



042 Roofing - Combined

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00 Design principles

0.01 Main considerations

It is a requirement to undertake the [00 PLANNING AND DESIGN/0001R - DESIGN REFERENCE](#) and [GLOSSARY OF TERMS](#) information into all aspects of design, detailing and delivery when developing the content here within. Clear demonstration of adherence to these requirements is part of the services and will be called upon at key points in the project and during at the discretion of the Department of Education (DoE).

This is a general description of requirements for metal roofing of all types.

Performance Criteria

GUIDE NOTE: Refer to [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - FINISH](#)

- Roofing system selections should be based on the following performance criteria:
- Offer value for money in a Whole of Life framework; Be readily available commercial proprietary systems.
- Have appropriate aesthetic appeal and preferably be pre-finished in standard off-the-shelf colours. Glare to adjoining buildings to be minimised.
- Offer long life span with high durability.
- Have low maintenance requirements and costs.
- Remain intact and waterproof under the local climatic conditions.
- Provide adequate means of dealing with vapour pressure, condensation, corrosion and thermal movement.
- Support the imposed loads and types of roof access without impairment of performance.
- Provide appropriate corrosion resistance for:
 - Atmospheric exposure conditions
 - Service conditions due to the nature of nearby activities taking place in the installation
 - Contact with other materials or contact with water washing off other materials
- Support sustainability by having recycling potential at the end of usable life, and/or include recycled content.

Note particularly the minimum pitch requirements and guide to roof drainage. Also note requirement for standard coloured sheeting and problems with regard to flashing, capping, etc.

All roofing is to be designed and installed in accordance with the manufacturer's recommendations, building regulations and associated Australian Standards.

The roof form will also have an impact on the overall performance of the roof, therefore the following should be considered:

- Roofs should contain minimum envelopes and be supported by simple structures.
- Curved roofs tend to be more expensive than straight roofs of the same volume, irrespective of the ingenuity of detailing. The clear benefit of the design for end users and external aesthetics needs to justify the extra cost.
- When curved roofs are used, the manufacturer's specifications are to be closely followed, particularly with regard to maximum and minimum curve and overlaps.
- The use of hot rolled steel is to be restricted to special instances and will require approval of Manager DoE Schools.
- Curved ceilings also require careful consideration and should only be used where they follow the line of the roof purlins.
- Roof guttering should be outside the line of the external walls (i.e. no box gutters) so that any overflow will be outside the envelope of the external walls.
- All roofing must be of continuous sheets wherever possible, complying with the minimum pitch requirements noted in the ROOFING section.
- Built up bituminous flat or membrane roofs should not be used.
- Provide access to roof areas to maintain the serviceability of the asset.

For guidance on roof sheet colours to mitigate heat island effect refer to section **0.13 Coloured Roof Sheeting** below.

0.02 Minimum pitch requirements

The roof slope for metal roofing (not including external covered ways) is to be 4° minimum to avoid drainage failure through:

- Ponding in the trays and flow restrictions due to sagging of the roof deck purlins, that can be caused by roof loadings mainly during construction
- Overflow at side laps during heavy rain when the trough capacity is exceeded at the base of lower pitched roof slopes

0.03 Roof design and access for maintenance

Provide access for the maintenance of roof surfaces, gutters and down pipes on buildings of 2 storeys or more, within the design of the building. The method of maintenance is to be identified for review during design and subsequent documentation, to ensure the provision and proper co-ordination of maintenance requirements.

Subject to site specific WHS considerations, portable ladders may be suitable for use on 1 storey buildings.

Safety measures for servicing of roof-top plant and equipment, including ladders, ladder fixing points, walkways and handrails around roof zones, must be indicated at design phase. The design is to meet the WHS safe access requirements.

0.04 Substructure - purlins

Suggested maximum purlin spacing is to suit roof sheeting and wire safety mesh to support insulation. Maximum spacing shall not exceed 2/3 of the manufacturer's recommended spacing for the roof sheeting to be used.

Include support for blanket insulation and safety mesh as required for safe working on roofs.

