

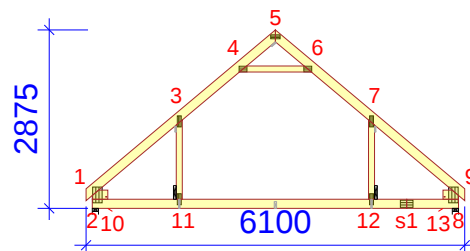
Truss calculation performed with computer program Pamir

Version: 6.1 SR2c (93402)

Program developed by: MiTek Europe

Project ID

Project code : T01
Client : MAE Construction
: Garage
: R/O 65 High Street
: Upwood, Cambridgeshire
Job number : 52329-N
Code type number : T01
Drawing number :



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
Loadsharing factor : 1.1
Spacing : 600 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

Roof : 0.900 kN/m²
Attic sloping ceiling : 0.250 kN/m²
Ceiling : 0.250 kN/m²
Floor : 0.250 kN/m²
Attic ceiling : 0.250 kN/m²
Attic room vertical : 0.125 kN/m²

Live load

ID	Type	Value kN/m ²	Joint Number	Offset mm	Joint Number	Offset mm	Distribution mm
LL2	Outside room	0.500	2	1353	2	250	1103
LL2	Outside room	0.500	2	103	2	250	147
LL2	Outside room	0.500	8	-103	8	-250	147
LL2	Outside room	0.500	8	-250	8	-1353	1103
LL3	Inside room	1.500	8	-1450	2	1450	3000
LL4	Collar beam	0.250	6	-116	4	116	927
LL3	Partition	0.350	8	-1450	2	1450	3000

Blanket load

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

Snow load

Snow zone: : User defined*
Sk : 0.750 kN/m²
Thermal coefficient (Ct) : 1
Altitude above sea level : 60 m
Overhanging snow load - Left : No
Overhanging snow load - Right : No
Snow fence - Left : No
Snow fence - Right : No

*) Differs from the location default

Wind load

Terrain category : Countryside
Basic wind speed : 23 m/s
Distance from shore : 100 km

Wind load

qp(z)	0.767 kN/m ²
Building width	6100 mm
Building height	7000 mm
Building length	8000 mm

Tank load

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

Support reactions by load case - Vertical

Load case	2 N	8 N
Dead	3166	3166
LL2	375	375
LL3	1665	1665
LL4	70	70
Uniform snow	732	732
Snow left (μ1 left, 0μ1 right)	558	174
Snow left 0.5 permutations	645	453
Exceptional snow left	1117	347
Snow right (μ1 right, 0μ1 left)	174	558
Snow right 0.5 permutations	453	645
Exceptional snow right	347	1117
Wind gable all permutations	-1077	-1077
Wind front (pressure) all permutations	-1077	-1077
Wind front (suction) all permutations	-398	-398
Wind back (pressure) all permutations	-1077	-1077
Wind back (suction) all permutations	-398	-398
Wind left (pressure) all permutations	138	136
	-809	-702
Wind left (uplift)	-809	-702
Wind left (suction) all permutations	816	814
	-130	-24
Wind right (pressure) all permutations	136	138
	-702	-809
Wind right (uplift)	-702	-809
Wind right (suction) all permutations	814	816
	-24	-130
Blanket	732	732
Tank	808	92
Vibration	500	500

Max global deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Ratio L/X	Deflection mm	Ratio %	LC
2-8	Winst	250	23.2	5800	491	11.8	50.9	1107:1
11-12	Wnet,fin	250	12.4	3097	298	10.4	83.9	1107:3

Max local deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
11-12	Winst	250	12.4	3097	416	7.4	60.2	1107:1
11-12	Wnet,fin	250	12.4	3097	298	10.4	83.9	1107:3

Max node deflection

Joints	Situation	Direction	Absolute mm	Negative deflection mm	Ratio %	LC	Positive deflection mm	Ratio %	LC
3	Winst		18				5.6	30.9	1086:3:1
4	Wnet,fin		18	-1.4	7.6	1012:1:3			

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	CSI %	LC No	CSI Type
Top chord Left	1-5	46x147	TR26	360	64	13	Max. combined CSI
Top chord Right	5-9	46x147	TR26	360	55	13	Max. combined CSI
Bottom chord	2-8	46x147	TR26	Sheeting	56	13	Max. combined CSI
Collar	4-6	46x97	TR26	Sheeting	18	13	Max. combined CSI
Room vertical Left	3-11	46x97	TR26	None	14	13	Max. combined CSI
Room vertical Right	7-12	46x97	TR26	None	12	13	Max. combined CSI

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	CSI %	LC No	CSI Type
Bottom chord	2-10	46x147	TR26		4	13	Max. combined CSI
Bottom chord	8-13	46x147	TR26		4	13	Max. combined CSI

Partial results from design in worst load combination

Grade: TR26 | γM: 1.3 | kcr: 0.67

Member Joints	Load comb.	Dist. mm	Dist. %	Depth mm	kh	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	1	169	72	147	1	0.6	0	-	-	1.30	1.00	-	0	50	-60	0.2	0.1	1.0	0.0	6.13	1.0
2-3	13	1760	100	147	1	0.8	1924x	810	-	1.00	-	0.83	1.63	-8024	1103	51.4	9.5	0.0	0.0	6.23	60.8
2-10	13	93	37	147	1	0.8	250x	168	-	1.30	-	-	0.14	0	3186	3.3	0.0	0.0	0.0	6.11	3.3
3-4	13	0	0	147	1	0.8	1924x	596	-	1.00	-	0.83	1.83	-5230	-2167	57.3	6.2	0.0	0.0	6.23	63.5
3-11	13	78	6	97	1.09	0.8	1237x	1237	-	1.00	1.00	-	-0.09	4293	39	6.2	7.7	0.8	0.0	6.17	13.9
4-5	13	0	0	147	1	0.8	1291x	347	-	1.22	-	-	-1.06	1303	1655	27.2	1.7	0.0	0.0	6.17	28.9
5-6	13	816	100	147	1	0.8	1360x	347	-	1.21	-	-	-1.15	1202	-1775	29.8	1.6	0.0	0.0	6.17	31.4
6-4	13	85	7	97	1.09	0.8	1043x	-	-	1.18	-	0.90	0.09	-7461	-174	5.0	12.3	0.0	0.0	6.23	17.3
6-7	13	1296	100	147	1	0.8	1789x	596	-	1.00	-	0.86	1.55	-5342	2033	48.7	6.1	0.0	0.0	6.23	54.8
7-8	13	0	0	147	1	0.8	1789x	810	-	1.00	-	0.86	1.4	-7867	-992	44.1	9.0	0.0	0.0	6.23	53.0
8-9	1	64	28	147	1	0.6	0	-	-	1.30	1.00	-	0	50	60	0.2	0.1	1.0	0.0	6.13	1.0
8-12	13	1402	100	147	1	0.8	1658x	-	-	1.16	-	-	0.89	5389	702	24.0	6.9	0.0	0.0	6.17	30.9
8-13	13	93	37	147	1	0.8	250x	168	-	1.30	-	-	-0.13	0	-2971	3.1	0.0	0.0	0.0	6.11	3.1
11-2	13	0	0	147	1	0.8	1611x	-	-	1.17	-	-	0.77	5438	-1163	20.6	7.0	0.0	0.0	6.17	27.6
12-7	13	44	3	97	1.09	0.8	1237x	1237	-	1.00	-	-	-0.08	3825	10	5.1	6.9	0.0	0.0	6.17	12.0
12-11	13	1549	50	147	1	0.8	2466x	-	1.00	1.00	1.00	-	-1.55	5399	-50	48.8	7.0	0.7	48.8	6.17	55.7

