Civil & Structural Engineering Design Services Pty. Ltd.

Client: **Extreme Marquees Pty. Ltd.**
Project: Design check – 4m, 5m, 6m, 7m & 8m Dome Structure for **100km/hr** Wind Speed.
Reference: Extreme Marquees Pty Ltd Technical Data

Report by: KZ
Checked by: EAB
Date: 30/05/2019

JOB NO: E-11-267171

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1 Introduction

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The following structural drawings and calculations are for the transportable 8m Dome Structure supplied by Extreme Marquees Pty Ltd.

The frame consists principally of Q235 steel components with hot dipped galvanized connections and base plate.

The report examines the effect of 3s gust wind of 100 km/hr on 8m Dome Structure as the worst-case scenario. The relevant Australian Standards AS1170.0:2002 General principles, AS1170.1:2002 Permanent, imposed and other actions and AS1170.2:2011 Wind actions are used. The design check is in accordance with AS/NZS 4100:1998 Steel Structures.

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2 Design Restrictions and Limitations

2.1 The erected structure is for temporary use only.

2.2 It should be noted that if high gust wind speeds are anticipated or forecast in the locality of the tent, the temporary erected structure should be dismantled.

2.3 For forecast winds in excess of **(refer to summary)** – all fabric shall be removed from the frames, and the structure should be completely dismantled.

(Please note that the locality squall or gust wind speed is affected by factors such as terrain exposure and site elevations.)

2.4 The structure may only be erected in regions with wind classifications no greater than the limits specified on the attached wind analysis.

2.5 The wind classifications are based upon Terrain Category 2. Considerations have also been made to the regional wind terrain category, topographical location and site shielding from adjacent structures. Please note that in many instances topographical factors such as a location on the crest of a hill or on top of an escarpment may yield a higher wind speed classification than that derived for a higher wind terrain category in a level topographical region. For this reason, particular regard shall be paid to the topographical location of the structure. For localities which do not conform to the standard prescribed descriptions for wind classes as defined above, a qualified Structural Engineer may be employed to determine an appropriate wind class for that the particular site.

2.6 The structures in no circumstances shall ever be erected in tropical or severe tropical cyclonic condition as defined on the Map of Australia in AS 1170.2-2011, Figure 3.1.

2.7 The tent structure has not been designed to withstand snow and ice loadings such as when erected in alpine regions.

2.8 For the projects, where the site conditions approach the design limits, extra consideration should be given to pullout tests of the stakes and professional assessment of the appropriate wind classification for the site.

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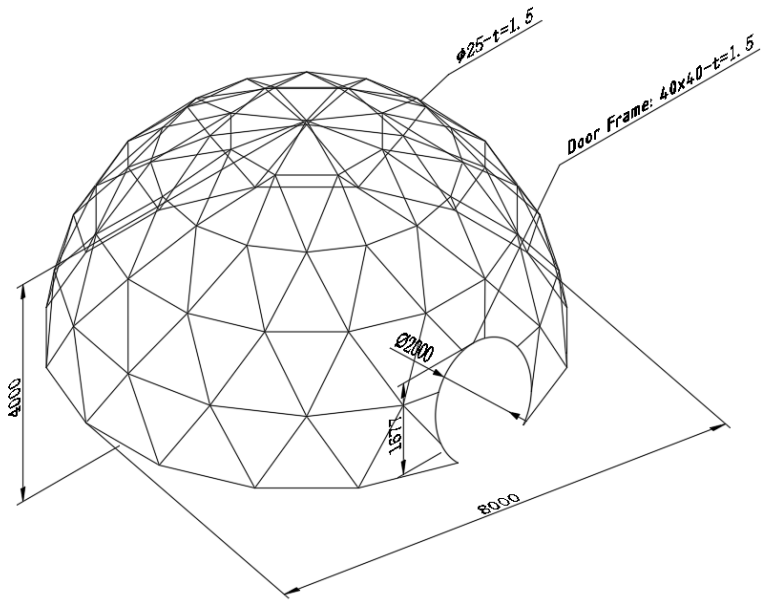
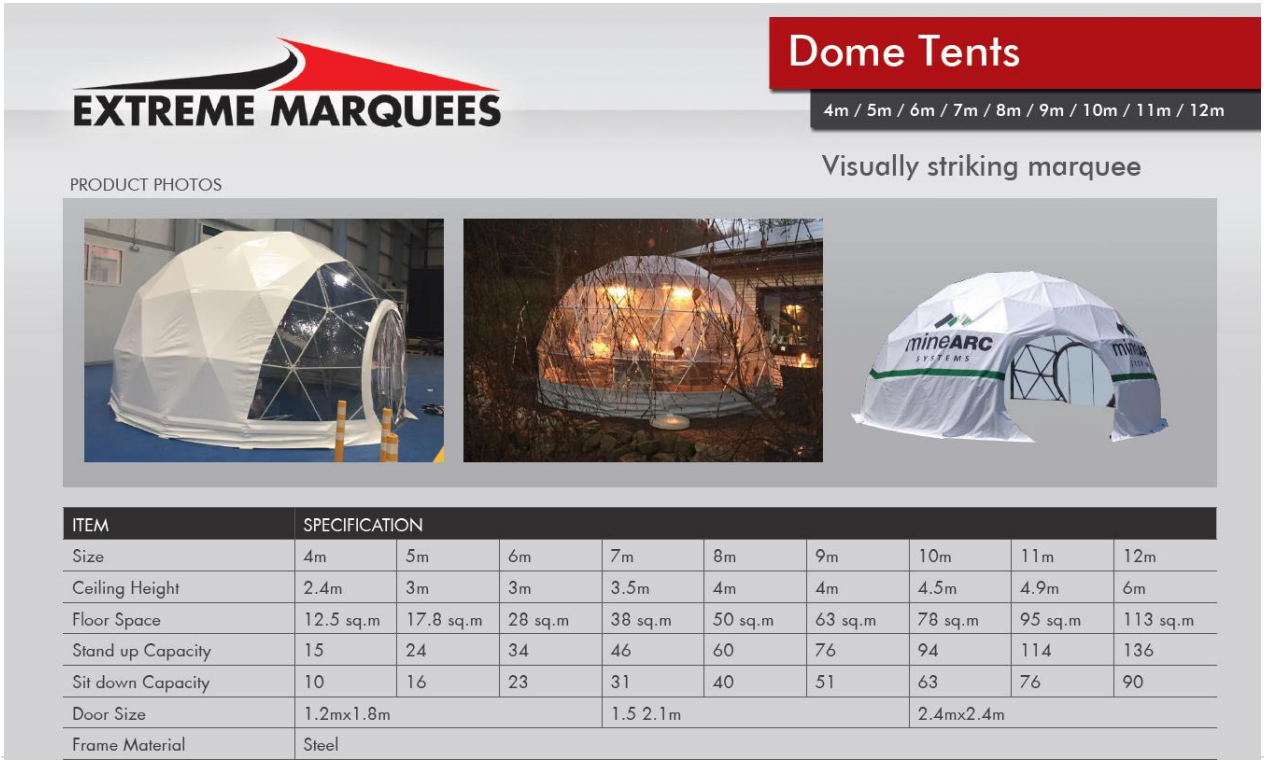
3 Specifications

3.1 General

Tent category	
Material	Steel Q235

Size	Model
8m	Dome





EXTREME MARQUEES

Dome Tents

4m / 5m / 6m / 7m / 8m / 9m / 10m / 11m / 12m

Visually striking marquee

PRODUCT PHOTOS

ITEM	SPECIFICATION								
Size	4m	5m	6m	7m	8m	9m	10m	11m	12m
Ceiling Height	2.4m	3m	3m	3.5m	4m	4m	4.5m	4.9m	6m
Floor Space	12.5 sq.m	17.8 sq.m	28 sq.m	38 sq.m	50 sq.m	63 sq.m	78 sq.m	95 sq.m	113 sq.m
Stand up Capacity	15	24	34	46	60	76	94	114	136
Sit down Capacity	10	16	23	31	40	51	63	76	90
Door Size	1.2mx1.8m			1.5 2.1m			2.4mx2.4m		
Frame Material	Steel								

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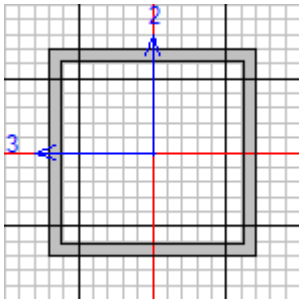
3.2 Steel Properties

TABLE: Material Properties 03a - Steel Data								
Material	**Fy**	**Fu**	**EffFy**	**EffFu**	**SHard**	**SMax**	**SRup**	**FinalSlope**
Text	KN/m2	KN/m2	KN/m2	KN/m2	Unitless	Unitless	Unitless	Unitless
Q235	235000	390000	260000	430000	0.015	0.11	0.17	-0.1