Purlin / batten fixing:

- Must be securely fixed to rafters/trusses and they in turn to columns or top plates strapped to walls, etc., so that all forces acting on the roof are transmitted through the structure to the foundations.
- Special care is required in exposed positions or areas known to be subjected to high winds.
- Double fixing may be required and should always be strapped securely to the sub frame at maximum points of exposure - ridge, eaves and gable ends.

The minimum size for hardwood battens to be 70mm wide x 35mm finished deep to ensure adequate holding for fastenings without splitting the timber. The minimum depth for softwood battens is 45mm finished.

Set out purlins/battens accurately to the desired pitch.

- Maximum deviation permissible is 5mm over any 1200mm span below the decking line (line between eaves and ridge).

-
- Maximum vertical tolerance 2mm at abutting ends of purlins. Specifications should provide for the plane of the purlins to be checked in the presence of the Supervising Officer before any roof sheets are fixed.
 - Maximum permissible deflection: Refer to [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - STRUCTURE](#) section for requirements

0.05 Roof fixing

- Negative pressure (or suction), a critical effect of wind on roofs, increases as the roof slope decreases, and low pitch roofs can incur very severe negative pressure problems.
- Eaves projections are particularly vulnerable with both the suction effect on the upper surface and positive pressure below.
- Roof fixing: As per Manufacturer's recommendations for the Site Wind category.

0.06 North coast wind loads

Roofing in the coastal strip north of Coffs Harbour or other areas with similar wind conditions (Region B as per AS for wind loading) should be fixed in accordance with manufacturers recommendations for extreme conditions.

0.07 Flashing and accessories

- All copings, ridging pieces and similar are to be securely fixed and adequately supported to hold their shape.
- Detail complex penetrations of the roofing by pipes or ducts where unavoidable.
- Upright of apron flashings to be 150mm minimum.
- Over flashings to lap 75mm.
- Slope flashings away from the upstand. Project side flashings over two ribs and lap flashing joints in the direction away from the prevailing wind.

Provide for expansion and contraction at all flashings.

0.08 Roof drainage

Roof guttering should be outside the line of the external walls so that any overflow will be outside the envelope of the external walls. Concealed gutters behind parapet walls, or box gutters between roof slopes should be avoided.

All roofing must be of continuous sheets wherever possible, complying with the minimum pitch requirements noted in roofing.

This need not be a design restriction, as many opportunities are apparent in the visual expression of roof drainage and climatic control systems, pertinent to our environment.

Refer [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - WATER](#) and [08 HYDRAULIC/0821 STORMWATER - BUILDINGS](#)

Gutters

- Detail eaves gutters to avoid blockage back-flows into buildings. Ensure outer gutter edge is lower than the inner edge.
- Valley gutters should be designed to BCA requirements and AS to suit local environmental conditions
- Allow for expansion and contraction of all rainwater goods.
- When a higher roof drains to a lower roof, detail and locate spreaders to avoid concentration of water - especially avoid discharging water over ribs of pan and rib decks.
- Provide metal leaf guards to all gutters.

Downpipes

- Downpipe size guide: 100 mm² per downpipe based on AS.
- Downpipe area of not less than half the area of the gutter and min 75mm dia. or 75mm deep for rectangular sections.
- Acceptable materials are stainless steel, galvanised water pipe, cast iron, UPVC, aluminium, zincalume, and copper. Unless the building is heritage listed, it is advisable to choose a material with low maintenance and ultimate longevity.
- Protection for light gauge material is required below 2100mm with a guard of minimum 1.6mm thickness, independently fixed or change the downpipe to heavy gauge material.
- Fix downpipes hard against wall or column where possible. Where downpipes are supported by cleats off columns or walls, the gap between downpipe and column or wall must be sized to avoid creating the potential for entrapment.
- Refer to [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - SAFETY](#)
- Fix Astragals of similar material at maximum 1800mm centres to downpipe as well as support.
- Locate downpipes if possible away from main circulation, driveways etc. They are not to be recessed into brickwork, or fully enclosed.