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	152.4	254	87
3	M20	63.5	177.8	64
4	M20	89.7	127	86
5	M20	63.5	152	34
6	M20	89.7	127	87
7	M20	63.5	177.8	54
8	M20	152.4	254	87
11	M20	63.5	177.8	69
12	M20	63.5	177.8	68
s1	M20	115.1	203.2	84

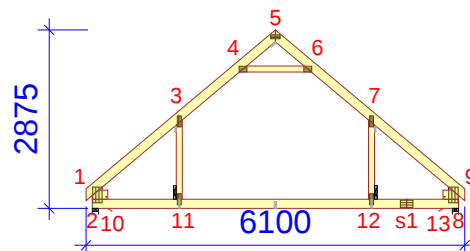
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General project parameters

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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
Loadsharing factor : 1.1
Spacing : 600 mm
Number of plies : 2

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

Forces are shown for a single truss, support reactions are shown for all plies together

Standard loads

Dead load

Roof : 0.900 kN/m²
Attic sloping ceiling : 0.250 kN/m²
Ceiling : 0.250 kN/m²
Floor : 0.250 kN/m²
Attic ceiling : 0.250 kN/m²
Attic room vertical : 0.125 kN/m²

Live load

ID	Type	Value kN/m ²	Joint Number	Offset mm	Joint Number	Offset mm	Distribution mm
LL2	Outside room	0.500	2	103	2	250	147
LL2	Outside room	0.500	8	-103	8	-250	147
LL2	Outside room	0.500	8	-250	8	-1353	1103
LL2	Outside room	0.500	2	1353	2	250	1103
LL3	Inside room	1.500	8	-140	8	-250	110
LL3	Inside room	1.500	8	-250	2	1450	4200
LL4	Collar beam	0.250	6	-116	4	116	927
LL3	Partition	0.350	8	-1450	2	1450	3000

Blanket load

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

Snow load

Snow zone: : User defined*
Sk : 0.750 kN/m²
Thermal coefficient (Ct) : 1
Altitude above sea level : 60 m
Overhanging snow load - Left : No
Overhanging snow load - Right : No
Snow fence - Left : No
Snow fence - Right : No

*) Differs from the location default

Wind load

Terrain category	Countryside
Basic wind speed	23 m/s
Distance from shore	100 km
qp(z)	0.767 kN/m ²
Building width	6100 mm
Building height	7000 mm
Building length	8000 mm

Tank load

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

Special loads

Extra uniform load / Adjusted standard loads

Joint Number	Offset mm	Value kN/m ²	Joint Number	Offset mm	Value kN/m ²	Method	Direction	Load case type	Chord
8	-1450	0.783	8	-250	0.783	Extra load	Vertical	Live load	Bottom chord
13	0	0.783	13	110	0.783	Extra load	Vertical	Live load	Bottom chord

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
2	2354	Bottom chord	2xB01	Yes	Yes		0.452		Dead
							0.152		Dead (Uplift)
							0.000		LL2
							1.723		LL3
2	1404	Bottom chord	2xB02	Yes	Yes		0.166		Dead
							0.166		Dead (Uplift)
							0.138		LL1
							0.441		LL3
							-0.037		Wind along
							-0.037		Wind along front (pressure)
							0.056		Wind along front (suction)
							-0.037		Wind along rear (pressure)
							0.056		Wind along rear (suction)
							-0.037		Wind left (pressure, permutation 1)
							-0.037		Wind left (pressure, permutation 2)
							-0.037		Wind left (pressure, permutation 3)
							-0.037		Wind left (pressure, permutation 4)
							-0.037		Wind left (uplift)
							0.056		Wind left (suction, permutation 1)
							0.056		Wind left (suction, permutation 2)
							0.056		Wind left (suction, permutation 3)
							0.056		Wind left (suction, permutation 4)
							-0.037		Wind right (pressure, permutation 1)
							-0.037		Wind right (pressure, permutation 2)
							-0.037		Wind right (pressure, permutation 3)
							-0.037		Wind right (pressure, permutation 4)
							-0.037		Wind right (uplift)
							0.056		Wind right (suction, permutation 1)
							0.056		Wind right (suction, permutation 2)
							0.056		Wind right (suction, permutation 3)
							0.056		Wind right (suction, permutation 4)
4	152	Collar	BM01a	Yes	Yes		1.667		Dead
							1.667		Dead (Uplift)
							0.053		LL4
							0.476		Uniform snow
							0.476		Snow left (μ1 left, 0μ1 right)
							0.476		Snow left (μ1 left, 0.5μ1 right)
							0.952		Exceptional snow left, 0 right
							0.476		Snow right (μ1 right, 0μ1 left)
							0.476		Snow right (μ1 right, 0.5μ1 left)
							0.952		Exceptional snow right, 0 left
							-1.908		Wind along
							-1.908		Wind along front (pressure)
							-1.049		Wind along front (suction)
							-1.908		Wind along rear (pressure)
							-1.049		Wind along rear (suction)
							0.593		Wind left (pressure, permutation 1)
							-0.456		
							0.593		Wind left (pressure, permutation 2)
							-0.456		
							0.593		Wind left (pressure, permutation 3)
							-0.456		

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
4	152	Collar	BM01a	Yes	Yes		0.593		Wind left (pressure, permutation 4)
							-0.456		
							0.593		Wind left (uplift)
							-0.456		
							1.452		Wind left (suction, permutation 1)
							1.452		Wind left (suction, permutation 2)
							1.452		Wind left (suction, permutation 3)
							1.452		Wind left (suction, permutation 4)
							-1.740		Wind right (pressure, permutation 1)
							-1.740		Wind right (pressure, permutation 2)
							-1.740		Wind right (pressure, permutation 3)
							-1.740		Wind right (pressure, permutation 4)
							-1.740		Wind right (uplift)
							0.509		Wind right (suction, permutation 1)
							-0.881		
							0.509		Wind right (suction, permutation 2)
							-0.881		
							0.509		Wind right (suction, permutation 3)
							-0.881		
							0.509		Wind right (suction, permutation 4)
							-0.881		
							0.476		Blanket
6	-152	Collar	BM01b	Yes	Yes		1.827		Dead
							1.827		Dead (Uplift)
							0.053		LL4
							0.476		Uniform snow
							0.476		Snow left (μ_1 left, $0\mu_1$ right)
							0.476		Snow left (μ_1 left, $0.5\mu_1$ right)
							0.951		Exceptional snow left, 0 right
							0.476		Snow right (μ_1 right, $0\mu_1$ left)
							0.476		Snow right (μ_1 right, $0.5\mu_1$ left)
							0.951		Exceptional snow right, 0 left
							-1.907		Wind along
							-1.907		Wind along front (pressure)
							-1.048		Wind along front (suction)
							-1.907		Wind along rear (pressure)
							-1.048		Wind along rear (suction)
							-1.738		Wind left (pressure, permutation 1)
							-1.738		Wind left (pressure, permutation 2)
							-1.738		Wind left (pressure, permutation 3)
							-1.738		Wind left (pressure, permutation 4)
							-1.738		Wind left (uplift)
							0.509		Wind left (suction, permutation 1)
							-0.880		
							0.509		Wind left (suction, permutation 2)
							-0.880		
							0.509		Wind left (suction, permutation 3)
							-0.880		
							0.509		Wind left (suction, permutation 4)
							-0.880		
							0.592		Wind right (pressure, permutation 1)
							-0.456		
							0.592		Wind right (pressure, permutation 2)
							-0.456		
							0.592		Wind right (pressure, permutation 3)
							-0.456		
							0.592		Wind right (pressure, permutation 4)
							-0.456		
							0.592		Wind right (uplift)
							-0.456		
							1.451		Wind right (suction, permutation 1)
							1.451		Wind right (suction, permutation 2)
							1.451		Wind right (suction, permutation 3)
							1.451		Wind right (suction, permutation 4)
5	0	Top chord	Ri01	Yes	Yes		0.476		Blanket
							-1.229		Dead
							-1.229		Dead (Uplift)
							-0.345		Uniform snow
							-0.345		Snow left (μ_1 left, $0\mu_1$ right)
							-0.345		Snow left (μ_1 left, $0.5\mu_1$ right)
							-0.691		Exceptional snow left, 0 right
							-0.345		Snow right (μ_1 right, $0\mu_1$ left)

