Ultimate
LouvreSystems

AUSTRALIAN MADE & DESIGNED

ULTIMATE LOUVRE SYSTEM

DESIGN MANUAL

MOTORISED OPENING & CLOSING LOUVRE SYSTEM

TOTALLY OUTDOORS

Distributed by: Totally Outdoors Pty Ltd

52 Star Crescent Hallam, Vic 3803

Tel: (03) 97904 4900

Email: sales@totallyoutdoors.com.au

DESIGN MANUAL – SIMPLIFIED PROCEDURE

Structural Design Guidance for the Ultimate Louvre System – Opening and Closing Roof

This manual provides a simplified procedural framework to assist designers in evaluating the structural adequacy of roof components, including supporting beams, posts, and connections, under typical loading conditions. It has been specifically developed to support the design of **Ultimate Louvre System – Opening and Closing Roof** structures.

It is important to note that the information contained within this manual does **not** constitute structural certification for individual projects. The specification of structural members, layouts, and maximum spans—along with the assessment of the adequacy of any existing structures to support part or all of the proposed system—must be verified by a **suitably qualified engineer**.

When designed in accordance with this manual, **Ultimate Louvre System – Opening and Closing Roof** structures will meet the necessary safety and serviceability requirements as per the relevant Australian Standards and Codes, including:

- **AS/NZS 1170.1:2002** – Structural Design Actions Part 1: Permanent, Imposed & Other Actions
- **AS/NZS 1170.2:2002** – Structural Design Actions Part 2: Wind Actions
- **AS/NZS 1664.1:1997** – Aluminium Structures Part 1: Limit State Design
- **AS 1720.1:2010** – Timber Structures Part 1: Design Methods
- **AS 4055:2021** – Wind Loads for Housing
- **AS 4100:2020** – Steel Structures
- **NCC 2022 Vol 2 Part H1** – Structure – National Construction Code

This manual is based on **limit state design methods**.

For the purposes of this manual, non-habitable **Ultimate Louvre System – Opening & Closing Roof** structures are classified as **Importance Level 2**, as outlined in **NCC 2022 Table 2.2.3a (Regional Wind Speeds)**. These classifications align with **Table 3.1 of AS/NZS 1170.2**, using **V500 for strength design** and **V20 for serviceability design**.

- Some projects, such as those within shopping centres, may be classified as **Importance Level 3**. In such cases, this manual **must not** be used.
- Certain open residential projects may fall under **Importance Level 1**, in which case this manual **may** be applicable.

For **wind direction multiplier (Md)** calculations, a value of **1.0** has been used in determining all wind loads, in accordance with **Table 3.2 of AS/NZS 1170.2**.

For **site-specific engineering design and compliance certification**, please consult a **suitably qualified engineer** for project-specific structural calculations.

Warning: *The Ultimate Louvre System Opening and Closing Roof system contains features which are unique. As such manual has been developed exclusively for Outdoor Project Suppliers Pty Ltd., for the design of Ultimate Louvre System Opening & Closing Roof structures and is based on relevant Australian Standards. The information contained in this manual may not be applied to other products and Outdoor Project Suppliers Pty Ltd. denies responsibility for the loss or damage resulting from unauthorised or improper use of the information contained in this manual.*

Muralitharan Kumarasamy Sarma

Registered Building Practitioner (PE 0001005)   Signed

P.O. Box 8053 Carrum Downs Vic 3201

T. 0433 331 368 **E.** info@msengsolution.com.au   Dated ________1 / 10 / 2023

Contents of this Manual

Design Limitations for Ultimate Louvre System – L200 & L150 Louvres (Opening and Closing Roof Structures)

This manual outlines the design parameters and limitations for **Ultimate Louvre System – L200 & L150 Louvres**, specifically for **Opening and Closing Roof structures**, subject to the following conditions:

1. Load Considerations

a) **Wind Loads** – Applicable to **Regions A (subregions 1-5), B, and C** in Australia.
b) **Self-Weight** – The design accounts for the self-weight of the structure only.

2. Roof Traffic

The **Ultimate Louvre System – Opening and Closing Roof** is classified as a **non-trafficable roof product**. It is not designed to support foot traffic or accommodate the stacking of materials. Individual louvre panels are **not engineered to bear live point loads** from human movement on the structure.

3. Allowable Deflections

The following **serviceability deflection limits** have been adopted under **V20 regional wind speeds** (as per **Table 3.1 of AS 1170.2**) and **dead loads**:

- **Louvre panels**: **Span/80**
- **Beams**: **Span/300 or 20mm (whichever is less)**

4. Adjoining Structures

Ultimate Louvre System structures that are **fixed on at least one side to an adjoining structure** are assumed to be capable of withstanding the additional loads imposed by the **Opening and Closing Roof structure**.

However, it is the responsibility of the designer to **verify the structural adequacy** of the adjoining structure to support these additional loads through appropriate due diligence assessments.

5. Elevations

The **maximum allowable structure height** is **5 metres above moderately level ground**. This manual assumes that the **Ultimate Louvre System does not exceed 5 metres above ground level**. Any **exceptional site conditions or variations** must be reviewed on a case-by-case basis.

6. Roof Pitch

The Ultimate Louvre System **Opening and Closing Roof** is designed for installations that are **near level**, with a **maximum allowable slope of 5°.**

For **gable roofs exceeding 5°**, site-specific **engineering design and certification** are required, as they are **not covered** within the scope of this manual.

7. Lateral Stability of Roof Beams

The supporting structure must be **structurally sufficient to maintain stability without reliance on the louvres**, as **louvre fixings are not designed to provide resistance against horizontal forces such as wind loads**.

- The Ultimate Louvre System must be designed as a **robust, self-supporting structure** capable of resisting **lateral wind forces**.
- **No lateral restraint should be assumed from louvre fixings to roof beams.**

8. Topography Considerations

For **topographic multiplier calculations**, this manual assumes a **maximum downhill slope of 1:10** in the **upwind direction**.

Determine Design Wind Factors

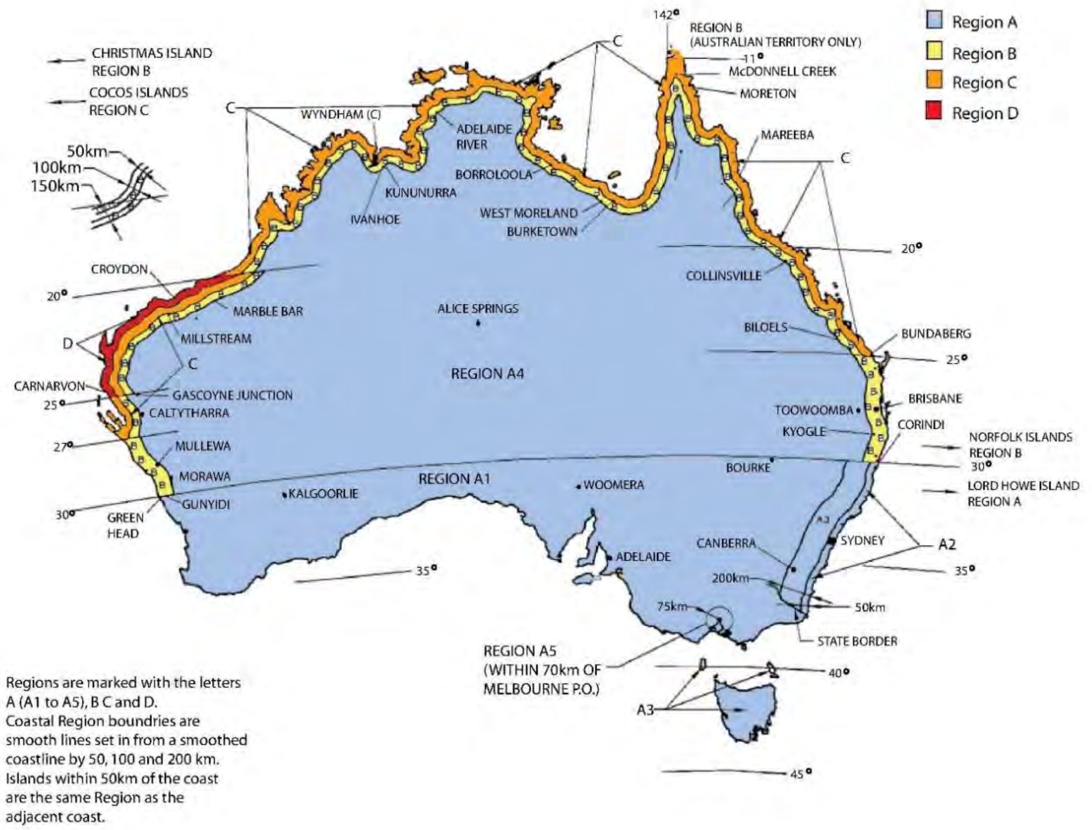
1.1 Wind Region

Select from the map region A, B or C and that the building site is in

Wind Regions are derived from the Australian Standards AS/NZS 1170:2:2002.

The Region refers to the **location.** The Terrain Category refers to the descri**ption** of the terrain at the **location.**

- WIND REGION A = **Ultimate** Design Wind speed of 41m/s or 147.6km/h
  (Region A, Terrain Category 2, 10m reference height)
- WIND REGION B = **Ultimate** Design Wind speed of 51.9m/s or 186.84km/h
  (Region B, Terrain category 2, 10m Reference height)
- WIND REGION C = **Ultimate** Design Wind Speed of 64.5m/s or 232.2km/h
  (Region C, Terrain Category 2, 10m Reference height)
- Wind Region D = **Ultimate** Design Wind speed of 88m/s or 316.8km/h
  (Region D, Terrain Category 2, 10m Reference height)



1.Determining Terrain Category

The first step in wind load assessment is determining the **Terrain Category (TC)** applicable to the site. The Terrain Category is a measure of surface roughness and is based on the least obstructed wind path in any direction for a **minimum distance of 500 metres**. The selected **Terrain Category should reflect the lowest expected surface roughness over the next five years**.

Terrain Category Classifications

- **TC1** – Exposed terrain with **few or no obstructions** for a distance of at least **10 km**. Examples include **flat, treeless plains, deserts, and snowfields**.
- **TC2** – Similar to **TC1** but with **scattered obstructions**, such as isolated trees or buildings. Typical examples include **coastal areas, airfields, and open grasslands**.
- **TC2.5** – Characterized by **scattered trees, agricultural land, crops, or sparsely distributed buildings**. This category applies to areas transitioning from **TC2 to TC3**, such as **outer suburban developments**.
- **TC3** – Terrain with **closely spaced objects** approximately the size of a **house or large established tree**, with a **minimum density of 10 houses or equivalent per hectare**.
- **TC4** – Areas with **numerous large and closely spaced obstructions** between **10 m and 30 m in height**, such as **major city centres and large industrial complexes**.

Terrain Category Considerations in Urban Areas

- In urban environments, open areas less than **200 metres wide** (e.g., **roadways or rivers**) are common features of **TC3**.
- Isolated parks up to **250,000 m^2** are also considered **TC3**.
- If open areas are spaced **less than 500 metres apart**, or if the **building site is within 500 metres of open country**, the **Terrain Category of the open country applies** to the site.

1.2 Shielding Classification

Once the **Terrain Category** has been established, the next step is determining whether **shielding conditions** apply to the site.

Shielded Sites

Shielding occurs when **wind speed is reduced** by the presence of **similar-sized or larger obstructions** near the structure. The classification is based on anticipated conditions **over the next five years**. A site is considered **shielded** when:

- It is **surrounded by at least two rows of houses** or similar permanent structures.
- It is located within a **heavily wooded area** (for **Regions A & B**).

- It is part of an **urban development** with a density of **10 or more houses (or similar obstructions) per hectare**.

Exceptions:

- Open areas such as **roads or parks** extending **50 metres or more** between the site and shielding structures may be disregarded.
- However, if a site is in the **first two rows of buildings adjacent to an open area (≥100 metres in width)**, it is **not considered shielded**.

Non-Shielded Sites

A site is classified as **non-shielded** if the surrounding conditions **do not meet the shielding criteria** outlined above.

