JOHNSON & COUZINS
The Name in Shade Since 1866

JOHNSON & COUZINS

Vertical Louvre Design Manual

15227
February 2019 – Revision 4

JOHNSON & COUZINS VERTICAL LOUVRE SYSTEM

Johnson & Couzins have developed a vertical louvre system for use in New Zealand. The system is manufactured out of aluminium and consists of a 90x75x8mm channel which supports various sizes of bevel or elliptical shaped louvres. The louvre fins span between the supporting channels which are fixed to the supporting structure. The louvre fins can run vertically up and down the face of a structure or horizontally along the face of a structure.

Richards Consulting Engineers Limited has been engaged by Johnson and Couzins to prepare standard design tables and template details to assist with the design of the Vertical Louvre System.

DESIGN PHILOSOPHY

The following design tables and calculations have been designed using wind speeds taken from NZS3604:2011 and open ground snows load of up to 2.0 kPa. The wind speeds shown in the tables are the Ultimate Limit State (ULS) design wind speeds. The associated pressures specific to the louvre fins and frame structure were calculated using AS/NZS 1170.2:2011, Structural Design Actions, Part 2: Wind Actions. The sectional capacities of the aluminium and stainless steel members have been determined using Aluminium Structures, Part 1: Limit State Design AS/NZS 1664.1:1997 and Steel Structures Standard, NZS3404: Part 1: 1997 respectively.

The lateral loads applied to the louvre system are directly transferred to the supporting structure. A Chartered Professional Engineer is to verify that the supporting structure has sufficient capacity to resist the loads applied from the louvres. A Chartered Professional Engineer shall also verify the connection of the louvre support channel to the supporting structural elements.

The design of the louvre structure based on the tables within this document is in compliance with the New Zealand Building Code (NZBC) section B1.

SERVICEABILITY CRITERIA

The following deflection limits were used for the following elements within the Silencio Louvre System:

- 15mm maximum louvre midspan deflections
- 7.5mm maximum louvre cantilevered end deflections

DESIGN LOADS AND LOAD CASES

The Ultimate Limit State wind speeds taken from NZS3604:2011 are as follows:

- Medium wind speed = 37m/s
- High wind speed = 44m/s
- Very high wind speed = 50m/s

The following design load cases have been applied to the louvre fins and frame members:

- Wu (ULS for wind uplift and lateral wind loading)
- 1.2G + S (ULS downward load case)
- Ws (SLS for wind related deflection)

Note: Earthquake cases do not govern due to the lightweight properties of the louvre system.

DESIGN LIMITATIONS

The following design assumptions apply to the design manual:

- The supporting structure has sufficient gravity and lateral capacity to support the louvre loads and will be verified by others
- The connection between the louvre support channel and the supporting structural member within the building will be verified by others
- Standard Johnson & Couzins connections will be used
- Johnson & Couzins will install the louvres

DESIGN EXCLUSIONS

The following items are specifically excluded from this design manual:

- Weather and waterproofing of both the louvre and the supporting structure
- Connections within the Johnson and Couzins louvre system
- Flutter effects caused by wind passing over the open louvres
- Lateral and gravity resisting strength of the building providing support to the louvre system
- Design of the connection between the louvre support channel and the building structure

MATERIAL AND SECTION PROPERTIES

The louvres will be made from aluminium with a 6060 alloy and a T5 temper.

The structural member properties are as follows:

300mm Bevel Louvre	$I_y = 0.776958 \times 10^6 mm^4$
250mm Bevel Louvre	$I_y = 0.672329 \times 10^6 mm^4$
170mm Bevel Louvre	$I_y = 0.149775 \times 10^6 mm^4$
110mm Bevel Louvre	$I_y = 0.034771 \times 10^6 mm^4$
300mm Elliptical Louvre	$I_y = 0.284075 \times 10^6 mm^4$
180mm Elliptical Louvre	$I_y = 0.062473 \times 10^6 mm^4$
150mm Elliptical Louvre	$I_y = 0.052096 \times 10^6 mm^4$

DURABILITY

The louvre system has been designed with an intended design life of not less than 20 years. Aluminum provides adequate durability for the life of the structure. All contact points between differing materials (Aluminium – Stainless Steel, Aluminium – Galvanised Steel and Galvanised Steel – Stainless Steel) shall have a grease barrier applied to them to prevent galvanic corrosion from occurring.

In a sea spray zone (as defined by NZS3604:2011) the aluminium shall be powder coated with Dulux Duratec by a Dulux registered applicator. Areas outside of the sea spray zone (including other corrosive environments) shall be coated in Dulux Duralloy.

There are three components required for corrosion to occur. An anode, a cathode and an electrically conductive liquid. In the case of the louvres, the anode is the aluminium and the cathode is the stainless or galvanised steel. It is the anode which corrodes sacrificially and therefore it is the aluminium which is at risk of corrosion, not the steel. A large anode with a small cathode such as a steel fixing into the louvre frame is low risk for corrosion due to the small area of the steel cathode relative to the aluminium. The connection of the flashings (steel) and the aluminium louvre

is the potential area of concern for corrosion to occur, however, both the louvre frame and the flashings are powder coated. We consider the aluminium combined with powder coating provides sufficient protection between the two metal types to prevent galvanic corrosion occurring over the proposed 20 year design life.

We note that there is no effective verification method for B2 contained within the Building Code. However, we confirm that we have researched the corrosive effects between aluminium and other dissimilar metals and consider a minimum design life of 20 years to be appropriate provided the aluminium is powder coated and the grease barriers are applied to the metals.