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
5	0	Top chord	Ri01	Yes	Yes		-0.345		Snow right (μ_1 right, $0.5\mu_1$ left)
							-0.691		Exceptional snow right, 0 left
							1.447		Wind along
							1.447		Wind along front (pressure)
							0.826		Wind along front (suction)
							1.447		Wind along rear (pressure)
							0.826		Wind along rear (suction)
							0.805		Wind left (pressure, permutation 1)
							-0.268		
							0.805		Wind left (pressure, permutation 2)
							-0.268		
							0.805		Wind left (pressure, permutation 3)
							-0.268		
							0.805		Wind left (pressure, permutation 4)
							-0.268		
							0.805		Wind left (uplift)
							-0.268		
							-0.757		Wind left (suction, permutation 1)
							-0.757		Wind left (suction, permutation 2)
							-0.757		Wind left (suction, permutation 3)
							-0.757		Wind left (suction, permutation 4)
							0.806		Wind right (pressure, permutation 1)
							-0.267		
							0.806		Wind right (pressure, permutation 2)
							-0.267		
							0.806		Wind right (pressure, permutation 3)
							-0.267		
							0.806		Wind right (pressure, permutation 4)
							-0.267		
							0.806		Wind right (uplift)
							-0.267		
							-0.756		Wind right (suction, permutation 1)
							-0.756		Wind right (suction, permutation 2)
							-0.756		Wind right (suction, permutation 3)
							-0.756		Wind right (suction, permutation 4)
							-0.345		Blanket

Support reactions by load case - Vertical

Load case	2 N	8 N
Dead	4509	4395
Dead (Uplift)	4329	4276
LL1	105	32
LL2	350	369
LL3	2863	2845
LL4	122	122
Uniform snow	1005	1005
Snow left (μ_1 left, $0\mu_1$ right)	846	462
Snow left 0.5 permutations	925	733
Exceptional snow left	1691	924
Snow right (μ_1 right, $0\mu_1$ left)	462	845
Snow right 0.5 permutations	733	925
Exceptional snow right	924	1691
Wind gable all permutations	-2254	-2234
Wind front (pressure) all permutations	-2254	-2234
Wind front (suction) all permutations	-955	-985
Wind back (pressure) all permutations	-2254	-2234
Wind back (suction) all permutations	-955	-985
Wind left (pressure) all permutations	105	-2026
	-1932	
Wind left (uplift)	-1932	-2026
Wind left (suction) all permutations	1526	1330
		-264
Wind right (pressure) all permutations	-2047	125
		-1912
Wind right (uplift)	-2047	-1912
Wind right (suction) all permutations	1360	1496
		-235
Blanket	1005	1005
Tank	808	92
Vibration	500	500

Max global deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Ratio L/X	Deflection mm	Ratio %	LC
2-8	Winst	250	23.2	5800	665	8.7	37.6	1107:1
11-12	Wnet,fin	250	12.4	3097	397	7.8	63.1	1107:3

Max local deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
11-12	Winst	250	12.4	3097	550	5.6	45.5	1107:1
11-12	Wnet,fin	250	12.4	3097	397	7.8	63.1	1107:3

Max node deflection

Joints	Situation	Direction	Absolute mm	Negative deflection mm	Ratio %	LC	Positive deflection mm	Ratio %	LC
3	Winst		18				4.1	23.0	1086:3:1
4	Wnet,fin		18	-1.7	9.3	1012:1:3			

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	CSI %	LC No	CSI Type
Collar	4-6	46x97	TR26	Sheeting	32	1	CSI – Shear force
Top chord Left	1-5	46x147	TR26	360	49	13	Max. combined CSI
Top chord Right	5-9	46x147	TR26	360	36	13	Max. combined CSI
Bottom chord	2-8	46x147	TR26	Sheeting	46	13	Max. combined CSI
Room vertical Left	3-11	46x97	TR26	None	11	13	Max. combined CSI
Room vertical Right	7-12	46x97	TR26	None	10	13	Max. combined CSI
Bottom chord	2-10	46x147	TR26		2	13	Max. combined CSI
Bottom chord	8-13	46x147	TR26		2	13	Max. combined CSI

Partial results from design in worst load combination

Grade: TR26 | γM: 1.3 | kcr: 0.67

Member Joints	Load comb.	Dist. mm	Dist. %	Depth mm	kh	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	1	169	72	147	1	0.6	0	-	-	1.28	1.00	-	0	50	-60	0.1	0.1	0.5	0.0	6.13	0.5
2-3	13	1760	100	147	1	0.8	1924x	810	-	1.00	-	0.83	2.5	-12723	1919	39.3	7.5	0.0	0.0	6.23	46.8
2-10	13	93	37	147	1	0.8	250x	168	-	1.30	-	-	0.16	0	3777	2.0	0.0	0.0	0.0	6.11	2.0
3-4	13	0	0	147	1	0.8	1924x	596	-	1.00	-	0.83	2.79	-8313	-3259	43.8	4.9	0.0	0.0	6.23	48.6
3-11	13	78	6	97	1.09	0.8	1237x	1237	-	1.00	1.00	-	-0.13	6794	50	4.4	6.1	0.5	0.0	6.17	10.5
4-5	632:3:-1	0	0	147	1	1.1	1440x	347	-	1.00	-	-	-1.7	2389	2262	19.5	1.2	0.0	0.0	6.17	20.6
5-6	634:3:-1	816	100	147	1	1.1	1597x	347	-	1.00	-	-	-1.85	2167	-2456	21.2	1.1	0.0	0.0	6.17	22.2
6-4	1	111	10	97	1.09	0.6	0	-	-	1.00	1.00	-	-0.03	-5516	-2544	1.4	5.9	31.5	0.0	6.13	31.5
6-7	13	1296	100	147	1	0.8	1649x	596	-	1.00	-	0.88	1.93	-8698	2800	30.3	4.8	0.0	0.0	6.23	35.1
7-8	13	0	0	147	1	0.8	1649x	810	-	1.00	-	0.88	1.76	-12219	-1489	27.7	6.8	0.0	0.0	6.23	34.4
8-9	1	64	28	147	1	0.6	0	-	-	1.26	1.00	-	0	50	60	0.1	0.1	0.5	0.0	6.13	0.5
8-12	13	1402	100	147	1	0.8	1764x	-	-	1.15	-	-	1.48	8403	1382	20.3	5.4	0.0	0.0	6.17	25.7
8-13	13	93	37	147	1	0.8	93x	168	-	1.30	-	-	-0.15	0	-3555	1.9	0.0	0.0	0.0	6.11	1.9
11-2	13	0	0	147	1	0.8	1581x	-	-	1.18	-	-	1.09	8512	-1138	14.5	5.5	0.0	0.0	6.17	20.0
12-7	13	44	3	97	1.09	0.8	1237x	1237	-	1.00	-	-	-0.13	5433	60	4.2	4.9	0.0	0.0	6.17	9.1
12-11	13	2145	69	147	1	0.8	2391x	-	1.00	1.00	1.00	-	-2.53	8463	12	39.8	5.5	0.1	39.8	6.17	45.2