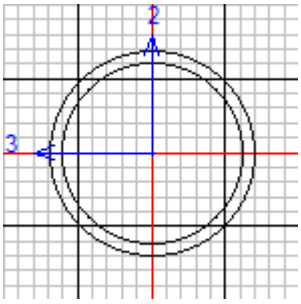
3.3 Section Properties

TABLE: Frame Section Properties 01 - General, Part 1 of 2										
SectionName	**Material**	**Shape**	**AS2**	**AS3**	**S33**	**S22**	**Z33**	**Z22**	**R33**	**R22**
Text	Text	Text	mm2	mm2	mm3	mm3	mm3	mm3	mm	mm
20X1.5 CHS	Q235	Pipe	43.78	43.78	375.42	375.42	514.5	514.5	6.562	6.562
40x40x2 SHS (Door Frame)	Q235	Box/Tube	160	160	3668.27	3668.27	4336	4336	15.535	15.535

TABLE: Frame Section Properties 01 - General, Part 2 of 2										
SectionName	**Material**	**Shape**	**t3**	**t2**	**tf**	**tw**	**Area**	**TorsConst**	**I33**	**I22**
Text	Text	Text	mm	mm	mm	mm	mm2	mm4	mm4	mm4
25X2 CHS	Q235	Pipe	20			1.5	87.18	7508.31	3754.15	3754.15
30x2 SHS (Door Frame)	Q235	Box/Tube	40	40	2	2	304	109744	73365.33	73365.33



40x2 SHS (Door Frame)



20x1.5 CHS (Main Frame)

4 Design Loads

4.1 Ultimate

		Distributed load (kPa)	Design load factor (-)	Factored imposed load (kPa)
Live	Q	-	1.5	-
Self weight	G	self weight	1.35, 1.2, 0.9	1.2 self weight, 0.9 self weight
3s 100km/hr gust	W	0.383 C_{fig}	1.0	0.383 C_{fig}

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4.2 Load Combinations

4.2.1 Serviceability

Gravity = $1.0 \times G$

Wind = $1.0 \times G + 1.0 \times W$

4.2.2 Ultimate

Downward = $1.35 \times G$
= $1.2 \times G + W_u$
= $1.2 \times G + W_u + W_{IS}$

Upward = $0.9 \times G + W_u$
$0.9 \times G + W_u + W_{IP}$

5 Wind Analysis

Wind towards surface (+ve), away from surface (-ve)

5.1 Parameters

Terrain category = 2
Site wind speed ($V_{sit,\beta}$) = $V_R M_d (M_{z,cat} M_s M_t)$
V_R = 27.78m/s (100 km/hr) *(regional 3 s gust wind speed)*
$M_d = 1$
$M_s = 1$
$M_t = 1$
$M_{z,cat} = 0.91$ *(Table 4.1(B) AS1170.2)*

$V_{sit,\beta}$ = 25.28 m/s

Height of structure (h) = 2 m *(mid of peak and eave)*
Total height of structure = 4 m
Width of structure (w) = 8 m
Length of structure (l) = 8 m

Pressure (P) = $0.5\rho_{air} (V_{sit,\beta})^2 C_{fig} C_{dyn}$
= $0.383 C_{fig}$ kPa

5.2 Pressure Coefficients (C_{fig})

Name	Symbol	Value	Unit	*Notes*	*Ref.*
		Input			
Importance level		2			*Table 3.1 - Table 3.2 (AS1170.0)*
Annual probability of exceedance		Temporary			*Table 3.3*

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Regional gust wind speed		100	Km/hr		*Table 3.1 (AS1170.2)*
Regional gust wind speed	V_R	**27.78**	m/s		
Wind Direction Multipliers	M_d	1			*Table 3.2 (AS1170.2)*
Terrain Category Multiplier	$M_{Z,Cat}$	0.91			*Table 4.1 (AS1170.2)*
Shield Multiplier	M_S	1			*4.3 (AS1170.2)*
Topographic Multiplier	M_t	1			*4.4 (AS1170.2)*
Site Wind Speed	$V_{Site,\beta}$	**25.28**	m/s	$V_{Site,\beta}=V_R*M_d*M_{z,cat}*M_S,M_t$	
Width	B	8	m		
Length	D	8	m		
Height	Z	2	m		
	h/d	0.25			
	h/b	0.25			

Wind Pressure

ρair	ρ	1.2	Kg/m^3		
dynamic response factor	C_{dyn}	1			
Wind Pressure	$\rho*C_{fig}$	**0.383**	Kg/m^2	$\rho=0.5\rho_{air}*(V_{des,\beta})^2*C_{fig}*C_{dyn}$	*2.4 (AS1170.2)*

WIND DIRECTION 1 (Perpendicular to Length)

Internal Pressure

Opening Assumption: With Dominant Opening (Cpi MIN & MAX)

Internal Pressure Coefficient (Without Dominant) **MIN**		-0.1			*Table 5.1 A (AS1170.2)*
Internal Pressure Coefficient (Without Dominant) **MAX**		0.2			
Internal Pressure Coefficient (With Dominant) **MIN**		**-0.3**			*Table 5.1 B (AS1170.2)*
Internal Pressure Coefficient (With Dominant) **MAX**		**0.2**			
N		0.7			
Combination Factor	$K_{C,i}$	1			
Internal Pressure Coefficient **MIN**	$C_{p,i}$	-0.30			
Internal Pressure Coefficient **MAX**	$C_{p,i}$	0.20			

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External Pressure					
1. Windward Wall					
External Pressure Coefficient	$C_{P,e}$	0.7			*Table 5.2 A*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
aerodynamic shape factor	$C_{fig,e}$	0.56			
Wind Wall Pressure	P	**0.21**	**kPa**		
2. Leeward Wall					
External Pressure Coefficient	$C_{P,e}$	-0.5			*Table 5.2 B*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
aerodynamic shape factor	$C_{fig,e}$	-0.4			
Lee Wall Pressure	P	**-0.15**	**kPa**		
3. Side Wall					*Table 5.2 C*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient	$C_{P,e}$	-0.65		*0 to 1h*	
External Pressure Coefficient	$C_{P,e}$	-0.5		*1h to 2h*	
External Pressure Coefficient	$C_{P,e}$	-0.3		*2h to 3h*	
External Pressure Coefficient	$C_{P,e}$	-0.2		*>3h*	
aerodynamic shape factor	$C_{fig,e}$	-0.52		*0 to 1h*	
aerodynamic shape factor	$C_{fig,e}$	-0.4		*1h to 2h*	
aerodynamic shape factor	$C_{fig,e}$	-0.24		*2h to 3h*	
aerodynamic shape factor	$C_{fig,e}$	-0.16		*>3h*	
Side Wall Pressure	P	**-0.20**	**kPa**	*0 to 1h*	
Side Wall Pressure	P	**-0.15**	**kPa**	*1h to 2h*	
Side Wall Pressure	P	**-0.09**	**kPa**	*2h to 3h*	
Side Wall Pressure	P	**-0.06**	**kPa**	*>3h*	

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4. Roof				*α>10°*	
r (rise)	r	4	m		
h/r	h/r	0.50			
Breadth Effect		1.00		*(b/d)^0.25>1*	
Rise-to-span ratio	r/d	0.50			
4.1 Roof Windward Quarter					
U	U	2	m		
Area Reduction Factor	K_a	1			
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,e}$	0			*Table C3*
External Pressure Coefficient **MAX**	$C_{P,e}$	0.3			
Factored External Pressure Coefficient **MIN**	$C_{P,e}$	0.00			
Factored External Pressure Coefficient **MAX**	$C_{P,e}$	0.30			
aerodynamic shape factor **MIN**	$C_{fig,e}$	0.00			
aerodynamic shape factor **MAX**	$C_{fig,e}$	0.24			
Pressure **MIN**	P	**0.00**	**kPa**		
Pressure **MAX**	P	**0.09**	**kPa**		
4.2 Roof Centre Half					
T	T	4	m		
Area Reduction Factor	K_a	1			
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,e}$	-0.65			*Table C3*
External Pressure Coefficient **MAX**	$C_{P,e}$	-0.65			
Factored External Pressure Coefficient **MIN**	$C_{P,e}$	-0.65			
Factored External Pressure Coefficient **MAX**	$C_{P,e}$	-0.65			
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.52			
aerodynamic shape factor **MAX**	$C_{fig,e}$	-0.52			
Pressure **MIN**	P	**-0.20**	**kPa**		
Pressure **MAX**	P	**-0.20**	**kPa**		
4.1 Roof Windward Quarter					
D	D	2	m		
Area Reduction Factor	K_a	1			

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combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,e}$	-0.2			*Table C3*
External Pressure Coefficient **MAX**	$C_{P,e}$	0			
Factored External Pressure Coefficient **MIN**	$C_{P,e}$	-0.20			
Factored External Pressure Coefficient **MAX**	$C_{P,e}$	0.00			
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.16			
aerodynamic shape factor **MAX**	$C_{fig,e}$	0.00			
Pressure **MIN**	P	**-0.06**	**kPa**		
Pressure **MAX**	P	**0.00**	**kPa**		