2. Selecting Design Wind Pressure

The **Design Wind Pressure (qz)** is determined based on the following factors:

1. **Wind Region** (**A1–A5, B, or C**)
2. **Terrain Category** (**4, 3, 2.5, 2, or 1**)
3. **Shielding Classification** (**Shielded or Non-Shielded**)
4. **Height Above Ground** (must be **≤5.0 m**)
5. **Topographic Conditions** (must be satisfied)

Design Wind Pressures (qz) for Different Wind Regions

Region A (V500 = 45 m/s)

Terrain Category	Shielded qz =	Non-Shielded qz =
4	0.49 kPa	0.69 kPa
3	0.60 kPa	0.84 kPa
2.5	0.66 kPa	0.92 kPa
2	0.73 kPa	1.02 kPa
1	0.86 kPa	1.19 kPa

Region B (V500 = 57 m/s)

Terrain Category	Shielded qz =	Non-Shielded qz =
4	0.79 kPa	1.09 kPa
3	0.97 kPa	1.34 kPa
2.5	1.06 kPa	1.47 kPa
2	1.16 kPa	1.61 kPa
1	1.38 kPa	1.91 kPa

Region C (V500 = 69.3 m/s)

Terrain Category	Shielded qz =	Non-Shielded qz =
4	1.33 kPa	1.84 kPa
3	1.33 kPa	1.84 kPa
2	1.88 kPa	2.60 kPa
1	1.88 kPa	2.60 kPa

Design Wind Pressure: q_z = _______________ kPa

Note: This table provides a simplified reference for design wind pressures. Not all scenarios and wind regions are covered. The design wind pressure depends on **terrain category, shielding conditions, and specific site factors**.

3. Determining Pressure Coefficient

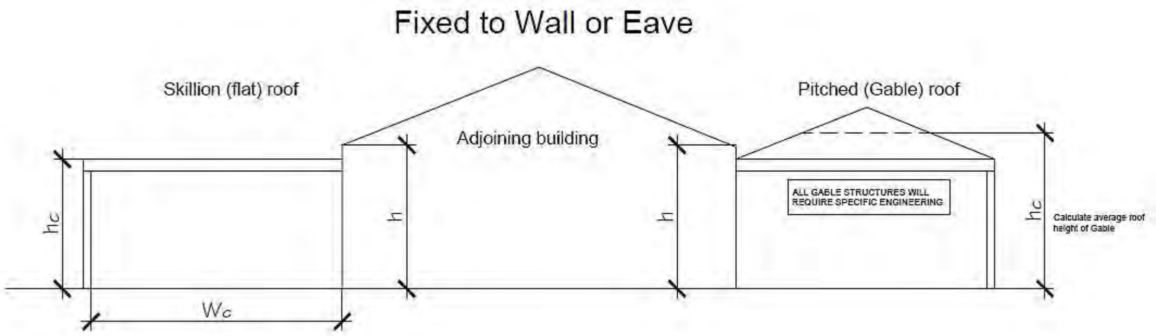
The **Pressure Coefficient (Cp)** for wind action on the **Ultimate Louvre System** is influenced by:

- The **dimensions** of the **Ultimate Louvre System**
- The **size and type** of the **adjoining building**
- The **number of enclosed walls**

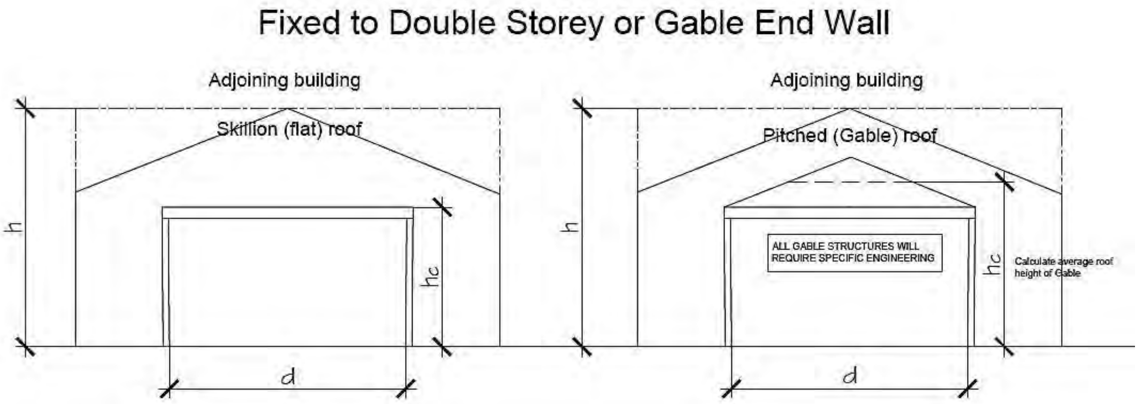
Scope of this Design Manual

- **This manual applies only to Ultimate Louvre Systems that are fixed to an existing building or dwelling on at least one side.**
- **Freestanding structures are NOT covered** within this manual.

- ### 3.1 Structural Dimensions
- The ratios **hc/wc** and **hc/h** must be calculated to determine the Pressure Coefficient (Cp) from **Section 3.2**.



hc/wc = ________________ **h_c/h** = ________________



Note: Gable Roof louvre structure are not covered in design manual calculations. Specific engineering calculation is required.

3.2 Number of Enclosed Sides

Both **upward** and **downward** wind pressures must be considered in the structural analysis of the **Ultimate Louvre System Opening Roof**. The pressure coefficients (**Cp**) for both directions must be determined based on the number of enclosed walls.

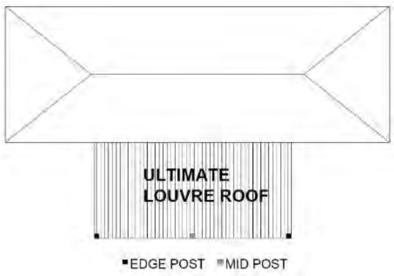
Case 1: Structure Enclosed on One Side

For a structure enclosed on one side, the **pressure coefficients (Cp)** for both **upward** and **downward** wind loads are determined using the ratios of **hc/wc** and **hc/h**, as outlined in the tables below.

1. Calculating the Downward Pressure Coefficient (Cpd)

h_c = __________m ÷ h = ____________ = (1) h_c/h ....

Refer now to Downwards pressure coefficient table (see below)



h_c/h	Cp_d
Less than 0.2	1.20
0.2 - < 0.30	0.70
.30 - <0.40	0.60
0.4 - <0.75	0.50
0.75 - <0.90	0.40
0.90 or higher	0.30

Downwards Pressure calculation Cp_u

2. Calculating the Upward Pressure Coefficient (Cpu)

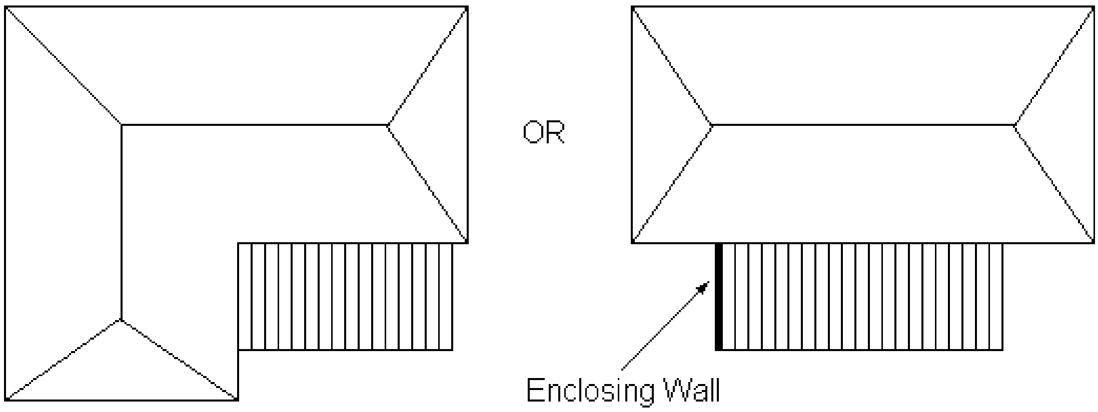
h_c = __________m ÷ w_c = ___________m = (2) h_c/w_c ....

Using the **Upward Pressure Coefficient Table**, find the appropriate coefficient by intersecting the row based on **hc/h** (from Step 1) and the column based on **hc/wc** (from Step 2):

Ration	Upwards Pressure Coefficient					
h_c/h	hc/wc ≤ 0.6	0.6 < hc/wc ≤ 0.8	0.8 < hc/wc ≤ 1.0	1.0 < hc/wc ≤ 1.2	1.2 < hc/wc ≤ 1.4	1.4 < hc/wc ≤ 1.6
Less than 0.5	0.20	0.20	0.20	0.20	0.20	0.20
0.5 - <0.6	0.35	0.37	0.38	0.40	0.41	0.43
0.6 - <0.7	0.40	0.43	0.46	0.49	0.53	0.56
0.7 - <0.8	0.47	0.53	0.58	0.64	0.69	0.75
0.8 - <0.9	0.57	0.65	0.74	0.83	0.92	1.00
0.9 or higher	0.66	0.78	0.90	1.02	1.14	1.26

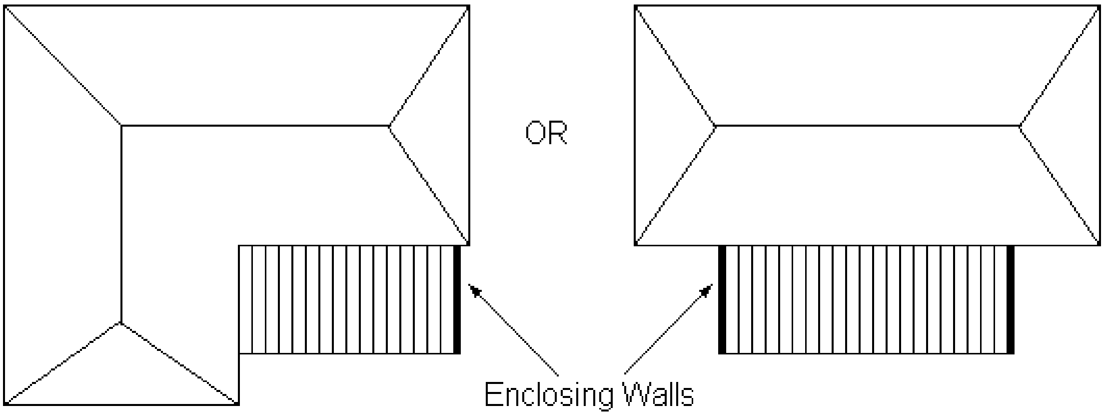
Upwards Pressure calculation Cp_u = ______________

<u>Case 2: *Structure Enclosed on Two Sides*</u>



- **Upward Pressure Coefficient (Cpu) = 1.0**
- **Downward Pressure Coefficient (Cpd)**: Determine using the **Case 1** method.

Case 3: Structure Enclosed on Three Sides



- **Upward Pressure Coefficient (Cpu) = 1.2**
- **Downward Pressure Coefficient (Cpd)**: Determine using the **Case 1** method.

Case 4: Structure Enclosed on Four Sides

- **Upward Pressure Coefficient (Cpu) = 0.9**
- **Downward Pressure Coefficient (Cpd) = 0.6**

4. Calculating Wind Pressure

The **maximum wind pressure** acting on the opening roof structure must be calculated for both **upward** and **downward** directions using the formulas:

Downward Wind Pressure (Pd)

Downward Pressure	Pd	=	qz x Cpd
		=	______x ______
		=	______ kPa
Upward Pressure	Pu	=	qz x Cpu
		=	______ x ______
		=	______ kPa

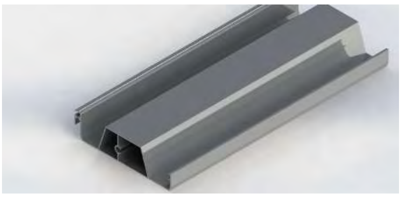
5.Selecting Maximum Louvre Span

The Ultimate Louvre System Louvre system provides two distinctive blade options.