-
- Downpipes should not connect directly into stormwater pipes but have bottom splayed 30 Degrees with lowest edge closest to the supporting column or wall and finishing above the pipe collar for cleaning access. (Except for charged downpipes to rainwater tanks.) Refer to Standard Detail - Typical Downpipe Sump
 - Finish collars 100mm above ground and min. 100mm below floor level, and fitted with a grate which cannot be removed by unauthorised persons.
 - Protect collars from mechanical damage and avoid possible splashing or flooding surrounding areas, eg by providing 300mm diameter dish, min 50mm deep, around grate.

0.09 Condensation, heat, transfer and noise

Condensation is caused by comparatively warm humid air coming in contact with the colder surface of the metal decking. Unless controlled, condensation can damage ceilings and insulation, and set up conditions conducive to corrosion.

A vapour barrier will prevent warm moist air coming in contact with the cold metal surface thereby preventing condensation. In areas where substantial moist warm air is generated, the vapour barrier will need to be sealed at all joints, wall junctions and ceiling penetrations.

Insulation is included in building walls, floors and ceilings to:

- Reduce heat transfer through the building envelope.
- Reduce sound transfer through the building envelope.

There are varying forms of insulation which will perform differently, but generally:

- Thermal insulation is measured according to its Thermal resistance (R Value).
- Acoustic insulation is measured according to its sound resistance.

One layer of double-sided foil laid under bulk insulation such as polyester or mineral wool with a 1.5 R-value, is to be pressed against the underside of the roof sheeting by means of wire stretched tightly over the purlins. This provides an initial level of thermal insulation and can reduce sound levels from rain and hail by damping vibration.

Additional bulk insulation is to be placed above the ceiling in order to reduce heat loss or gain in the spaces below and meet BCA insulation requirements.

Refer BCA Section J – ENERGY EFFICIENCY- Table J1.3 ROOFS & CEILINGS

Refer [04 ENCLOSURE/ 0471 THERMAL INSULATION AND PLIABLE MEMBRANES](#)

Foil should be double-sided, reinforced, anti-glare and fire-retardant type.

The vapour barrier must always be on the warm side of any insulation. For air-conditioned buildings in hot areas (particularly hot humid climates) the vapour barrier is placed on the outside of the structure.

0.10 Corrosion

General

The performance of metal roofing and walling is affected by:

- Atmospheric exposure conditions.
- Service conditions due to the nature of nearby activities taking place in the installation.
- Contact with other materials or contact with water washing off other materials.

Metals are vulnerable to attack from certain gases or particles found in the surrounding atmosphere including salts, industrial fallout and acids.

Galvanic corrosion between metals occurs when moisture is present.

The manufacturers of metal roofing and rainwater accessories give advice on the suitability of their products to various exposure conditions and corrosive elements. Follow a conservative Whole of Life approach in the selection of roofing materials.

In severe corrosive situations. It may be appropriate to consider applying protective coatings. Steel decks can be coated with paint and/or resins (as can aluminium), PVC or a build-up of materials including bitumen.

Electro-Chemical Reactions

- Avoid the use of galvanically incompatible materials in contact with each other or where moisture can carry charged particles of one metal onto a more active metal, particularly in the roof and roof penetration design.
- If incompatible materials cannot be avoided, an appropriate material should separate them, e.g. bituminous, zinc or rubber paints, plastic sheet or tapes, or bituminous membrane.
- Where air-borne pollutants are a problem, detail to minimise the use of metal externally, e.g. don't expose the steel roof structure.
- Rainwater must never run off from copper, brass or copper alloy onto aluminium, galvanised iron or Zinalume surfaces.

-
- Overflows from copper lined hot water tanks should not be discharged onto the above metals.
 - Lead must never be used with Zinalume (use zinc or soft aluminium) and where condensation on the underside of the roof sheeting is likely to occur steel purlins should be zinc coated. Lead must not be used with aluminium.
 - Aluminium: Under normal conditions aluminium can be fixed directly to zinc coated steel members. In extreme conditions such as in industrial or coastal environments, the aluminium should be separated from the steel and suitable fasteners used. Only aluminium flashings should be used.
 - Contact with materials such as hardwood or chemically treated timber, lime, cement, concrete or mortar should always be avoided by using a bituminous separator strip or painting metal surfaces to be in contact with two coats of bituminous paint.

