



JOHNSON & COUZINS

The Name in Shade Since 1866

JOHNSON & COUZINS

Balustrade Louvre Design Manual

15227

August 2020 – Revision 1

JOHNSON & COUZINS LOUVRE SYSTEM

Johnson & Couzins have developed an opening louvre system for use in New Zealand. The system is manufactured out of aluminium and consists of a perimeter RHS frame with either heavy or light grade louvre fins spanning in one direction loading up the frame members. The louvre roof is typically supported on aluminium SHS posts and braced against an existing structure or by the posts cantilevering from their footings. Refer to the Silencio and concertina design manual for the design of the main louvre system.

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 Balustrade Louvre System.

JOHNSON & COUZINS BALUSTRADE LOUVRE SYSTEM

Johnson & Couzins have developed a Balustrade louvre which they can install between the posts of their louvre frame. The balustrade will consist of a series of vertical louvre fins supported by a top and bottom drive box. Lateral loads from the balustrade will be supported by an additional top rail and deck framing. The top rail will be held in place by the posts of the louvre

DESIGN PHILOSOPHY

The following design flow chart, design tables and calculations have been designed using wind speeds taken from NZS3604:2011. 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 balustrade actions have been calculated based on the B1-Guidance on barrier design 2011 document. 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 design of the louvre balustrade 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 balustrade Louvre System:

- Maximum top rail deflections under balustrade loading $H/60 + L/240$ or 30mm.

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:

- $0.9G + W_u$ (ULS for wind uplift)
- $1.2G + S$ (ULS downward load case)
- $1.2G + 1.5Q$ (ULS downward load case)
- W_s (SLS for wind related deflection)
- $G + \psi_s Q$ (SLS for live load 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 balustrade must not be classified as an area subject to overcrowding
- The balustrade has a maximum height of 1.1m above the deck level.
- The balustrade must be a type A C3 as per table 3.3 in B1 guidance on barrier design. i.e domestic residential activity, or offices and work areas not subject to over crowding
- The supporting frame has a maximum height of 2.7m above deck.
- Standard Johnson & Couzins connections will be used.
- Johnson & Couzins (or an approved Johnson and Cousins installer) will install the louvre.

DESIGN EXCLUSIONS

The following items are specifically excluded from this design manual:

- Weather and waterproofing of both the louvre and the supporting structure.
- Electronic services to the louvre.
- Connections within the Johnson and Couzins louvre system.

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:

140x50x6 RHS $I_x = 6.56 \times 10^6 \text{ mm}^4$

DURABILITY

The louvre system has been designed with an intended design life of 15 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. The paved surfaces which the aluminium posts are fixed to are to be 225mm above adjacent unfinished ground surfaces (E1).

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 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.

APPENDICIES

- PS1
- Design Table
- Details

SUPPORT RAIL SPAN

Table 1 – Johnson & Couzins Maximum Balustrade Louvre Span

Louvre Top Beam	All wind zones
140x50x6 RHS	4.1 m (max)

Notes:

1. Balustrade span for medium and high wind zones governed by Balustrade loads acting horizontally.
2. The post connected to the top rail/RHS must be a cantilever bracing post as per J and C louvre fin design tables
3. The louvre bottom mechanism must be connected into the deck at each floor joist or blocking at 400mm crs.
4. All wind zones up to and including very high as per NZS3604:2011



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Incorporated



Building Code Clause(s).....B1 & B2.....

PRODUCER STATEMENT – PS1 – DESIGN

(Guidance on use of Producer Statements (formerly page 2) is available at www.engineeringnz.org)

ISSUED BY:.....Richards Consulting Engineers Limited(RCE)
(Design Firm)

TO:..... Johnson & Couzins Limited
(Owner/Developer)

TO BE SUPPLIED TO:..... All Territorial Authorities within New Zealand
(Building Consent Authority)

IN RESPECT OF:... Johnson and Couzins standard design tables for their Balustrade Louvre System
(Description of Building Work)

AT:.....
(Address)

Town/City: **LOT** **DP** **SO**
(Address)

We have been engaged by the owner/developer referred to above to provide:

.....engineering design of the Balustrade Louvre System standard design tables.....
(Extent of Engagement)

services in respect of the requirements of Clause(s) ...B1 & B2.....of the Building Code for:

All or 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, NZS3404: Part 1:1997 and;

Compliance Documents issued by the Ministry of Business, Innovation & Employment.....B1/VM1.....or
(verification method / acceptable solution)

Alternative solution as per the attached schedule.....