Selection of louvre depends on required clear span, performance and aesthetic outcome

ULTIMATE L150 LOUVRE

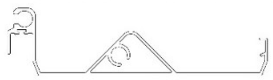
ULTIMATE L200 LOUVRE



	Ultimate 150 Louvre	Ultimate 200 Louvre
Max Span	4.20m	5.20m
Fully Engineered	Yes	Yes
Coverage	150mm	188mm
Width (approx.)	158mm	200mm
Material	Aluminium	Aluminium
Alloy Temper (Marine Corrosion Resistant)	6106-T6	6106-T6
Standards	AS 1866	AS1866
Pins	Aluminium	Aluminium
Control Pins	Marine Grade Stainless Steel	Marine Grade Stainless Steel
Motor	Sealed IP07	Sealed IP07
Drive	Rotary	Rotary
Stops if encountering an obstruction	Yes	Yes
External Drive components	Marine Grade Stainless Steel	Marine Grade Stainless Steel
Speed Open to Close	4 to 8 seconds	5 to 8 seconds
Programable	Yes	Yes
Max Opening of Blade	170°	170°
Waterproof - most weather conditions	Yes	Yes
Bay Capacity	26m2	36m2
Continuous run of louver bay	Max Length 7.2m	Max Length 7.2m
Tracks	Aluminium	Aluminium
Rain Sensor	Yes	Yes
Control System		
Light Capability	Yes	Yes
Remote	Yes	Yes
12 volts	Yes	Yes
CBUS Integration	Optional	Optional
Bluetooth	Optional	Optional
Voice Activation	Optional	Optional
Control App	Optional	Optional

ULTIMATE LOUVRE SYSTEM L150 Flat - Region A

Ultimate Louvre L150 v3



Select the maximum louvre span from the Tables using P_u and P_d from Section 4

Table 5.1 a

Max Louvre Span

Based on UPWARD Pressure

Louvre Span from P_u = _________ m

Wind Pressure P_u	Max Louvre Span
kPa	**m**
0.4	4.20
0.5	4.20
0.6	4.20
0.7	4.20
0.8	4.20
0.9	4.01
1	3.85
1.1	3.70
1.2	3.58
1.3	3.47
1.4	3.37
1.5	3.28
1.6	3.21
1.7	3.13
1.8	3.07
1.9	3.01
2	2.95
2.1	2.90
2.2	2.85
2.3	2.81
2.4	2.76
2.5	2.72
2.6	2.69
2.7	2.65
2.8	2.62
2.9	2.58
3	2.55
3.1	2.52
3.2	2.50

Table 5.2 a

Max Louvre Span

Based on DOWNWARD Pressure

Louvre Span from P_d = ________m

Wind Pressure P_d	Max Louvre Span
kPa	**m**
0.40	4.20
0.50	4.12
0.60	3.93
0.70	3.78
0.80	3.64
0.90	3.53
1	3.42
1.10	3.33
1.20	3.25
1.30	3.17
1.40	3.10
1.50	3.04
1.60	2.98
1.70	2.93
1.80	2.88
1.90	2.83
2	2.79
2.10	2.75
2.20	2.71
2.30	2.67
2.40	2.63
2.50	2.60
2.60	2.57
2.70	2.54
2.80	2.51
2.90	2.48
3	2.46
3.10	2.43
3.20	2.41

The maximum allowable louvre span is the LESSER of the two values.

Maximum Louvre Span = ___________ meters

ULTIMATE LOUVRE SYSTEM L150 Flat – Regions B & C

Select the maximum louvre span from the Tables using P_u and P_d from Section 4.

Table 5.3 B & C
Maximum Louvre Span
Based on UPWARD Pressure

Wind Pressure P_u	*Max Louvre Span*
kPa	*m*
0.40	*4.20*
0.50	*4.20*
0.60	*4.20*
0.70	*4.20*
0.80	*4.20*
0.90	*4.20*
1	*4.20*
1.10	*4.20*
1.20	*4.20*
1.30	*4.10*
1.40	*3.98*
1.50	*3.87*
1.60	*3.77*
1.70	*3.68*
1.80	*3.60*
1.90	*3.52*
2	*3.45*
2.10	*3.39*
2.20	*3.33*
2.30	3.27
2.40	3.22
2.50	3.17
2.60	3.13
2.70	3.08
2.80	3.04
2.90	3.00
3	2.97
3.10	2.93
3.20	2.90

Table 5.4 B & C
Maximum Louvre Span
Based on DOWNWARD Pressure

Wind Pressure P_d	*Max Louvre Span*
kPa	*m*
0.40	*4.20*
0.50	*4.20*
0.60	*4.20*
0.70	*4.20*
0.80	*4.07*
0.90	*3.95*
1	*3.84*
1.10	*3.74*
1.20	*3.66*
1.30	*3.58*
1.40	*3.50*
1.50	*3.44*
1.60	*3.37*
1.70	*3.32*
1.80	*3.26*
1.90	*3.21*
2	*3.16*
2.10	*3.12*
2.20	*3.07*
2.30	3.03
2.40	2.99
2.50	2.96
2.60	2.92
2.70	2.89
2.80	2.86
2.90	2.83
3	2.80
3.10	2.77
3.20	2.74

Louvre Span from P_u = ________ m   Louvre Span from P_d = ________m

The maximum allowable louvre span is the LESSER of the two values.

Maximum Louvre Span = ____________ meters

ULTIMATE LOUVRE SYSTEM L200 Flat - Region A

Select the maximum louvre span from the Tables using P_u and P_d from Section 4

This table you can extrapolate between values.

ULTIMATE L200

Table 5.4a
Maximum Louvre Span
Based on UPWARD Pressure

Wind Pressure P_u	Max Louvre Span
kPa	m
0.4	5.20
0.5	5.20
0.6	5.20
0.7	5.20
0.8	5.20
0.9	5.20
1	5.20
1.1	5.20
1.2	5.20
1.3	5.13
1.4	4.98
1.5	4.85
1.6	4.73
1.7	4.63
1.8	4.53
1.9	4.44
2	4.35
2.1	4.27
2.2	4.20
2.3	4.13
2.4	4.07
2.5	4.01
2.6	3.95
2.7	3.90
2.8	3.85
2.9	3.80
3	3.75
3.1	3.71
3.2	3.67

Table 5.5a
Maximum Louvre Span
Based on DOWNWARD Pressure

Wind Pressure P_d	Max Louvre Span
kPa	m
0.40	5.20
0.50	5.20
0.60	5.20
0.70	5.20
0.80	5.20
0.90	5.11
1	4.96
1.10	4.83
1.20	4.72
1.30	4.61
1.40	4.51
1.50	4.42
1.60	4.34
1.70	4.26
1.80	4.19
1.90	4.12
2	4.06
2.10	4.00
2.20	3.94
2.30	3.89
2.40	3.84
2.50	3.79
2.60	3.75
2.70	3.70
2.80	3.66
2.90	3.62
3	3.58
3.10	3.55
3.20	3.51

Louvre Span from P_u = __________ m   Louvre Span from P_d = _________m

The maximum allowable louvre span is the LESSER of the two values.

Maximum Louvre Span = _____________ meters

ULTIMATE LOUVRE SYSTEM L200 Flat - Region B & C Select the maximum louvre span from the Tables using P_u and P_d from Section 4. This table you can extrapolate between values.

Table 5.6 B&C
Maximum Louvre Span
Based on UPWARD Pressure

Wind Pressure P_u	Max Louvre Span
kPa	m
0.40	5.20
0.50	5.20
0.60	5.20
0.70	5.20
0.80	5.20
0.90	5.20
1	5.20
1.10	5.20
1.20	5.20
1.30	5.20
1.40	5.20
1.50	5.20
1.60	5.20
1.70	5.20
1.80	5.20
1.90	5.20
2	5.11
2.10	5.01
2.20	4.92
2.30	4.84
2.40	4.76
2.50	4.69
2.60	4.62
2.70	4.55
2.80	4.49
2.90	4.43
3	4.37
3.10	4.32
3.20	4.27

Louvre Span from P_u = _________ m

Table 5.7 B&C
Maximum Louvre Span
Based on DOWNWARD Pressure

Wind Pressure P_d	Max Louvre Span
kPa	m
0.40	5.20
0.50	5.20
0.60	5.20
0.70	5.20
0.80	5.20
0.90	5.20
1	5.20
1.10	5.20
1.20	5.20
1.30	5.18
1.40	5.08
1.50	4.98
1.60	4.90
1.70	4.81
1.80	4.74
1.90	4.66
2	4.60
2.10	4.53
2.20	4.47
2.30	4.41
2.40	4.36
2.50	4.31
2.60	4.26
2.70	4.21
2.80	4.16
2.90	4.12
3	4.08
3.10	4.04
3.20	4.00

Louvre Span from P_d = ________m

The maximum allowable louvre span is the LESSER of the two values.

Maximum Louvre Span = ____________ meters

6.Selecting Louvre Support Beam

Standard **Ultimate Louvre System Opening and Closing Roof** structures have beams on all sides.

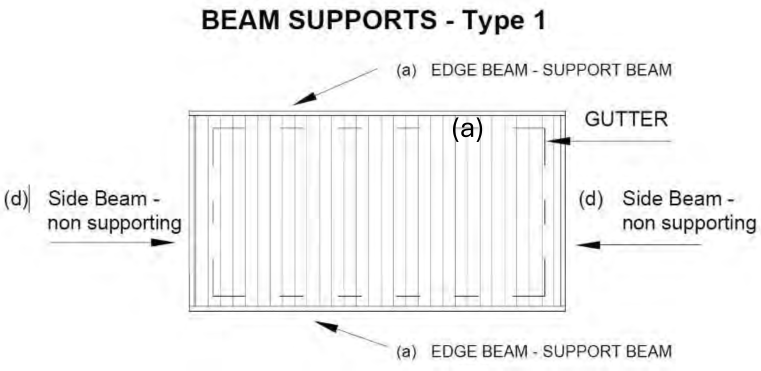
Type 1

The two beams which take the load from the louvres are the Louvre Support Beams. In type 1 they are EDGE beams. The beams parallel to the louvre's span direction are side beams which are non-load bearing.

The structural adequacy of the Louvre Support Beams needs to be evaluated based on the wind load that is transferred to the beams from the louvres.

Edge Beam – in this example edge beam (a) is the supporting beam.

Side Beam - The (d) Side Beams are non-load bearing beams.



Type 2

The two beams which take the load from the louvres are the Louvre Edge Support Beams.
They may be either EDGE beams & MID beams &/or Side Beam - supporting.

This example shows a MID Beam between louvre bays

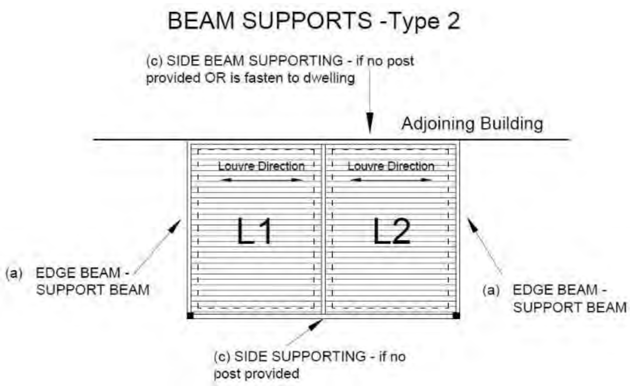
Edge Beam – calculate load as per type 1 – refer to Edge Beam calculation method. This beam is single side load.

Mid Beams – Calculate as per type 2 refer Mid-beam (b) calculation method.

Side Beam (Supporting) – Calculate Side Supporting Beam supporting (c) as per type 2 refer Mid beam calculation method for bay dimensions.

This beam has a point load of mid-beam (b) at intersection (unless post provided) to support the mid beam.

The side beams (non-supporting) are commonly non-load bearing beams, matching to other support beam size for aesthetic reason.



In Type 2 where a additional post is not given at the intersection of beams, side beam is load bearing beam.

In Type 2 where a additional post given supporting the mid-beam, side beam is not-load bearing beam. (Non-supporting beam).

Type 3

In this type of arrangement, both load bearing and non-load bearing side beams are shown with edge beam and mid beam.

In this example, post is supporting the loads from mid beam and side beam becomes non-load bearing beam. Other end, side beam becomes load bearing beam as no post provided.

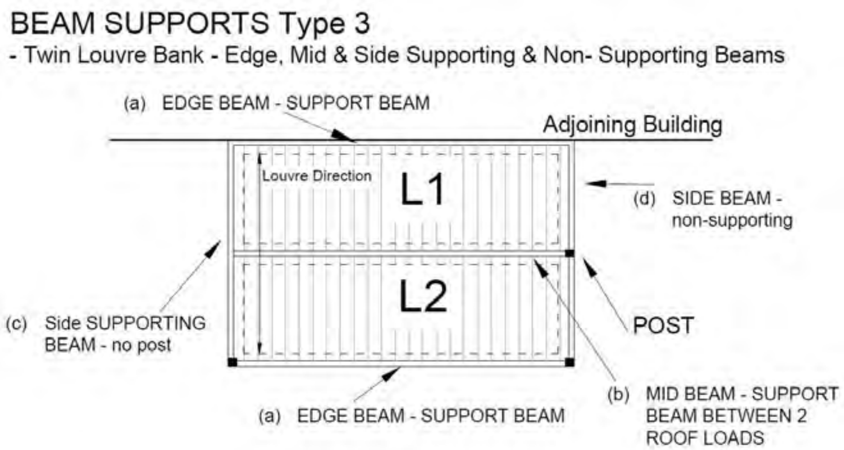
Therefore, this example we have four (4) beam types.

a) Edge Beam

b) Mid Beam

c) Side Beam – supporting.

d) Side Beam – non-supporting.