DESIGN MANUAL NOTES

It is intended this manual will be used by people experienced with the Johnson & Couzins Vertical Louvre System. The louvre designer shall:

- Design the supporting channel spacing to be no greater than the maximum louvre span set out in the enclosed tables.
- Where supporting the louvre on the existing building they shall ensure the existing structure has adequate vertical and lateral load resisting capacity to support the additional loads.
- Only the attached connection details shall be used
- a Chartered Professional Engineer shall verify that the connection between the louvre support channel and the structural element within the supporting building which the channel is fixed to has sufficient capacity to support the applied loads
- No substitution with the products included in this manual is permitted.
- Where the louvre does not fit within the design manual criteria a Structural Engineer shall be engaged to specifically design the louvre.

APPENDICIES

- PS1
- Design Tables
- Details

RICHARDS
CONSULTING | ENGINEERS

Project: 15227

25 February 2019

JOHNSON & COUZINS VERTICAL LOUVRE DESIGN MANUAL
PRODUCER STATEMENT (PS1)

ISSUED BY: Richards Consulting Engineers Limited
TO: Johnson & Couzins Limited
IN RESPECT OF: Johnson and Couzins Standard Design Tables for their Vertical Louvre System

Richards Consulting Engineers Limited have been engaged by Johnson & Couzins Limited to provide engineering design of the Vertical Louvre System Standard Design Tables in respect of the requirements of Clause(s) B1 of the Building Regulations 1992 for

☐ All ☒ Part only (as specified in the attachment to this statement)

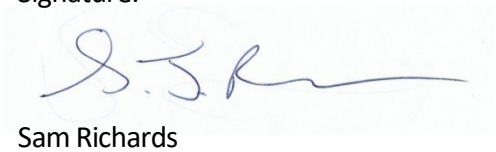
of the proposed building work. The design carried out by us has been prepared in accordance with AS/NZS 1170.2:2011, AS/NZS 1664.1:1997 and NZS3404: Part 1:1997 and Compliance Documents issued by the Ministry of Business, Innovation & Employment B1/VM1. The proposed building work covered by this producer statement is described within Johnson & Couzins design manual titled "Johnson & Couzins Vertical Louvre Design Manual" dated February 2019.

As an independent design professional covered by a current policy of Professional Indemnity Insurance to a minimum value of $200,000, I BELIEVE ON REASONABLE GROUNDS that subject to:

1. The verification of the following assumptions:
    i) the site loadings have been calculated corrected
    ii) the louvre system has been designed and constructed within the bounds of the supplied tables and related documents/details
    iii) the louvre system is constructed by an approved Johnson & Couzins installer
    iv) a Chartered Professional Engineer has confirmed that the connection between the louvre support channel and the structural element which the channel is fixed to has sufficient capacity to support the applied loads
    v) all other assumptions stated within the attached design manual have been satisfied/accounted for

the proposed vertical louvres, if designed and constructed in accordance with the attached design tables, drawings, specifications, and other relevant documents to comply with the relevant provisions of the building code.

Signature: Date: 25 February 2019



Sam Richards
CPEng 228315

Note: This statement is not to be altered in any way. This statement is valid for one year only.

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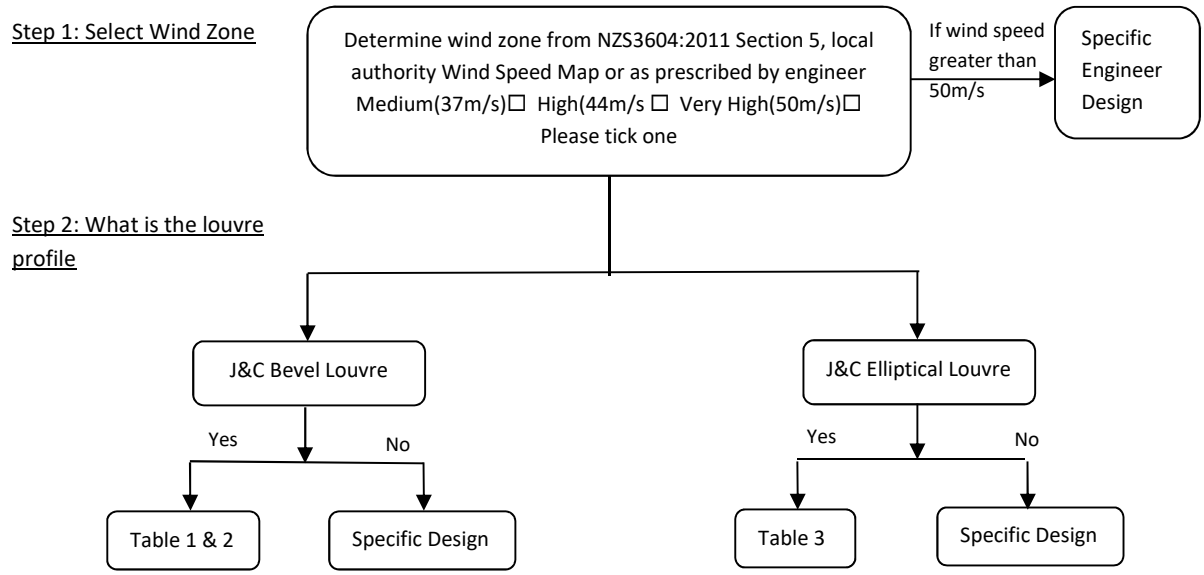
Site address: .....

Designer's name: .....

Vertical Louvre Design Flow Chart



Design Manual Notes

It is intended this manual will be used by people experienced with the Johnson & Couzins Vertical Louvre System. The louvre designer shall:

- Design the louvre layout within the maximum spans set out in the enclosed tables.
- Only the attached connection details shall be used.
- No substitution with the products included in this manual is permitted.
- Where the louvre does not fit within the design manual criteria a Structural Engineer shall be engaged to specifically design the louvre.