The proposed building work covered by this producer statement is described on the drawings titled:

...Johnson & Couzins design manual titled “Johnson & Couzins Silencio Louvre Design Manual” dated July 2020.....;
together with the specification, and other documents set out in the schedule attached to this statement.

On behalf of the Design Firm, and subject to:

Site verification of the following design assumptions:

- (i) site loadings have been calculated correctly
- (ii) louvre system has been designed and constructed within the bounds of the supplied tables and related documents/details
- (iii) louvre system is constructed by an approved Johnson & Couzins installer
- (iv) all other assumptions stated within the design manual have been satisfied/accounted for

I **believe on reasonable grounds** that a) the building, if constructed in accordance with the drawings, specifications, and other documents provided or listed in the attached schedule, will comply with the relevant provisions of the Building Code and that b), the persons who have undertaken the design have the necessary competency to do so. I also recommend the following level of construction monitoring/observation:

CM1 CM2 CM3 CM4 CM5 (Engineering Categories) or as per agreement with owner/developer (Architectural)

I,Sam Richards..... am: CPEng ...228315.....# Reg Arch#
(Name of Design Professional)

I am a member of : Engineer New Zealand NZIA and hold the following qualifications:.....BE(hons).....

The Design Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000*.

The Design Firm is a member of ACENZ:

SIGNED BYSam Richards(signature).....
(Name of Design Professional)

ON BEHALF OFRichards Consulting Engineers Limited.....Date...3th August 2020 This PS1 is valid for 1 year only.....
(Design Firm)

Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000.*

This form is to accompany Form 2 of the Building (Forms) Regulations 2004 for the application of a Building Consent.