WIND DIRECTION 2 (Parallel to Length)

Internal Pressure

Opening Assumption	With Dominant Opening (Cpi MIN & MAX)				
Internal Pressure Coefficient (Without Dominant) **MIN**		-0.1			*Table 5.1 A (AS1170.2)*
Internal Pressure Coefficient (Without Dominant) **MAX**		0.2			
Internal Pressure Coefficient (With Dominant) **MIN**		**-0.3**			*Table 5.1 B (AS1170.2)*
Internal Pressure Coefficient (With Dominant) **MAX**		**0.2**			
N		0.7		*Cpi= N*Cpe*	
Combination Factor	$K_{C,i}$	1			
Internal Pressure Coefficient **MIN**	$C_{p,i}$	-0.30			
Internal Pressure Coefficient **MAX**	$C_{p,i}$	0.20			

External Pressure

1. Windward Wall					
External Pressure Coefficient	$C_{P,e}$	0.7			*Table 5.2 A*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
aerodynamic shape factor	$C_{fig,e}$	0.56			

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Wind Wall Pressure	P	**0.21**	**kPa**		
2. Leeward Wall					
External Pressure Coefficient	$C_{P,e}$	-0.3			*Table 5.2 B*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
aerodynamic shape factor	$C_{fig,e}$	-0.24			
Lee Wall Pressure	P	**-0.09**	**kPa**		
3. Side Wall					*Table 5.2 C*
Area Reduction Factor	K_a	1			*Table 5.4*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient	$C_{P,e}$	-0.65		*0 to 1h*	
External Pressure Coefficient	$C_{P,e}$	-0.5		*1h to 2h*	
External Pressure Coefficient	$C_{P,e}$	-0.3		*2h to 3h*	
External Pressure Coefficient	$C_{P,e}$	-0.2		*>3h*	
aerodynamic shape factor	$C_{fig,e}$	-0.52		*0 to 1h*	
aerodynamic shape factor	$C_{fig,e}$	-0.4		*1h to 2h*	
Side Wall Pressure	**P**	**-0.20**	**kPa**	*0 to 1h*	
Side Wall Pressure	**P**	**-0.15**	**kPa**	*1h to 2h*	
Side Wall Pressure	**P**	**-0.09**	**kPa**	*2h to 3h*	
Side Wall Pressure	**P**	**-0.06**	**kPa**	*>3h*	
4. Roof				α *<10°*	
Area Reduction Factor	K_a	1			*Table 5.3 A*
combination factor applied to internal pressures	$K_{C,e}$	0.8			
local pressure factor	K_l	1			
porous cladding reduction factor	K_p	1			
External Pressure Coefficient **MIN**	$C_{P,e}$	0.00		*0 to 0.5h*	
External Pressure Coefficient **MIN**	$C_{P,e}$	-0.90		*0.5 to 1h*	

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External Pressure Coefficient **MIN**	$C_{P,e}$	-0.50		*1h to 2h*
External Pressure Coefficient **MIN**	$C_{P,e}$	-0.30		*2h to 3h*
External Pressure Coefficient **MIN**	$C_{P,e}$	-0.20		*>3h*
External Pressure Coefficient **MAX**	$C_{P,e}$	-0.40		*0 to 0.5h*
External Pressure Coefficient **MAX**	$C_{P,e}$	-0.40		*0.5 to 1h*
External Pressure Coefficient **MAX**	$C_{P,e}$	0.00		*1h to 2h*
External Pressure Coefficient **MAX**	$C_{P,e}$	0.10		*2h to 3h*
External Pressure Coefficient **MAX**	$C_{P,e}$	0.20		*>3h*
aerodynamic shape factor **MIN**	$C_{fig,e}$	0		*0 to 0.5h*
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.72		*0.5 to 1h*
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.4		*1h to 2h*
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.24		*2h to 3h*
aerodynamic shape factor **MIN**	$C_{fig,e}$	-0.16		*>3h*
aerodynamic shape factor **MAX**	$C_{fig,e}$	-0.32		*0 to 0.5h*
aerodynamic shape factor **MAX**	$C_{fig,e}$	-0.32		*0.5 to 1h*
aerodynamic shape factor **MAX**	$C_{fig,e}$	0		*1h to 2h*
aerodynamic shape factor **MAX**	$C_{fig,e}$	0.08		*2h to 3h*
aerodynamic shape factor **MAX**	$C_{fig,e}$	0.16		*>3h*
Pressure **MIN**	**P**	**0.00**	**kPa**	*0 to 0.5h*
Pressure **MIN**	**P**	**-0.28**	**kPa**	*0.5 to 1h*
Pressure **MIN**	**P**	**-0.15**	**kPa**	*1h to 2h*
Pressure **MIN**	**P**	**-0.09**	**kPa**	*2h to 3h*
Pressure **MIN**	**P**	**-0.06**	**kPa**	*>3h*
Pressure **MAX**	**P**	**-0.12**	**kPa**	*0 to 0.5h*
Pressure **MAX**	**P**	**-0.12**	**kPa**	*0.5 to 1h*
Pressure **MAX**	**P**	**0.00**	**kPa**	*1h to 2h*
Pressure **MAX**	**P**	**0.03**	**kPa**	*2h to 3h*
Pressure **MAX**	**P**	**0.06**	**kPa**	*>3h*

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WIND EXTERNAL PRESSURE			Direction1 (Perpendicular to Length)				Direction2 (Parallel to Length)				
Windward (kPa)			0.21				0.21				
Leeward (kPa)			-0.15				-0.09				
Sidewall (m)			Length	(m)	(m)	(Kpa)	(Kpa)				
			0 - 1h	0	2	-0.20	-0.20				
			1h - 2h	2	4	-0.15	-0.15				
			2h - 3h	4	6	-0.09	-0.09				
			>3h	6	-	-0.06	-0.06				
Roof		Length	(m)	(m)	Min (Kpa)	Max (Kpa)	Length	(m)	(m)	Min (Kpa)	Max (Kpa)
	Windward Quarter	0 - 0.25d	0	2	0.00	0.09	0-0.5h	0.00	1.00	0.00	-0.12
	Centre Half	0.25d - 0.75d	2	6	-0.20	-0.20	0.5h-1h	1.00	2.00	-0.28	-0.12
	Leeward Quarter	0.75d - 1d	6	8	-0.06	0.00	1h-2h	2.00	4.00	-0.15	0.00
							2h-3h	4.00	6.00	-0.09	0.03
							>3h	6.00	-	-0.06	0.06
Wind Internal Pressure (kPa)			Min (kPa)			Max (kPa)	Min (kPa)			Max (kPa)	
			-0.12			0.08	-0.12			0.08	

TABLE C3

EXTERNAL PRESSURE COEFFICIENTS ($C_{p,e}$)—CURVED ROOFS

Rise-to-span ratio (r/d)	Windward quarter (U)	Centre half (T)	Leeward quarter (D)
0.09	$-(0.2 + 0.4\ h/r)$ or 0.0	$-(0.55 + 0.2\ h/r)$	$-(0.4 + 0.2\ h/r)$ or 0.0
0.2	$(0.3 - 0.4\ h/r)$ or 0.0		$-(0.25 + 0.2\ h/r)$ or 0.0
0.5	$(0.5 - 0.4\ h/r)$ or 0.0		$-(0.1 + 0.2\ h/r)$ or 0.0

NOTES:

1 h is the average roof height and r is the rise of the arch (see Figure C3).