BEVEL LOUVRE FIN SPANS

Table 1 – Johnson & Couzins Maximum Louvre Fin Spans – Bevel Louvre

Bevel Louvre Fin Size	Medium wind zone (37m/s)	High wind zones (44 m/s)	Very High wind zone (50 m/s)
110mm Bevel	2.5 m	2.3 m	2.2 m
170mm Bevel	3.3 m	3.0 m	2.8 m
250mm Bevel	4.3 m	4.0 m	3.7 m
300mm Bevel	4.3 m	3.9 m	3.7 m

Notes:

1. The site wind speed is to be verified by others.
2. Includes allowance to resist up to 2.0 kPa open ground snow load.
3. A maximum louvre fin deflection of 15mm has been used. Specific Engineering Design is required for louvres which will be located within areas sensitive to deflections.
4. All spans shown above are maximum values.
5. All wind speeds shown above are maximum values.
6. The fixing of the louvre support channel to the structure is to be verified by others.

BEVEL LOUVRE FIN CANTILEVER DISTANCES

Table 2 – Johnson & Couzins Maximum Louvre Cantilever Distances – Bevel Louvre

Bevel Louvre Fin Size	Medium wind zone (37m/s)	High wind zones (44 m/s)	Very High wind zone (50 m/s)
110mm Bevel	1.1 m	1.0 m	0.9 m
170mm Bevel	1.4 m	1.3 m	1.2 m
250mm Bevel	1.9 m	1.7 m	1.6 m
300mm Bevel	1.9 m	1.7 m	1.6 m

Notes:

1. The site wind speed is to be verified by others.
2. Includes allowance to resist up to 2.0 kPa open ground snow load.
3. A maximum louvre fin deflection of 7.5mm has been used. Specific Engineering Design is required for louvres which will be located within areas sensitive to deflections.
4. All spans shown above are maximum values.
5. All wind speeds shown above are maximum values.
6. The fixing of the louvre support channel to the structure is to be verified by others.

ELLIPTICAL LOUVRE FIN SPANS

Table 3 - Johnson & Couzins Maximum Louvre Fin Spans – Elliptical Louvre

Elliptical Louvre Fin Size	Medium wind zone (37m/s)	High wind zones (44 m/s)	Very High wind zone (50 m/s)
150mm Elliptical	2.6 m	2.4 m	2.2 m
180mm Elliptical	2.6 m	2.4 m	2.2 m
300mm Elliptical	3.3 m	3.1 m	2.9 m

Notes:

1. The site wind speed is to be verified by others.
2. Includes allowance to resist up to 2.0 kPa open ground snow load.
3. A maximum louvre fin deflection of 15mm has been used. Specific Engineering Design is required for louvres which will be located within areas sensitive to deflections.
4. All spans shown above are maximum values.
5. All wind speeds shown above are maximum values.
6. The fixing of the louvre support channel to the structure is to be verified by others.

ELLIPTICAL LOUVRE FIN CANTILEVER DISTANCES

Table 4 – Johnson & Couzins Maximum Louvre Cantilever Distances – Elliptical Louvre

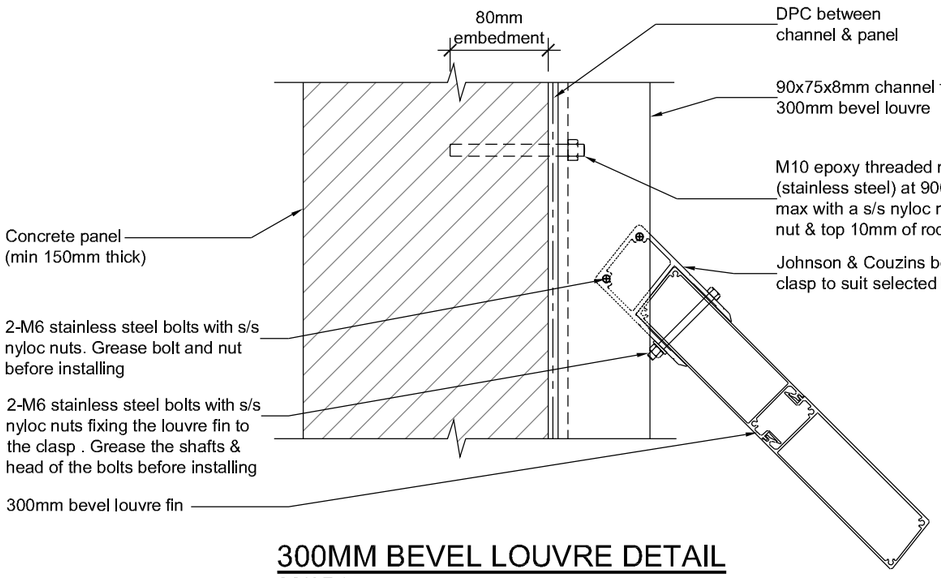
Elliptical Louvre Fin Size	Medium wind zone (37m/s)	High wind zones (44 m/s)	Very High wind zone (50 m/s)
150mm Elliptical	1.1 m	1.0 m	1.0 m
180mm Elliptical	1.1 m	1.0 m	1.0 m
300mm Elliptical	1.5 m	1.3 m	1.2 m

Notes:

1. The site wind speed is to be verified by others.
2. Includes allowance to resist up to 2.0 kPa open ground snow load.
3. A maximum louvre fin deflection of 7.5mm has been used. Specific Engineering Design is required for louvres which will be located within areas sensitive to deflections.
4. All spans shown above are maximum values.
5. All wind speeds shown above are maximum values.
6. The fixing of the louvre support channel to the structure is to be verified by others.