0.11 Thermal movement

Many metals will expand and contract in extreme heat and cold conditions. Metal roof decks, flashings, ridge cappings and similar are to be designed to allow for thermal expansion.

0.12 Length of roof sections

Roof design should take into consideration the lengths of roofing material that are available, the impact of potential expansion due to weather extremes and the maximum length of material that can be delivered on a vehicle.

It should be noted that the police department in the past have placed a restriction of 21.34m on the length of transported materials.

Roof sheeting should be installed in single lengths.

Where longer spans are required, use site rolling if available or end lap the sections of sheets and increase the roof pitch to prevent leaking.

Note that long sheets are heavy, needing special handling equipment, increased manpower, can be easily damaged and subject to thermal expansion problems. The cost of transport, crane hire and increased labour could mean cheaper roof installation, in two or more lengths.

0.13 Coloured roof sheeting

Select colours from the manufacturer's standard colour range. This should enable the use of matching colour flashings and cappings as well as reducing the ordering lead time.

The colour selected will have an impact on the thermal performance of the roofing. Light colours will reflect more of the sun's heat and darker colours absorb more of the sun's heat, which will be transferred into the roof structure.

Unless prevented by glare issues to surrounding development, light colours must be selected to reduce the thermal load from solar heating and contribute to heat island effect mitigation.

The product selected must meet the following three-year Solar Reflectance Index (SRI) requirements:

For roof pitch < 15°, minimum SRI of 64

For roof pitch > 15°, minimum SRI of 34

Where a three-year SRI is not available, the following requirements must be met:

For roof pitch < 15°, minimum SRI of 82

For roof pitch > 15°, minimum SRI of 39

When selecting roofing for an extension to an existing building the colour of the roofing should match the existing roofing.

0.14 Roof mounted turbo ventilator

Refer to [00 PLANNING AND DESIGN/ 0001C DESIGN CHECKLIST - SUSTAINABILITY](#)

Roof mounted ventilators are often used to assist in ventilating spaces, whether it is a room or roof ceiling void.

The location and design of the roof ventilator needs to be carefully considered to ensure that it provides the maximum benefit to the design.

Design and installation should be in accordance with the manufacturer's recommendation.

Required air changes

- The size and number of ventilators to be included will depend upon the volume and use of the individual rooms and the local climatic conditions to provide suitable air changes and room cross ventilation.

-
- Provide a minimum of two roof ventilators to each Secondary General Learning Space or a Primary Home Base unless otherwise directed, or other number recommended by the manufacturer for the size of the space (whichever is the greater).
 - Ventilator throat diameter to be no less than 400mm.

Ventilator location

- Close coordination is required with the ceiling structure, luminaires and ceiling fans.
- Consider aesthetics - Consider uniformity of spacing both within and external to the building, and the size selected. A larger size may be required for satisfactory visual effect unless otherwise directed or specified.
- Mount ventilators at high points of roofs (e.g. ridges) to avoid hot air being trapped in the peak of the roof space.
- Likewise, locate ceiling grilles at high points of the ceiling and away from makeup air.

Flashings

- For slope mounted units, flashing should extend all the way from the ridge-piece to the turbo.
- Ridge-mounted units are recommended by manufacturers to reduce this flashing.

Space ventilation

When roof mounted ventilators are used to provide space ventilation:

- Grilles and roof structure must give minimum air resistance.
- Dampers will be required to limit heat loss and control in winter. Install electric powered dampers with controls marked open summer & closed winter.
- The effectiveness of ventilators relies on an intake of relatively cool air into the room.
- In canteens, roof mounted turbo-ventilators are recommended to ventilate the roof space. Ceiling grilles are not permitted.