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	152.4	254	66
3	M20	63.5	177.8	49
4	M20	89.7	127	80
5	M20	63.5	152	41
6	M20	89.7	127	82
7	M20	63.5	177.8	40
8	M20	152.4	254	65
11	M20	63.5	177.8	73
12	M20	63.5	177.8	60
s1	M20	115.1	203.2	63

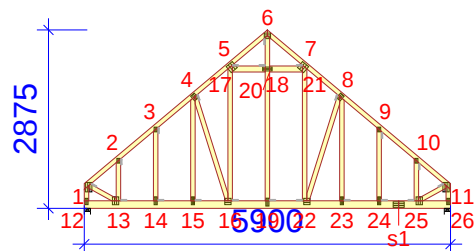
Truss calculation performed with computer program Pamir

Version: 6.1 SR2c (93402)

Program developed by: MiTek Europe

Project ID

Project code : T02
Client : MAE Construction
: Garage
: R/O 65 High Street
: Upwood, Cambridgeshire
Job number : 52329-N
Code type number : T02
Drawing number :



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
Loadsharing factor : 1.1
Spacing : 600 mm
Number of plies : 2

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

Forces are shown for a single truss, support reactions are shown for all plies together

Standard loads

Dead load

Roof : 0.900 kN/m²
Ceiling : 0.250 kN/m²
Wall : 0.150 kN/m²

Live load

ID	Type	Value kN/m ²	Joint Number	Offset mm	Joint Number	Offset mm	Distribution mm
LL1	Bottom chord	0.500	12	2914	12	2386	528
LL1	Bottom chord	0.500	26	-2386	26	-2914	528
LL1	Bottom chord	0.500	26	-72	12	72	5756
LL3	Inside room	1.500	26	-1450	12	1450	3000

Blanket load

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

Snow load

Snow zone: : User defined*
Sk : 0.750 kN/m²
Thermal coefficient (Ct) : 1
Altitude above sea level : 60 m
Overhanging snow load - Left : No
Overhanging snow load - Right : No
Snow fence - Left : No
Snow fence - Right : No

*) Differs from the location default

Wind load

Terrain category : Countryside
Basic wind speed : 23 m/s
Distance from shore : 100 km
qp(z) : 0.767 kN/m²
Building width : 5900 mm
Building height : 7000 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)

Special loads

Extra uniform load / Adjusted standard loads

Joint Number	Offset mm	Value kN/m ²	Joint Number	Offset mm	Value kN/m ²	Method	Direction	Load case type	Chord
12	0	1.500	26	0	1.500	Extra load	Vertical	Dead load	Bottom chord
1	0	1.500	6	0	1.500	Extra load	Vertical	Dead load	Top chord
11	0	1.500	6	0	1.500	Extra load	Vertical	Dead load	Top chord
12	1450	0.216	26	-1450	0.216	Extra load	Vertical	Live load	Bottom chord

Support reactions by load case - Vertical

Load case	12 N	26 N
Dead	8644	8644
Dead (Uplift)	2524	2524
LL1	1022	1022
LL3	194	194
Uniform snow	708	708
Snow left (μ1 left, 0μ1 right)	534	174
Snow left 0.5 permutations	621	441
Exceptional snow left	1068	348
Snow right (μ1 right, 0μ1 left)	174	534
Snow right 0.5 permutations	441	621
Exceptional snow right	348	1068
Wind gable all permutations	-1077	-1077
Wind front (pressure) all permutations	-1077	-1077
Wind front (suction) all permutations	-421	-421
Wind back (pressure) all permutations	-1077	-1077
Wind back (suction) all permutations	-421	-421
Wind left (pressure) all permutations	156	122
	-759	-694
Wind left (uplift)	-759	-694
Wind left (suction) all permutations	812	777
	-104	-38
Wind right (pressure) all permutations	122	156
	-694	-759
Wind right (uplift)	-694	-759
Wind right (suction) all permutations	777	812
	-38	-104
Man on bottom chord	737	737
Blanket	708	708
Tank	497	403

Max global deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Ratio L/X	Deflection mm	Ratio %	LC
12-26	Winst	250	23.2	5800	2257	2.6	11.1	1086:3:1
12-26	Wnet,fin	250	23.2	5800	1522	3.8	16.5	1012:1:3

Max local deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
23-24	Winst	250	2.4	600	5304	0.1	4.8	1106:1
8-9	Wnet,fin	150	5.4	807	1578	0.5	9.6	1002:3

Max node deflection

Joints	Situation	Direction	Absolute mm	Negative deflection mm	Ratio %	LC	Positive deflection mm	Ratio %	LC
5	Winst		23.6	-2.3	9.8	1086:3:1			
5	Wnet,fin		18	-3.4	18.7	1012:1:3			