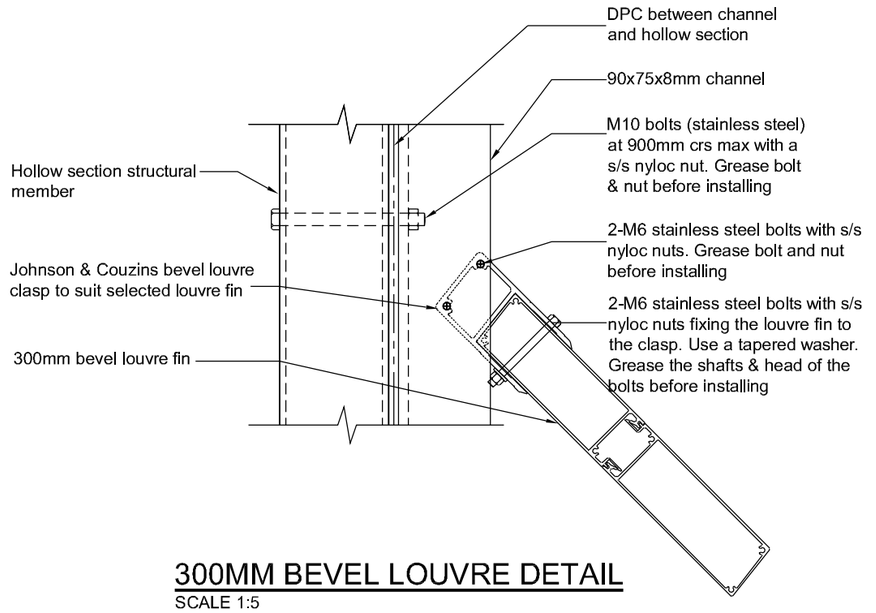
STRUCTURAL NOTES:

- **A Structural Engineer is to confirm the supporting structure which the channels are fixed to will have sufficient capacity to support the louvres and their applied forces**
- **All channels are to be fixed to the supporting structure at 900mm crs maximum**
- **All channels are to be located 100mm above or below the concrete panel openings**
- **All channel fixings are to miss panel reinforcing steel. To achieve this a reinforcing steel scanner shall be used while installing the louvre system**
- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



300MM BEVEL LOUVRE DETAIL

SCALE 1:5



300MM BEVEL LOUVRE DETAIL

SCALE 1:5

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The Name in Shade Since 1966
Phone : 0800 664 083 Website : johnsonandcouzins.co.nz

PROJECT TITLE
JOHNSON & COUZINS
VERTICAL LOUVRE
STANDARD DETAILS

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DETAILS

REV NO.	REVISION	DATE	APPROVED
1.	FOR CONSTRUCTION	NOV 2016	SR
2.	FOR CONSTRUCTION	MAR 2017	SR

PROJECT NO. 15227
SCALE @ A3
REV NO. 2
DESIGNED NB
DRAWN YB
SHEET NO. S1.01

STRUCTURAL NOTES:

- **A Structural Engineer is to confirm the supporting structure which the channels are fixed to will have sufficient capacity to support the louvres and their applied forces**
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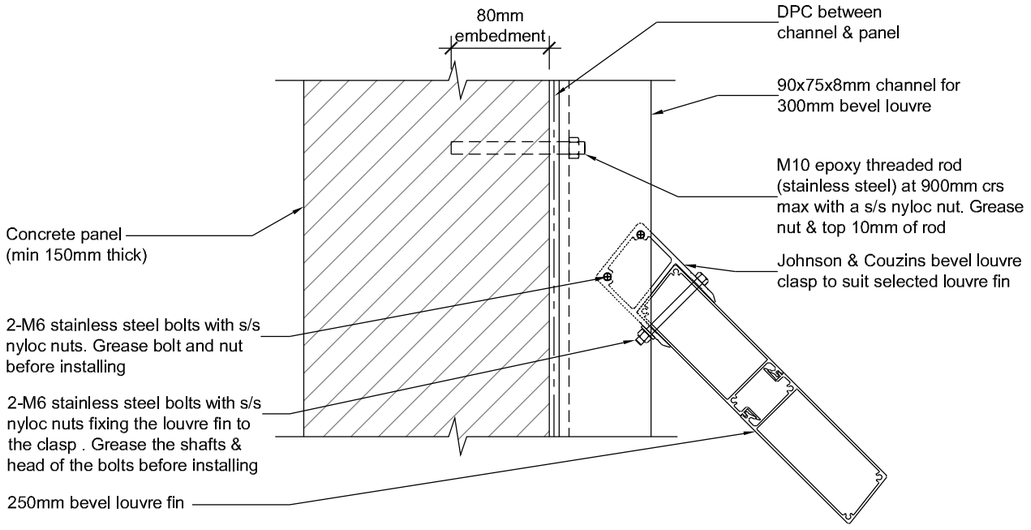