2 For intermediate values of rise-to-span ratio, linear interpolation shall be used.

3 For $h/r > 2$, Table C3 shall be applied with $h/r = 2$.

4 For $r/d < 0.09$, Table 5.3(A) shall be applied.

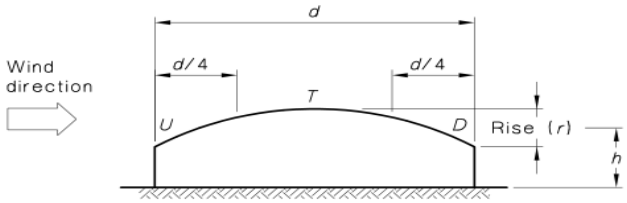

FIGURE C3 EXTERNAL PRESSURE COEFFICIENTS ($C_{p,e}$)—CURVED ROOFS

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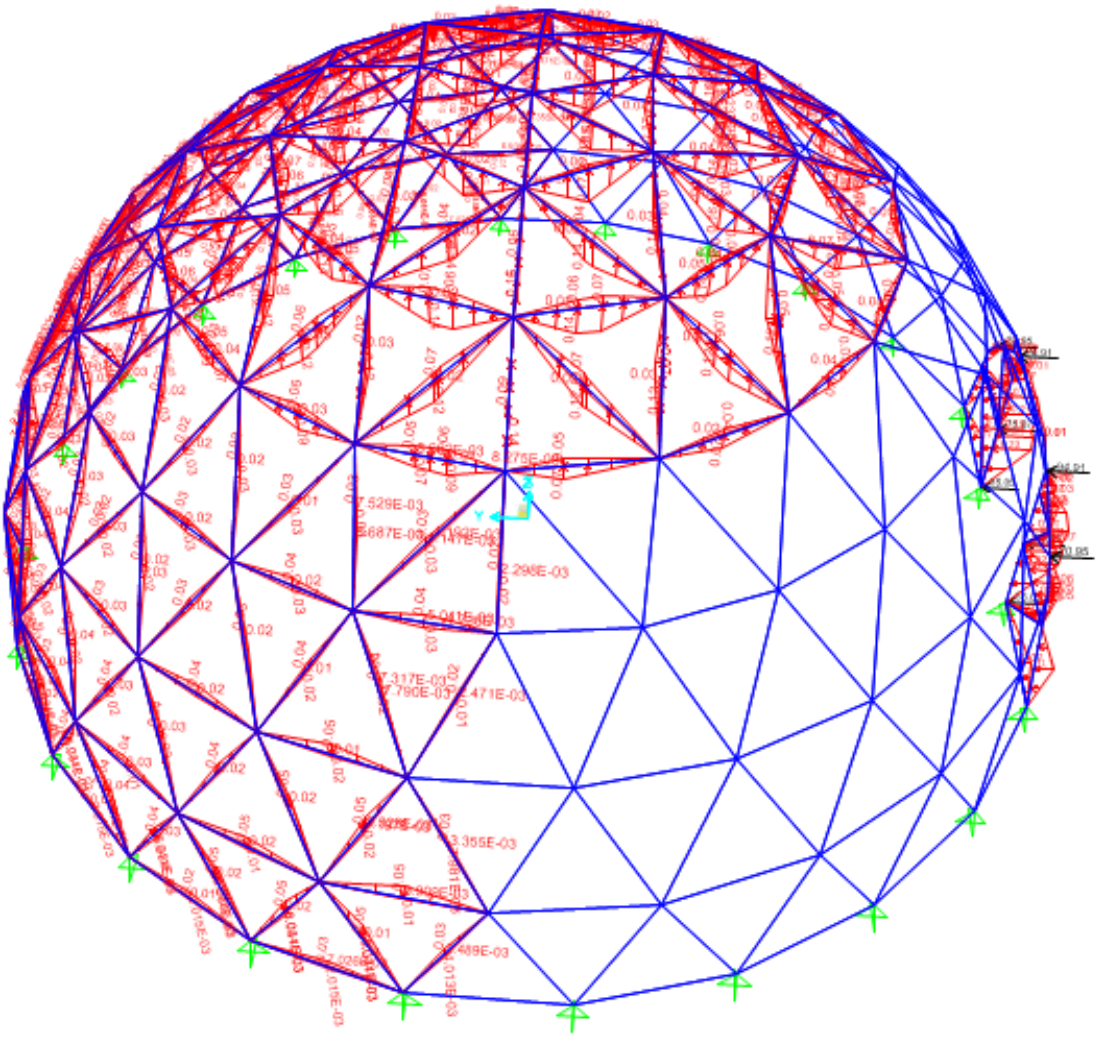
5.3 Wind Load Diagrams

5.3.1 Wind 1(case 1,min)



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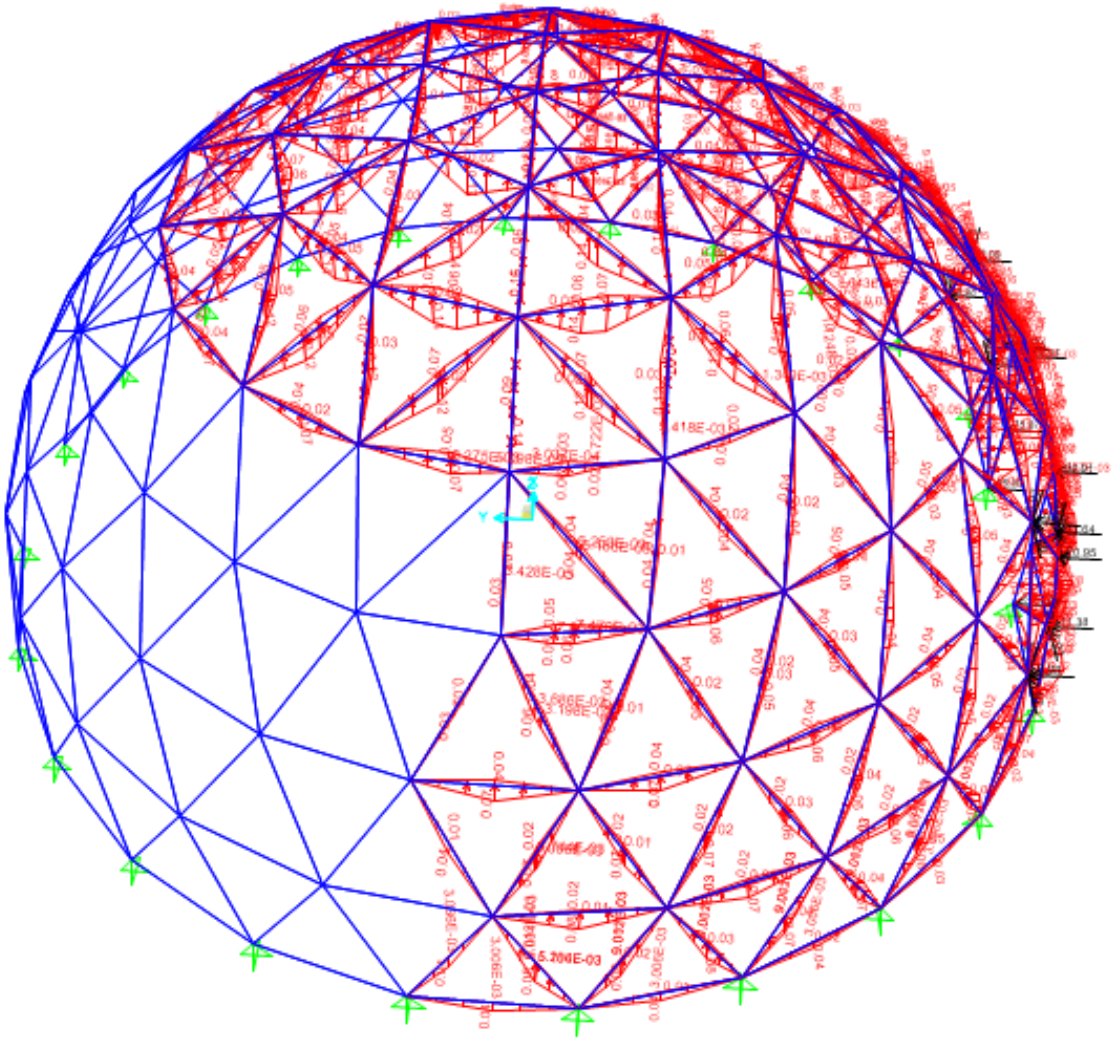
5.3.2 Wind 1(case 2,max)



