# PAB20

LYSAGHT PRODUCT ADVISORY BULLETIN

OCTOBER 2024 | REV 01 | This version supersedes all previous issues.

# LOW LEVEL ROOF VENTILATION INSTALLATION DETAIL

## NCC 2022 DTS COMPLIANCE FOR VENTILATION OF ROOF SPACES - LOW LEVEL (15 - 75 DEGREE ROOF PITCH)

In climate zones 6, 7 and 8 a roof must have a roof space that is ventilated to outdoor air through evenly distributed openings in accordance with NCC 2022 Volume 1 Table F8D5 and Table 10.8.3 ABCB Housing Provisions standard.

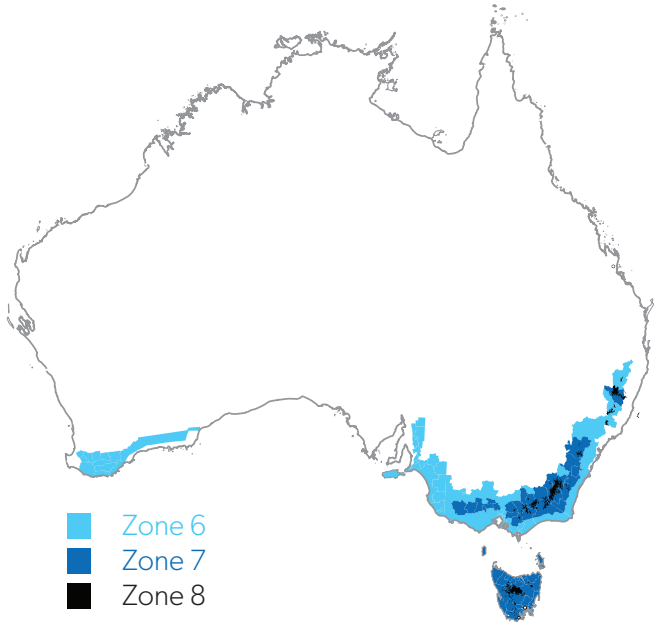



**Table 10.8.3: Roof space ventilation requirements**

| Roof Pitch | Ventilation Openings |
|---|---|
| **<10°** | 25,000 mm²/m provided at each of two opposing ends |
| **≥ 10° and < 15°** | 25,000 mm²/m provided at the eaves and 5,000 mm²/m at high level |
| **≥ 15° and < 75°** | 7,000 mm²/m provided at the eaves and 5,000 mm²/m at high level, plus an additional 18,000 mm²/m at the eaves if the roof has a cathedral ceiling |

Table Notes:

1. Ventilation openings are specified as a minimum free open area per metre length of the longest horizontal dimension of the roof.
2. For the purposes of this table, high level openings are openings provided at the ridge or not more than 900mm below the ridge or highest point of the roof space, measured vertically.

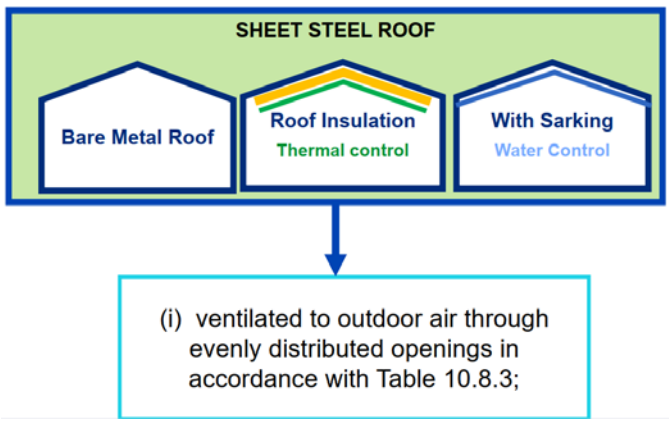
**Consideration of using the details of PAB20 in construction**

A metal cladding roof, with or without a membrane (bare roof), when installed in compliance with NCC provisions (AS 1562.1 and HB 39) is considered to be weatherproof.

Pliable membranes or blanket/foil (cut at the lowest batten) installed in accordance with PAB20 meet NCC 2022 DTS passive ventilation solution as per Table 10.8.3 will provide condensation and thermal control.