Summary

The structural adequacy of **Louvre Support Beams** must be assessed based on the wind load transferred from the louvres. The **Side Beam** supports the point load from the **Mid Beam**, and the beam type determines the load calculation method:

- **Edge Beam**: Calculate load as per **Type 1** (refer to Edge Beam calculation method).
- **Mid Beam**: Calculate load as per **Type 2** (refer to Mid Beam calculation method).
- **Side Beam (Supporting)**: Once the **Mid Beam** load is determined, calculate this beam. This applies where a post is absent at the juncture of the Mid Beam and Side Beam.
- **Side Beam (Non-Supporting)**: Typically, the same size as other beams, supporting the **Mid Beam** when a post is present.

Refer to **Section 6.1** for **Uniformly Distributed Load (UDL) calculations** based on the beam type under review (**Edge Beam, Side Beam (Supporting), or Mid Beam**).

Ultimate LouvreSystems

6.1 Calculate Uniformly Distributed Beam Load (UDL)

It is assumed that the wind load on the louvres produces a Uniformly Distributed Load across the length of the beam for edge & mid beams. It is further assumed the load for side beam supporting is producing a point load. Refer to regions table and then applicable beam table.

Calculations use the Roof Design Pressure which is the HIGHEST value of Pu and P_d.

Roof Design Pressure P = ______ kP_a

EDGE BEAMS (i.e. beams supporting louvres on one side only).

Use Roof Design Pressure P = ______ kPa

and ACTUAL Louvre Span L = ______ m

The roof load is transferred to 2 beams, therefore: -

Uniformly Distributed Load UDL $\frac{P \times L}{2}$

Edge Beam = ______ kN/m

MID BEAMS (i.e. beams supporting louvres on both sides).

Use Roof Design Pressure P = ______ kPa

ACTUAL Louvre Span, Roof 1 L_1 = ______ m

ACTUAL Louvre Span, Roof 2 L_2 = ______ m

The mid beam takes the load from 2 roof sections, therefore: -

Uniformly Distributed Load UDL = $\frac{P \times (L_1 + L_2)}{2}$

Mid Beam = _______ kN/m

SIDE BEAMS SUPPORTING (i.e.: where side beam is supporting a load of a mid-beam, and no post has been provided at junction or along the beams length – refer beams supports type 2)

The Side Beam load will be a point load, not a UDL.

Use the result in Mid Beam calculation (see above) = ___________ kN/m

Mid Beam Length = ___________ m

Calculate Mid Beam ______ kN/m x Mid Beam Length ________m ÷ 2

Side Beam (Supporting) =_______ P (kN)

Special Note:

Edge Beam, Side Beam (support) & Mid Beam tables can be extrapolated between values.

6.2 Select Suitable Edge & Mid Beam Region

The wind load on the **louvres** is assumed to generate a **Uniformly Distributed Load (UDL)** across the **Edge Beams** and **Mid Beams**, while the **Side Beam (Supporting)** experiences a **point load**. Refer to the **regions table** and corresponding **beam table** for calculations. The calculations are based on the **Roof Design Pressure**, which is the **higher value** of **Pu** (upward pressure) and **Pd** (downward pressure):

Uniform Load UDL	Beam Size 6060T5	Beam Size 6060T5	Beam Size 6063T5	Beam Size 6351T6
(kN/m)	150 x 50 x 3 mm	200 x 50 x 3 mm	250 x 50 x 3 mm	300 x 50 x 4 mm
0.20	6.97	8.41	9.76	11.84
0.30	6.30	7.60	8.82	10.70
0.40	5.81	7.07	8.21	9.96
0.50	5.40	6.69	7.76	9.42
0.60	5.08	6.39	7.42	9.00
0.70	4.82	6.15	7.14	8.66
0.80	4.61	5.93	6.90	8.37
0.90	4.44	5.70	6.70	8.13
1.00	4.28	5.51	6.53	7.92
1.10	4.15	5.33	6.37	7.73
1.20	4.03	5.18	6.24	7.57
1.30	3.92	5.04	6.11	7.42
1.40	3.83	4.92	6.00	7.28
1.50	3.74	4.81	5.87	7.16
1.60	3.66	4.71	5.74	7.04
1.70	3.59	4.61	5.63	6.94
1.80	3.52	4.53	5.52	6.84
1.90	3.46	4.45	5.42	6.74
2.00	3.40	4.37	5.33	6.66
2.10	3.35	4.30	5.24	6.58
2.20	3.29	4.23	5.16	6.50
2.30	3.25	4.17	5.09	6.43
2.40	3.20	4.11	5.02	6.36
2.50	3.16	4.06	4.95	6.30
2.60	3.12	4.00	4.88	6.24
2.70	3.08	3.95	4.82	6.18
2.80	3.04	3.91	4.76	6.12
2.90	3.00	3.86	4.71	6.07
3.00	2.97	3.82	4.66	6.02
3.20	2.91	3.74	4.56	5.89
3.40	2.85	3.66	4.45	5.78
3.60	2.79	3.59	4.33	5.67
3.80	2.75	3.51	4.22	5.57
4.00	2.70	3.43	4.11	5.47
4.20	2.65	3.34	4.01	5.38
4.40	2.60	3.27	3.92	5.30
4.60	2.54	3.20	3.84	5.22
4.80	2.49	3.13	3.76	5.15
5.00	2.44	3.07	3.69	5.08
You can extrapolate between values in all tables				

- Select Suitable Edge & Mid Beam Regions B & C
    - **Edge & Mid Beam Summary Tables – Region B & C**
  - Using the UDL calculated, select a suitable beam from Table 6.1bc
  - **Extruded Aluminium Beams, Rectangular Hollow Section (RHS)**
    - **Table 6.1bc – Maximum Allowable Beams Span (metres)**

Uniform Load UDL	Beam Size 6060T5	Beam Size 6060T5	Beam Size 6063T5	Beam Size 6351T6
(kN/m)	150 x 50 x 3 mm	200 x 50 x 3 mm	250 x 50 x 3 mm	300 x 50 x 4 mm
0.20	7.65	9.24	10.72	13.00
0.30	6.91	8.35	9.69	11.75
0.40	6.43	7.77	9.02	10.93
0.50	6.09	7.35	8.53	10.34
0.60	5.75	7.02	8.15	9.88
0.70	5.47	6.75	7.84	9.51
0.80	5.23	6.53	7.58	9.19
0.90	5.03	6.34	7.36	8.93
1.00	4.85	6.18	7.17	8.70
1.10	4.70	6.03	7.00	8.49
1.20	4.57	5.87	6.85	8.31
1.30	4.45	5.72	6.71	8.14
1.40	4.34	5.58	6.59	7.99
1.50	4.24	5.45	6.48	7.86
1.60	4.15	5.33	6.37	7.73
1.70	4.07	5.17	6.20	7.62
1.80	3.99	5.03	6.03	7.51
1.90	3.91	4.90	5.88	7.41
2.00	3.81	4.78	5.73	7.31
2.10	3.72	4.67	5.60	7.22
2.20	3.64	4.57	5.48	7.14
2.30	3.56	4.47	5.36	7.06
2.40	3.49	4.38	5.25	6.99
2.50	3.42	4.30	5.15	6.92
2.60	3.36	4.21	5.05	6.85
2.70	3.30	4.14	4.96	6.78
2.80	3.24	4.07	4.88	6.72
2.90	3.18	4.00	4.79	6.66
3.00	3.13	3.93	4.71	6.61
3.20	3.03	3.81	4.57	6.50
3.40	2.94	3.70	4.44	6.40
3.60	2.86	3.60	4.32	6.31
3.80	2.79	3.50	4.20	6.23
4.00	2.72	3.42	4.10	6.15
4.50	2.57	3.23	3.87	5.96
5.00	2.44	3.06	3.68	5.76
5.50	2.33	2.92	3.51	5.58
6.00	2.23	2.80	3.36	5.42
6.50	2.14	2.69	3.23	5.27
This table you can extrapolate between values				

6.3 Select Suitable Side Beam – Supporting Region A

Side Beam – Supporting - Summary Tables – Region A

Using the p (kN) calculated, select a suitable beam from Table 6.2a

Extruded Aluminium Beams, Rectangular Hollow Section (RHS)

Table 6.2a – Maximum Allowable Beams Span (metres)

	Beam Size 6060T5	Beam Size 6060T5	Beam Size 6063T7	Beam Size 6351T6
	150 x 50 x 3mm	200 x 50 x 3mm	250 x 50 x 3mm	300 x 50 x 4mm
P (kN)	Lb (m)	Lb (m)	Lb (m)	Lb (m)
1	6.66	8.55	10.43	13.50
2	4.96	6.79	8.28	10.71
3	4.05	5.90	7.23	9.36
4	3.50	5.11	6.57	8.50
5	2.92	4.53	6.10	7.89
6	2.45	3.82	5.39	7.43
7	2.12	3.30	4.68	7.05
8	1.86	2.91	4.13	6.75
9	1.66	2.60	3.70	6.49
10	1.50	2.35	3.35	6.26
11	1.36	2.14	3.06	6.07
12	1.25	1.97	2.81	5.84
13	1.16	1.82	2.61	5.61
14	1.08	1.69	2.43	5.41
15	1.01	1.58	2.27	5.23
16	0.95	1.49	2.13	5.06
17	0.89	1.40	2.01	4.91
18	0.84	1.33	1.90	4.77
19	0.80	1.26	1.81	4.64
20	0.76	1.20	1.72	4.53
21	0.72	1.14	1.64	4.42
22	0.69	1.09	1.57	4.31
23	0.66	1.04	1.50	4.22
24	0.63	1.00	1.44	4.13
25	0.61	0.96	1.38	4.05
26	0.59	0.93	1.33	3.97
27	0.57	0.89	1.28	3.90
28	0.55	0.86	1.24	3.82
29	0.53	0.83	1.20	3.76
30	0.51	0.80	1.16	3.70
31	0.49	0.78	1.12	3.64
32	0.48	0.75	1.09	3.58
33	0.46	0.73	1.05	3.52
34	0.45	0.71	1.02	3.47
35	0.44	0.69	1.00	3.42
36	0.43	0.67	0.97	3.37
37	0.41	0.65	0.94	3.33
38	0.40	0.64	0.92	3.28
39	0.39	0.62	0.89	3.24
This table you can extrapolate between values				

Select Suitable Side Beam – Supporting Region B & C

Side Beam – Supporting - Summary Tables – Region B & C

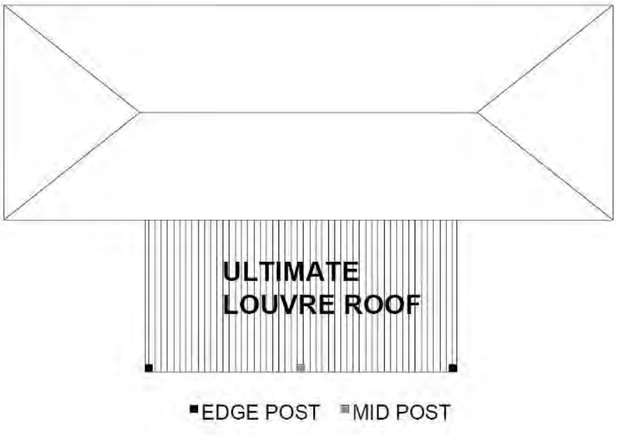
Using the p (kN) calculated, select a suitable beam from Table 6.2bc

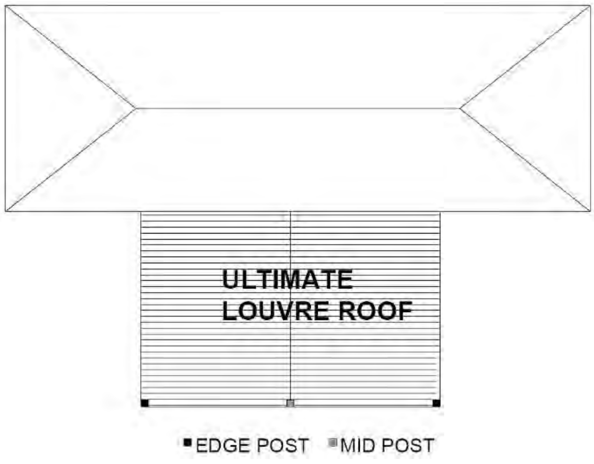
Extruded Aluminium Beams, Rectangular Hollow Section (RHS)

Table 6.2bc – Maximum Allowable Beams Span (metres)

