5	M20	89.7	127	89
6	M20	230.1	254	92
9	M20	89.7	101.6	97
10	M20	89.7	127	92
s1	M20	89.7	177.8	92