Pliable membranes installed as sarking and extending into the eaves gutter in accordance with PAB 20 will require an additional ventilation device to meet NCC 2022 DTS passive ventilation solutions as per Table 10.8.3 and will provide condensation, thermal and drainage control.

Bare roofs installed in accordance with PAB20 meet NCC 2022 DTS passive ventilation solution as per Table 10.8.3 by providing open area passive ventilation which assists condensation control.




Following are the 3 primary functions that pliable membrane or blanket/foil can provide for the roof. These functions can be utilised individually or in combination.

i) Drainage control

ii) Thermal control

iii) Condensation control

**Drainage control (sarking)**

- Pliable membranes installed under steel roofs as sarking (extend 25mm into the eaves gutter in accordance to AS 1562.1 and HB 39) can provide a secondary water control function and thermal/internal condensation control in addition to primary function of drainage control. This may supplement drainage of storm water leakage from severe weather events.
- PAB 20 Installation detail (Fig 4) can be selected when pliable membrane installed as sarking - extended in to the gutter (by providing low level ventilation devices) are used for condensation, thermal and drainage control.

**Thermal control (reflective foils - Class 1 and Class 2 as per AS 4200.1)**

- Pliable building membranes under roofs act as a thermal control layer and also condensation control layer. This can be achieved by using reflective foils (Class 1 and Class 2 as per AS 4200.1) with an adjacent air gap or a membrane that includes inherent insulation properties (eg: pliable membrane, blanket, foil, foams and bubbles).
- PAB20 Installation detail (Fig 3) can be selected when Pliable membrane (cut at lowest batten) are used only for thermal control.

**Condensation control (in the form of air gap and/or passive ventilation)**

- By providing an air gap/barrier under the roof cladding these provide the secondary function of condensation control in addition to the primary function of thermal control.
- PAB20 installation detail (Fig 3) can be selected when pliable membrane (cut at lowest batten) are used only for condensation control.

Notes:

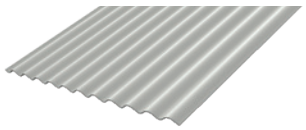
1. By providing sarking, drainage, thermal and condensation control can be achieved.
2. For BAL compliant installations (refer Figure 6), ember mesh in accordance to AS 3959 must be installed.

Open profile claddings are able to provide low and high level ventilation pathways. Examples include corrugated and trapezoidal profiles as shown below.

**Corrugated (i.e. CUSTOM ORB®)**

Low level ventilation - 7,500 $mm^2/m$

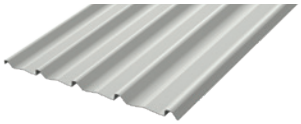
*High level ventilation - 7,500 $mm^2/m$*



**Trapezoidal (i.e. TRIMDEK®)**

*Low level ventilation - 6,500 $mm^2/m$

*High level ventilation - 21,000 $mm^2/m$*



**Close Pitched Trapezoidal (i.e. SPANDEK®)**

Low level ventilation - 11,000 $mm^2/m$

*High level ventilation - 12,000 $mm^2/m$*

Two low level ventilation options can be applied to meet the NCC low level ventilation openings requirement:

i) applied to both sides of the longest horizontal roof plan length which achieves the minimum ventilation area or,

ii) applied to whole or part of the perimeter of dwelling exceeding requirements.

Ventilation openings are to be evenly distributed to avoid creating pockets of stagnant air.

To utilise ventilation path-ways via profile openings, openings are to be unobstructed. Roof ventilation profile open area could be added with ventilation device open area to achieve compliance.

Note: * Low level ventilation area for Trapezoidal profile vent is less than the NCC requirement when installing to low level ventilation application option i) and compliant when installing to option ii).

**For 15 to 75 degree roof pitch ▷ Low level ventilation of 7000$mm^2/m$ is the required DTS measure.**

This can be achieved via evenly distributed ventilated openings:

a) Inherent openings in profiled steel roofing or,

b) Inherent opening in profile can be added to ventilation device open area.

Low level ventilation is applicable for skillion, gable and hip roofs. For gable and hipped roofs with corrugated profile, calculations are outlined in Figure 1 and Figure 2 as examples.

Low level profile openings are accessible when no membrane (bare roof) or blanket and foil product is used.