	Beam Size 6060T5 150 x 50 x 3mm	Beam Size 6060T5 200 x 50 x 3mm	Beam Size 6063T7 250 x 50 x 3mm	Beam Size 6351T6 300 x 50 x 4mm
P (kN)	Lb (m)	Lb (m)	Lb (m)	Lb (m)
1	7.54	9.69	11.82	15.29
2	5.98	7.69	9.38	12.13
3	4.64	6.72	8.19	10.60
4	3.56	5.45	7.45	9.63
5	2.89	4.46	6.28	8.94
6	2.43	3.77	5.32	8.41
7	2.10	3.26	4.61	7.99
8	1.84	2.87	4.07	7.64
9	1.65	2.57	3.65	7.35
10	1.49	2.32	3.31	7.10
11	1.35	2.12	3.02	6.87
12	1.24	1.95	2.78	6.68
13	1.15	1.81	2.58	6.50
14	1.07	1.68	2.40	6.34
15	1.00	1.57	2.25	6.20
16	0.94	1.48	2.11	6.07
17	0.89	1.39	1.99	5.92
18	0.84	1.32	1.89	5.75
19	0.79	1.25	1.79	5.60
20	0.76	1.19	1.70	5.46
21	0.72	1.13	1.63	5.33
22	0.69	1.08	1.55	5.20
23	0.66	1.04	1.49	5.09
24	0.63	0.99	1.43	4.98
25	0.61	0.96	1.37	4.88
26	0.58	0.92	1.32	4.79
27	0.56	0.89	1.27	4.70
28	0.54	0.86	1.23	4.61
29	0.52	0.83	1.19	4.53
30	0.51	0.80	1.15	4.42
31	0.49	0.77	1.11	4.28
32	0.48	0.75	1.08	4.15
33	0.46	0.73	1.05	4.04
34	0.45	0.71	1.02	3.92
35	0.44	0.69	0.99	3.81
36	0.42	0.67	0.96	3.71
37	0.41	0.65	0.94	3.62
38	0.40	0.63	0.91	3.53
39	0.39	0.62	0.89	3.44
40	0.38	0.60	0.87	3.36
41	0.37	0.59	0.85	3.28
42	0.36	0.57	0.83	3.20
This table you can extrapolate between values				

7.Determination of Footing Size





To Determine the Footing Size for an EDGE Post

Uplift Load (kN) = Edge Beam UDL x (Edge Beam Span (L) / 2)

N = UDL ________x Edge Beam Length ________ / 2 = Uplift __________ (kN)

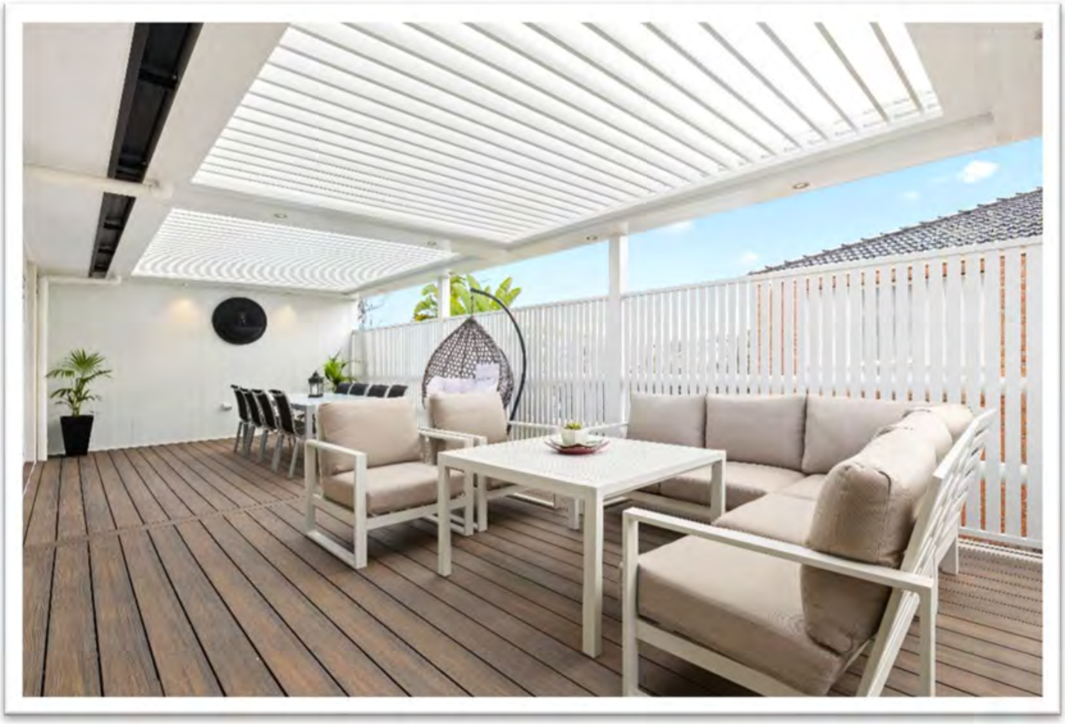
Note: UDL & Beam span are from workout sheet above, refer to Table below for Footing size.

To Determine the Footing Size for a MID Post

Uplift Load Mid Beam UDL x Mid Beam Length /2

kN =UDL ________x Mid Beam Length ________/ 2) = Uplift __________ (kN)

Note: UDL & Beam spans are from workout sheet above, refer to Table below for Footing size choosing Type number relative to your (kN) outcome or above.



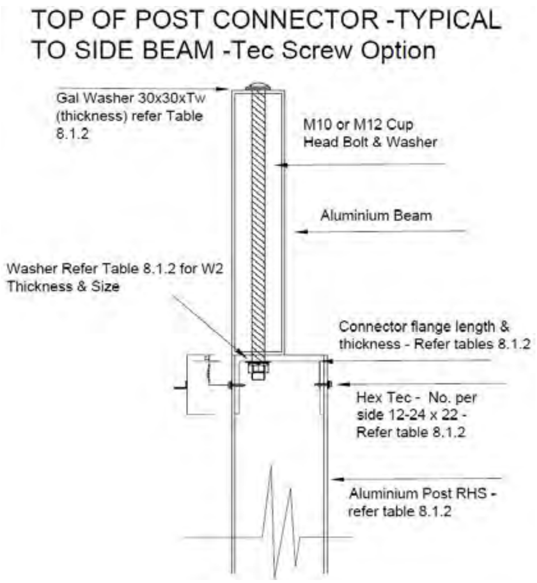
Note: UDL & Beam spans are from workout sheet above, refer to Table below for Footing size choosing Type number relative to your (kN) outcome or above.

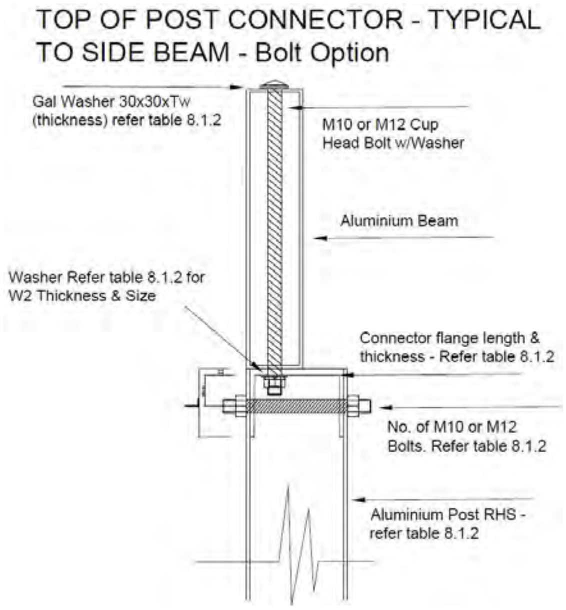
Footing Table 7.1

Up Lift (kN)	Footing Size mm	Footing Depth mm	Shape	Type
1.5	400	400	Round/Square	1
3	400	500	Round/Square	2
5	450	600	Square	3
6	600	500	Square	4
7	600	550	Square	5
8	600	600	Square	6
9	600	650	Square	7
10	600	750	Round/Square	8
15	600	1200	Round	9
20	600	1500	Round	10

8.Determination of Post Size & Top Connectors

From the uplift force calculated from section 7 of this manual, work out post and connector required.





For the nominated connection above with the standard posts and fixing channels as listed below

Table 8.1.1

Aluminium Post Sizes	Connection Channel & Size
90 x 90 x 2mm post	84mm Folded Gal Channel all sides & base
100 x 100 x 3mm post	93mm Folded Gal Channel all sides & base
125 x 125 x 3mm post	118mm Folded Gal Channel all sides & base
150 x 150 x 4mm post	140mm Folded Gal Channel all sides & base

Uplift Capacity = 1.0 kN

Or by addition of a 30 x 30 x 3mm gal washer under the head of the bolt connection through the beam to the post

Uplift Capacity = 2.0 kN

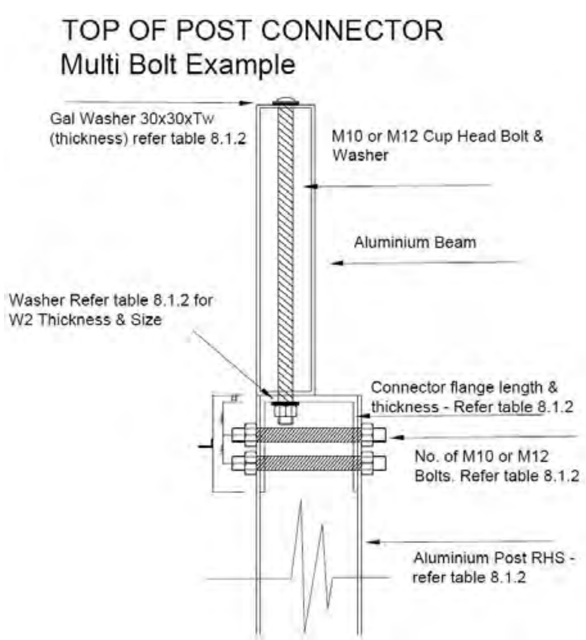
Note: For higher loads please following pages refer diagrams and tables for changes to fastening and connector sizes.

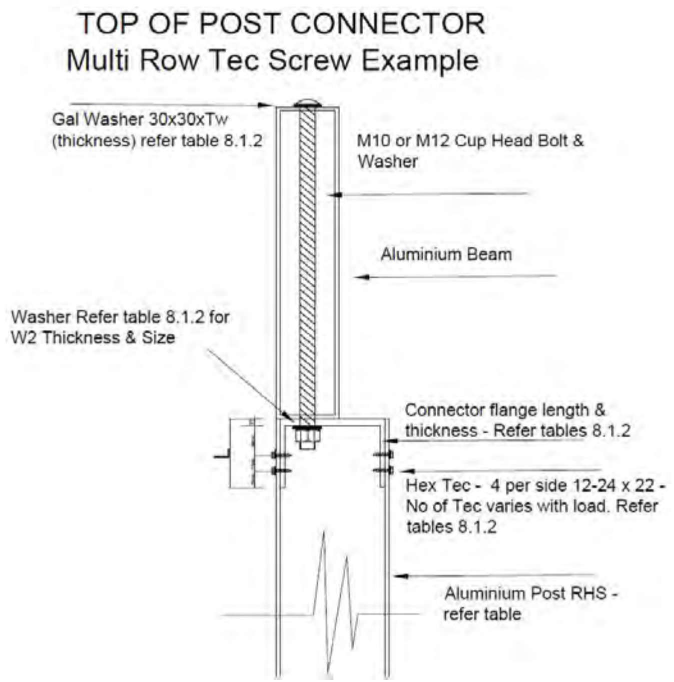
Determination of Post Size & Top Connector cont'd

From the uplift force calculated from section 7 of this manual for selected post size.

1. Obtain top connection details from appropriate connection nominated from table 8.1.2 nominated from table 8.1.2
2. Obtain the bottom connection details from base plates 1 to 3 refer to respective tables applicable to base plate chosen.

Examples of Top of post to beam where multi rows of Tec Screws or Bolts have been specified.