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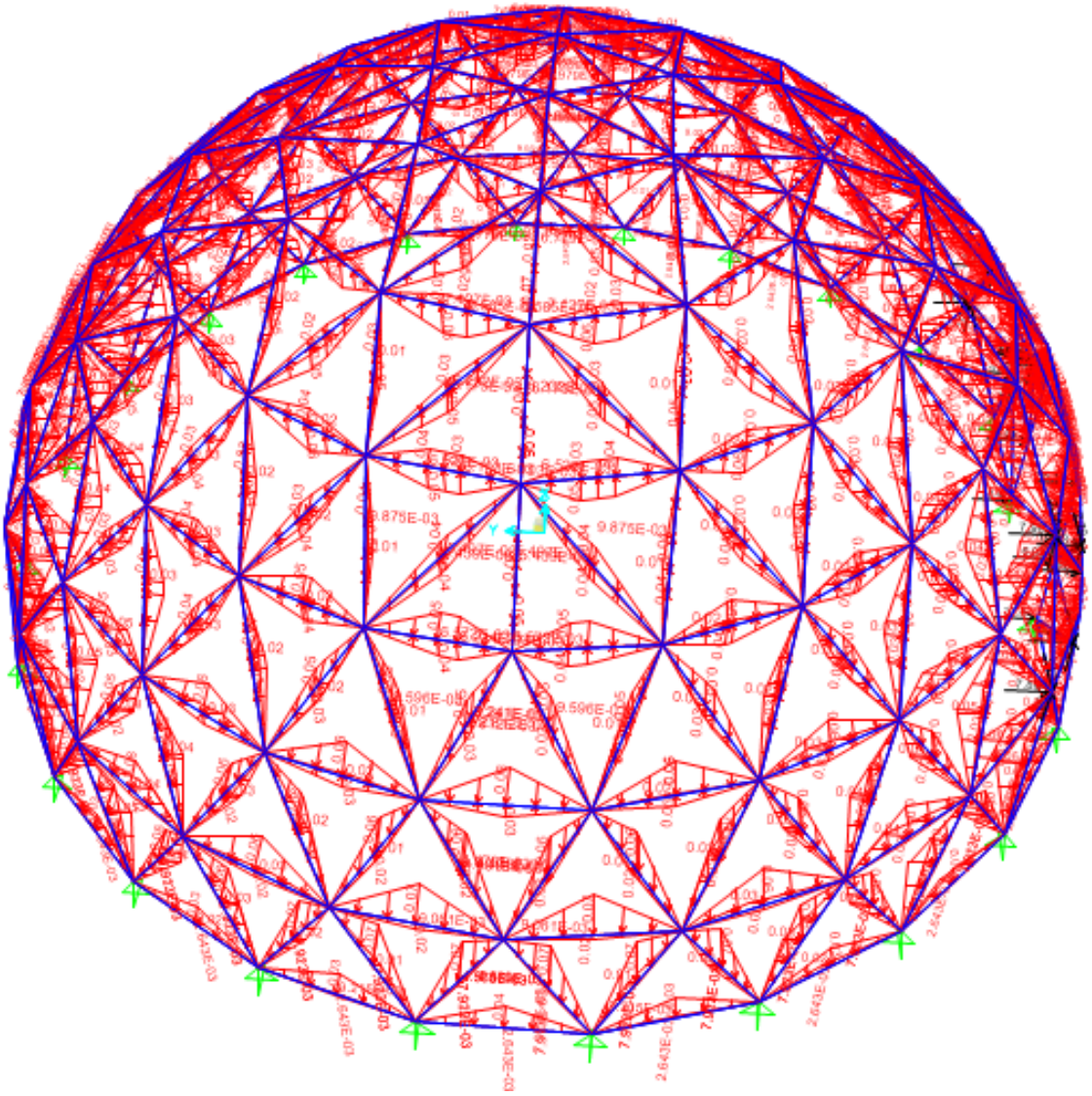
5.3.3 Wind Internal Pressure



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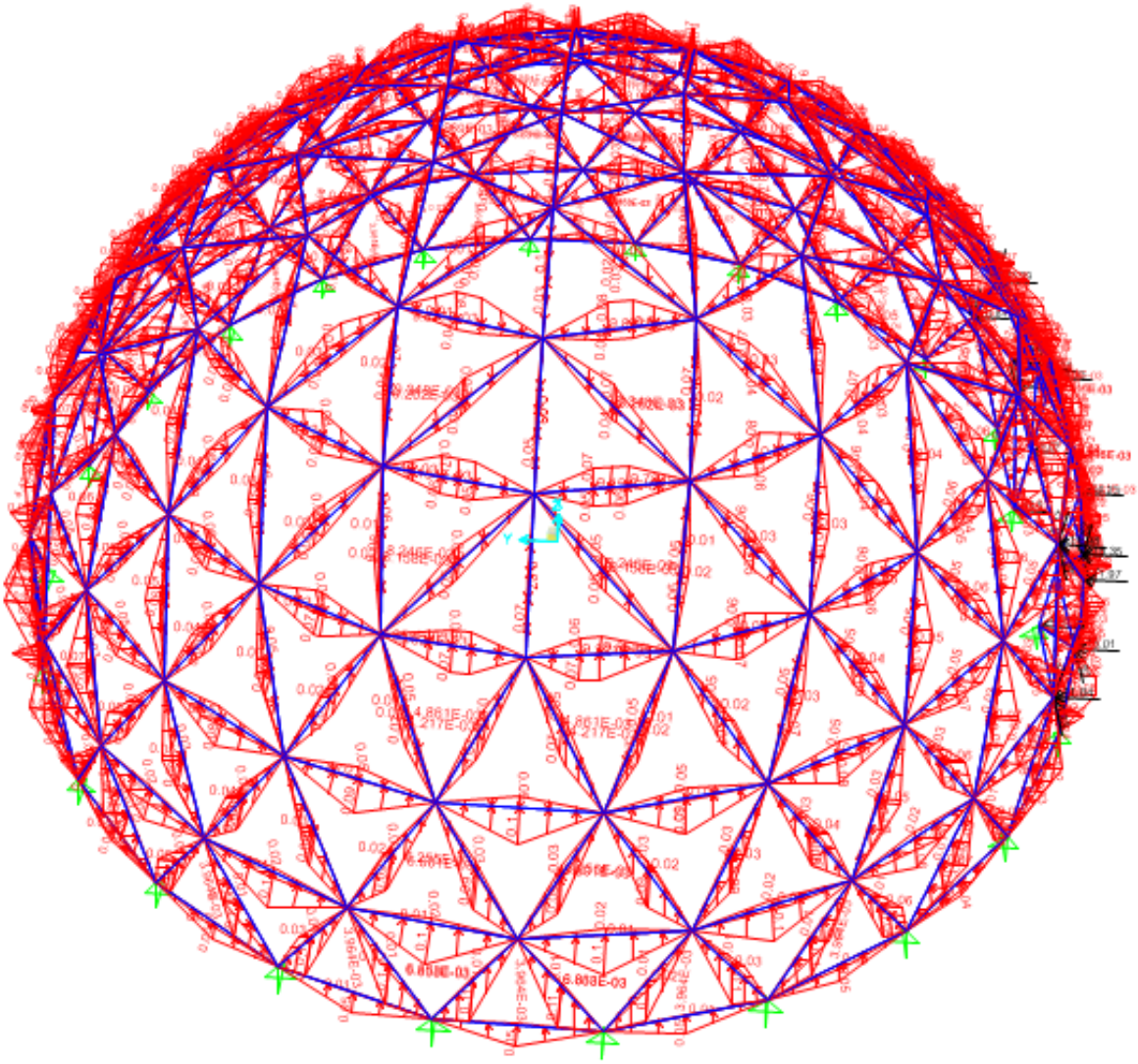
5.3.4 Wind Internal Suction



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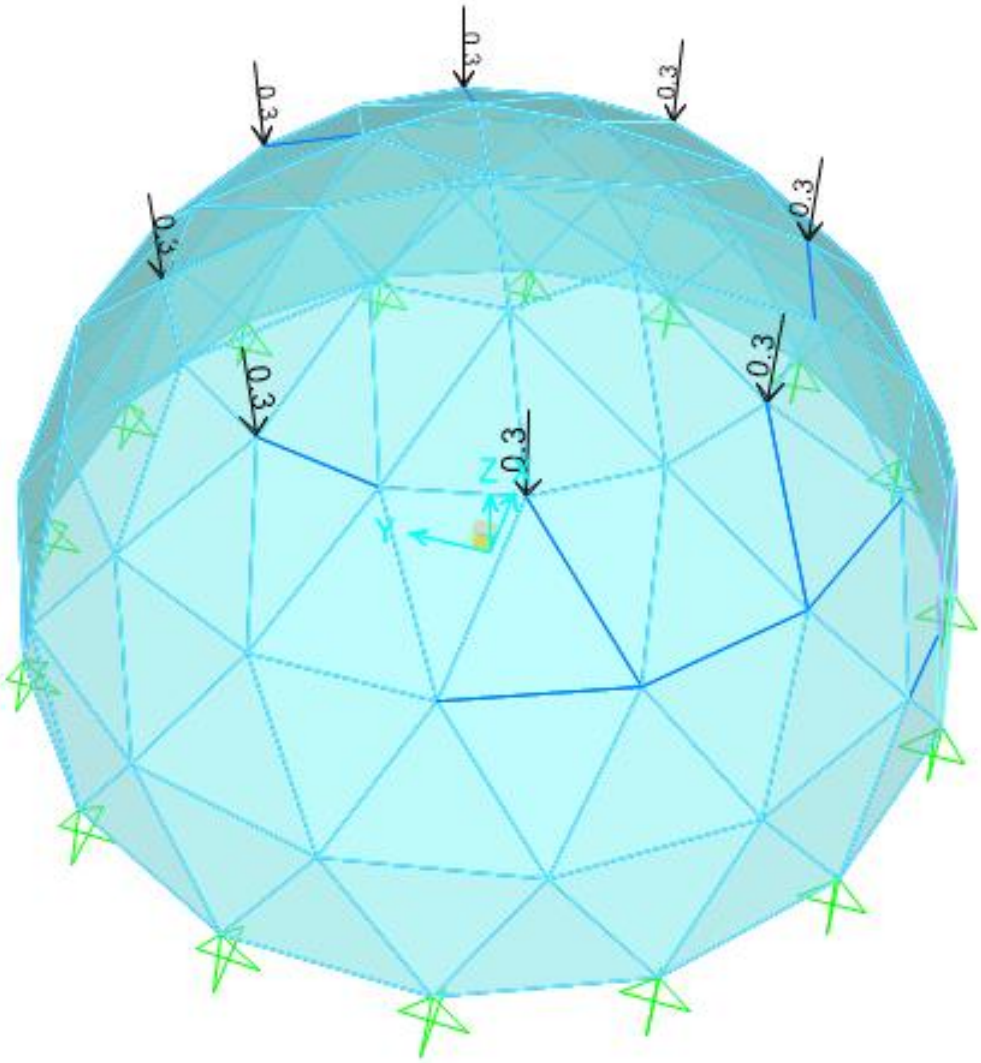
5.3.5 Super Imposed Dead Load:



8 off 0.3kN (30kg) = 240kg in total

After 3D model analysis, each member is checked based on adverse load combination.
In this regard the maximum bending moment, shear and axial force due to adverse load combinations for each member are presented as below:

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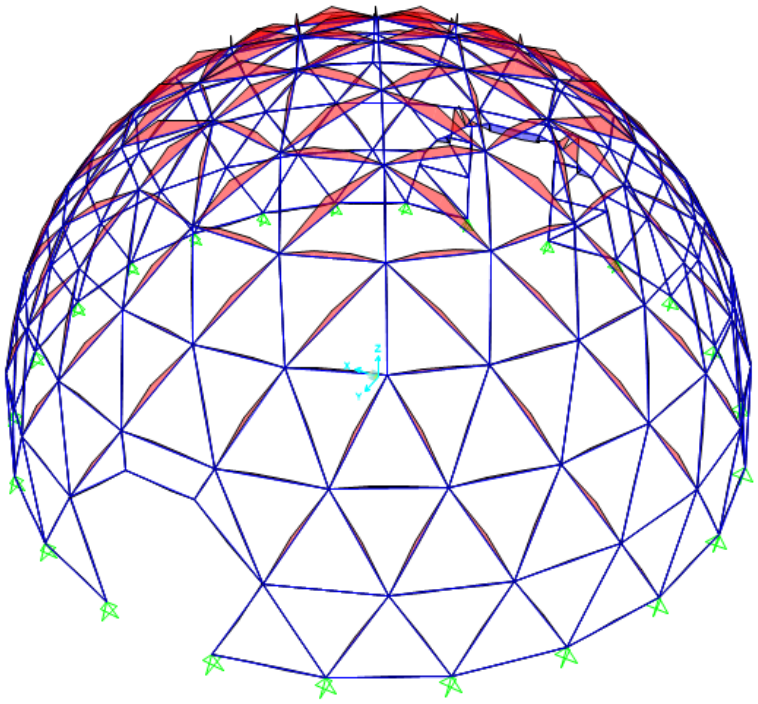
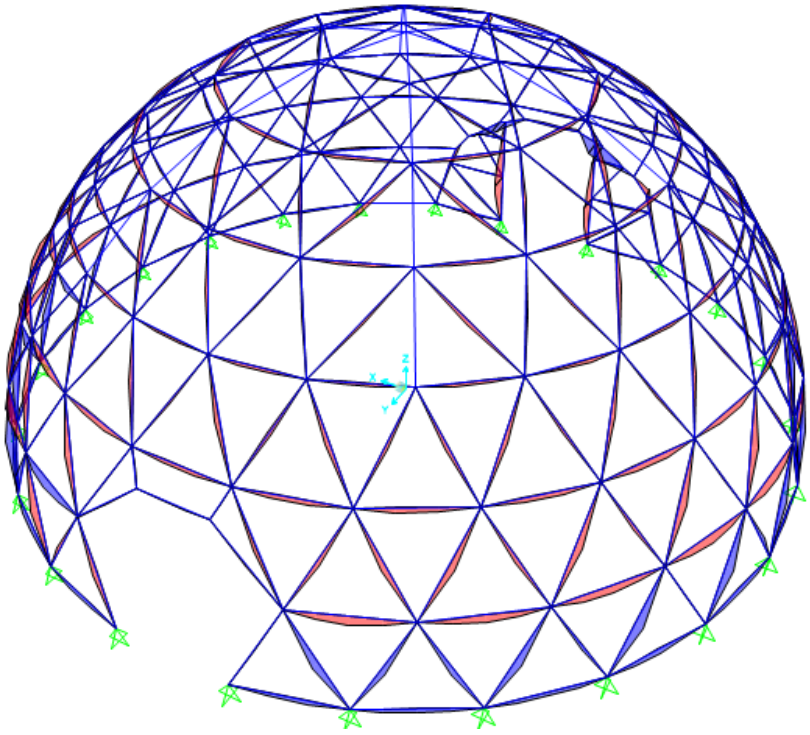
5.3.6 Max Bending Moment due to critical load combination in major axis



5.3.7 Max Bending Moment in minor axis due to critical load combination



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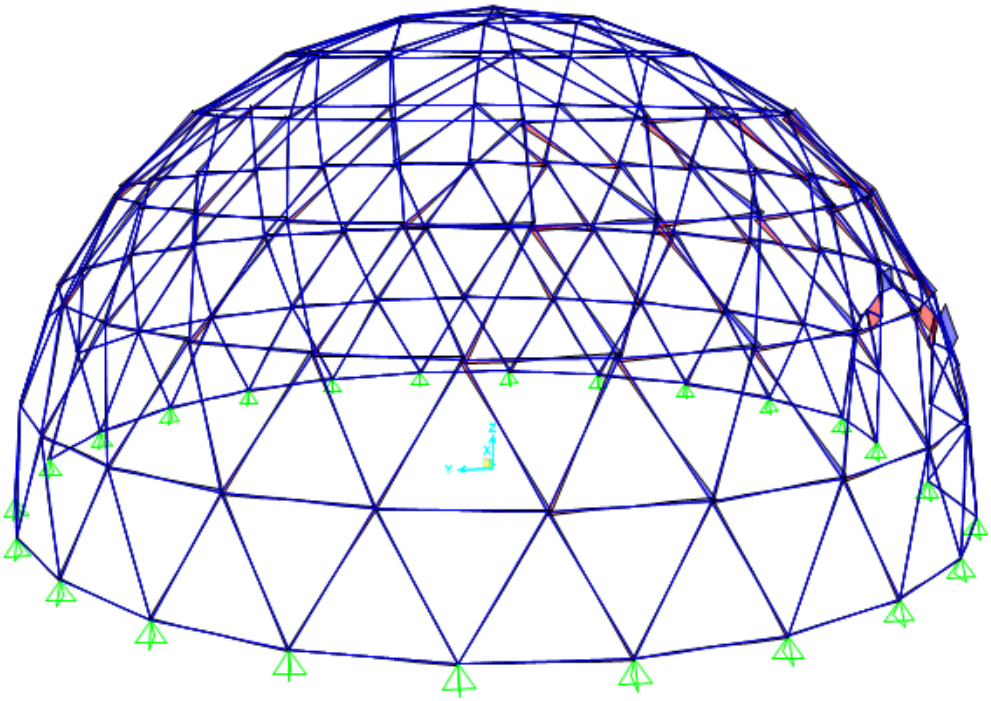
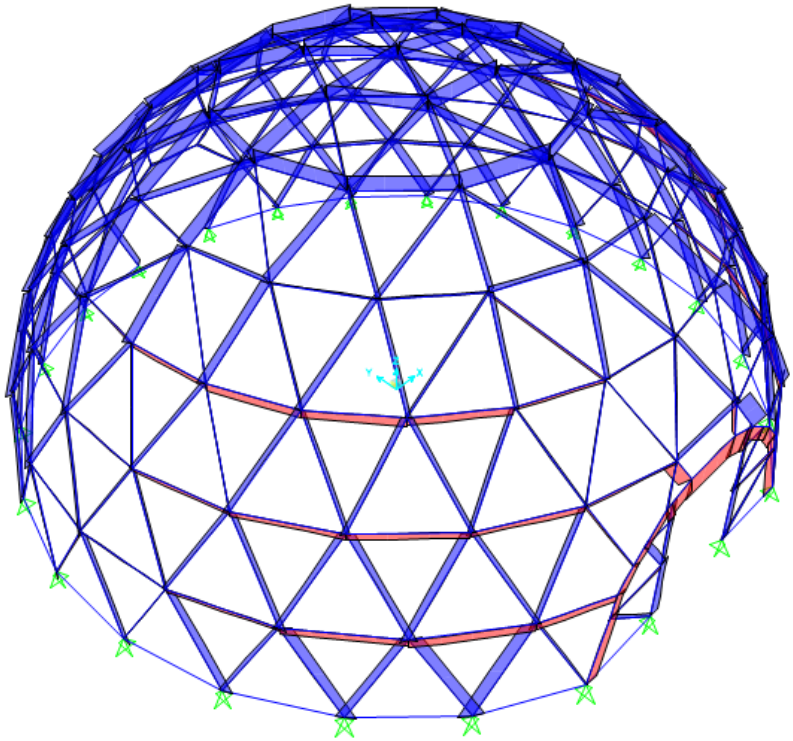
5.3.8 Max Shear in due to critical load combination