When incorporating a membrane or blanket and foil at the roof level, the openings can be accessed by terminating the membrane at the lowest batten.

Notes:

1. This approach is only suitable for thermal membranes that are not acting as a secondary drainage plane (or sarking).
2. Ventilation openings are to be evenly distributed to avoid creating pockets of stagnant air.

**Flow chart to calculate ventilation opening requirement**

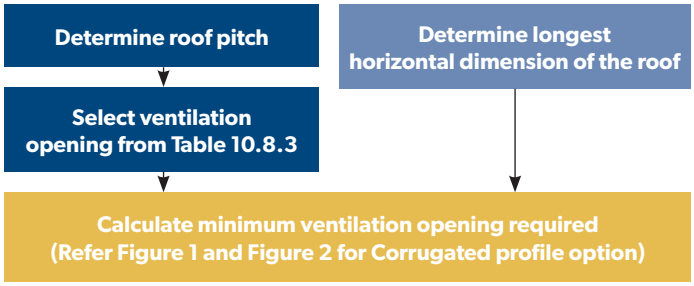
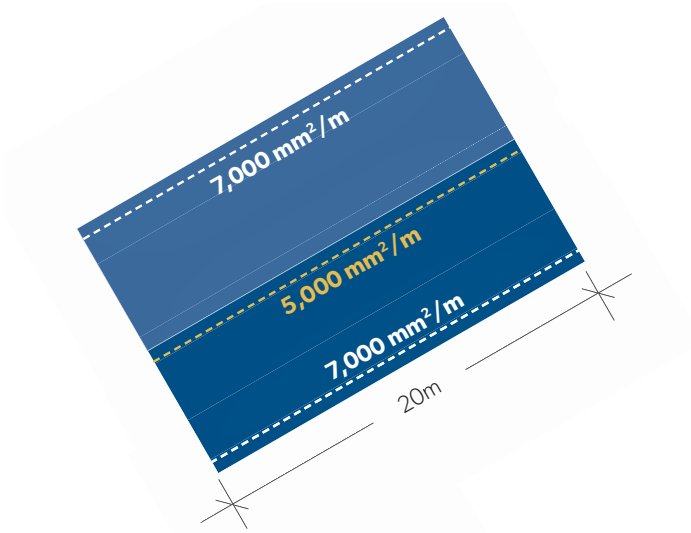
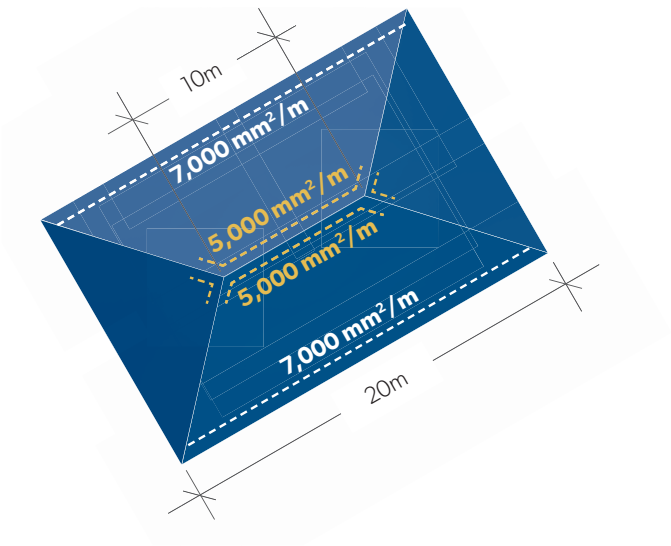


**Figure 1: Gable roof - corrugated profile**




- Roof pitch = 22 deg
- Longest horizontal dimension = 20 m
- NCC minimum ventilation free open area required /m (low level) = 20 x 2 x 7,000 = 280,000 $mm^2$ (along two longest horizontal dimensions)
- Ventilation opening provided (corrugated profile open area) = 20 x 2 x 7,500 = 300,000$mm^2$ > 280,000 $mm^2$
  Exceeds the requirement

