
# Civil & Structural Engineering Design Services Pty. Ltd.

**Client:** **Krekels promotiemateriaal**
**Project:** Wind Analysis – Weight required per leg for 3m × 3m Marquees with two opened side walls for Varied Wind Speed.
**Reference:** Krekels Technical Data

Report by: KZ
Checked by: EAB
Date: 19 / 05 / 2016

JOB NO: E-11-264384

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# 1 Introduction

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The report examines the effect of 3s gust wind of 80 km/hr on 3m × 3 m Marquees. 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.

# 2 Design Restrictions and Limitations

2.1 The erected structure is for temporary use only.

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

2.3 The wind classifications are based upon category 2 in AS. 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.

2.4 The structures in no circumstances shall ever be erected in tropical or severe tropical cyclonic condition.

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





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# 3 Design Loads

## 3.1 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 80 km/hr gust | W | 0.296 $C_{fig}$ | 1.0 | 0.296 $C_{fig}$ |

## 3.2 Load Combinations

Ultimate

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

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

# 4 Wind Analysis

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

## 4.1 Parameters

Terrain category = 2
Site wind speed ($V_{sit,\beta}$) = $V_R M_d (M_{z,cat} M_s M_t)$
$V_R$ = 22.22 m/s (120 km/hr) *(regional 3 s gust wind speed)*
$M_d$ = 1
$M_s$ = 1
$M_t$ = 1
$M_{z,cat}$ = 1 *(Table 4.1(B) AS1170.2)*

$V_{sit,\beta}$ = 22.22 m/s

Height of structure (h) = 3 m *(mid of peak and eave)*
Width of structure (w) = 3 m
Length of structure (l) = 3 m

Pressure (P) = $0.5\rho_{air} (V_{sit,\beta})^2 C_{fig} C_{dyn}$
= $0.296 C_{fig}$ kPa





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## 4.2 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* |
| Regional gust wind speed | | 80 | Km/hr | | Table 3.1 (AS1170.2) |
| Regional gust wind speed | $V_R$ | **22.22** | m/s | | |
| Wind Direction Multipliers | $M_d$ | 1 | | | *Table 3.2 (AS1170.2)* |
| Terrain Category Multiplier | $M_{Z,Cat}$ | 1 | | | Table 4.1 (AS1170.2) |
| Shield Multiplier | $M_S$ | 1 | | | *Table 4.3 (AS1170.2)* |
| Topographic Multiplier | $M_t$ | 1 | | | *4.4 (AS1170.2)* |
| Site Wind Speed | $V_{Site,\beta}$ | **22.22** | m/s | $V_{Site,\beta}=V_R*M_d*M_{z,cat}*M_S,M_t$ | |
| Pitch | α | 18 | Deg | | |
| Pitch | α | 0.314 | rad | | |
| Width | B | 3 | m | | |
| Width Span | $S_w$ | 3 | m | | |
| Length | D | 3 | m | | |
| Height | Z | 3 | m | | |
| Bay Span | | 3 | m | | |
| Purlin Spacing | | 1.5 | m | | |
| Number of Intermediate Purlin | | 3 | | | |
| | h/d | 1.00 | | | |
| | h/b | 1.00 | | | |
| ***Wind Pressure*** | | | | | |
| ρair | ρ | 1.2 | $Kg/m^3$ | | |
| dynamic response factor | $C_{dyn}$ | 1 | | | |
| Wind Pressure | ρ*$C_{fig}$ | **0.296** | $Kg/m^2$ | $\rho=0.5\rho_{air}*(V_{des,\beta})^2*C_{fig}*C_{dyn}$ | *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 | | *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 |





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| | | | | | |
|---|---|---|---|---|---|
| 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 | **0.17** | **kPa** | | |
| Edge Column Force | F | **0.25** | **kN/m** | | |
| Intermediate Column Force | F | **0.50** | **kN/m** | | |