Ventilators in corrosive environments

- Turbo-ventilators must be certified by the manufacturer for use in coastal and corrosive environments (i.e. marine grade aluminium and stainless steel) in schools located within 3km of the ocean, 1km from bays or in highly industrialised areas with corrosive atmospheres.

Specification

01 General

As per current NATSPEC.

02 Product

As per current NATSPEC except as follows:

2.1 Components

Fasteners

GUIDE NOTE: Refer to manufacturer's technical bulletins for fasteners to roofing.

Screws and fasteners - Standard Colorbond grade roof sheeting: Use only self-drilling and tapping screws to AS 3566 class 3 of the types and sizes indicated in the roof manufacturer's printed technical data sheets.

Screws and fasteners – Ultra Colorbond grade steel roof sheeting: Use only self-drilling and tapping screws to AS 3566 class 4 of the types and sizes indicated in the roof manufacturer's printed technical data sheets.

Thermal break

A metal roof with metal purlins or metal battens, to which the ceiling lining is fixed directly underneath must have a thermal break installed between the metal purlins or metal battens and the metal deck roofing; consisting of a material with an R-Value of not less than 0.2.

2.2 Sheet metal roofing

Roofing product

GUIDE NOTES: Colorbond ultra steel roof sheeting is required in severe environments (e.g. generally 100 to 200 metres from a surf beach) refer to the manufacturer's technical publications, and relevant Australian standards (e.g. AS 1397 and AS 2728) Amend the

specification description accordingly. All metal roofing must have a minimum BMT (Base metal thickness) of 0.48 mm (0.42 mm BMT Metal Roofing is not permitted).

Thickness, Base Metal Thickness (BMT) (mm): 0.48.

GUIDE NOTES: Glare is a major issue in schools. select colours that do not cause unacceptable glare (e.g. Off whites, light grey and other light colours are generally unacceptable). Select standard colours. (a) the selection of nonstandard colours may result in significant cost increases (B) small orders are virtually impossible to colour match at a later date. (e.g. replacement sheets or extensions)

2.6 Skylights

A.

Description

Industrial glass fibre reinforced polyester (GRP) fire retardant roof sheeting.

Twin walled polycarbonate thermal barrier.

Prismatic diffuser panel at ceiling level.

Material: Fire retardant solar controlled laminated glass fibre reinforced polyester (GRP) roof sheeting.

Profile: To match adjacent roof sheeting.

Weight:

GUIDE NOTE: Refer to manufacturer's printed span and wind load table, to determine correct sheet weight series (g/m²). Include and/or delete weights as applicable. Generally, 2400 g/m²

- 2400 g/m²
- 3050 g/m²
- 3660 g/m²

Colour: Pearl

Light Transmission (nominal):

-
- 2400 g/m2. 40%
 - 3050 g/m2. 38%
 - 3660 g/m2. 36%

Fire retardant resin system: Proprietary fire-retardant resin incorporated into the roof sheeting during manufacture.

- Identification: Coloured thread embedded along the entire side rib of each sheet to identify that it complies with the required fire hazard indices.

Fire resistance – Fire hazard properties – School buildings: To be in full compliance with BCA requirements for the applicable location.

Sheet dimensions: To AS/NZS 4256.3 and manufacturer's standards.

- Roof sheeting to be cut to width by the manufacturer during production. The sheeting to be cut within the following tolerances:
 - Overall width: $\pm 5.0\text{mm}$ per sheet length
 - Cover Width: $\pm 5.0\text{mm}$ per sheet length
 - Nominated length: $\pm 10, -0\text{mm}$
 - Squareness (over sheet ends): -5mm per metre width
 - Site cutting: Longitudinal cutting (sheet width) must not be undertaken on the site.

Compliance: Provide a manufacturer's certified Certificate of Compliance for the following:

- Fire
 - Resin supplier
 - Resin batch number
- Product
 - GRP description
 - GRP code
 - Date of manufacture

Clear sheeting under translucent roofing

Type: Impact resistant, twin walled clear polycarbonate structured clear sheeting installed above the clear prismatic diffuser.