Determination of Post Size & Connector cont'd

Table 8.1.2 – Post Connector - Top

Post	Nx (kN)	Tw (mm)	Tf (mm)	W2 (mm)	Hex Tec Screws	No. M10	No. M12	FL
		Washer Thickness	Connector Thickness	Washer Thickness	12-24x22	Bolts	Bolts	Width, Length & Height
50x50x2mm Alum SHS	1	4	3	3	2 per side	1	1	45 x 45 x 100
	2	5	3	4	2 per side	1	1	45 x 45 x 100
	5	8	3	6	3 per side	1	1	45 x 45 x 100
	10	11	6	8	5 per side	2	2	45 x 45 x 100
	15	13	6	10	8 per side	3	3	45 x 45 x 125
	20	15	6	11	10 per side	4	4	45 x 45 x 150
	25	16	6	12	12 per side	5	4	45 x 45 x 175
90x90x2mm Alum SHS	1	4	3	3	2 per side	1	1	85 x 85 x 100
	2	5	3	5	2 per side	1	1	85 x 85 x 100
	5	8	3	7	3 per side	2	1	85 x 85 x 100
	10	11	6	10	5 per side	3	2	85 x 85 x 100
	15	13	6	12	8 per side	4	3	85 x 85 x 125
	20	15	6	14	10 per side	5	4	85 x 85 x 150
	25	16	6	15	12 per side	6	5	85 x 85 x 175
100x100x3mm Alum SHS	1	4	3	3	2 per side	1	1	93 x 93 x 100
	2	5	3	5	2 per side	1	1	93 x 93 x 100
	5	8	3	7	3 per side	2	1	93 x 93 x 100
	10	11	6	10	3 per side	2	2	93 x 93 x 100
	15	13	6	12	5 per side	3	2	93 x 93 x 125
	20	15	6	13	6 per side	4	3	93 x 93 x 150
	25	16	6	15	8 per side	5	4	93 x 93 x 175
125x125x3mm Alum SHS	1	4	3	3	2 per side	1	1	118x118x100
	2	5	3	5	2 per side	1	1	118x118x100
	5	8	3	7	2 per side	2	1	118x118x100
	10	11	6	10	3 per side	2	2	118x118x100
	15	13	6	12	5 per side	3	2	118x118x125
	20	15	6	13	6 per side	4	3	118x118x150
	25	16	6	15	8 per side	4	4	118x118x175
150x150x4mm Alum SHS	1	4	3	3	2 per side	1	1	140x140x100
	2	5	3	5	2 per side	1	1	140x140x100
	5	8	3	7	2 per side	2	1	140x140x100
	10	11	6	10	3 per side	2	2	140x140x100
	15	13	6	12	4 per side	3	2	140x140x125
	20	15	6	13	5 per side	4	3	140x140x150
	25	16	6	15	6 per side	5	4	140x140x175

8.2 – Determination of Post Stirrups

Depending upon location your needs to have multiple options to fasten base plates to concrete are provided below.

Refer directly to table applicable to type chosen and your location.

We recommend min. 2 anchors per fixing regardless of the up-lift capacity.

Table: 8.2.0 - Concrete Connections - Base Plates

Up to 5kN	M10 Dynabolt or Ankascrew (min 50 embedment) (Min. 2 Anchors per fixing.)
10kN	Two M10 Dynabolts or Ankascrews (min 50 embedment, min 50 spacing)
15kN	M12 Ankascrew (min 75 embedment) (Min. 2 anchors per fixing)
20kN	Two M12 Ankascrews (min 75 embedment, min 50 spacing)
25kN	Two M12 Ankascrews (min 75 embedment, min 50 spacing)

Base Plate – Aluminium Post welded to aluminium base plate

Base Plate type 1

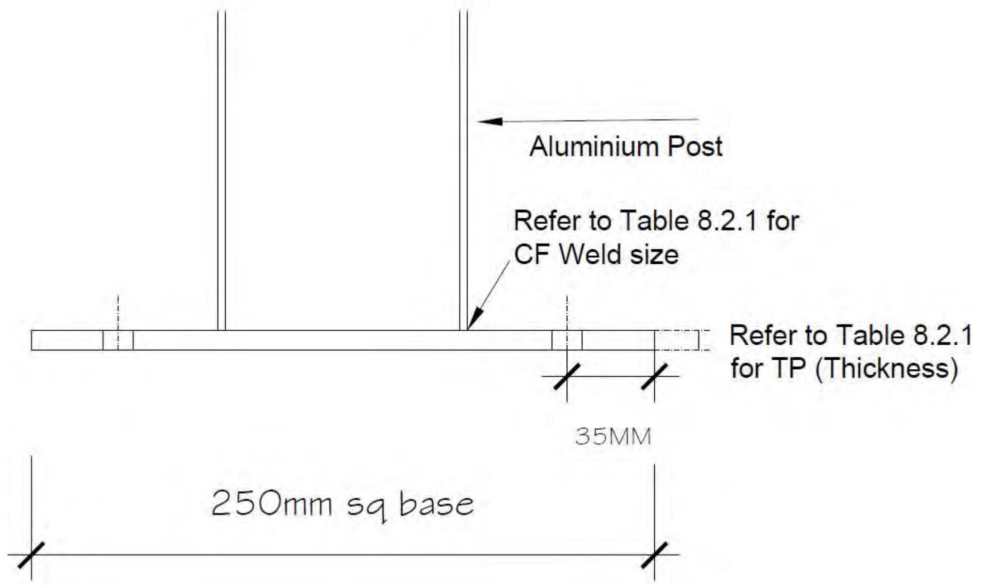
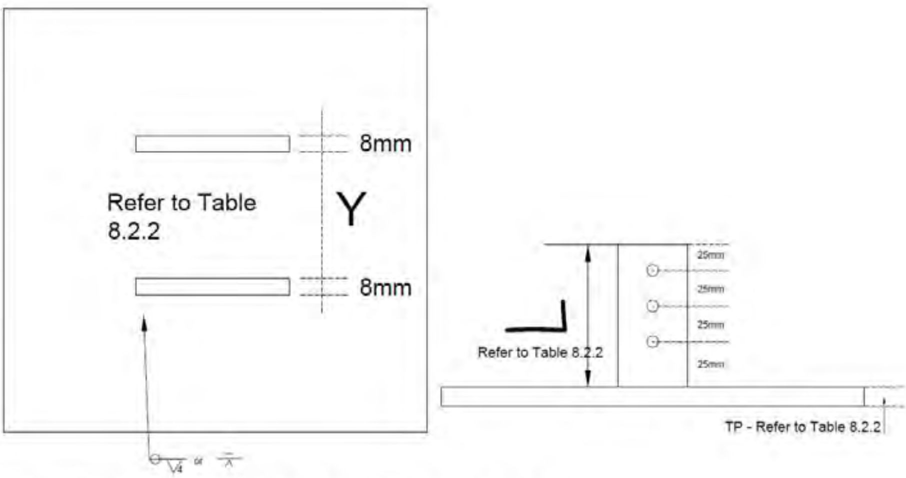


Table 8.2.1 – Base Plate Type 1

Post	Nx (kN)	CFWeld (mm)	TP mm
90x90x2mm Alum SHS	5	2	8
	10	2	10
	15	3	12
	20	4	12
	25	4	16
100x100x3mm 125 x 125x3mm 140x140x4mm Alum SHS	5	2	8
	10	2	8
	15	3	10
	20	3	12
	25	4	12

Steel Base Plate with welded uprights Base Plate Type 2



Note: Spacing of upright to suit proposed post size

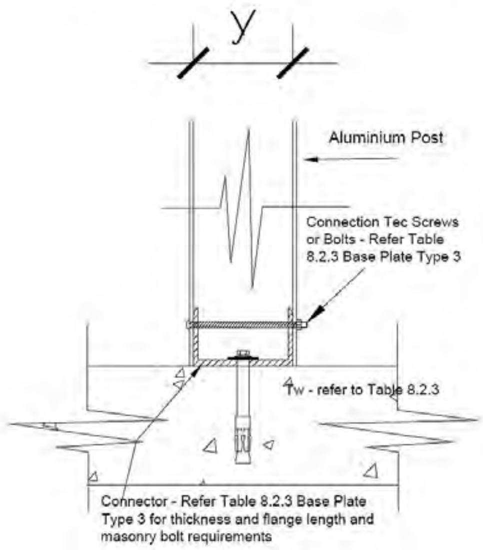
Table 8.2.2 – Base Plate Type 2

Post	Nx (kN)	Tp (mm)	Hex Tec Screws	No. M10	No. M12	L	X	Y
			12-24x22	bolts	bolts	(mm)	(mm)	(mm)
	1	3	2 per side	1	1	75	84	69
	2	4	2 per side	1	1	75	84	69
90x90x2mm	5	8	2 per side	2	1	75	84	69
Alum SHS	10	9	5 per side	3	2	75	84	69
	15	11	8 per side	4	3	100	84	69
	20	12	10 per side	5	4	125	84	69
	25	14	12 per side	6	5	150	84	69
	1	3	2 per side	1	1	75	93	77
	2	4	2 per side	1	1	75	93	77
100x100x3mm	5	6	2 per side	1	1	75	93	77
Alum SHS	10	9	2 per side	2	2	75	93	77
	15	10	3 per side	3	2	75	93	77
	20	12	4 per side	3	3	125	93	77
	25	13	5 per side	4	4	150	93	77
	1	3	2 per side	1	1	75	118	102
	2	4	2 per side	1	1	75	118	102
125x125x3mm	5	6	2 per side	1	1	75	118	102
Alum SHS	10	8	2 per side	2	2	75	118	102
	15	9	3 per side	3	2	75	118	102
	20	11	4 per side	4	3	125	118	102
	25	12	5 per side	4	4	150	118	102
	1	2	2 per side	1	1	75	140	102
	2	3	2 per side	1	1	75	140	102
140x140x4mm	5	4	2 per side	1	1	75	140	102
Alum SHS	10	6	2 per side	2	2	75	140	102
	15	7	3 per side	3	3	75	140	102
	20	8	3 per side	4	3	125	140	102
	25	9	4 per side	4	4	150	140	102

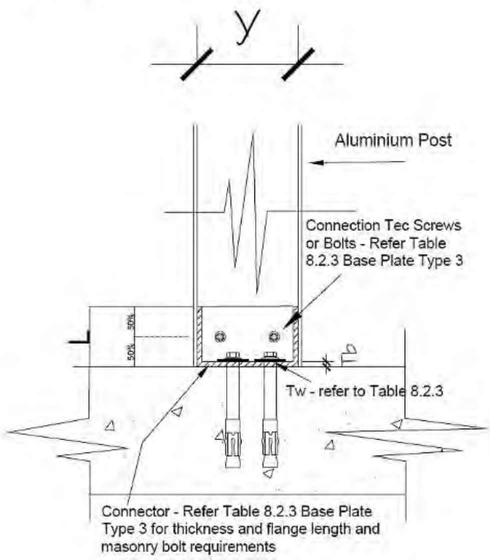
Dependent upon your project and minimum type required via table. Bolt down connectors below showing various options for fastening to concrete and to beams. Refer Table 8.2.3

Base Connector U Bracket Diagram – Type 3

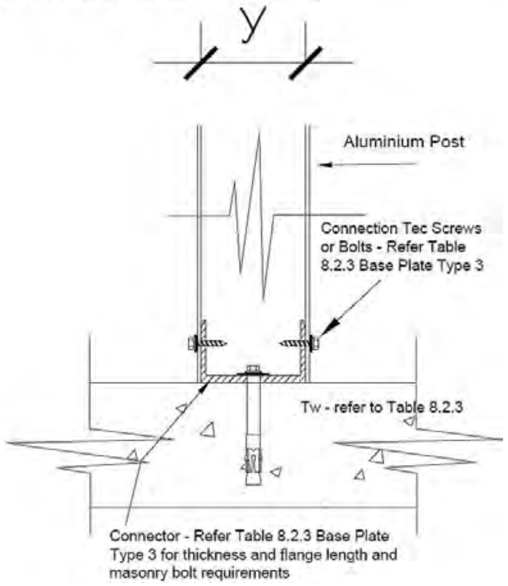
SIDE VIEW (A) TYPICAL FOOTING CONNECTOR BOLT OPTION WITH SINGLE(1) MASONRY BOLT



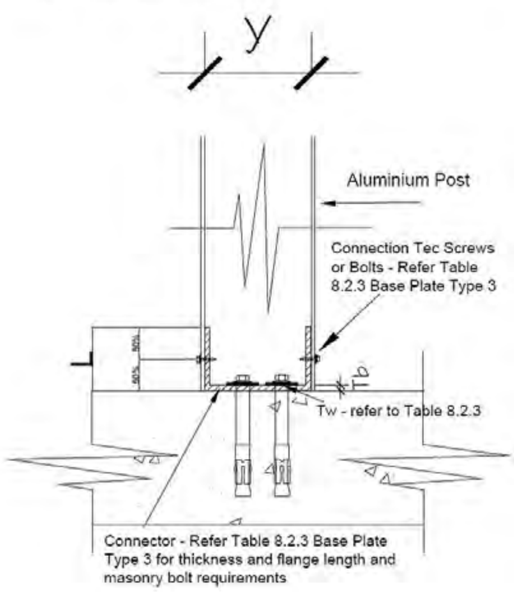
FASTENING VIEW (B) FOOTING CONNECTOR BOLT OPTION



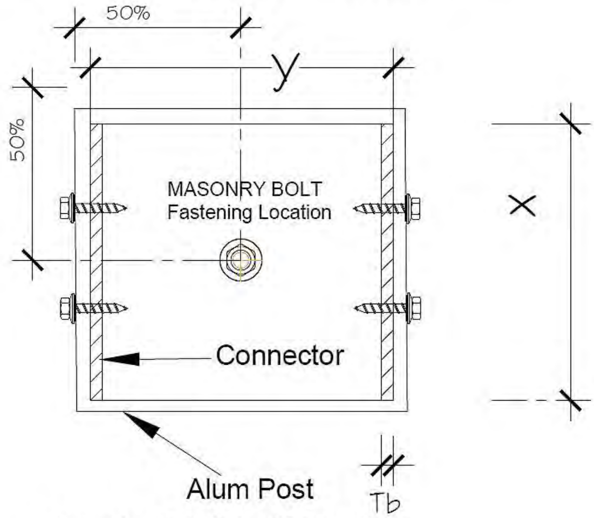
FASTENING VIEW TYPICAL FOOTING CONNECTOR TEC SCREW & SINGLE(1) MASONRY BOLT OPTION