***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 | **-0.12** | **kPa** | | |
| Edge Column Force | F | **-0.18** | **kN/m** | | |
| Intermediate Column Force | F | **-0.36** | **kN/m** | | |

***3. Side Wall***

| | | | | | |
|---|---|---|---|---|---|
| | | | | | Table 5.2 C |
| | | | | | *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 | **-0.15** | **kPa** | *0 to 1h* | |
| Side Wall Pressure | P | **-0.12** | **kPa** | *1h to 2h* | |
| Side Wall Pressure | P | **-0.07** | **kPa** | *2h to 3h* | |
| Side Wall Pressure | P | **-0.05** | **kPa** | *>3h* | |

***4. Roof Up Wind Slope***

| | | | | | |
|---|---|---|---|---|---|
| | | | | $\alpha > 10^o$ | |
| | | | | | Table 5.3 B |
| 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** | $C_{P,e}$ | -0.4 | | | |
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.4 | | | |





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| | | | | |
|---|---|---|---|---|
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -0.32 | | |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.32 | | |
| Pressure **MIN** | P | **-0.09** | **kPa** | |
| Pressure **MAX** | P | **-0.09** | **kPa** | |
| Edge Rafter Force **MIN** | F | **-0.14** | **kN/m** | |
| Edge Rafter Force **Max** | F | **-0.14** | **kN/m** | |
| Intermediate Rafter Force **MIN** | F | **-0.28** | **kN/m** | |
| Intermediate Rafter Force **MAX** | F | **-0.28** | **kN/m** | |
| ***5. Roof Down Wind Slope*** | | | | |
| Area Reduction Factor | $K_a$ | 1 | | |
| combination factor applied to internal pressures | $K_{C,e}$ | 0.8 | | Table 5.3C |
| local pressure factor | $K_l$ | 1 | | |
| porous cladding reduction factor | $K_p$ | 1 | | |
| External Pressure Coefficient | $C_{P,e}$ | -0.6 | | |
| aerodynamic shape factor | $C_{fig,e}$ | -0.48 | | |
| Pressure **MIN** | P | **-0.14** | **kPa** | |
| Pressure **MAX** | P | **-0.14** | **kPa** | |
| Edge Rafter Force **MIN** | F | **-0.21** | **kN/m** | |
| Edge Rafter Force **MAX** | F | **-0.21** | **kN/m** | |
| Intermediate Rafter Force **MIN** | F | **-0.43** | **kN/m** | |
| Intermediate Rafter Force **MAX** | F | **-0.43** | **kN/m** | |

***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) *Ta (AS1170.2)* |
| Internal Pressure Coefficient (Without Dominant) **MAX** | | 0.2 | | |
| Internal Pressure Coefficient (With Dominant) **MIN** | | **-0.3** | | Table 5.1 B (AS1170.2) *Ta (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*** | | | Table 5.2 A |
| 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 | |





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| | | | | | |
|---|---|---|---|---|---|
| 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 | **0.17** | **kPa** | | |
| Edge Column Force | F | **0.25** | **kN/m** | | |
| Intermediate Column Force | F | **0.50** | **kN/m** | | |

***2. Leeward Wall***

Table 5.2 B

| | | | | | |
|---|---|---|---|---|---|
| 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 | **-0.12** | **kPa** | | |
| Edge Column Force | F | **-0.18** | **kN/m** | | |
| Intermediate Column Force | F | **-0.36** | **kN/m** | | |

***3. Side Wall***

Table 5.2 C

| | | | | | |
|---|---|---|---|---|---|
| Area Reduction Factor | $K_a$ | 1 | | | *Table 5.2 C* |
| combination factor applied to internal pressures | $K_{C,e}$ | 0.8 | | | *Table 5.4* |
| 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** | **-0.15** | **kPa** | *0 to 1h* | |
| Side Wall Pressure | **P** | **-0.12** | **kPa** | *1h to 2h* | |
| Side Wall Pressure | **P** | **-0.07** | **kPa** | *2h to 3h* | |
| Side Wall Pressure | **P** | **-0.05** | **kPa** | *>3h* | |