250MM BEVEL LOUVRE DETAIL

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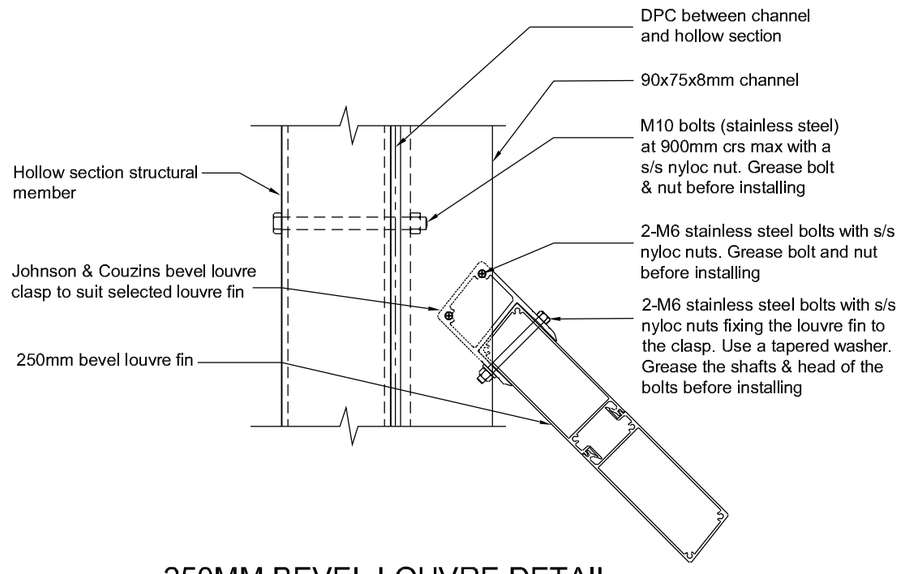

250MM BEVEL LOUVRE DETAIL

SCALE 1:5

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SCALE @ A3
REV NO. 2
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STRUCTURAL NOTES:

- **A Structural Engineer Is to confirm the supporting structure which the channels are fixed to will have sufficient capacity to support the louvres and their applied forces**
- **All channels are to be fixed to the supporting structure at 900mm crs maximum**
- **All channels are to be located 100mm above or below the concrete panel openings**
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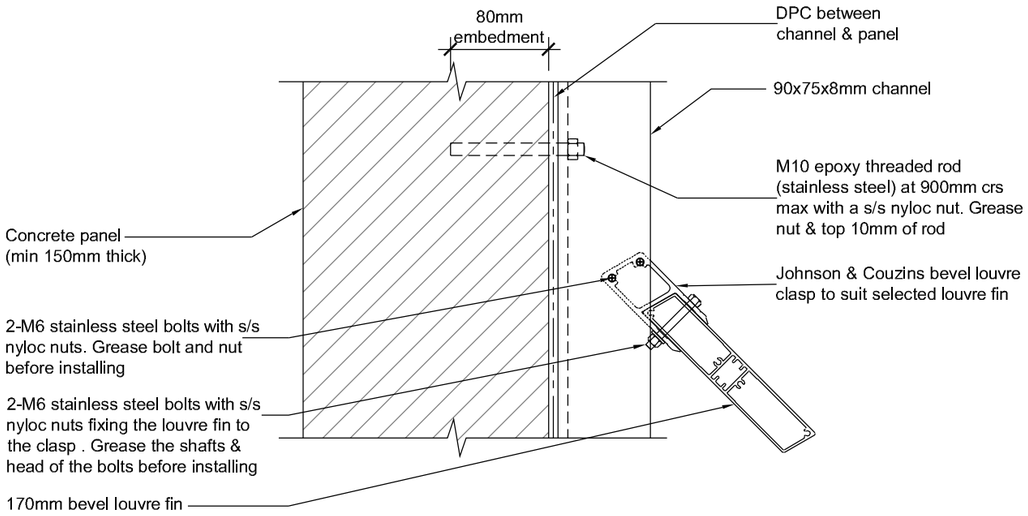
- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



170MM BEVEL LOUVRE DETAIL

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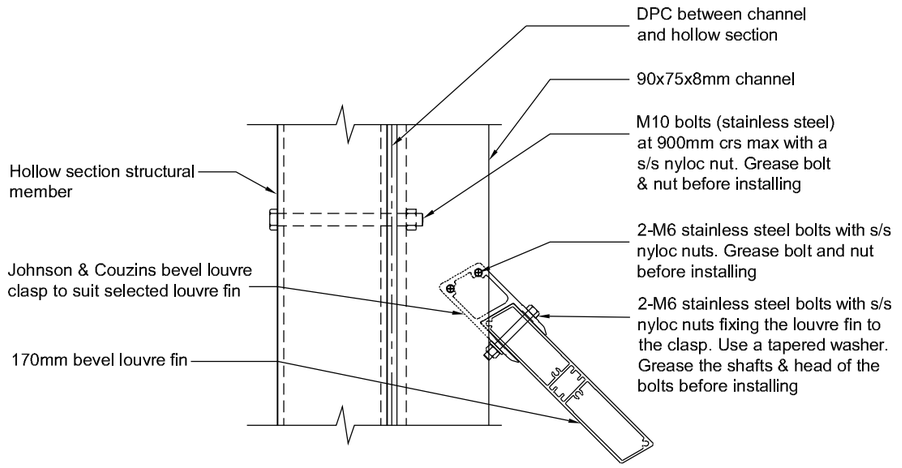

170MM BEVEL LOUVRE DETAIL

SCALE 1:5

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2.	FOR CONSTRUCTION	MAR 2017	SR

PROJECT NO. 15227	DESIGNED NB
SCALE @ A3	DRAWN YB
REV NO. 2	SHEET NO. S1.03

STRUCTURAL NOTES:

- **A Structural Engineer is to confirm the supporting structure which the channels are fixed to will have sufficient capacity to support the louvres and their applied forces**
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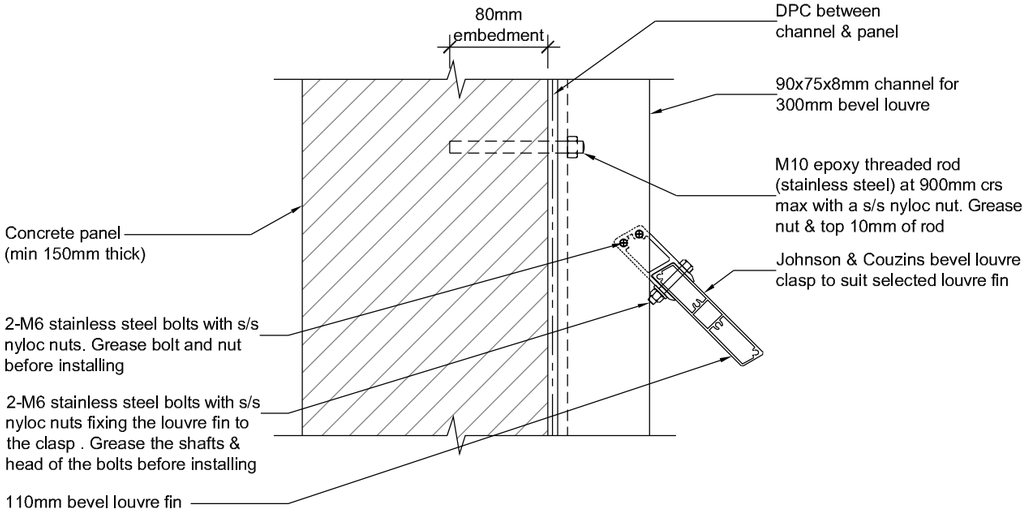
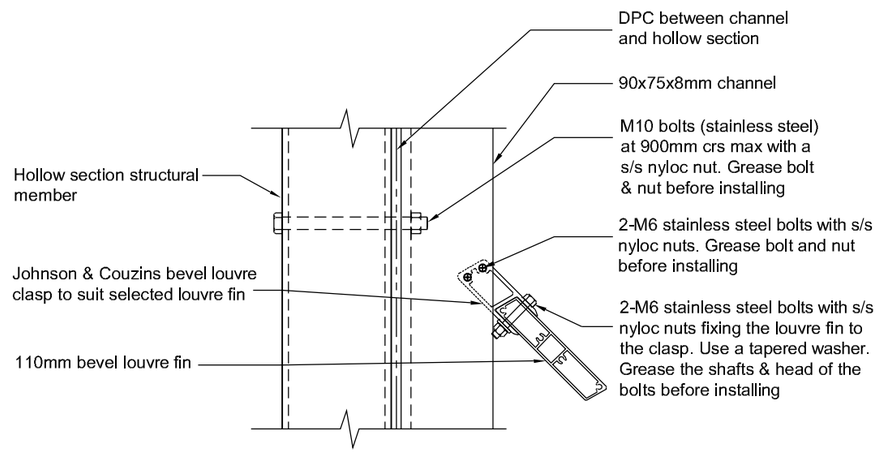
- **All channels are to be located 100mm above or below the concrete panel openings**
- **All channel fixings are to miss panel reinforcing steel. To achieve this a reinforcing steel scanner shall be used while installing the louvre system**
- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



110MM BEVEL LOUVRE DETAIL

SCALE 1:5



110MM BEVEL LOUVRE DETAIL

SCALE 1:5

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PROJECT NO. 15227
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STRUCTURAL NOTES:

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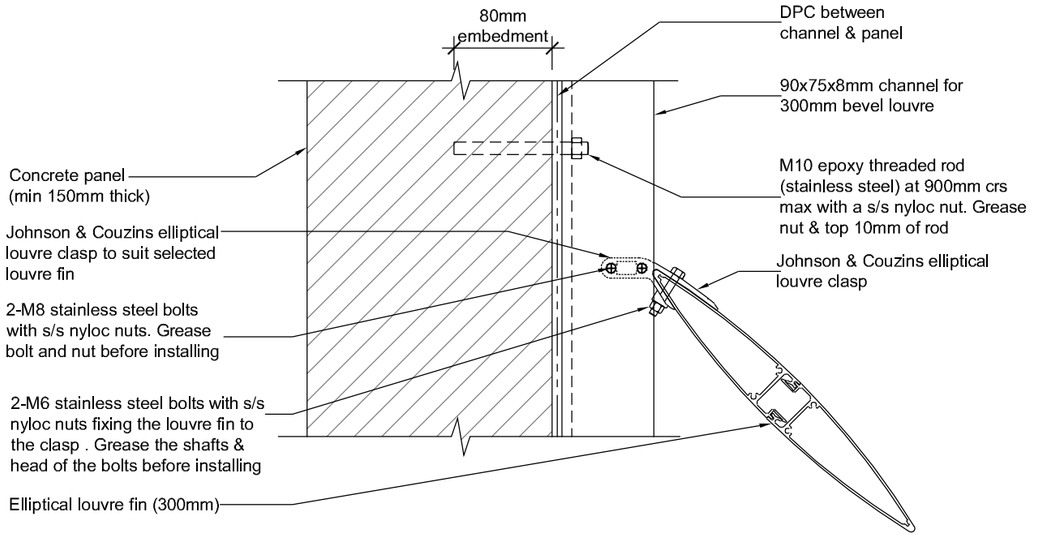
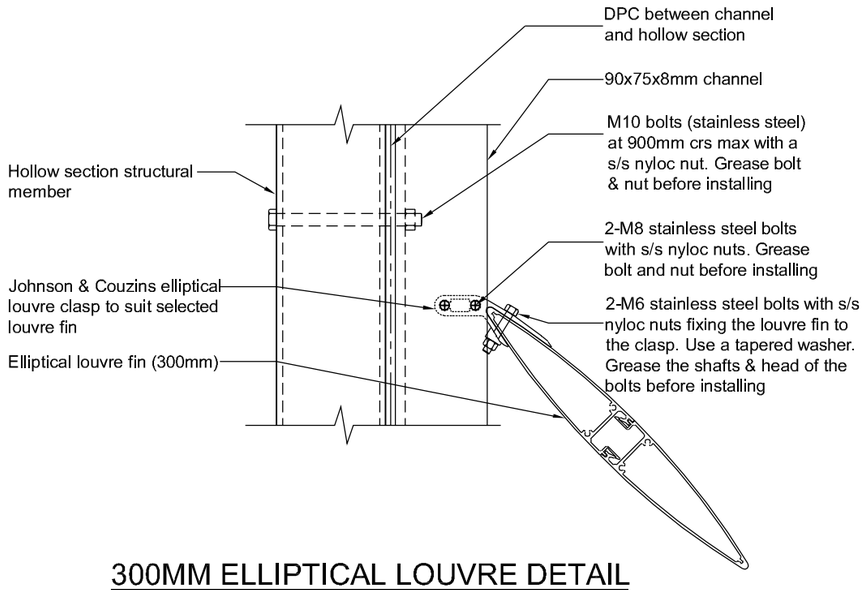
- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