THIS FORM AND ITS CONDITIONS ARE COPYRIGHT TO ACENZ, ENGINEERING NEW ZEALAND AND NZIA

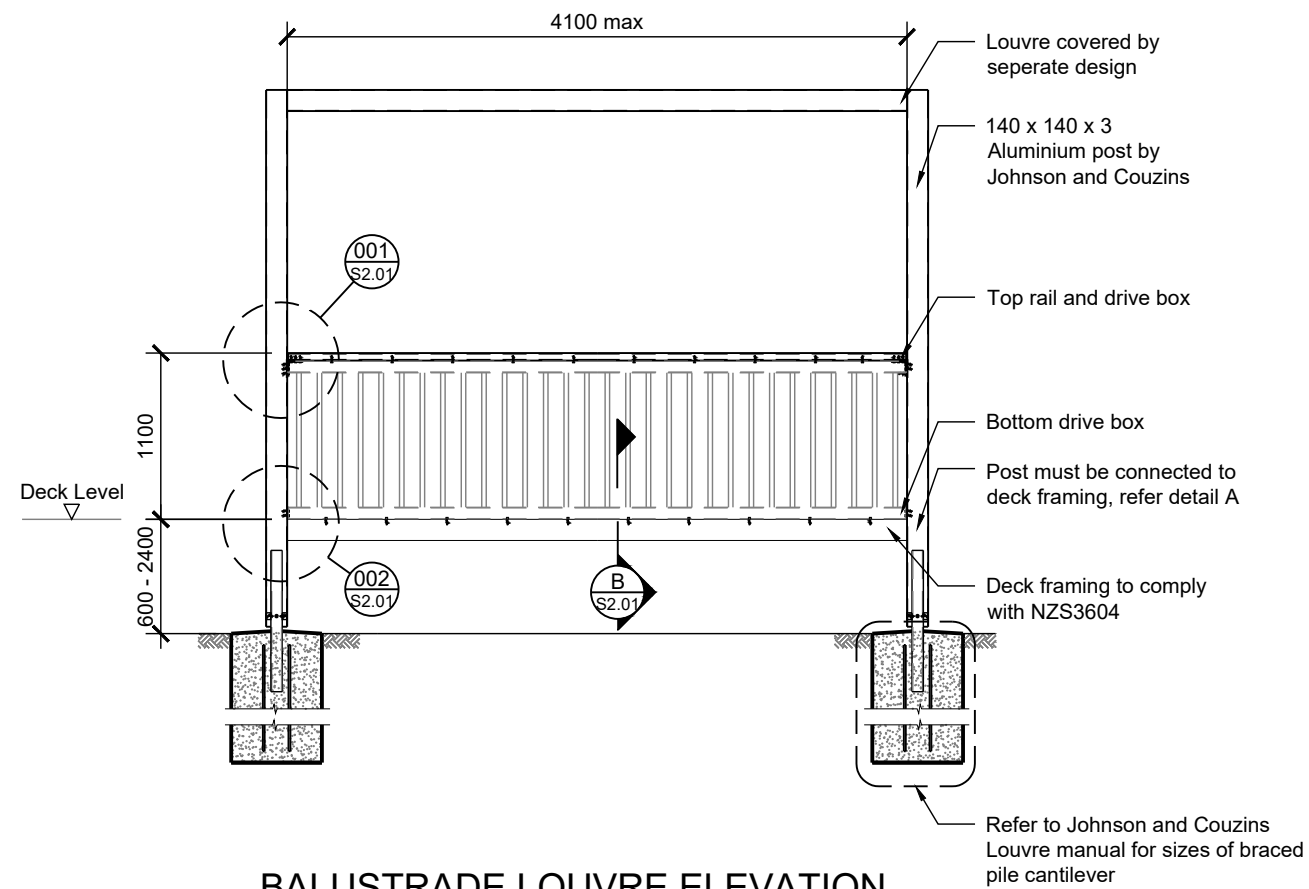
BALUSTRADE LOUVRE

STRUCTURAL DRAWING LIST

Job No 15227

DWG No. **TITLE**

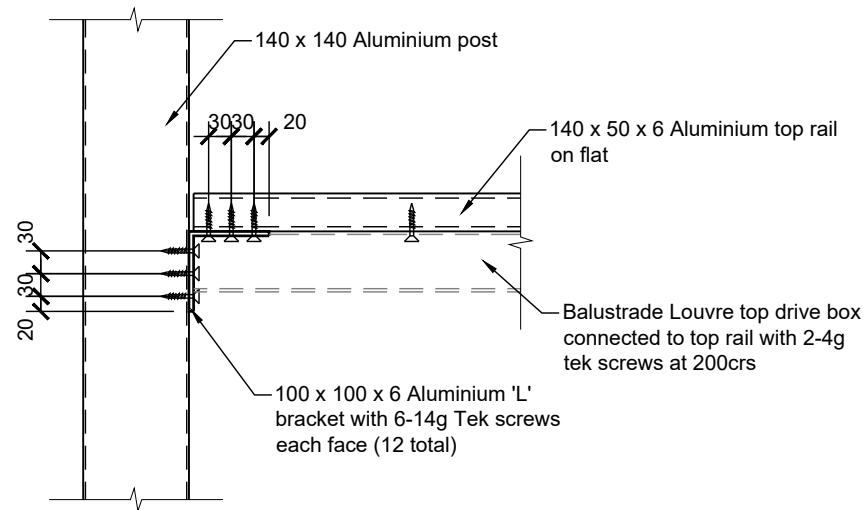
S1.01	BALUSTRADE LOUVRE ELEVATION
S2.01	DETAILS