***4. Roof***

$\alpha$ *<10°*

Table 5.3 A

| | | | | | |
|---|---|---|---|---|---|
| Area Reduction Factor | $K_a$ | 1 | | | *Tab* |
| 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** | $C_{P,e}$ | -1.30 | | *0 to 0.5h* | |
| External Pressure Coefficient **MIN** | $C_{P,e}$ | -0.70 | | *0.5 to 1h* | |
| External Pressure Coefficient **MIN** | $C_{P,e}$ | -0.70 | | *1h to 2h* | |
| External Pressure Coefficient **MIN** | $C_{P,e}$ | -0.70 | | *2h to 3h* | |
| External Pressure Coefficient **MIN** | $C_{P,e}$ | -0.70 | | *>3h* | |





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| | | | | |
|---|---|---|---|---|
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.60 | | *0 to 0.5h* |
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.30 | | *0.5 to 1h* |
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.30 | | *1h to 2h* |
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.30 | | *2h to 3h* |
| External Pressure Coefficient **MAX** | $C_{P,e}$ | -0.30 | | *>3h* |
| | | | | |
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -1.04 | | *0 to 0.5h* |
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -0.56 | | *0.5 to 1h* |
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -0.56 | | *1h to 2h* |
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -0.56 | | *2h to 3h* |
| aerodynamic shape factor **MIN** | $C_{fig,e}$ | -0.56 | | *>3h* |
| | | | | |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.48 | | *0 to 0.5h* |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.24 | | *0.5 to 1h* |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.24 | | *1h to 2h* |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.24 | | *2h to 3h* |
| aerodynamic shape factor **MAX** | $C_{fig,e}$ | -0.24 | | *>3h* |
| | | | | |
| Pressure **MIN** | **P** | **-0.31** | **kPa** | *0 to 0.5h* |
| Pressure **MIN** | **P** | **-0.17** | **kPa** | *0.5 to 1h* |
| Pressure **MIN** | **P** | **-0.17** | **kPa** | *1h to 2h* |
| Pressure **MIN** | **P** | **-0.17** | **kPa** | *2h to 3h* |
| Pressure **MIN** | **P** | **-0.17** | **kPa** | *>3h* |
| | | | | |
| Pressure **MAX** | **P** | **-0.14** | **kPa** | *0 to 0.5h* |
| Pressure **MAX** | **P** | **-0.07** | **kPa** | *0.5 to 1h* |
| Pressure **MAX** | **P** | **-0.07** | **kPa** | *1h to 2h* |
| Pressure **MAX** | **P** | **-0.07** | **kPa** | *2h to 3h* |
| Pressure **MAX** | **P** | **-0.07** | **kPa** | *>3h* |
| | | | | |
| Edge Purlin Force **MIN** | **F** | **-0.23** | **kN/m** | *0 to 0.5h* |
| Edge Purlin Force **MIN** | **F** | **-0.12** | **kN/m** | *0.5 to 1h* |
| Edge Purlin Force **MIN** | **F** | **-0.12** | **kN/m** | *1h to 2h* |
| Edge Purlin Force **MIN** | **F** | **-0.12** | **kN/m** | *2h to 3h* |
| Edge Purlin Force **MIN** | **F** | **-0.12** | **kN/m** | *>3h* |
| | | | | |
| **Edge Purlin Force MAX** | **F** | **-0.11** | **kN/m** | *0 to 0.5h* |
| **Edge Purlin Force MAX** | **F** | **-0.05** | **kN/m** | *0.5 to 1h* |
| **Edge Purlin Force MAX** | **F** | **-0.05** | **kN/m** | *1h to 2h* |
| **Edge Purlin Force MAX** | **F** | **-0.05** | **kN/m** | *2h to 3h* |
| **Edge Purlin Force MAX** | **F** | **-0.05** | **kN/m** | *>3h* |
| | | | | |
| Intermediate Purlin Force **MIN** | **F** | **-0.46** | **kN/m** | *0 to 0.5h* |
| Intermediate Purlin Force **MIN** | **F** | **-0.25** | **kN/m** | *0.5 to 1h* |
| Intermediate Purlin Force **MIN** | **F** | **-0.25** | **kN/m** | *1h to 2h* |
| Intermediate Purlin Force **MIN** | **F** | **-0.25** | **kN/m** | *2h to 3h* |
| Intermediate Purlin Force **MIN** | **F** | **-0.25** | **kN/m** | *>3h* |
| | | | | |
| Intermediate Purlin Force **MAX** | **F** | **-0.21** | **kN/m** | *0 to 0.5h* |
| Intermediate Purlin Force **MAX** | **F** | **-0.11** | **kN/m** | *0.5 to 1h* |
| Intermediate Purlin Force **MAX** | **F** | **-0.11** | **kN/m** | *1h to 2h* |
| Intermediate Purlin Force **MAX** | **F** | **-0.11** | **kN/m** | *2h to 3h* |
| Intermediate Purlin Force **MAX** | **F** | **-0.11** | **kN/m** | *>3h* |