5.3.9 Max Axial force in upright support and roof beam due to critical load combination



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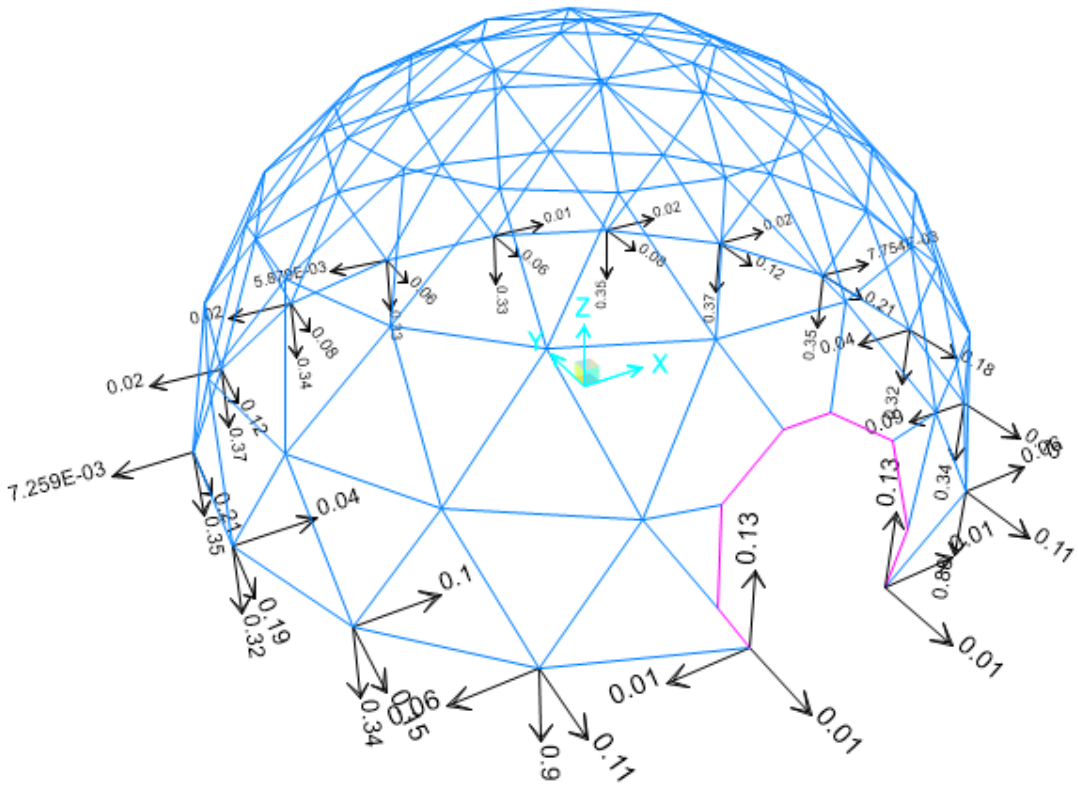
5.3.10 Max reactions



Max Reaction (Bearing) $N^* = 1$ kN
Max Reaction (Uplift) $N^* = 0.9$ kN

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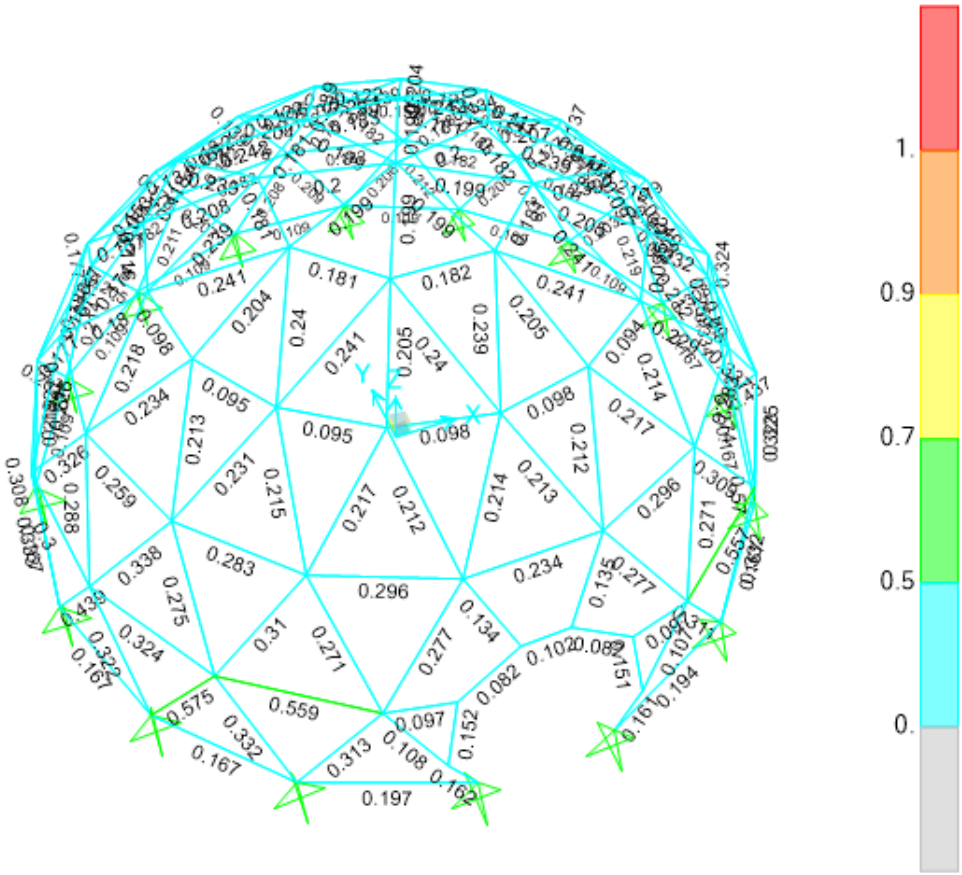
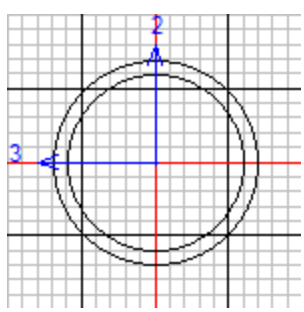
6 Checking Members Based on AS4100:1998



All steel members pass with the factor of safety 2 or greater




```
AS 4100-1998 STEEL SECTION CHECK  (Summary for Combo and Station)
Units  : KN, m, C

Frame : 265        X Mid: -2.073     Combo: COMB6            Design Type: Beam
Length: 1.484      Y Mid: -3.102     Shape: 20x1.5CHS        Frame Type:  Braced Frame
Loc   : 0.495      Z Mid: 1.236      Class: Compact          Princpl Rot: 0.000 degrees

PhiB=0.900         PhiC=0.900        PhiTY=0.900       PhiTF=0.900       PhiS=0.900
```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```
A=8.718E-05        I33=3.754E-09      r33=0.007          Z33=3.754E-07      Av3=4.378E-05
J=7.508E-09        I22=3.754E-09      r22=0.007          Z22=3.754E-07      Av2=4.378E-05
E=206000000.0      fy=235000.000      Ry=1.106           S33=5.145E-07
RLLF=1.000         Fu=370000.000      SteelType=HR       S22=5.145E-07


STRESS CHECK FORCES & MOMENTS (Combo COMB6)
    Location              N*        M33*        M22*         V2*         V3*          T*
    0.495             -1.116       0.010       0.026      -0.012      -0.034       0.000

PMM DEMAND/CAPACITY RATIO   (8.4.2.2b)
    D/C Ratio:   0.559 = 0.559                                      <  0.950          OK
                       = M22*/(phi*Mi22)

BASIC FACTORS
    Buckling Mode   K Factor    L Factor        KL/r
    Major Flexure      1.000       1.000     226.181
    Minor Flexure      1.000       1.000     226.181
    Major Braced       1.000       1.000     226.181
    Minor Braced       1.000       1.000     226.181
    LTB                1.400       1.000     316.654

AXIAL FORCE & BIAXIAL MOMENT DESIGN   (8.4.2.2b)
    Factor                 L   Braced ke     Sway ke     Delta_b     Delta_s    Cm Betam
    Major Bending      1.000       1.000       1.000       1.417       1.000 0.961-0.901
    Minor Bending      1.000       1.000       1.000       1.475       1.000 1.000 -1.00

                        Lltb          Kt          Kl          Kr     Alpha_m     Alpha_s
    LTB Factors        1.000       1.000       1.400       1.000       1.174       0.971

