This guide is a resource and reference document and is for general information only.

It has been produced to help designers and home owners understand how the occurrence of condensation can occur in buildings. The example design details contained within this guide do not form part of any building code requirement or regulation.

They are included as indicative to a range of typical building solutions to help designers detail plans for dry buildings and reduce moisture related issues.
How to Minimise Condensation, Mildew and Mould Growth in Buildings

DESIGN CONSIDERATIONS

△ Understand the process of vapour pressure and how it can cause condensation

△ Design for dry buildings

△ Detail plans and specifications to avoid condensation

△ Inform owners how to limit condensation in their buildings when occupied

TROUBLE SPOTS

- Roof spaces and cathedral ceilings
- External wall designs
- Sub floors and under crofts
- Weather protection of building materials during construction
- Occupant use
WHAT IS CONDENSATION?

Air contains invisible water vapour. The higher the air temperature, the more water vapour it can hold. The lower the air temperature, the less water it can hold.

Condensation occurs in buildings where the air temperature rises and becomes warmer and then contacts a cold surface. The air then cools as it contacts the cold surface and produces visible water droplets on the cold surface. Water that is formed is known as ‘condensate’ and the process called ‘condensation’. If more water vapour (warmer air) is present, further condensation will occur.

The occurrence of condensation in buildings is the result of complex interactions between the environment, construction methods and building occupant behaviour. The process of condensation in buildings is reversible. Where construction material surfaces are warmer or ventilated, condensation may evaporate.

MILDEW, MOULD AND FUNGUS GROWTH

Prolonged condensation in buildings can lead to the development of mildew, mould and fungus growth, the perfect conditions for dust mites. Structural decay of building components and fabric can develop as a result of these conditions.

DETAILING TO MINIMISE CONDENSATION

This guide highlights some of the trouble spots in buildings that designers should consider when generating designs to help minimise condensation.

Historically, Tasmanian buildings were ‘vapour breathable’ and had little or no insulation. Changing occupant practices, modern building methods and enhanced bushfire construction requirements have resulted in the need for greater ‘detailing’ in building design practice to reduce moisture related problems in buildings and how they are managed.
It is worth remembering that The National Construction Code (NCC) does not contain specific requirements for the management of condensation in buildings. However, it does identify requirements for damp, weatherproofing, ventilation, fire and energy efficiency that influence condensation management solutions.

The code addresses the ‘objective’ for damp and waterproofing in buildings to safeguard occupants from the accumulation of internal moisture in a building. To help avoid ‘interstitial condensation’ within the building envelope (roof, walls and floors), design solutions may include drained or ventilated wall cavities, the use of ‘vapour permeable membranes’ or thermal control layers.

In severe locations, the use of permanently installed mechanical or non-mechanical vents and air flow pathways may be required.

**FACTS AND FIGURES**

- An adult contributes up to about 3 litres/3kg of water vapour per day being released into a home environment.
- Normal occupant activities such as dish washing, bath/showering, cooking and clothes drying produces up to 15litres/15kg of released water vapour per day into the home environment for an average family of 4.
- An unflued gas heater can produce up to 5litres/5kg of water vapour in a single evening