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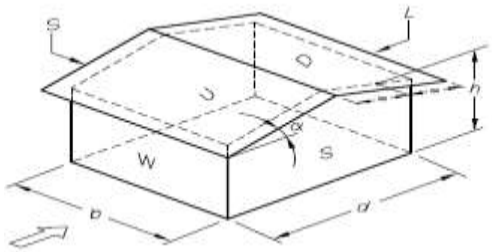
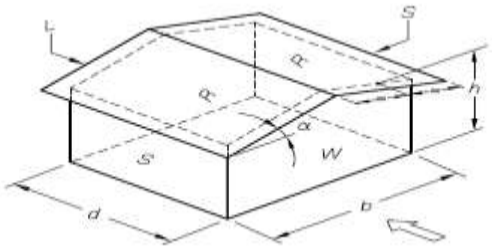
4.2.1 Pressure summary

| WIND EXTERNAL PRESSURE | | | Direction1 (Perpendicular to Length) | | Direction2 (Parallel to Length) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Windward (kPa) | | | 0.17 | | 0.17 | | | | |
| Leeward (kPa) | | | -0.12 | | -0.12 | | | | |
| Sidewall (m) | Length | (m) | (m) | (Kpa) | (Kpa) | | | | |
| | 0 - 1h | 0 | 3 | -0.15 | -0.15 | | | | |
| | 1h - 2h | 3 | 6 | -0.12 | -0.12 | | | | |
| | 2h - 3h | 6 | 9 | -0.07 | -0.07 | | | | |
| | >3h | 9 | - | -0.05 | -0.05 | | | | |
| Roof | | | Min (Kpa) | Max (Kpa) | Length | (m) | (m) | Min (Kpa) | Max (Kpa) |
| | Upwind Slope | | -0.09 | -0.09 | 0-0.5h | 0.00 | 1.50 | -0.31 | -0.14 |
| | Downwind Slope | | -0.14 | -0.14 | 0.5h-1h | 1.50 | 3.00 | -0.17 | -0.07 |
| | | | | | 1h-2h | 3.00 | 6.00 | -0.17 | -0.07 |
| | | | | | 2h-3h | 6.00 | 9.00 | -0.17 | -0.07 |
| | | | | | >3h | 9.00 | - | -0.17 | -0.07 |
| Wind Internal Pressure (kPa) | | | Min (kPa) | Max (kPa) | Min (kPa) | | | Max (kPa) | |
| | | | -0.09 | 0.06 | -0.09 | | | 0.06 | |