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	CSI %	LC No	CSI Type
End vertical Right	11-26	35x72	TR26	244	26	1	Max. combined CSI
End vertical Left	1-12	35x72	TR26	244	26	1	Max. combined CSI
Web	7-22	35x72	C16	None	15	1	Max. combined CSI
Web	3-14	35x72	C16	None	7	1	Max. combined CSI
Web	2-13	35x72	C16	None	10	1	Max. combined CSI
Web	10-25	35x72	C16	None	10	1	Max. combined CSI
Web	8-22	35x72	C16	None	24	1	Max. combined CSI
Web	1-13	35x72	C16	None	41	1	Max. combined CSI
Web	11-25	35x72	C16	None	41	1	Max. combined CSI
Top chord Left	1-6	35x72	TR26	360	42	36:10	Max. combined CSI
Top chord Right	6-11	35x72	TR26	360	45	36:11	Max. combined CSI
Web	9-24	35x72	C16	None	7	36:11	Max. combined CSI
Web	8-23	35x72	C16	None	12	36:13	Max. combined CSI
Web	4-15	35x72	C16	None	14	36:3	Max. combined CSI
Web	4-16	35x72	C16	None	25	36:3	Max. combined CSI
Bottom chord	12-26	35x122	TR26	Sheeting	28	36:5	Max. combined CSI
Web	5-16	35x72	C16	None	16	36:5	Max. combined CSI
Bottom chord	17-18	35x97	TR26	Sheeting	10	36:5	Max. combined CSI
Web	6-19	35x72	C16	None	13	36:7	Max. combined CSI
Bottom chord	20-21	35x97	TR26	Sheeting	11	36:8	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	1	726	100	72	1.16	TR26	0.6	1013x	221	-	1.10	-	0.79	-0.14	-9619	-516	12.6	21.2	0.0	0.0	6.23	33.8
2-3	1	0	0	72	1.16	TR26	0.6	1013x	274	-	1.10	-	0.79	-0.19	-10883	873	17.1	23.9	0.0	0.0	6.23	41.0
2-13	1	610	95	72	1.16	C16	0.6	581x	581	-	1.00	1.00	0.95	-0.03	-1876	-76	5.4	4.6	2.1	0.0	6.23	10.0
3-4	37:10	397	49	72	1.16	TR26	0.9	1569x	282	1.00	1.00	-	0.47	0.14	-13128	33	9.1	32.6	0.5	16.6	6.23	41.6
3-14	1	840	73	72	1.16	C16	0.6	1034y	1034	1.00	1.00	-	0.48	-0.01	-1126	-19	1.0	5.5	0.6	5.5	6.24	6.4
4-5	1	770	100	72	1.16	TR26	0.6	810x	270	-	1.16	-	0.88	-0.19	-8684	-750	16.0	17.1	0.0	0.0	6.23	33.0
4-15	37:3	11	1	72	1.16	C16	0.9	1487x	1487	-	1.00	1.00	-	-0.06	2474	45	6.6	6.6	0.9	0.0	6.17	13.2
5-6	37:6	227	27	72	1.16	TR26	0.9	649x	278	1.00	1.00	-	0.94	0.13	-4468	32	8.7	5.6	0.5	6.2	6.23	14.2
5-16	37:5	2133	99	72	1.16	C16	0.9	1940x	1940	-	1.00	1.00	-	0.04	4103	31	5.1	10.9	0.6	0.0	6.17	15.9
6-7	1	499	60	72	1.16	TR26	0.6	644x	278	1.00	1.00	-	0.94	0.08	-3136	9	7.9	5.9	0.2	6.3	6.23	13.7
6-20	37:7	536	100	72	1.16	C16	0.9	2393x	2393	-	1.00	-	-	-0.01	4033	-20	1.7	10.7	0.0	0.0	6.17	12.4
7-8	37:10	561	73	72	1.16	TR26	0.9	1633x	270	1.00	1.00	-	0.44	0.03	-12484	-15	2.2	33.1	0.3	15.1	6.23	35.3
7-22	1	2133	99	72	1.16	C16	0.6	1940x	1940	-	1.00	1.00	-	-0.02	2696	-7	3.7	10.8	0.3	0.0	6.17	14.4
8-9	37:11	410	51	72	1.16	TR26	0.9	1630x	282	1.00	1.00	-	0.44	0.14	-13357	-47	9.4	35.3	0.7	17.0	6.23	44.6
8-23	37:13	11	1	72	1.16	C16	0.9	1487x	1487	-	1.00	1.00	-	0.05	2162	-41	6.0	5.8	0.8	0.0	6.17	11.7
9-10	1	783	100	72	1.16	TR26	0.6	1010x	274	-	1.10	-	0.79	-0.19	-10887	-873	17.0	23.9	0.0	0.0	6.23	40.9
9-24	37:11	1117	97	72	1.16	C16	0.9	1034x	1034	-	1.00	-	0.77	0.03	-1221	49	4.0	2.5	0.0	0.0	6.23	6.5
10-11	1	0	0	72	1.16	TR26	0.6	1010x	221	-	1.10	-	0.79	-0.14	-9625	514	12.5	21.1	0.0	0.0	6.23	33.6
10-25	1	610	95	72	1.16	C16	0.6	581x	581	-	1.00	1.00	0.95	0.03	-1874	76	5.4	4.6	2.1	0.0	6.23	10.0
11-26	1	64	26	72	1.16	TR26	0.6	244x	244	-	1.30	1.00	1.02	-0.09	-10955	610	6.8	18.7	13.4	0.0	6.23	25.5
12-1	1	180	74	72	1.16	TR26	0.6	244x	244	-	1.30	1.00	1.02	-0.09	-10949	-609	6.8	18.7	13.4	0.0	6.23	25.5
13-1	1	46	9	72	1.16	C16	0.6	454x	454	-	1.00	-	-	0.05	8048	-95	8.4	32.0	0.0	0.0	6.17	40.3
13-12	1	404	80	122	1.04	TR26	0.6	0	-	-	1.27	1.00	-	0.18	609	577	5.6	0.8	7.5	0.0	6.13	7.5
14-13	37:5	646	100	122	1.04	TR26	0.9	909x	-	-	1.26	-	-	0.9	10305	2542	18.3	9.0	0.0	0.0	6.17	27.3
15-14	37:2	600	100	122	1.04	TR26	0.9	1918x	-	-	1.00	-	-	-0.67	10243	-547	17.3	8.9	0.0	0.0	6.17	26.2
16-4	37:3	456	26	72	1.16	C16	0.9	1587y	1587	1.00	1.00	-	0.22	0.02	-3305	-15	1.5	22.6	0.3	22.7	6.24	24.1
16-15	37:5	264	47	122	1.04	TR26	0.9	1835x	-	1.00	1.00	1.00	-	-0.55	10320	-661	14.2	9.0	5.7	14.2	6.17	23.2
18-17	37:5	495	94	97	1.09	TR26	0.9	467x	-	-	1.00	1.00	-	-0.23	-6171	-454	8.8	0.3	5.0	0.0	6.19	9.1
19-16	37:7	25	4	122	1.04	TR26	0.9	0	-	-	1.25	1.00	-	0.2	9571	-2549	4.1	8.4	22.0	0.0	6.13	22.0
20-19	37:6	0	0	72	1.16	C16	0.9	2393x	2393	-	1.00	-	-	-0.04	2654	31	5.1	7.1	0.0	0.0	6.17	12.1
21-20	37:8	33	6	97	1.09	TR26	0.9	479x	-	-	1.00	1.00	1.00	-0.15	-5765	268	5.9	5.0	3.0	0.0	6.23	10.9
22-8	1	456	26	72	1.16	C16	0.6	1587y	1587	1.00	1.00	-	0.22	-0.01	-2153	9	1.7	22.1	0.3	22.1	6.24	23.7
22-19	1	636	100	122	1.04	TR26	0.6	1272x	-	-	1.18	-	-	0.22	7127	768	7.3	9.3	0.0	0.0	6.17	16.6
23-22	37:11	300	53	122	1.04	TR26	0.9	1672x	-	1.00	1.00	1.00	-	-0.45	10177	-305	11.5	8.9	2.7	11.5	6.17	20.3
24-23	37:14	0	0	122	1.04	TR26	0.9	1506x	-	-	1.00	-	-	-0.66	10128	585	17.1	8.8	0.0	0.0	6.17	25.8
25-11	1	46	9	72	1.16	C16	0.6	454x	454	-	1.00	-	-	-0.05	8051	96	8.4	32.0	0.0	0.0	6.17	40.4
25-24	1	0	0	122	1.04	TR26	0.6	822x	-	-	1.27	-	-	0.54	7779	-1933	16.4	10.2	0.0	0.0	6.17	26.6
26-25	1	100	20	122	1.04	TR26	0.6	0	-	-	1.27	1.00	-	0.18	610	-571	5.6	0.8	7.4	0.0	6.13	7.4

Fastener

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

Max tolerance for fastener position: 5 mm

Joint Number	Fastener Type	Size Width	Length	CSI %
1	M20	101.6	152	72
2	M20	50.8	76.2	72
3	M20	50.8	76.2	72
4	M20	76.2	101.6	98
5	M20	127.8	127	44
6	M20	89.7	101.6	61
7	M20	127.8	127	44

Joint Number	Fastener Type	Size Width	Length	CSI %
8	M20	76.2	101.6	98
9	M20	50.8	76.2	72
10	M20	50.8	76.2	72
11	M20	101.6	152	72
12	M20	50.8	101.6	69
13	M20	101.6	127	74
14	M20	50.8	127	45
15	M20	50.8	127	45
16	M20	101.6	101.6	84
19	M20	50.8	127	52
20	M20	63.5	152	41
22	M20	101.6	101.6	84
23	M20	50.8	127	45
24	M20	50.8	127	45
25	M20	101.6	127	74
26	M20	50.8	101.6	69
s1	M20	89.7	177.8	31