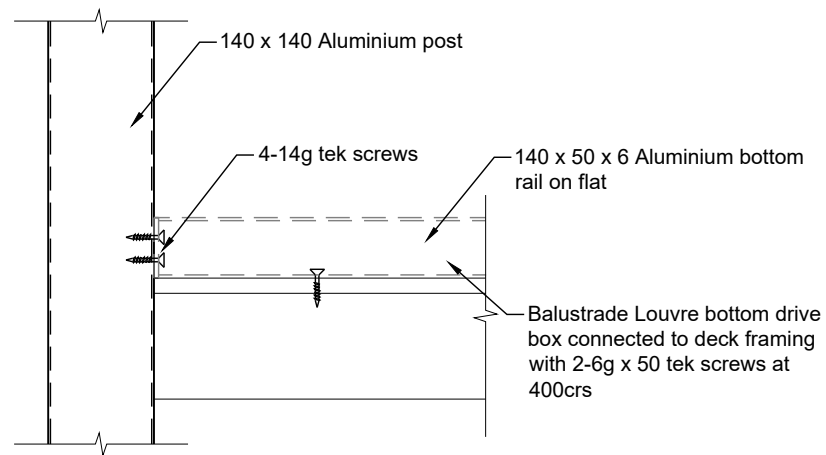
BALUSTRADE LOUVRE ELEVATION
SCALE 1:50

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

REV NO.	REVISION	DATE	APPROVED	PROJECT NO. 15227	DESIGNED AS
1.	FOR CONSTRUCTION	JUL 2020	SR	SCALE @ A3 1:10	DRAWN MA
			SR	REV NO.	SHEET NO.
				1	S1.01