Direction 1




Direction 2

AS1170.2





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4.3 Wind Analysis result:

***REACTIONS***

| | MAX Reactions (kN) | | | | |
|---|---|---|---|---|---|
| | **External Pressure** | | | **Internal Pressure** | | **Combine Action** |
| **Wind Direction 1** | Windward Wall | 1.49 | | Windward Wall **MIN** | -0.80 | 2.29 |
| | Leeward Wall | -1.07 | | Windward Wall **MAX** | 0.53 | 0.96 |
| | Side Wall | -1.39 | | Leeward Wall **MIN** | -0.80 | -0.27 |
| | Rafter Up Wind Slope **MIN** | -0.45 | | Leeward Wall **MAX** | 0.53 | -1.60 |
| | Rafter Up Wind Slope **MAX** | -0.45 | | Side Wall **MIN** | -0.80 | -0.59 |
| | Rafter Down Wind Slope **MIN** | -0.67 | | Side Wall **MAX** | 0.53 | -1.92 |
| | Rafter Down Wind Slope **MAX** | -0.67 | | Rafter Up Wind Slope **MIN** | -0.42 | -0.73 |
| | | | | Rafter Up Wind Slope **MAX** | 0.28 | -0.03 |
| | | | | Rafter Down Wind Slope **MIN** | -0.42 | -0.95 |
| | | | | Rafter Down Wind Slope **MAX** | 0.28 | -0.25 |
| | **Max X Force** | **1.49** | | **Max X Force** | **0.80** | **2.29** |
| | **Max Y Force** | **1.39** | | **Max Y Force** | **0.80** | **1.92** |
| | **Max Z Force** | **1.12** | | **Max Z Force** | **0.84** | **1.68** |
| **Wind Direction 2** | Windward Wall | 1.49 | | Windward Wall **MIN** | -0.80 | 2.29 |
| | Leeward Wall | -1.07 | | Windward Wall **MAX** | 0.53 | 0.96 |
| | Side Wall | -1.39 | | Leeward Wall **MIN** | -0.80 | -0.27 |
| | Roof Purlin **MIN** | -1.39 | | Leeward Wall **MAX** | 0.53 | -1.60 |
| | Roof Purlin **MAX** | -0.32 | | Side Wall **MIN** | -0.80 | -0.59 |
| | | | | Side Wall **MAX** | 0.53 | -1.92 |
| | | | | Roof Purlin **MIN** | -0.40 | -1.65 |
| | | | | Roof Purlin **MAX** | 0.27 | 0.08 |
| | **Max X Force** | **1.49** | | **Max X Force** | **0.80** | **2.29** |
| | **Max Y Force** | **1.39** | | **Max Y Force** | **0.80** | **1.92** |
| | **Max Z Force** | **2.77** | | **Max Z Force** | **0.80** | **3.31** |

**Required Weight Per Leg**

| | | |
|---|---|---|
| **Maximum Sliding Force** | **1.15** | **kN** |
| **Maximum Uplift Force** | **1.65** | **kN** |
| **Friction Coefficient** | 0.7 | |
| **Weight per Leg to Resist Against Uplift** | **169** | **Kg** |
| **Weight per Leg to Prevent Sliding** | **167** | **Kg** |





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# 5 Summary

## 5.1 Conclusions

a. The 3m x 3m Marquees as specified has been analyzed with a conclusion that for uplift due to 80 km/hr, 170 kg holding down weight/per leg is required.
b. The bearing pressure of soil should be clarified and checked by an engineer prior to any construction for considering foundation and base plate.
c. For weight requirements per leg for varied wind speed, refer to table below:

| | Wind Speed (km/hr) | | | |
|---|---|---|---|---|
| | 90 | 80 | 70 | 60 |
| **required weight per leg (kg)** | 220 | 170 | 130 | 100 |