SIDE VIEW (A) FOOTING CONNECTOR TEC SCREW OPTION

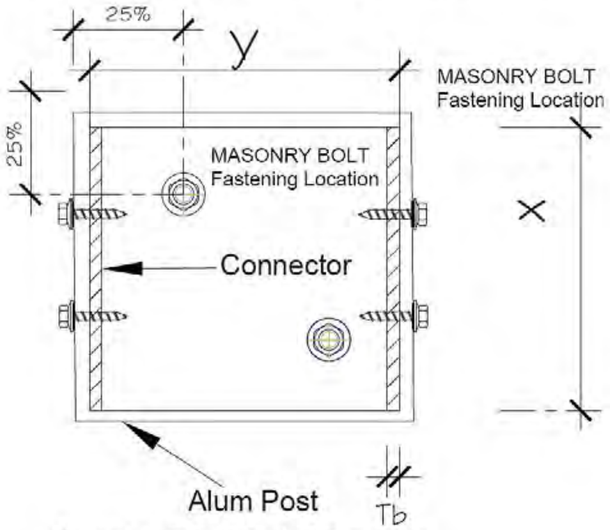


TOP VIEW FOOTING CONNECTOR
FOR SINGLE (1) MASONRY BOLT



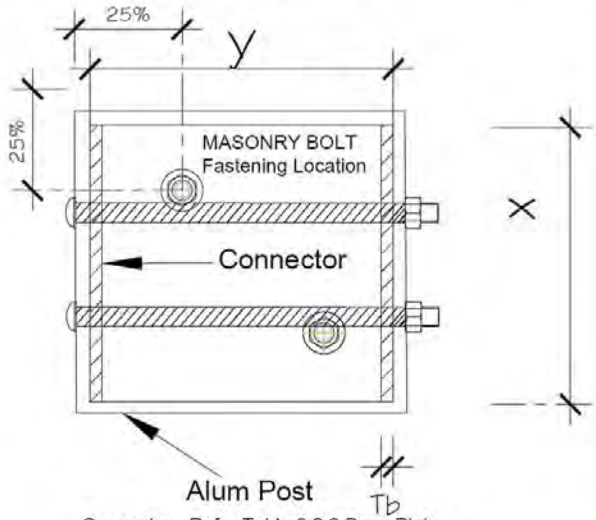
Connector - Refer Table 8.2.3 Base Plate Type 3 for thickness and flange length and masonry bolt requirements

TOP VIEW FOOTING CONNECTOR
FOR 2 MASONRY BOLT LOCATION



Connector - Refer Table 8.2.3 Base Plate Type 3 for thickness and flange length and masonry bolt requirements

TOP VIEW FOOTING CONNECTOR
MULTIPLE BOLTS OPTION



Connector - Refer Table 8.2.3 Base Plate Type 3 for thickness and flange length and masonry bolt requirements

Connectors for Stirrup or Beam
(top & bottom of post)
Gal U Connector Brackets 3 mm

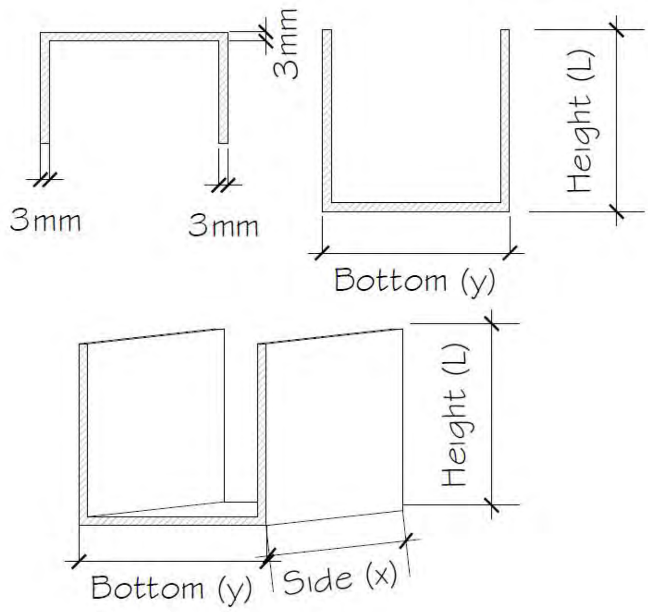


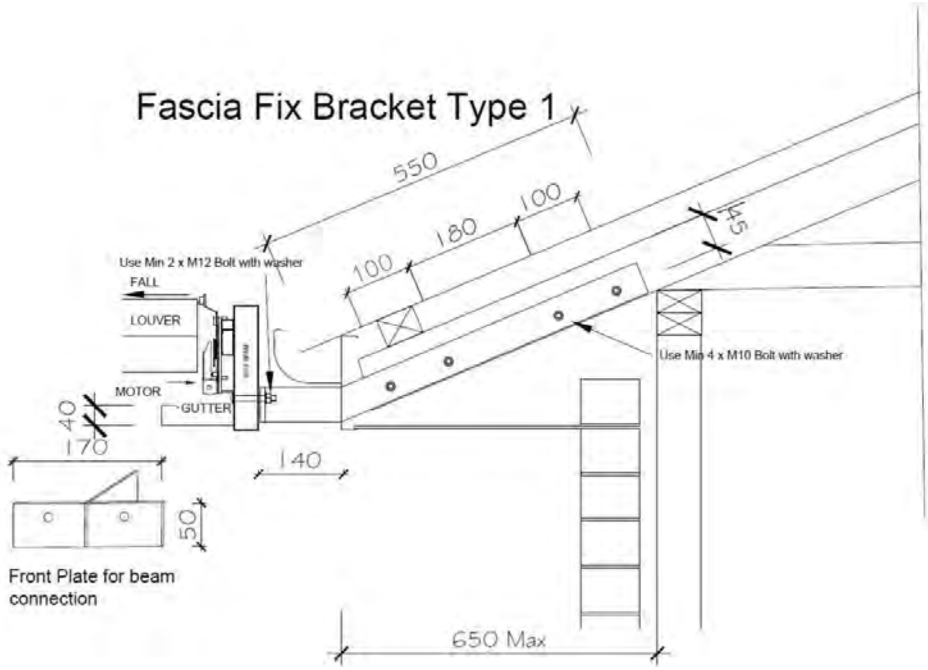
Table 8.2.3 – Base Connector U Bracket – Type 3

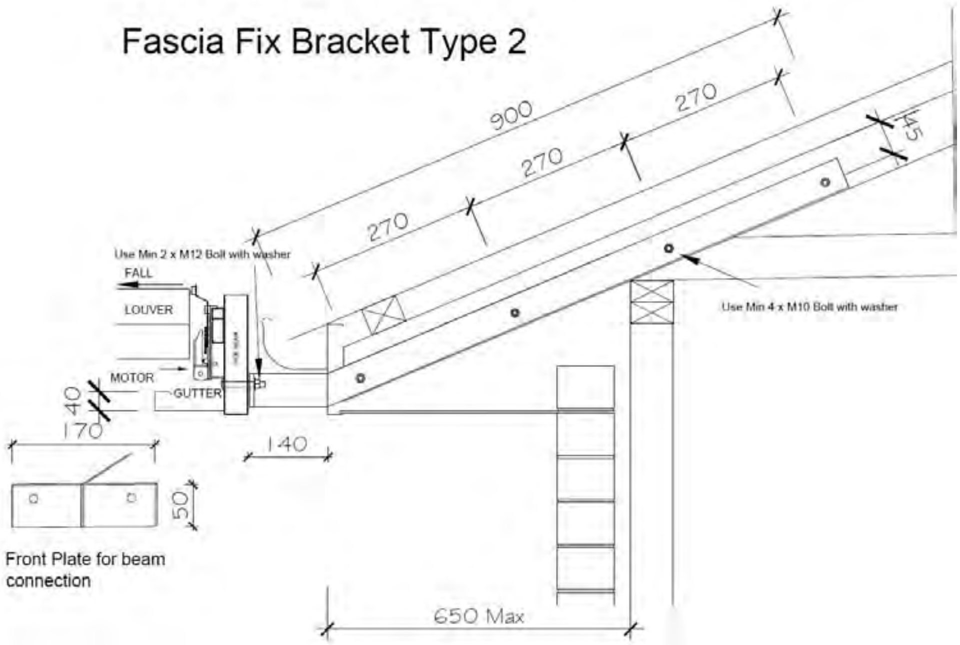
Post	Nx (kN)	Tb (mm)	Tw	Hex Tec Screws	No.M10	No.M12	L	X	Y
		Thickness	Thickness	12-24x22	bolts	bolts	(mm)	(mm)	(mm)
	1	3	4	2 per side	1	1	75	84	84
	2	3	5	2 per side	1	1	75	84	84
90x90x2mm	*5*	3	8	2 per side	*2*	*1*	75	84	84
Alum SHS	*10*	5	11	5 per side	*3*	*2*	75	84	84
	15	5	13	8 per side	*4*	*3*	100	84	84
	20	5	15	10 per side	*5*	*4*	125	84	84
	25	5	16	12 per side	*6*	*5*	150	84	84
	1	3	4	2 per side	1	1	75	93	93
	2	3	5	2 per side	1	1	75	93	93
100x100x3mm	*5*	3	8	2 per side	*1*	*1*	75	93	93
Alum SHS	*10*	5	11	2 per side	*2*	*2*	75	93	93
	15	5	13	3 per side	*3*	*2*	75	93	93
	20	5	15	4 per side	*3*	*3*	125	93	93
	25	5	16	5 per side	*4*	*4*	150	93	93
	1	3	4	2 per side	1	1	75	118	118
	2	3	5	2 per side	1	1	75	118	118
125x125x3mm	*5*	3	8	2 per side	*1*	*1*	75	118	118
Alum SHS	*10*	5	11	2 per side	*2*	*2*	75	118	118
	15	5	13	3 per side	*3*	*2*	75	118	118
	20	5	15	4 per side	*4*	*3*	125	118	118
	25	5	16	5 per side	*4*	*4*	150	118	118
	1	2	4	2 per side	1	1	75	140	140
	2	3	5	2 per side	1	1	75	140	140
140x140x4mm	5	4	8	2 per side	*1*	*1*	75	140	140
Alum SHS	10	6	11	2 per side	*2*	*2*	75	140	140
	15	7	13	3 per side	*3*	*3*	75	140	140
	20	8	15	3 per side	*4*	*3*	125	140	140
	25	9	16	4 per side	*4*	*4*	150	140	140

9. Selecting Rafter Brackets

The Ultimate Louvre System Opening Roof may be supported from an existing building roof structure by fixing the louvre support beam to the rafters or roof trusses using Rafter Brackets.

Rafter Brackets are available as Type 1 or Type 2 as shown below.





The load capacity of the rafter brackets (hockey sticks) varies with the type of rafters or trusses and load used in the construction to an existing building.

Allowable safe working load (SWL) for rafter brackets are tabled below for some common rafter or truss top chords.

9.1 Selecting Rafter Brackets

Table 9.1 Allowable Bracket Load, W_b (kN)

1.The rafter dimensions apply at the top plate. Rafters may have been reduced in strength at the top plate by birds mouthing and this must be considered.
2.It is assumed that the tie down capacity of each rafter to which a rafter bracket is fixed, is adequate for both existing & proposed roof loading.
3.Existing roof structure structural adequacy should be confirmed by suitably qualified Engineer before/during construction.

Rafter or Truss Top Chord	Type 1 Bracket SWL (kN)	Type 2 Bracket SWL (kN)
90 x 35 F7 Radiata Pine	0.72	1.3
90 x 45 F7 Radiata Pine	1.00	1.6
100 x 50 F11 Hardwood	Below outcome only applicable to 100 x 50 F11	
Birds mouthed to: - 60 x 50	0.81	1.4
Birds mouthed to: - 70 x 50	1.19	1.7

The number and type of rafter brackets required to support the Ultimate Louvre System Opening & Closing Roof may be calculated using the following values (determined previously):

Use Distributed Beam Load UDL = ________kN/m

and

Safe working load W_b = ________kN

Normally the Rafter Brackets are spaced evenly along the beam. To calculate the number of evenly spaced brackets required use: -

$$\text{No. of Brackets} = \frac{\text{UDL x Beam Length}}{W_b}$$

= ______________(Rounded UP to nearest whole number)

Also calculate the average bracket spacing: -

$$S = \frac{W_b}{\text{UDL}}$$

= ________metres

The position of attachment of brackets will be determined by the existing truss spacings. Therefore, ADDITIONAL brackets may be required to ensure the spacings to do not exceed the average spacing,

10. Standard Fixing for Louvres

This section outlines the standard fixings required to attach the Ultimate Louvre System Opening & Closing Roof louvre system within framework.