**Figure 2: Hipped roof - corrugated profile**

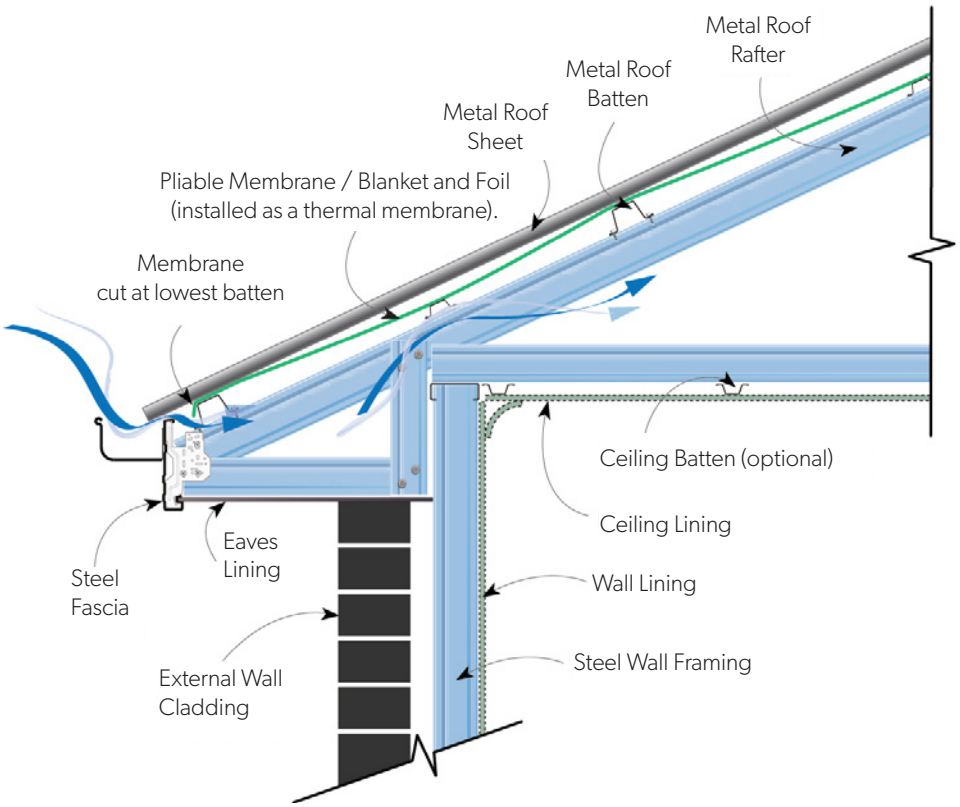



- Roof pitch = 22 deg
- Longest horizontal dimension = 20 m
- NCC minimum ventilation free open area required per m (low level) = 20 x 2 x 7,000 = 280,000 $mm^2$ (along two longest horizontal dimensions)
- Ventilation opening provided (Corrugated profile open area) = 20 x 2 x 7,500 = 300,000 > 280,000 $mm^2$
  Exceeds the requirement

Notes:

1. When working out low level ventilation calculate NCC minimum free open ventilation area. Then calculate ventilation opening solution which should meet or exceed NCC requirement.
2. Both these calculations should be shown on the house roof plans for the building certifier.
3. For hipped roofs, if required, additional low level ventilation (inherent openings in cladding) can be used on other low level sections of roof plane to achieve ventilation compliance.
4. All ventilation openings need to be evenly distributed to avoid stagnant air spaces.