Standards: To AS/NZS 4256.5

Fire resistance – Fire hazard properties – School buildings: To be in full compliance with BCA requirements for the applicable location. Thickness: 8 mm

Colour: Clear

Diffuser panel

Type: Clear prismatic diffuser panel at ceiling level

Fire resistance – Fire hazard properties – School buildings: To be in full compliance with BCA requirements for the applicable location.

Prism: 4.5mm (nominal) square base female conical prism parallel and perpendicular to the length and width of the panel.

- Finish colour: White

B.

GUIDE NOTE: If applicable create new clause number and insert in appropriate place.

Standard: To AS 4285.

Description

Tubular Daylighting System consisting of 2 (two) roof mounted Domes (External and Inner Domes) aluminium tubes, transition box with daylight dimmer, and ceiling diffuser assembly flush with ceiling, transferring sunlight to interior spaces.

Roof Dome

Variable prism optics moulded into outer dome to capture low angle sunlight and limit high angle sunlight with transparent, UV and impact resistant inner dome. 3.7 mm minimum thickness injection moulded acrylic, classified as CC2 material; UV inhibiting, impact modified acrylic blend with EDCS (Effective Daylight Capture Surface) of 4838cm² (750 square inches)

Flashing

Flashing base to be moulded to suit roof profile along with separate moulded Hub to support top of tubes and Domes. Flashings to be coloured to match metal roofing colour.

Tubing

Nominal diameter: 530mm

Reflective aluminium sheet tubing 0.5mm thick, nominally 600 mm long and cut to size to suit site dimensions.

Internal finish: 99.7% high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent.

Total solar spectrum (400 nm to 2500 nm) less than 93 percent.

Transition Box

Ceiling mounted box transitioning from round tube to square ceiling assembly with supporting light transmitting surface at bottom termination of tube; 605mm x 605mm square frame to fit flush with selected metal strip ceiling.

Daylight Dimmer: Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent.

Provide Daylight Dimmer Switches (1 Switch controls up to 10 units).

Low voltage switch (white) required to operate Daylight Dimmer. Note: only one switch is required per set of synchronously controlled dimmers.

Daylight Dimmer Cables. Two conductor low voltage cable (150m.) for multiple unit DC connection.

Diffuser: Fresnel lens designed to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.6 mm thick. Classified as CC2.

Performance Tested: NFRC (National Fenestration and Ratings Council). Meets SHGC and U-Value requirements set out in the BCA (Building Code of Australia) tables 3.12.1.2 and J1.4. SHGC = 0.20 U-Factor = 2.67

2.9 Roof ventilators

A. Rotary roof ventilator

GUIDE NOTE: Liaise with specialist consultants for ventilator selection and placement

Location:

Refer to drawings:

Number and size:

Description: Rotating wind-driven roof mounted ventilator/s including power operated dampers, fixings, trim and flashings. Finish to match adjacent roofing.

Bearings: Precision roller bearing type. The bearings to be located in the ventilator so that the inner case and the outer case remain parallel at all time.

- Fully isolated from the environment.
- Steel or stainless steel.
- Minimum two races of roller bearings.
- Permanently lubricated.
- Shaft: Aluminium machine grade 2011 T3 or stainless-steel grade 316.

Base: Tapered square to round (base/throat) construction to match roof profile and pitch.

Construction Type: Spot-welded or mechanically fastened at all points of connection.

Performance classification

Rain resistance: Class A to AS4740

Effective Aerodynamic Area: Class 2 to AS4740 as minimum.

Performance tests: To AS4740 and conducted by a NATA accredited laboratory.

Test Reports: Submit performance test report when requested.

Corrosive locations

- Within 3 km from surf beaches.
- Within 1 km from bay beaches.
- Highly industrialised areas.

Material: Roof ventilators in corrosive locations are to be of aluminium construction.

- Turbine and Base: Aluminium grade: 5005 H34
- Finish: Powder coated.

Flashing: In accordance with manufacturers printed instructions.