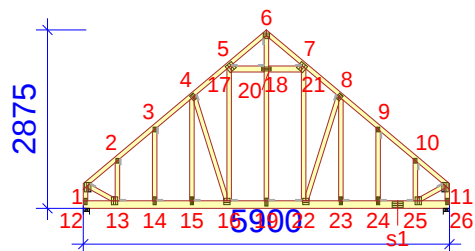
Truss calculation performed with computer program Pamir

Version: 6.1 SR2c (93402)

Program developed by: MiTek Europe

Project ID

Project code : T02
Client : MAE Construction
: Garage
: R/O 65 High Street
: Upwood, Cambridgeshire
Job number : 52329-N
Code type number : T02
Drawing number :



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
Loadsharing factor : 1.1
Spacing : 600 mm
Number of plies : 2

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

Forces are shown for a single truss, support reactions are shown for all plies together

Standard loads

Dead load

Roof : 0.900 kN/m²
Ceiling : 0.250 kN/m²
Wall : 0.150 kN/m²

Live load

ID	Type	Value kN/m ²	Joint Number	Offset mm	Joint Number	Offset mm	Distribution mm
LL1	Bottom chord	0.500	26	-2386	26	-2914	528
LL1	Bottom chord	0.500	26	-72	12	72	5756
LL1	Bottom chord	0.500	12	2914	12	2386	528
LL3	Inside room	1.500	26	-140	26	-432	292
LL3	Inside room	1.500	26	-440	26	-432	8
LL3	Inside room	1.500	26	-440	12	2654	2806

Blanket load

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

Snow load

Snow zone: : User defined*
Sk : 0.750 kN/m²
Thermal coefficient (Ct) : 1
Altitude above sea level : 60 m
Overhanging snow load - Left : No
Overhanging snow load - Right : No
Snow fence - Left : No
Snow fence - Right : No

*) Differs from the location default

Wind load

Terrain category : Countryside
Basic wind speed : 23 m/s
Distance from shore : 100 km
qp(z) : 0.767 kN/m²
Building width : 5900 mm
Building height : 7000 mm

Wind load

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)

Special loads**Extra uniform load / Adjusted standard loads**

Joint Number	Offset mm	Value kN/m ²	Joint Number	Offset mm	Value kN/m ²	Method	Direction	Load case type	Chord
12	0	1.500	26	0	1.500	Extra load	Vertical	Dead load	Bottom chord
1	0	1.500	6	0	1.500	Extra load	Vertical	Dead load	Top chord
11	0	1.500	6	0	1.500	Extra load	Vertical	Dead load	Top chord
12	2654	0.601	26	-835	0.601	Extra load	Vertical	Live load	Bottom chord
26	-432	0.601	26	-140	0.601	Extra load	Vertical	Live load	Bottom chord
26	-835	0.601	26	-440	0.601	Extra load	Vertical	Live load	Bottom chord
26	-432	0.601	26	-140	0.601	Extra load	Vertical	Live load	Bottom chord
25	110	0.601	25	118	0.601	Extra load	Vertical	Live load	Web

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
12	2354	Bottom chord	2xB01	Yes	Yes		0.468		Dead
							0.217		Dead (Uplift)
							0.012		LL2
							1.777		LL3
12	1404	Bottom chord	2xB02	Yes	Yes		0.290		Dead
							0.290		Dead (Uplift)
							0.266		LL1
							0.698		LL3
							-0.072		Wind along
							-0.072		Wind along front (pressure)
							0.109		Wind along front (suction)
							-0.072		Wind along rear (pressure)
							0.109		Wind along rear (suction)
							-0.072		Wind left (pressure, permutation 1)
							-0.072		Wind left (pressure, permutation 2)
							-0.072		Wind left (pressure, permutation 3)
							-0.072		Wind left (pressure, permutation 4)
							-0.072		Wind left (uplift)
							0.109		Wind left (suction, permutation 1)
							0.109		Wind left (suction, permutation 2)
							0.109		Wind left (suction, permutation 3)
							0.109		Wind left (suction, permutation 4)
							-0.072		Wind right (pressure, permutation 1)
							-0.072		Wind right (pressure, permutation 2)
							-0.072		Wind right (pressure, permutation 3)
							-0.072		Wind right (pressure, permutation 4)
							-0.072		Wind right (uplift)
							0.109		Wind right (suction, permutation 1)
							0.109		Wind right (suction, permutation 2)
							0.109		Wind right (suction, permutation 3)
							0.109		Wind right (suction, permutation 4)
17	137	Bottom chord	BM01a	Yes	Yes		2.741		Dead
							2.741		Dead (Uplift)
							0.069		LL4
							0.791		Uniform snow
							0.791		Snow left (μ1 left, 0μ1 right)
							0.791		Snow left (μ1 left, 0.5μ1 right)
							1.581		Exceptional snow left, 0 right
							0.791		Snow right (μ1 right, 0μ1 left)
							0.791		Snow right (μ1 right, 0.5μ1 left)
							1.581		Exceptional snow right, 0 left
							-3.159		Wind along
							-3.159		Wind along front (pressure)
							-1.760		Wind along front (suction)
							-3.159		Wind along rear (pressure)
							-1.760		Wind along rear (suction)
							0.996		Wind left (pressure, permutation 1)
							-0.746		

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
17	137	Bottom chord	BM01a	Yes	Yes		0.996		Wind left (pressure, permutation 2)
							-0.746		
							0.996		Wind left (pressure, permutation 3)
							-0.746		
							0.996		Wind left (pressure, permutation 4)
							-0.746		
							0.996		Wind left (uplift)
							-0.746		
							2.395		Wind left (suction, permutation 1)
							2.395		Wind left (suction, permutation 2)
							2.395		Wind left (suction, permutation 3)
							2.395		Wind left (suction, permutation 4)
							-2.879		Wind right (pressure, permutation 1)
							-2.879		Wind right (pressure, permutation 2)
							-2.879		Wind right (pressure, permutation 3)
							-2.879		Wind right (pressure, permutation 4)
							-2.879		Wind right (uplift)
							0.829		Wind right (suction, permutation 1)
							-1.480		
							0.829		Wind right (suction, permutation 2)
							-1.480		
							0.829		Wind right (suction, permutation 3)
							-1.480		
							0.829		Wind right (suction, permutation 4)
							-1.480		
							0.791		Blanket
21	-137	Bottom chord	BM01b	Yes	Yes		3.008		Dead
							3.008		Dead (Uplift)
							0.069		LL4
							0.790		Uniform snow
							0.790		Snow left (μ 1 left, 0 μ 1 right)
							0.790		Snow left (μ 1 left, 0.5 μ 1 right)
							1.580		Exceptional snow left, 0 right
							0.790		Snow right (μ 1 right, 0 μ 1 left)
							0.790		Snow right (μ 1 right, 0.5 μ 1 left)
							1.580		Exceptional snow right, 0 left
							-3.156		Wind along
							-3.156		Wind along front (pressure)
							-1.758		Wind along front (suction)
							-3.156		Wind along rear (pressure)
							-1.758		Wind along rear (suction)
							-2.876		Wind left (pressure, permutation 1)
							-2.876		Wind left (pressure, permutation 2)
							-2.876		Wind left (pressure, permutation 3)
							-2.876		Wind left (pressure, permutation 4)
							-2.876		Wind left (uplift)
							0.828		Wind left (suction, permutation 1)
							-1.479		
							0.828		Wind left (suction, permutation 2)
							-1.479		
							0.828		Wind left (suction, permutation 3)
							-1.479		
							0.828		Wind left (suction, permutation 4)
							-1.479		
							0.995		Wind right (pressure, permutation 1)
							-0.746		
							0.995		Wind right (pressure, permutation 2)
							-0.746		
							0.995		Wind right (pressure, permutation 3)
							-0.746		
							0.995		Wind right (pressure, permutation 4)
							-0.746		
							0.995		Wind right (uplift)
							-0.746		
							2.393		Wind right (suction, permutation 1)
							2.393		Wind right (suction, permutation 2)
							2.393		Wind right (suction, permutation 3)
							2.393		Wind right (suction, permutation 4)
							0.790		Blanket
6	0	Top chord	Ri01	Yes	Yes		-2.125		Dead
							-2.125		Dead (Uplift)
							-0.627		Uniform snow