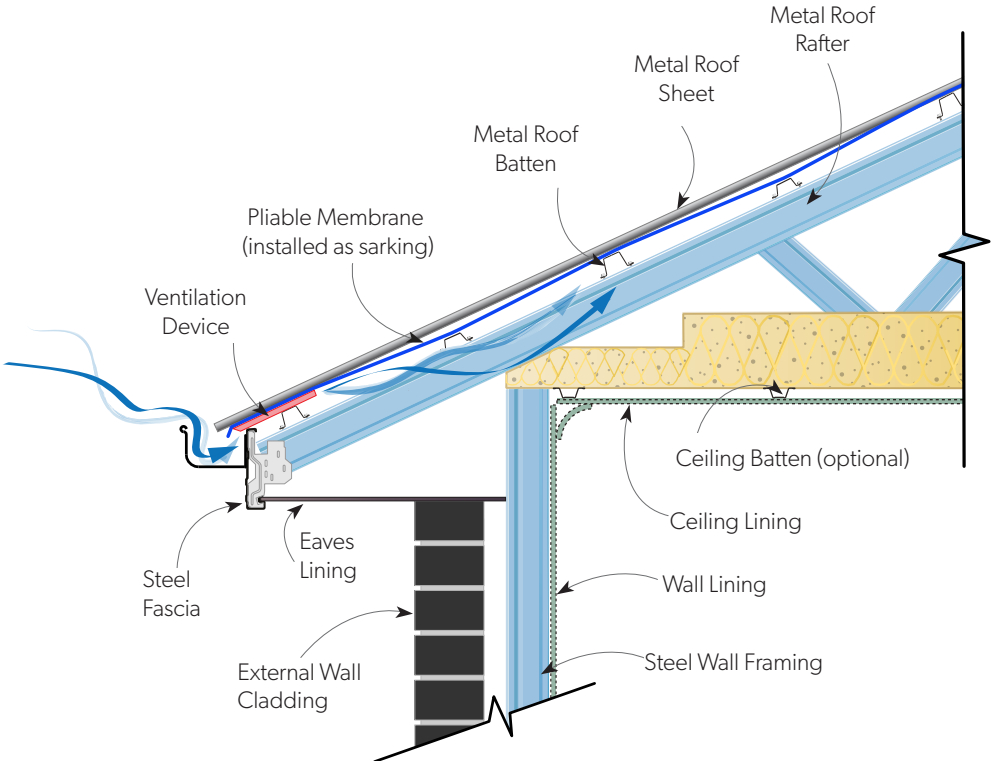
**Figure 3: Low level profile ventilation (15 to 75 degrees) with membrane cut detail (Pliable membrane for Thermal control or Condensation control)**




Notes:

1. Weather proofing details to be maintained
2. This detail can be used for eaves construction with and without soffits

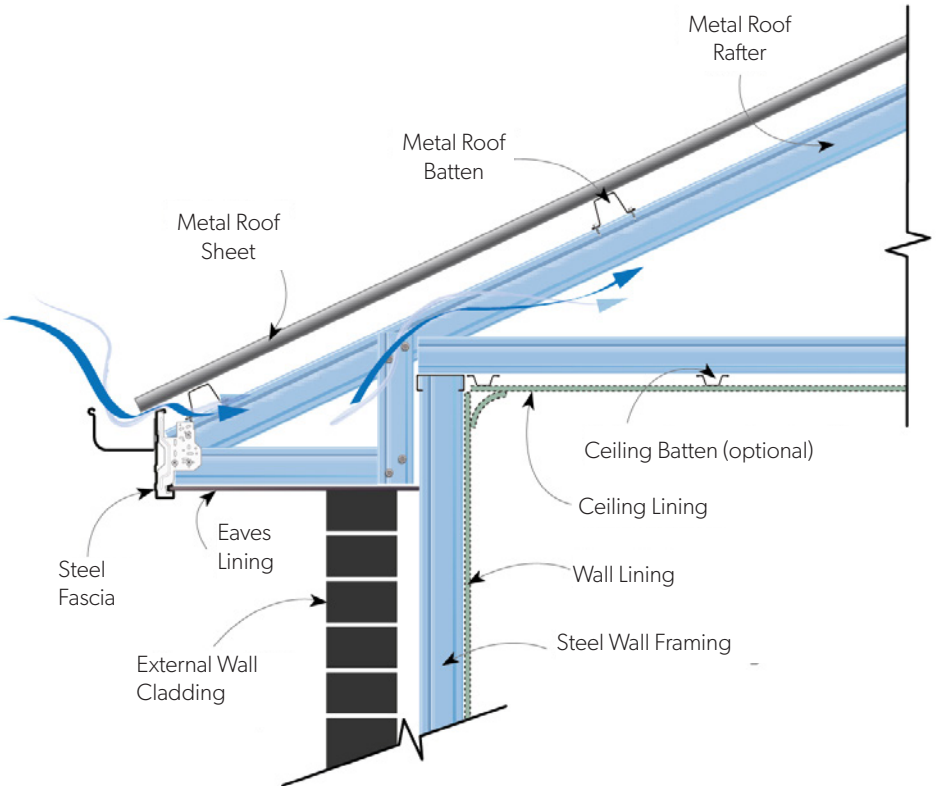
**Figure 4: Low level profile ventilation (15 to 75 degrees) with membrane extended 25mm into the eaves gutter (Drainage control)**