Damper

Location: Inside throat

Operation: Motor driven operation via a 240V AC, 50 Hz nominal 3 W rated motor driving and holding in either the fully open or fully closed position

Switches: Supplied from an external changeover switch so that either the “open” or the “close” switch-wire will be continuously energised from a 240V supply.

Wiring: Prewired and fit with a minimum 1.0 m long 4 core flexible cable with a 4-pin plug top with cores for a 240V “open” switch-wire, 240V “close” switch-wire, neutral and earth. (The socket, changeover switch and all wiring on the line side of the socket forms part of the building work).

Switch: Control switches are required on the basis of one switch per space, and are to be a single gang plate labelled ROOF VENTS containing a two-way switch with a position also machined engraved and filled as OPEN - SUMMER and CLOSED- WINTER. Each control switch is to be at the standard lighting switch height adjacent to the ceiling fan controller.

Refer to [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - MECHANICAL](#) / Damper Operation Switch.

Drawing reference

Wiring and socket: Wire a 240V open switchwire (summer), 240V closed switchwire (winter), neutral, and earth to a 4-pin socket adjacent to each damper motor. The type of socket and connection diagram are as required by the damper motor supplier.

Supply: Provide a separate circuit on the relevant switchboards for motor driven dampers.

Register /ceiling grille

Refer to [05 INTERIOR/ 0511 LINING](#) and [05 INTERIOR/ 0531 SUSPENDED CEILINGS](#).

Guarantee

Minimum 10-year written guarantee on replacement of rotary roof ventilator if defective. The guarantee must cover the following ventilator failures:

- Base
- Bearing/s
- Domed top (if applicable)
- Sufficient rotation to repel water
- Water/moisture penetration

-
- Surface finish

Distribution: Hand one copy to the Principal's Authorised Person / Principal's Representative.

Information and marking

Standard: To AS/NZS 4740 Section 4

Certification

Provide test reports confirming compliance with the required specified performance classification requirements.

B. Roof smoke ventilators

GUIDE NOTES: Create new clause and insert in appropriate place. The Roof smoke ventilator described below is based on IVR's Ipv/Irl series RO of smoke ventilator with SDL (sound deadened lids) that has a certification from a NATA accredited testing laboratory. Other proprietary Roof smoke ventilator that comply with the specification requirements described below may also be acceptable.

Location:

Refer to drawings:

Description: Proprietary roof mounted smoke ventilator/s with remote operating dampers including fixings, trim and flashings. Finish: Match adjacent roofing.

Standards

Comply with the BCA NSW H101.22 and be capable of opening against a resistance load of 0.48 Kpa/m² and remain set against 1.44 Kpa/m² uplift pressure.

Tested to: AS2428.1,2,3,4,5 and AS2427

Construction: Fabricate from aluminium zinc coated steel sheet material with stainless steel and nylon pivots, bearings etc. Spot welded or mechanically fastened at all points of connection.

Operation: Automatic fusible link operation at 710 maximum temperature.

Certification: Provide a certificate of compliance.

2.11 Rainwater tanks

GUIDE NOTES: Above ground tank installations are preferred.

Refer to the NATSPEC Building Template - Hydraulic Design and Install.

Metal tanks and rainwater goods: to AS/NZS 2179.1 and SAA HB 230.

Tanks to contain potable water: to AS2070 and AS/NZS 4020.

Polyethylene tanks: to AS/NZS 4766.

Refer to [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - WATER](#)

03 Execution

As per current NATSPEC except as follows:

3.3 Sheet metal roofing

Roof sheet installation:

- To HB 39 Code of Common Practice for Steel Roofing.
- ASTM D200 Classification System for Rubber Products in Automotive Products.
- Manufacturers Roofing and Walling Installation Manual/s.

Workmanship: Care, storage, handling, cutting and installation all in accordance with the relevant Australian Standards and the roof manufacturers printed technical data sheets.