                  Steel Type          Kf          Kt     Alpha_a     Alpha_b     Alpha_c
    Axial Factors         HR       1.000       1.000       9.237      -1.000       0.161

                     Element    Lambda_e   Lambda_ep   Lambda_ey   Lambda_ew Compactness
    Bending              Any      12.533      50.000     120.000   1.000E+14     Compact
    Axial                Any      12.533                  82.000                 Compact

                     ZeMajor     ZeMinor          de        Aeff
    Effective Pro  5.145E-07   5.145E-07       0.020   8.718E-05

                          M*          Ms          Mr          Mi          Nc
    Major Moment       0.014       0.121       0.114       0.075       3.299
    Minor Moment       0.038       0.121       0.114       0.075       3.299

                       Mo,cr          Mb          Mo          Mc          Mt
    Major Moment       1.025       0.121       0.075       0.075       0.075

                          N*          Ns          Nc          Nt         Noz
    Axial             -1.116      20.487       3.299      20.487    6907.275

SHEAR CHECK
                          V*          Vv      Stress      Status
                       Force    Capacity       Ratio       Check
    Major Shear        0.012       6.638       0.002          OK
    Minor Shear        0.034       6.638       0.005          OK
```


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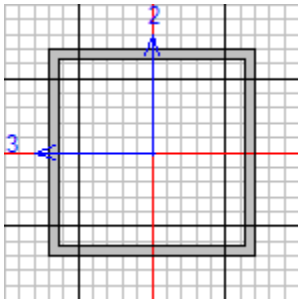


```
AS 4100-1998 STEEL SECTION CHECK  (Summary for Combo and Station)
Units  : KN, m, C

Frame : 288       X Mid: -0.829     Combo: COMB10          Design Type: Brace
Length: 0.513     Y Mid: -3.876     Shape: 40x40x2         Frame Type:  Braced Frame
Loc   : 0.513     Z Mid: 0.215      Class: Compact         Princpl Rot: 0.000 degrees

PhiB=0.900        PhiC=0.900        PhiTY=0.900       PhiTF=0.900       PhiS=0.900

A=3.040E-04       I33=7.337E-08     r33=0.016         Z33=3.668E-06     Av3=1.600E-04
J=1.097E-07       I22=7.337E-08     r22=0.016         Z22=3.668E-06     Av2=1.600E-04
E=206000000.0     fy=235000.000     Ry=1.106          S33=4.336E-06
RLLF=1.000        Fu=370000.000     SteelType=HR      S22=4.336E-06


STRESS CHECK FORCES & MOMENTS (Combo COMB10)
    Location              N*        M33*        M22*         V2*         V3*          T*
    0.513            -0.694       0.147      -0.038      -0.279       0.057       0.000

PMM DEMAND/CAPACITY RATIO   (8.4.4.1)
    D/C Ratio:   0.162 = 0.162                                     <  0.950          OK
                       = M33*/(phi*Mo33)

BASIC FACTORS
    Buckling Mode   K Factor    L Factor        KL/r
    Major Flexure      1.000       1.000      33.044
    Minor Flexure      1.000       1.000      33.044
    Major Braced       1.000       1.000      33.044
    Minor Braced       1.000       1.000      33.044
    LTB                1.400       1.000      46.261

AXIAL FORCE & BIAXIAL MOMENT DESIGN   (8.4.4.1)
    Factor                 L   Braced ke     Sway ke     Delta_b     Delta_s    Cm Betam
    Major Bending      1.000       1.000       1.000       1.000       1.000 0.600 0.000
    Minor Bending      1.000       1.000       1.000       1.001       1.000 1.000 -1.00

                        Lltb          Kt          Kl          Kr     Alpha_m     Alpha_s
    LTB Factors        1.000       1.000       1.400       1.000       1.803       1.027

                  Steel Type          Kf          Kt     Alpha_a     Alpha_b     Alpha_c
    Axial Factors         HR       1.000       1.000      15.052      -1.000       0.988

    Slenderness     Lambda_e   Lambda_ep   Lambda_ey   Lambda_ew Lambda_e/ey Compactness
    Major/Flange      17.452      30.000      45.000     180.000       0.388     Compact
         /Web         17.452      82.000     115.000     180.000       0.152     Compact
    Minor/Flange      17.452      82.000     115.000     180.000       0.152     Compact
         /Web         17.452      30.000      45.000     180.000       0.388     Compact
```


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Axial/Flange	17.452	45.000	0.388	Compact
/Web	17.452	45.000	0.388	Compact

	ZeMajor	ZeMinor	b-be	d-de	Aeff
Effective Pro	4.336E-06	4.336E-06	0.000	0.000	3.040E-04

	M*	Ms	Mr	Mi	Nc
Major Moment	0.147	1.019	1.019	1.019	70.609
Minor Moment	-0.038	1.019	1.019	1.008	70.609

	Mo,cr	Mb	Mo	Mc	Mt
Major Moment	50.112	1.019	1.008	1.008	1.008

	N*	Ns	Nc	Nt	Noz
Axial	-0.694	71.440	70.609	71.440	18014.713

SHEAR CHECK

	V* Force	Vv Capacity	Stress Ratio	Status Check
Major Shear	0.279	20.304	0.014	OK
Minor Shear	0.057	20.304	0.003	OK

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7 Summary

7.1 Conclusions

a. The 8m Dome Structure as specified has been analyzed with a conclusion that it has the capacity to withstand wind speeds up to and including **100km/hr.**

b. For forecast winds in excess of **100km/hr** – all fabric shall be removed from the frames, and the structure should be completely dismantled.

c. For uplift due to 100km/hr, the supports are required to provide resistance equal to 1.5 kN (150kg) force downward per anchor.

d. The bearing pressure of soil should be clarified and checked by an engineer prior to any construction for considering foundation and base plate.

Yours faithfully,

E.A. Bennett M.I.E. Aust. NPER 198230

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8 Appendix 'A' – Data Sheet

EXTREME MARQUEES

Dome Tents

4m / 5m / 6m / 7m / 8m / 9m / 10m / 11m / 12m

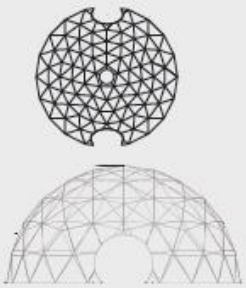
Visually striking marquee

PRODUCT PHOTOS

ITEM	SPECIFICATION								
Size	4m	5m	6m	7m	8m	9m	10m	11m	12m
Ceiling Height	2.4m	3m	3m	3.5m	4m	4m	4.5m	4.9m	6m
Floor Space	12.5 sq.m	17.8 sq.m	28 sq.m	38 sq.m	50 sq.m	63 sq.m	78 sq.m	95 sq.m	113 sq.m
Stand up Capacity	15	24	34	46	60	76	94	114	136
Sit down Capacity	10	16	23	31	40	51	63	76	90
Door Size	1.2mx1.8m			1.5 2.1m			2.4mx2.4m		
Frame Material	Steel								
Frame Size	20mm Diameter x 1.5mm thickness				20mm Diameter x 1.5mm thickness				
Frame Weight	118Kg	141Kg	186Kg	220Kg	321Kg	397Kg	498Kg	534Kg	736Kg
Roof Weight	41Kg	64Kg	77Kg	105Kg	137Kg	155Kg	191Kg	231Kg	308Kg
Bearing Bar Weight	11Kg	14Kg	17Kg	19Kg	22Kg	25Kg	27Kg	30Kg	33Kg
Total Weight	170Kg	218Kg	279Kg	344Kg	479Kg	576Kg	716Kg	795Kg	1076Kg
Installation Time (Hours)	4	4	4	5	5	5	6	7	8
Labors (QTY)	3	3	4	4	5	5	6	6	6
Equipment Scaffold Crane	2.5m N/A	2.5m N/A	2.5m N/A	2.5m N/A	2.5m N/A	3m N/A	3.5m N/A	4m N/A	N/A 20 Ton Crane
Roof Fabrics	580GSM PVC & Clear PVC								
Roof Type	Solid PVC Roof, Clear PVC Roof or 1/3 Clear 2/3 Solid PVC Roof								
PVC Standard Colours	White, Clear PVC, Red, Yellow, Blue, Green and Black								
Printing	Full Roof Digital Printing								
Package Includes	Steel Pins								
Warranty	5 years for Frame / 2 years for PVC Roof								
Engineer Certification									

AVAILABLE COLOURS

TECHNICAL DIAGRAMS



ADDITIONAL FEATURES

The Extreme Marquee Dome is a visually striking marquee with an innovative space age design. The frame is made from strong tubular powder coated steel. Connectors join the tubular bars to form triangular cross sections, which join together to give this structure both its enormous strength and futuristic outer appearance.

We design | We manufacture | We sell | We Deliver Australia wide www.extrememarquees.com.au admin@extrememarquees.com.au 1300 850 832

At Extreme Marquees we design & manufacture all of our products & deliver Australia wide.

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