Point load

Joint Number	Offset mm	Timber group	Name	Bottom	Extra properties	HOR. kN	VER. kN	MOM. kNm	Load case type
6	0	Top chord	Ri01	Yes	Yes		-0.627		Snow left ($\mu 1$ left, $0\mu 1$ right)
							-0.627		Snow left ($\mu 1$ left, $0.5\mu 1$ right)
							-1.255		Exceptional snow left, 0 right
							-0.627		Snow right ($\mu 1$ right, $0\mu 1$ left)
							-0.627		Snow right ($\mu 1$ right, $0.5\mu 1$ left)
							-1.255		Exceptional snow right, 0 left
							2.418		Wind along
							2.418		Wind along front (pressure)
							1.352		Wind along front (suction)
							2.418		Wind along rear (pressure)
							1.352		Wind along rear (suction)
							1.399		Wind left (pressure, permutation 1)
							-0.383		
							1.399		Wind left (pressure, permutation 2)
							-0.383		
							1.399		Wind left (pressure, permutation 3)
							-0.383		
							1.399		Wind left (pressure, permutation 4)
							-0.383		
							1.399		Wind left (uplift)
							-0.383		
							-1.229		Wind left (suction, permutation 1)
							-1.229		Wind left (suction, permutation 2)
							-1.229		Wind left (suction, permutation 3)
							-1.229		Wind left (suction, permutation 4)
							1.400		Wind right (pressure, permutation 1)
							-0.382		
							1.400		Wind right (pressure, permutation 2)
							-0.382		
							1.400		Wind right (pressure, permutation 3)
							-0.382		
							1.400		Wind right (pressure, permutation 4)
							-0.382		
							1.400		Wind right (uplift)
							-0.382		
							-1.228		Wind right (suction, permutation 1)
							-1.228		Wind right (suction, permutation 2)
							-1.228		Wind right (suction, permutation 3)
							-1.228		Wind right (suction, permutation 4)
							-0.627		Blanket

Support reactions by load case - Vertical

Load case	12 N	26 N
Dead	10793	10611
Dead (Uplift)	4521	4390
LL1	1096	1019
LL2	7	5
LL3	1923	1672
LL4	69	69
Uniform snow	1153	1153
Snow left ($\mu 1$ left, $0\mu 1$ right)	994	635
Snow left 0.5 permutations	1073	894
Exceptional snow left	1988	1271
Snow right ($\mu 1$ right, $0\mu 1$ left)	636	994
Snow right 0.5 permutations	894	1073
Exceptional snow right	1271	1988
Wind gable all permutations	-3011	-2990
Wind front (pressure) all permutations	-3011	-2990
Wind front (suction) all permutations	-1434	-1465
Wind back (pressure) all permutations	-3011	-2990
Wind back (suction) all permutations	-1434	-1465
Wind left (pressure) all permutations	173	-2845
	-2583	
Wind left (uplift)	-2583	-2845
Wind left (suction) all permutations	1952	1629
	-467	
Wind right (pressure) all permutations	-2866	193
	-2563	
Wind right (uplift)	-2866	-2563
Wind right (suction) all permutations	1661	1921
	-438	

Support reactions by load case - Vertical

Load case	12 N	26 N
Man on bottom chord	737	737
Blanket	1153	1153
Tank	497	403

Max global deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Ratio L/X	Deflection mm	Ratio %	LC
12-26	Winst	250	23.2	5800	1097	5.3	22.8	1086:3:1
12-26	Wnet,fin	250	23.2	5800	853	6.8	29.4	1107:3

Max local deflection span

Member Joints	Situation	Allowed L/X	Absolute mm	Length mm	Relative L/X	Deflection mm	Ratio %	LC
17-18	Winst	250	2.1	528	1726	0.3	14.5	1086:3:1
17-18	Wnet,fin	250	2.1	528	1303	0.4	19.2	1012:1:3

Max node deflection

Joints	Situation	Direction	Absolute mm	Negative deflection mm	Ratio %	LC	Positive deflection mm	Ratio %	LC
5	Winst		23.6	-5	21.2	1086:3:1			
5	Wnet,fin		18	-6.3	35.1	1107:3			