(Source ABCB)
EFFECTS CONDENSATION CAN HAVE ON BUILDINGS

- Condensation can create environments within buildings that allow mildew, mould and fungus growth to occur on structural timbers and building components
- Mould growth and mildew are perfect conditions for dust mites
- Damp or musty building environments can cause allergic sensitivity for building occupants
- Prolonged condensation can lead to the rotting of structural timbers and the weakening of connections between these components
- Water ponding can occur within horizontally enclosed confined spaces (suspended ceilings, boxed enclosures and the like) this can lead to visible water leakage at penetrations within the enclosures or where joints formed in materials during the construction process
- Insulation material can become wet and less effective
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<tr>
<th>WHAT HOME OWNERS CAN DO TO LIMIT THE OCCURRENCE OF SURFACE CONDENSATION IN BUILDINGS</th>
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<tbody>
<tr>
<td>Open windows during and after showering and when cooking in kitchens</td>
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<tr>
<td>Ensure (non-condensing) clothes dryers are ducted to outside air</td>
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<tr>
<td>Keep lids on pans during cooking, avoid unnecessary steam production</td>
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<tr>
<td>Don’t store large quantities of firewood inside the home in unventilated spaces</td>
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<tr>
<td>Keep lids on aquariums. Avoid introducing plants or water features into rooms that are not ventilated</td>
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<tr>
<td>Dry clothes in rooms that are well ventilated and warm and shut off from the rest of the building</td>
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<tr>
<td>Provide increased ventilation to rooms containing spas or saunas, open windows more often</td>
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<tr>
<td>Avoid the use of unflued gas heaters</td>
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<th>WHAT DESIGNERS CAN DO TO LIMIT THE OCCURRENCE OF CONDENSATION IN BUILDINGS</th>
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<tr>
<td>Duct gas appliances, kitchen range hoods, clothes dryers, bathroom exhaust fans to outside air.</td>
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<tr>
<td>Consider make up air strategies e.g. undercut doors, install vents etc</td>
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<tr>
<td>Control dampness in sub floors and undercroft spaces by covering soils with sealed impervious membranes</td>
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<tr>
<td>Use second generation ‘vapour-permeable’ wall wraps (not punched sarkings)</td>
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<td>Consider the use of bonded foil/insulation for roofs, in conjunction with ventilated roof spaces</td>
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<td>Create air spaces and ventilate cavities where hardboard, cement sheet or other solid materials used for external wall claddings</td>
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<tr>
<td>Use eaves and soffit vents (with bush fire mesh – where required) to vent roof voids</td>
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<tr>
<td>Keep building materials dry during construction</td>
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<tr>
<td>Minimise use of cold surface materials that directly contact with conditioned warm air spaces</td>
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<tr>
<td>Ventilate spaces between cold surface materials and conditioned warm air spaces</td>
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<tr>
<td>Avoid light fittings that allow warm moist air into colder roof spaces i.e. use surface mounted lights or sealed down lights</td>
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Example Designs

• Vented wall cavities, floors, walls and roof spaces
• Use of Vapour permeable wraps
• Including Bush Fire Mesh when required

NOTE: These diagrams are compliant up to and including BAL 29. In bushfire prone areas, the requirements of Australian Standard AS3959 must be taken into account.

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FIGURE 1 - RIDGE DETAIL: IRON ROOF

BUSHFIRE PRONE

FIGURE 1.1 - RIDGE DETAIL: IRON ROOF

NON-BUSH FIRE PRONE
FIGURE 2 - EAVES DETAILS: TRUSS & IRON ROOF

BUSH FIRE MESH WHEN REQUIRED TO AS3959

FIGURE 3 - EAVES DETAIL: SKILLON & IRON ROOF

BUSH FIRE MESH WHEN REQUIRED TO AS3959
FIGURE 4 - RIDGE DETAIL: SKILLON & IRON ROOF

BUSH FIRE MESH WHEN REQUIRED TO AS3959

FIGURE 5 - ROOF DETAIL: VENTED SKILLION & IRON ROOF
FIGURE 6 - EAVES DETAIL
BOX GUTTER TRUSS & IRON ROOF
BUSH FIRE MESH WHEN REQUIRED TO AS3959

FIGURE 7 - RIDGE DETAIL
TRUSS AND IRON ROOF
BUSH FIRE MESH WHEN REQUIRED TO AS3959
FIGURE 8 - EXTERNAL WALL
VENTED CLADDING SYSTEM
SUSPENDED TIMBER FLOOR
BUSH FIRE MESH WHEN REQUIRED TO AS3959

CONCRETE FLOOR
BUSH FIRE MESH WHEN REQUIRED TO AS3959

FIGURE 9 - EXTERNAL WALL
VENTED CLADDING SYSTEM
FIGURE 10 - EXTERNAL WALL
VENTED CLADDING SYSTEM
SUSPENDED TIMBER FLOOR
MASONRY BASE
BUSH FIRE MESH WHEN REQUIRED TO AS3959
FURTHER INFORMATION

Australian Building Codes Board (ABCB) website
http://www.abcb.gov.au

See “YouTube Clip: Minimising Condensation in Buildings”

“Condensation in buildings - handbook”

Or contact Building Standards and Occupational Licensing
In Tasmania - 1300 366 322
Outside Tasmania - (03) 6166 4600
or Email: wstinfo@justice.tas.gov.au

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