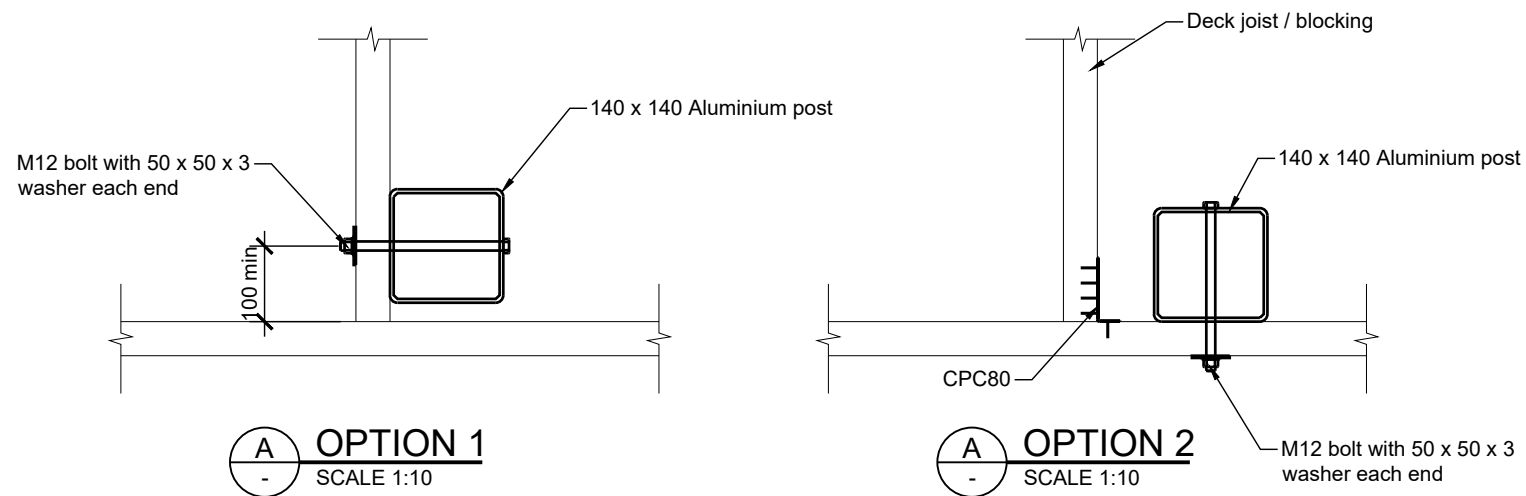


001 BAUSTRADE TOP RAIL AND DRIVE BOX TO POST
S1.01 SCALE 1:10



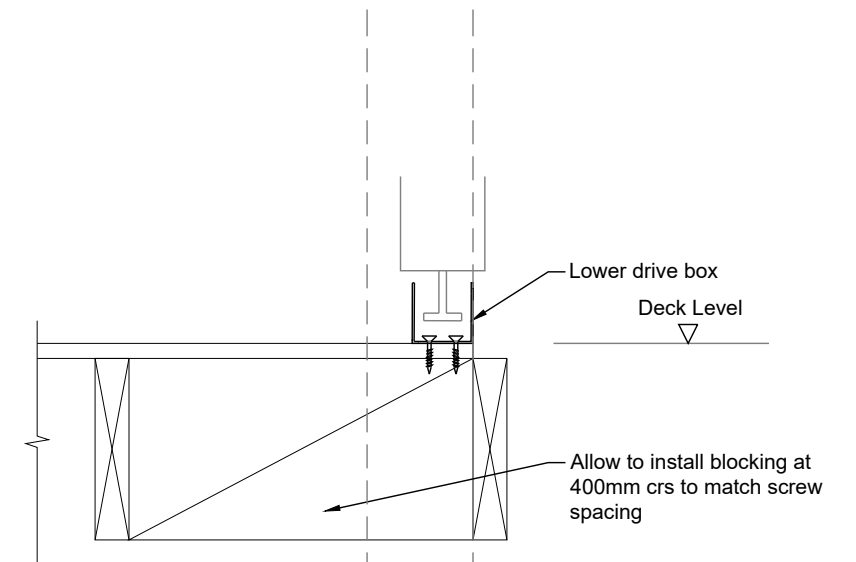
Note
Max balustrade top rail span = 4.1m
Max balustrade height = 1.1m (to top of rail)

002 BAUSTRADE BOTTOM DRIVE BOX TO POST
S1.01 SCALE 1:10

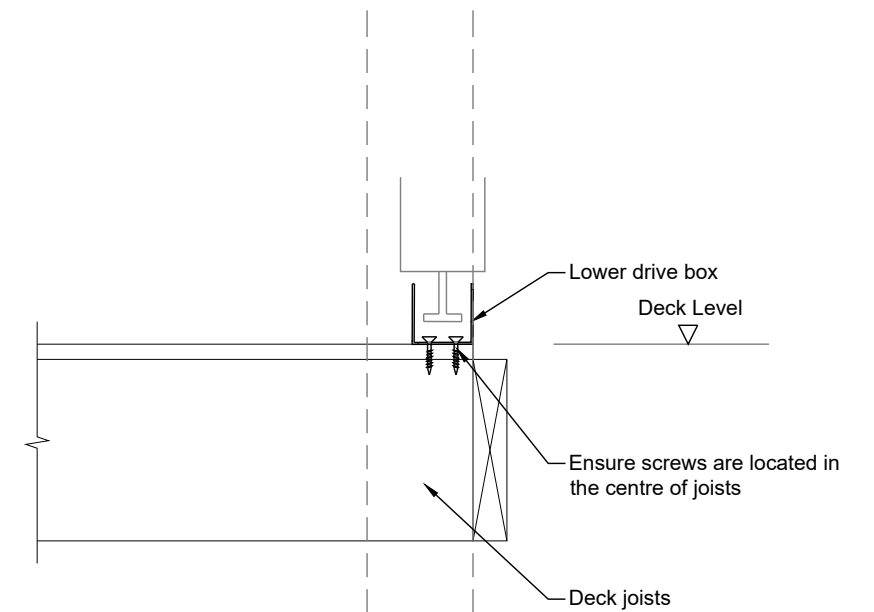


A OPTION 1
SCALE 1:10

A OPTION 2
SCALE 1:10



B OPTION 1
SCALE 1:10



B OPTION 2
SCALE 1:10

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