Timber parameters

Timber group	Joints	Cross section mm	Grade	Bracing mm/no.	CSI %	LC No	CSI Type
End vertical Right	11-26	35x72	TR26	244	32	1	Max. combined CSI
End vertical Left	1-12	35x72	TR26	244	33	1	Max. combined CSI
Web	2-13	35x72	C16	None	13	1	Max. combined CSI
Web	10-25	35x72	C16	None	13	1	Max. combined CSI
Web	11-25	35x72	C16	None	54	1	Max. combined CSI
Bottom chord	17-18	35x97	TR26	Sheeting	36	1	CSI – Shear force
Bottom chord	20-21	35x97	TR26	Sheeting	42	1	CSI – Shear force
Top chord Left	1-6	35x72	TR26	360	64	13	Max. combined CSI
Bottom chord	12-26	35x122	TR26	Sheeting	48	13	Max. combined CSI
Web	5-16	35x72	C16	None	21	13	Max. combined CSI
Web	1-13	35x72	C16	None	56	13	Max. combined CSI
Top chord Right	6-11	35x72	TR26	360	63	36:11	Max. combined CSI
Web	9-24	35x72	C16	None	12	36:11	Max. combined CSI
Web	3-14	35x72	C16	None	10	36:5	Max. combined CSI
Web	7-22	35x72	C16	None	22	606:3	Max. combined CSI
Web	8-22	35x72	C16	None	24	633:3:-1	Max. combined CSI
Web	6-19	35x72	C16	None	29	634:3	Max. combined CSI
Web	8-23	35x72	C16	None	15	634:3	Max. combined CSI
Web	4-15	35x72	C16	None	18	634:3:-1	Max. combined CSI
Web	4-16	35x72	C16	None	32	634:3:-1	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	13	726	100	72	1.16	TR26	0.8	1197x	221	-	1.04	-	0.68	-0.29	-16983	-657	21.0	32.5	0.0	0.0	6.23	53.5
2-3	13	0	0	72	1.16	TR26	0.8	1197x	274	-	1.04	-	0.68	-0.37	-18669	1116	26.8	35.7	0.0	0.0	6.23	62.5
2-13	1	610	95	72	1.16	C16	0.6	581x	581	-	1.00	1.00	0.95	-0.04	-2162	-111	7.7	5.3	3.1	0.0	6.23	12.9
3-4	13	397	49	72	1.16	TR26	0.8	1597x	282	1.00	1.00	-	0.45	0.16	-17906	76	12.3	51.4	1.3	25.7	6.23	63.7
3-14	36:5	1117	97	72	1.16	C16	0.9	1034x	1034	-	1.00	-	0.77	-0.07	-1063	-97	7.9	2.2	0.0	0.0	6.23	10.0
4-5	13	124	16	72	1.16	TR26	0.8	1597x	270	1.00	1.00	-	0.45	0.07	-16948	58	5.0	48.7	1.0	23.2	6.23	53.7
4-15	634:3:-1	11	1	72	1.16	C16	1.1	1487x	1487	-	1.00	1.00	-	-0.09	4209	71	8.6	9.2	1.1	0.0	6.17	17.8
5-6	606:3	0	0	72	1.16	TR26	1.1	1335x	278	-	1.00	-	0.60	0.45	-5067	-72	24.4	8.1	0.0	0.0	6.23	32.5
5-16	13	2133	99	72	1.16	C16	0.8	1940x	1940	-	1.00	1.00	-	0.05	4672	29	6.5	14.0	0.6	0.0	6.17	20.4
6-7	604:3	797	97	72	1.16	TR26	1.1	658x	278	-	1.00	1.00	0.93	0.29	-5264	-80	16.0	5.4	1.0	0.0	6.23	21.3
6-20	36:7	536	100	72	1.16	C16	0.9	2393x	2393	-	1.00	-	-	-0.04	8351	-56	4.4	22.2	0.0	0.0	6.17	26.5
7-8	606:3	0	0	72	1.16	TR26	1.1	1297x	270	-	1.00	-	0.62	-0.63	-14619	1503	34.2	22.5	0.0	0.0	6.23	56.6
7-22	606:3	38	2	72	1.16	C16	1.1	1940x	1940	-	1.00	-	-	-0.13	3918	78	12.9	8.5	0.0	0.0	6.17	21.4
8-9	36:13	317	39	72	1.16	TR26	0.9	1408x	282	1.00	1.00	-	0.55	0.19	-18603	-1	12.6	39.1	0.1	24.0	6.23	51.7
8-23	634:3	413	25	72	1.16	C16	1.1	1487y	1487	1.00	1.00	-	0.25	-0.03	-2499	42	2.0	12.4	0.7	12.5	6.24	14.3
9-10	36:11	783	100	72	1.16	TR26	0.9	1284x	274	-	1.01	-	0.63	-0.41	-19441	-1180	27.1	36.0	0.0	0.0	6.23	63.0
9-24	36:11	1117	97	72	1.16	C16	0.9	1034x	1034	-	1.00	-	0.77	0.08	-1324	110	8.9	2.7	0.0	0.0	6.23	11.6
10-11	36:11	0	0	72	1.16	TR26	0.9	1284x	221	-	1.01	-	0.63	-0.32	-17604	763	21.3	32.6	0.0	0.0	6.23	53.9
10-25	1	610	95	72	1.16	C16	0.6	581x	581	-	1.00	1.00	0.95	0.04	-2169	110	7.5	5.3	3.0	0.0	6.23	12.8
11-26	1	64	26	72	1.16	TR26	0.6	208x	244	-	1.30	1.00	1.03	-0.1	-13921	709	7.8	23.6	15.6	0.0	6.23	31.4

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 %
12-1	1	180	74	72	1.16	TR26	0.6	209x	244	-	1.30	1.00	1.03	-0.1	-14238	-724	8.0	24.1	15.9	0.0	6.23	32.1
13-1	13	46	9	72	1.16	C16	0.8	454x	454	-	1.00	-	-	0.1	14242	-190	12.9	42.5	0.0	0.0	6.17	55.3
13-12	36:5	0	0	122	1.04	TR26	0.9	1001x	-	-	1.24	-	-	0.64	957	-944	13.3	0.9	0.0	0.0	6.17	14.1
14-13	13	646	100	122	1.04	TR26	0.8	984x	-	-	1.24	-	-	1.46	13584	3433	34.0	13.3	0.0	0.0	6.17	47.3
15-14	36:3	300	50	122	1.04	TR26	0.9	1797x	-	1.00	1.00	1.00	-	-0.88	15029	-1304	22.7	13.1	11.3	22.7	6.17	35.7
16-4	634:3-1	456	26	72	1.16	C16	1.1	1587y	1587	1.00	1.00	-	0.22	0.02	-5407	-24	1.5	30.2	0.4	30.3	6.24	31.7
16-15	634:3	0	0	122	1.04	TR26	1.1	1936x	-	-	1.00	-	-	-1.62	14124	1852	34.0	10.1	0.0	0.0	6.17	44.0
18-17	1	391	74	97	1.09	TR26	0.6	0	-	1.00	1.30	1.00	-	-0.5	-7192	2203	22.5	0.9	35.8	13.8	6.13	35.8
19-16	634:3	596	94	122	1.04	TR26	1.1	1936x	-	-	1.00	-	-	-1.66	12587	-2293	34.8	9.0	0.0	0.0	6.17	43.7
20-19	634:3	0	0	72	1.16	C16	1.1	2393x	2393	-	1.00	-	-	-0.22	3039	159	21.4	6.6	0.0	0.0	6.17	28.0
21-20	1	33	6	97	1.09	TR26	0.6	0	-	-	1.30	1.00	-	-0.25	-7171	-2535	11.4	0.9	41.2	0.0	6.13	41.2
22-8	633:3-1	456	26	72	1.16	C16	1.1	1587y	1587	1.00	1.00	-	0.22	-0.02	-4006	18	1.5	22.4	0.3	22.5	6.24	23.8
22-19	634:3	0	0	122	1.04	TR26	1.1	1138x	-	-	1.21	-	-	1.62	12428	-2742	28.1	8.9	0.0	0.0	6.17	36.9
23-22	634:3	564	100	122	1.04	TR26	1.1	1138x	-	-	1.21	-	-	1.41	11566	3822	24.4	8.3	0.0	0.0	6.17	32.6
24-23	36:13	300	50	122	1.04	TR26	0.9	1285x	-	1.00	1.00	1.00	-	-0.78	14250	-635	20.2	12.4	5.5	20.2	6.17	32.5
25-11	1	46	9	72	1.16	C16	0.6	454x	454	-	1.00	-	-	-0.07	10541	132	11.9	41.9	0.0	0.0	6.17	53.8
25-24	36:11	0	0	122	1.04	TR26	0.9	955x	-	-	1.25	-	-	1.41	14134	-3591	29.1	12.3	0.0	0.0	6.17	41.4
26-25	36:11	504	100	122	1.04	TR26	0.9	955x	-	-	1.25	-	-	0.49	925	734	10.1	0.9	0.0	0.0	6.17	10.9

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 %
1	M20	101.6	152	96
2	M20	50.8	76.2	72
3	M20	50.8	76.2	72
4	M20	76.2	101.6	98
5	M20	127.8	127	71
6	M20	89.7	101.6	61
7	M20	127.8	127	67
8	M20	76.2	101.6	98
9	M20	50.8	76.2	72
10	M20	50.8	76.2	72
11	M20	101.6	152	94
12	M20	50.8	101.6	89
13	M20	101.6	127	98
14	M20	50.8	127	45
15	M20	50.8	127	58
16	M20	101.6	101.6	85
19	M20	50.8	127	55
20	M20	63.5	152	58
22	M20	101.6	101.6	93
23	M20	50.8	127	45
24	M20	50.8	127	45
25	M20	101.6	127	96
26	M20	50.8	101.6	87
s1	M20	89.7	177.8	59