Notes:

1. Weather proofing details to be maintained
2. This detail can be used for eaves construction with and without soffits

**Figure 5: Low level profile ventilation (15 to 75 degrees) with no membrane/bare roof**



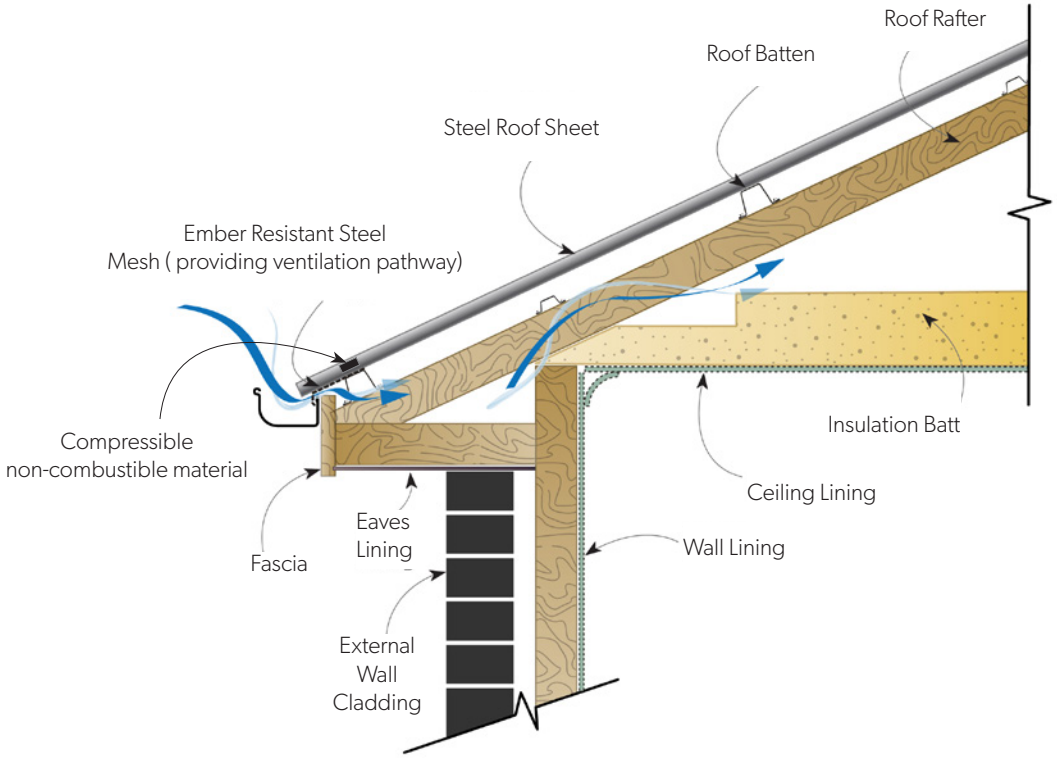

Notes:

1. Weather proofing details to be maintained
2. This detail can be used for eaves construction with and without soffits

**Figure 6: Low level profile ventilation for BAL 12.5 to BAL40**

For bushfire zones BAL12.5 to BAL40 ember resistant mesh (to AS 3959) with apertures no larger than 2mm can be used. This facilitates ventilation while meeting the bushfire ember resistance requirement.

Aerosol migration for marine zones (1km from surf or exposed marine and 100m from calm) can be reduced by installing non corrosive mesh with aperture less than 2mm.




Notes:

1. This detail can be also be used with BAL compliant pliable membranes or blanket/foil
2. This detail can be used for eaves construction with and without soffits
3. When using steel framing complying to NASH standard steel framed construction in bushfire prone areas, mesh is not required

## AUSTRALIAN STANDARDS

| Australian Standard | Definition |
|---|---|
| AS 1562.1:2018 | Design and installation of sheet roof and wall cladding - Part 1: Metal |
| AS 3959:2018 | Construction of buildings in bushfire-prone areas |
| AS 4200.1:2017 | Pliable building membranes and underlays Materials |

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