CORROSION

CONDENSATION

TECHNICAL BULLETIN CTB-11

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TEMPERATE ENVIRONMENTS

To minimise the risk of corrosion mechanisms related to condensation under roof sheeting, a vapour barrier should be provided adjacent to the underside of the sheeting to prevent contact between the moist air and the roof sheet.

Reflective foil laminates which are commonly used to provide heat insulation under roof sheeting can serve a dual function as a vapour barrier, simply by thoroughly sealing the foil overlaps with moisture impervious adhesive tape. The laps should be about 100 mm and kept in close contact when positioning the laminate so the tape can be readily applied. The laminate must be allowed to drape between the roof supports so the cold temperature of the roof sheeting will not be transmitted to the laminate by contact. If this were to happen condensation could form on the underside of the laminate and may drip into the ceiling space.

Condensation forms under/on roof sheeting when the sheeting becomes colder than the air in contact with it. Water vapour carried in the air then condenses on the colder surface of the roof sheet. It's formation is somewhat unpredictable and many types of buildings are subject to this problem.

On a cool, clear night roof sheeting will radiate heat into the atmosphere until the temperature of the sheeting drops below that of the surrounding air, sometimes by as much as 5 degrees Celsius. The sheeting will continue to radiate heat and remain colder than the air in contact with it until it is subjected to radiation from the sun. Until this time the water vapour in the air will continue to condense on the underside of the roof sheeting. The amount of condensation will depend on the amount of water vapour in the air and this will vary with both climatic and building conditions.

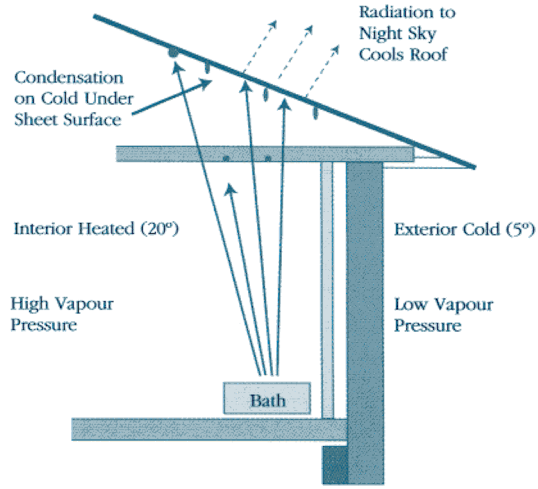
Certain activities within the building can add substantially to the amount of water vapour in the air. In a house, this applies to bathing *(particularly showering)*, cooking, washing machines, clothes dryers, dishwashers and even the presence of people. Some combustion heaters have been found to increase the atmospheric humidity to unusually high levels. Moisture will pass fairly freely through plaster board linings

In addition to the obvious problems of water dripping from the roof or ceiling and staining the ceiling and walling, condensation can lead to deterioration of inaccessible building components. Also, if bulk insulation is wet or even slightly dampened by condensation its efficiency will be drastically reduced. Corrosion of metal components and the degradation of structural timbers in contact will be greatly enhanced by the presence of elevated levels of moisture within the bulk insulation material.

If condensation occurs in a building it is both difficult and costly to eradicate subsequent to erection. Hence it is wise to take precautionary measures during design and construction. To avoid condensation related problems in a roof cavity, moist air must be prevented from contacting the underside of the sheeting. The inclusion of a bulk insulation layer between the reflective foil laminate and roof sheeting will further insulate the laminate from the cold roof sheeting during condensation conditions.

Ventilation of the ceiling cavity may assist in the reduction of condensation however it has been shown that ventilation will not completely eliminate the condensation cycle. In certain marine situations ventilation may also carry saline salts into the roof cavity which will, in the presence of condensation, lead to accelerated corrosion attack.