10.1 Fixing Track to Beam

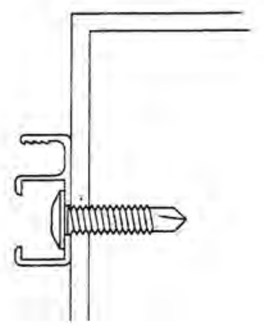
The Track sections hold the Pivot Pins of the louvres and are extruded aluminium Grade 6060-T5. They are to be attached using 10-gauge screws which must have adequate corrosion resistance, such as stainless steel or a Class 3 Coating.

Applicable L150 Louvre

Aluminium Beams

Applicable L150 Louvre

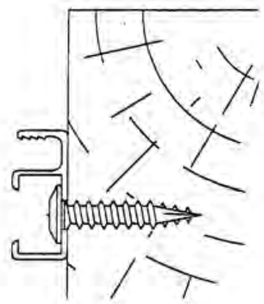
Attach Track using Wafer Head Tek screws 10G-24 x 22 mm at 300 mm centres



Timber Beams

Applicable L150 Louvre

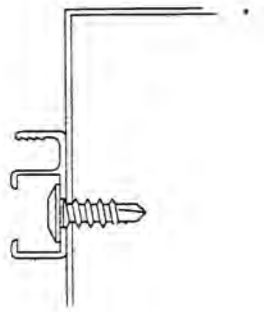
Attach Track using Wafer Head Tek screws 10G-12 x 25 mm at 300 mm centres



Steel Beams

Applicable L150 Louvre

Attach Track using Wafer Head Tek screws 10G-24 x 2



Applicable to L200 Louvre

Aluminium Beams

Applicable L200 Louvre

Attach Track using Wafer Head Tek screws 10G-24 x 22 mm at 400 mm & 600mm centres per detail

Timber Beams

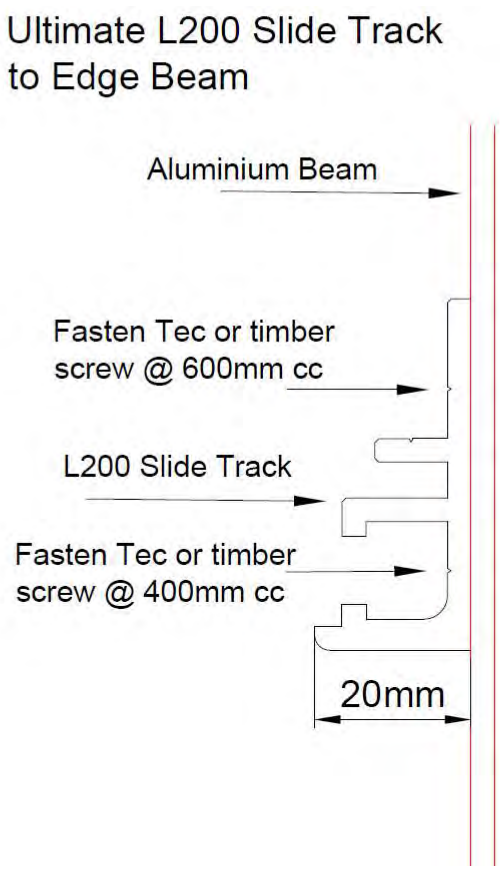
Applicable L200 Louvre

Attach Track using Wafer Head Tek screws 10G-12 x 25 mm at 400 mm & 600mm centres per detail

Steel Beams

Applicable L200 Louvre

Attach Track using Wafer Head Tek screws 10G-24 x 22 mm at 400 mm & 600mm centres per detail

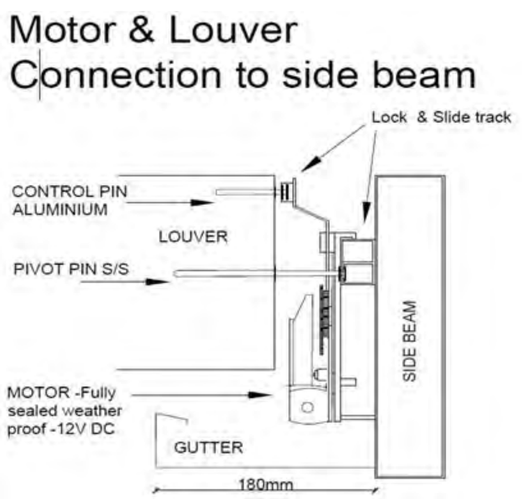


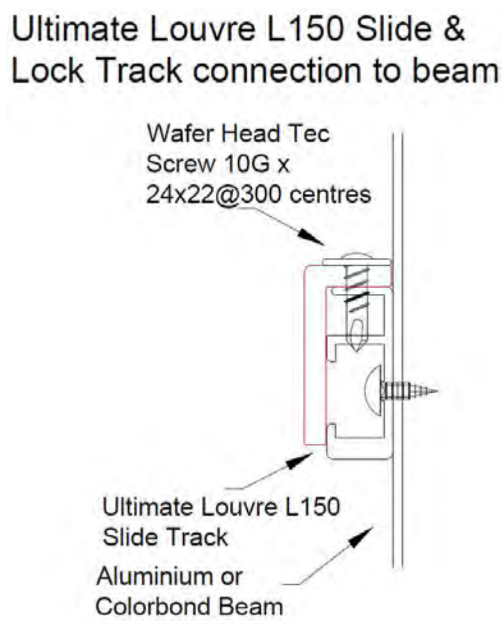
10.2 Fixing Pins into Track

The Pivot Pins are inserted into the slot of the Track and secured into place by fixing the Locking Angle over the top of the Pins and the Track. The Locking Angle sections are extruded aluminium Grade 6060-T5.

They are to be attached using 10-gauge screws which must have adequate corrosion resistance, such as stainless steel or a Class 3 Coating.

Applicable to L150 Louvres



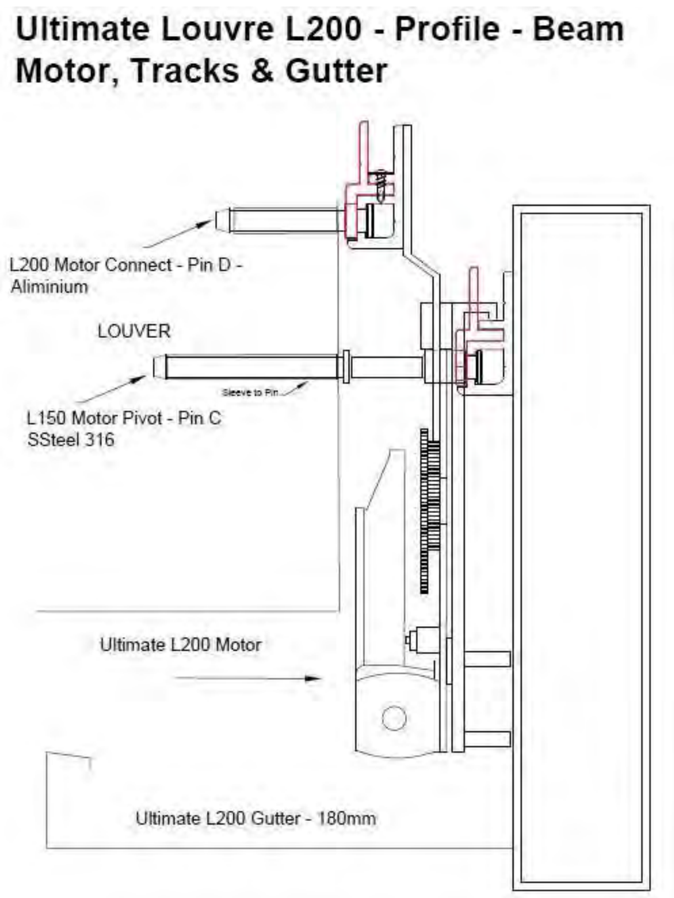


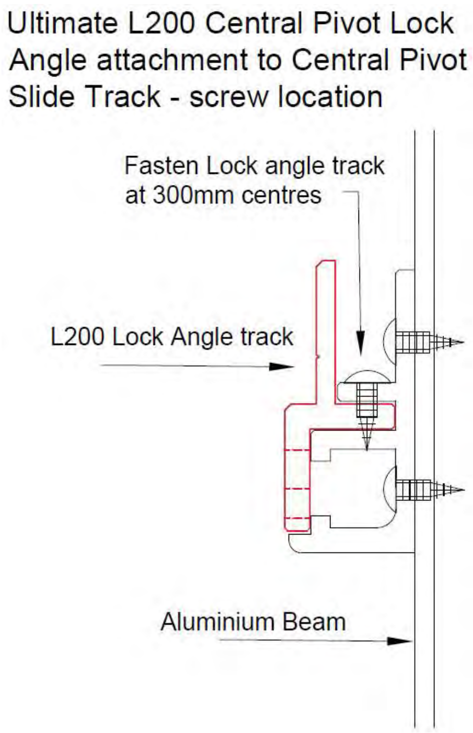
For All Cases

L150 Louvre

Attach Locking Angle using 10G-24 x 22 mm screws at 300 mm centres.

Applicable to L200 Louvres





For All Cases

L200 Louvre

Attach Locking Angle using 10G-24 x 22 mm screws at 400 mm centres for lower connection to beam & 600mm centre for upper connection to beam.

.

Ultimate Opening Roof Design Worksheet	Dated / /
Worksheet is a summary of design Calculations from Ultimate Design Manual	

Owners:- ____________ **Site Address:-** ____________

1. Wind Design Factors

Wind Region = ________

Terrain Category = ________

Shielded or Non-shielded = ________

2. Design Wind Pressure, q_z

Using the Design Wind Factors select q_z from the Tables in Section 2 of Design Manual. q_z = ________ kPa

3. Pressure Coefficient, Cp_u & Cp_d

Determine both UPWARD and DOWNWARD pressure coefficients.

Height of Structure h_c = ________ m h_c / w_c = ________ Cp_u = ________

Height of Building h = ________ m

Projection of Structure w_c = ________ m h_c / h = ________ Cp_d = ________

Number of Enclosed Sides = ________

4. Wind Pressure, (kPa) Calculate wind pressure for both UPWARD and DOWNWARD directions.

Downward Pressure P_d = q_z x Cp_d = ________ x ________ P_d = ________ kPa

Upward Pressure P_u = q_z x Cp_u = ________ x ________ P_u = ________ kPa

5. Select Louvre Span (m)

Using P_u and P_d select the maximum louvre span from the Tables in Section 5 of the Design Manual. Maximum

Louvre Span, based on UPWARD pressure = ________ m

Maximum Louvre Span, based on DOWNWARD pressure = ________ m

The Allowable Maximum Span is the LESSER of these two values.

Maximum Louvre Span = ________ m Proposed Louvre Span = ________ m

6. Louvre Support Beams

Calculate the Uniformly Distributed Beam Load (UDL) then select beam with appropriate span from Table 6.1. For Design Pressure, P use the HIGHER value of P_u and P_d

<u>EDGE BEAM</u> Louvre Span Length (dist. between tracks): **P** = ________ kPa

L = ________ m

UDL = P x L/2 = ________ x ________ **UDL** = ________ kN/m

<u>MID BEAM</u> Louvre Span Lengths (dist. between tracks): L1 = m L2 = ________ m

UDL = P x (L1 + L2) ÷ 2 = ________ x ________ **UDL** = ________ kN/m

<u>SIDE BEAM SUPPORTING</u> - Supporting Point Load

MID BEAM UDL (kN/m) ________ x MID BEAM Length (m) ÷ 2 ________ = ________ P (k/N)

Beam Selection Summary

Beam	Type	kN/m or k/N	SIZE	Max. Span	Proposed
Type = Edge, Mid Beam & / or Side Beam Supporting					
Beam 1					
Beam 2					
Beam 3					
Beam 4					
Beam 5					

Ultimate
LouvreSystems

ULTIMATE LOUVRE SYSTEM

OPENING AND CLOSING ROOF SYSTEM

Australian Designed & Made

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Engineered for Purpose

Controlling – Light – Shade – Weather

Aluminium Extruded Blades

Perfect for Residential & Commercial Applications

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