Yours faithfully,

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





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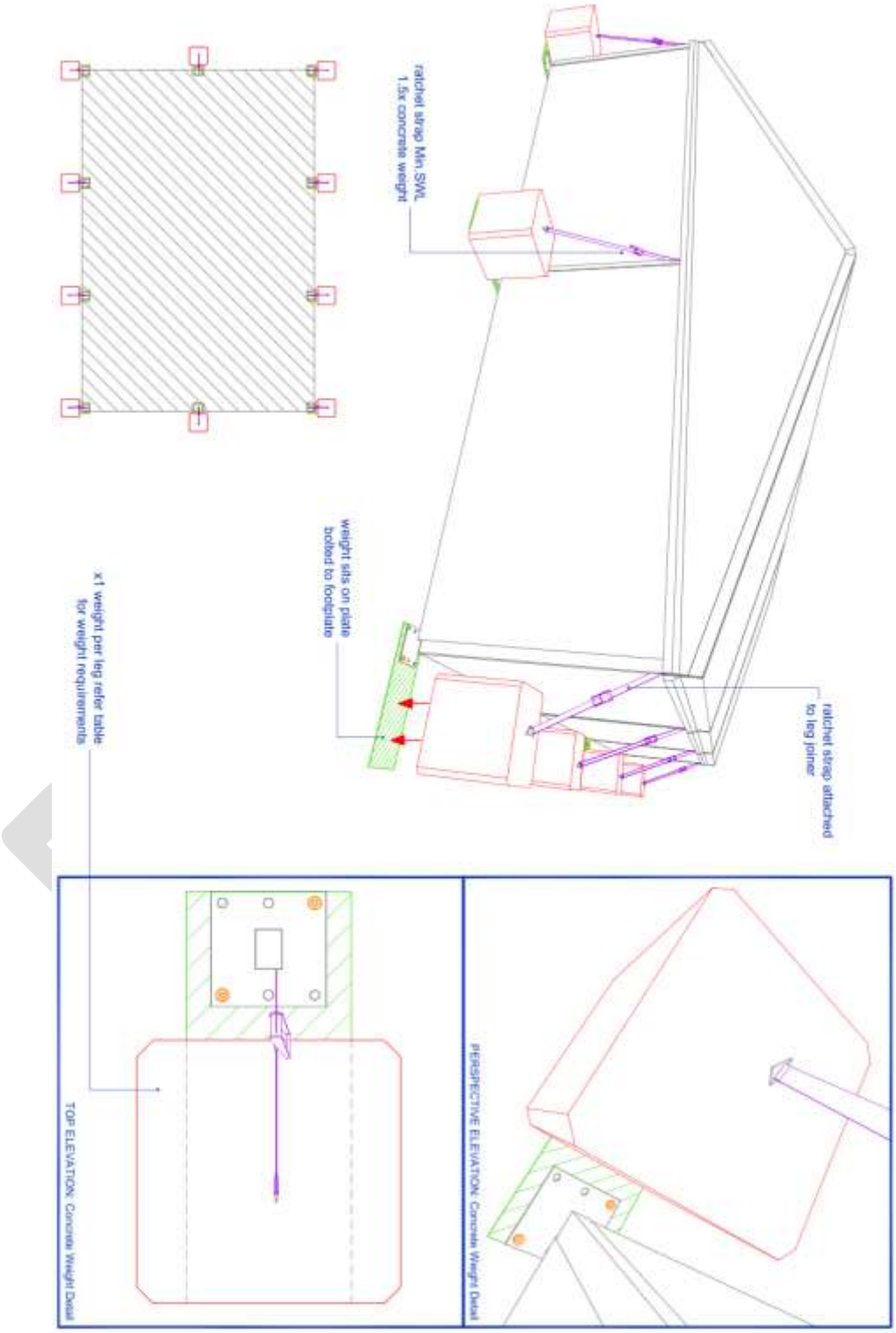
# 6 Appendix A – Hold Down Method Details



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