Completion: On completion of roof installation obtain certification from the roof manufacturer stating that the material and installation is in accordance with the printed technical data sheets provided by the manufacturer and the specification. Hand the certification to the Principal's Authorised Person / Principal's Representative

3.5 Roof plumbing

General

Pipework: All rainwater collection pipework to be suitable for use with potable water in compliance with AS 3855 (INT) and testing to AS/NZS 4020

GUIDE NOTE: Extra super heavy bituminous coated aluminium flashing (Min. 0.70mm Alum. thickness) to be used for roof flashing.

Table 01: Flashing and capping schedule

| Component | Material and Finish | Thickness and Grade | Profile and Size | Jointing method |
|-----------|--|--|------------------|-----------------|
| Flashings | Extra Super heavy, bituminous coated aluminium | 0.70 mm (aluminium thickness) to AS 2904 | N/A | N/A |

Gutters

GUIDE NOTES: Gutter brackets to be installed as per manufacturers recommendation. Additional supports to be provided in areas considered to be high risk, which are prone to interference due to low gutter height in traffic areas.

Gutter brackets for half round gutters: 50 x 5mm MS fabricated to match gutter. Hot dipped galvanised and pre-coated.

- Hot dipped galvanising: To BS 6497.
- Epoxy primer: 250 microns.
- Polyester powder: 80 microns to AS/NZS 4506.

Internal fitting gutter brackets must not be used.

Leaf guards to gutters:

GUIDE NOTE: Leaf guards to be site specific, considering existing and proposed trees.

Alternative may be "leafless" gutters, subject to cost benefit and availability.

Leaf guards to gutters - Water tank installation: Provide leaf debris diversion and exclusion systems.

- Must be fire proof (zero ignitability index), non-rusting and approved for potable water.

Downpipes

GUIDE NOTE: Downpipes to be min. 75mm Dia. or 75mm deep for rectangular sections.

Acceptable materials are stainless steel, galvanised waterpipe, cast iron, UPVC, aluminium, zincalume steel and copper.

For light gauge metals, protection is required below 2100mm. with a guard of min. 1.6mm thick, fixed independently. Downpipes to be fixed hard against wall, column, etc. Astragals of similar material generally to be at 1800 centres, fixed to downpipe as well as support.

If possible locate downpipes away from main circulation, driveways etc.

Downpipes are not to be recessed into brickwork or fully enclosed.

They should not connect directly into stormwater pipes but above a collar with a grate.

3.8 Skylights

Roof material

Clear sheeting under translucent roofing

Installation:

- Continually supported under the corrugated roof sheeting for the whole length.
- To AS/NZS 1562.3 and in conjunction with manufacturer's instructions
- As shown on drawings.

Diffuser panel

GUIDE NOTE: The extruded aluminium H channel described below is based on “Capral aluminium’s – Alcan extrusion EI5328”. Other proprietary extrusions that comply with the specification requirements described Below may also be acceptable.

Installation: Install an extruded aluminium “H” channel to hold the diffuser panel in position. The “H” channel is to be ribbed internally to help grip the diffuser. Spot fix diffuser panel in channel with clear silicone at intervals of 400mm (minimum).

3.11 Roof ventilators

Rotary roof ventilators

Installation: In accordance with manufacturers printed instructions. Fix ventilator base to fixing battens and securely strap fixing battens to roof members.

Roof smoke ventilators

Installation:

- All in accordance with manufacturers printed instructions.
- Fix ventilator base to fixing battens. Flashing: All in accordance with manufacturers printed instructions.
- Controls: Manual operation controlled by two positions on both sides of the stage.
- Height from Floor: 1500 mm from finished floor level to centre of remote manual controlled mechanism.
- Signs: Install signs describing the operation of the vent system, at each of the manual or automatic operating positions.

3.15 Safety mesh

Location: All roofs

Requirement

Permanently fix safety mesh to all roofs and over the entire area to be roofed (including eaves). Safety mesh must remain in place after completion of building.

Standards

General: To AS/NZS 4389

Code of Practice: Must be in accordance with WorkCover's – Code of practice for Safe Work of Roofs – Part 1 Commercial and Industrial buildings Cl. 3.2 Safety mesh

- Other available methods as an alternative to safety mesh must not be used.

04 Selections

As per current NATSPEC.