300MM ELLIPTICAL LOUVRE DETAIL

SCALE 1:5



300MM ELLIPTICAL LOUVRE DETAIL

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- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
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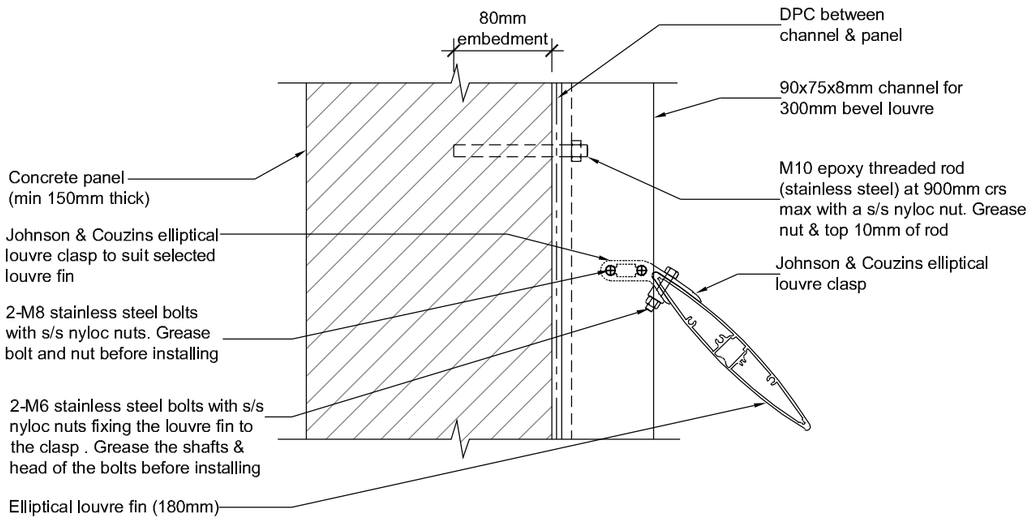
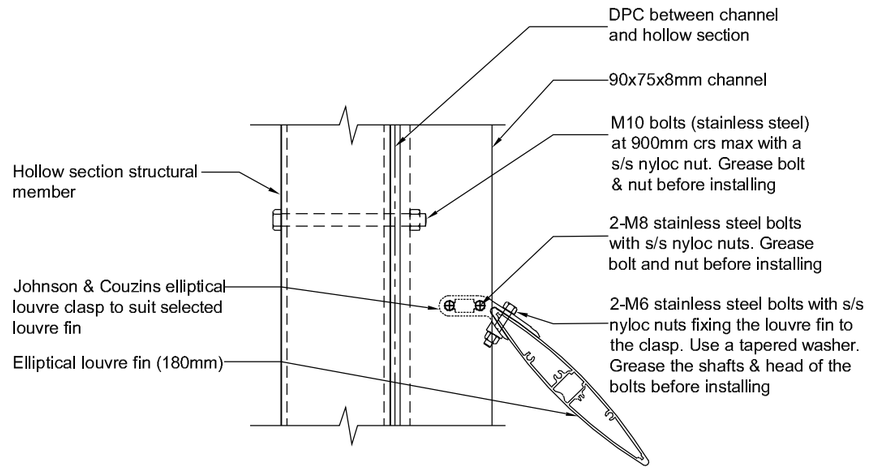


180MM ELLIPTICAL LOUVRE DETAIL

SCALE 1:5



180MM ELLIPTICAL LOUVRE DETAIL

SCALE 1:5

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STRUCTURAL NOTES:

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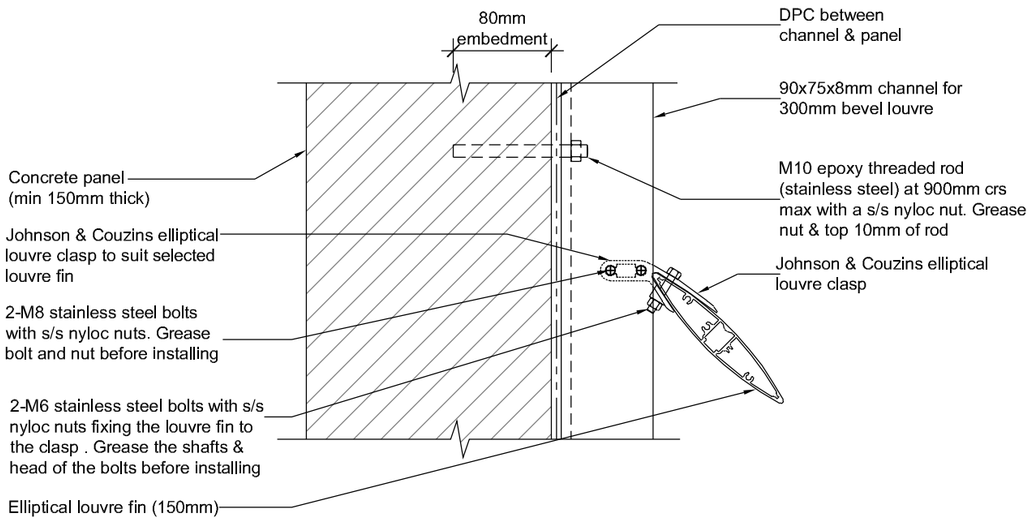
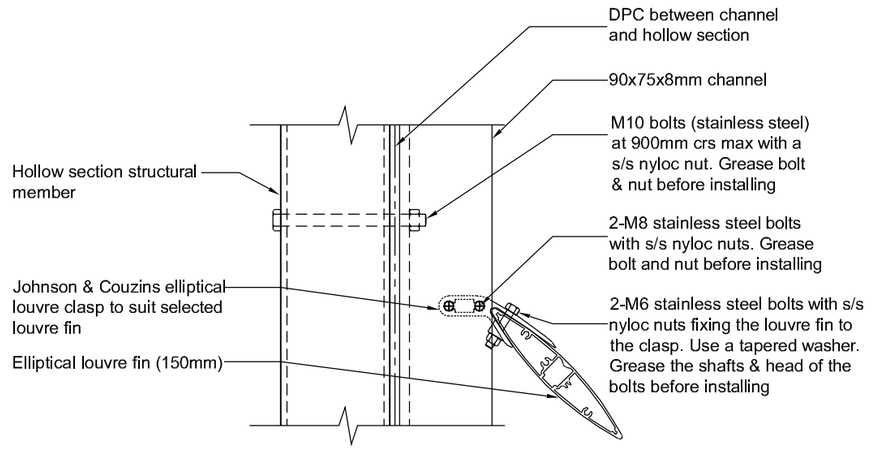
- **All channels are to be located 100mm above or below the concrete panel openings**
- **All channel fixings are to miss panel reinforcing steel. To achieve this a reinforcing steel scanner shall be used while installing the louvre system**
- **All channels, clasps and louvres are to be made form aluminium with a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



150MM ELLIPTICAL LOUVRE DETAIL

SCALE 1:5



150MM ELLIPTICAL LOUVRE DETAIL

SCALE 1:5

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ARCHITECT'S DRAWINGS

JOHNSON & COUZINS
The Name in Shade Since 1866
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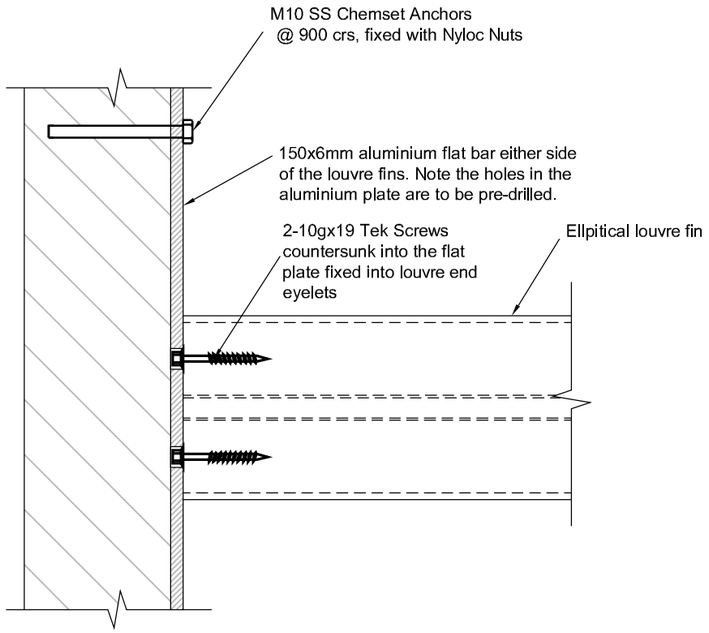
PROJECT TITLE
JOHNSON & COUZINS
VERTICAL LOUVRE
STANDARD DETAILS

DARWING TITLE
DETAILS

REV NO.	REVISION	DATE	APPROVED
1.	FOR CONSTRUCTION	NOV 2016	SR
2.	FOR CONSTRUCTION	MAR 2017	SR

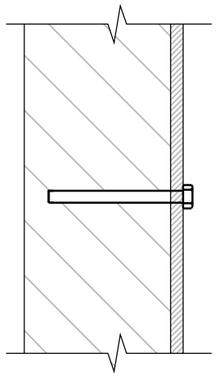
PROJECT NO. 15227
SCALE @ A3
REV NO. 2
DESIGNED NB
DRAWN YB
SHEET NO. S1.07



NOTE: The 150mm elliptical louvre fin has been shown in this example detail and is indicative only

STRUCTURAL NOTES:

- **A Structural Engineer is to confirm the supporting structure which the channels are fixed to will have sufficient capacity to support the louvres and their applied forces**
- **All channels are to be fixed to the supporting structure at 900mm crs maxlmum**
- **All channels are to be located 100mm above or below the concrete panel openings**
- **All channel fixings are to miss panel reinforcing steel. To achieve this a reinforcing steel scanner shall be used while installing the louvre system**
- **All channels, clasps and louvres are to be made form alumlnlum wlth a 6060 alloy and T5 temper**
- **The connections detailed are relevant for louvres in wind zones up to "very high". Above this specific engineer design is required**



VERTICAL LOUVRE END CONNECTION
TO STEEL PLATE
SCALE 1:5

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DETAILS

REV NO.	REVISION	DATE	APPROVED
1.	FOR CONSTRUCTION	MAR 2017	SR

PROJECT NO. 15227
SCALE @ A3 1:10
REV NO. 1
DESIGNED NB
DRAWN YB
SHEET NO. S1.08