Figure 1: Diagram of Condensation Cycle



BLUESCOPE

TROPICAL ENVIRONMENTS

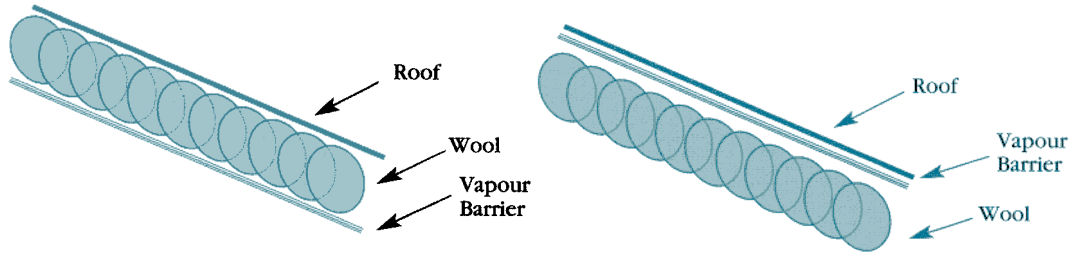
For tropical environments, ie Darwin, Cairns, South East Asian countries or similar environments, the climatic scenario is different. In this situation, there is continuously hot, moist external air attempting to find cold *(air conditioned)* interior regions where condensation vapour will be at or below the dew point of the external air.

To avoid condensation problems under these 'tropical' conditions the vapour barrier must be placed nearest the external building cladding with the glass wool to the interior side, ie **exactly opposite to the 'temperate' case.**

Condensation vapour barriers must always be placed to the warm side of the insulation blanket. *(Refer Figure 2).*

Particularly in high risk areas *(large differences in temperature and humidity between internal and external surfaces)*, it is important to seal joints and penetrations of the vapour barrier to minimise air leakage from the warm side.

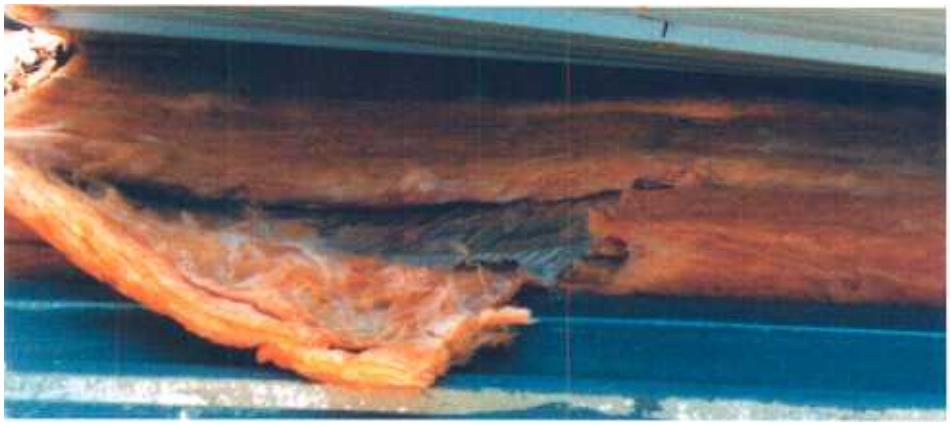
Figure 2 - Insulation configuration for tropical and temperate environments.



Temperate Environments

Tropical Environments

Figure 3 - Photo depicting the result of incorrect installation procedure in a tropical environment.



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BlueScope Steel

BlueScope Steel Limited ABN 16 000 011 058
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625

9 320075 034986

AUSTRALIA
SYDNEY Telephone: (02) 9795 6700
MELBOURNE Telephone: (03) 9586 2222
BRISBANE Telephone: (07) 3845 9300

OVERSEAS
BlueScope Steel (Malaysia) Sdn Bhd Telephone: (603) 3250 8333
BlueScope Steel (Thailand) Limited Telephone: (66 38) 685 710
PT BlueScope Steel Indonesia Telephone: (62 21) 570 7564