

## BREATHER MEMBRANE

BRE Digest 262 was introduced to discuss the possible requirement for breather papers in roofing applications to reduce possible problems caused by interstitial condensation. The conclusion as indicated in the document is that the majority of roofs would need a separate breather membrane.

However this advice was based on domestic roofing. The roof pitch on these constructions generally being in excess of 15°. This poses a problem for twin skin constructions. The most common pitch is 6° and at this angle condensation could pond on top of the breather membrane directly below the external steel sheet due to possible deflection in the insulation and breather membrane.

To eliminate this potential problem CA Building Products supplies Therma-quilt, which is a glasswool insulation product made up from natural minerals and recycled glass. Therma-quilt is a Non-hygroscopic glasswool, whose individual fibres are coated with silicon. This feature sheds any moisture, which may come in to contact with the insulation, on to the metal liner, where it is drained out of the cavity into the external gutter.

In addition, CA Building Products supplies all external sheets with vented filler blocks as standard. Available in either Polyethylene (PEL) or Metallocene Polyolefin (MP), the fillers can also be supplied angle cut for use on hips and mitres. These fillers allow natural ventilation along the crowns of the profile, which allows dissipation of any theoretical condensation present.

This is based upon Class 1, 2, 3 & 4 buildings to BS5250: 2002. Class 5 buildings should be designed individually.

Humidity Class	Minimum f-factor	Building Type
1	0.30	Storage areas
2	0.50	Offices, shops
3	0.65	Dwellings with low occupancy
4	0.80	Dwellings with high occupancy, sports halls, kitchens, canteens, buildings heated with un-flued gas heaters
5	0.90	Swimming pools, laundries, breweries

Further information can be found on CABP Technical Note TN-06: Therma-quilt Insulation Parameters.

## HUMIDITY

There are many issues associated with humidity in respect of roofing and cladding of industrial buildings. Therefore it is important to be aware of the meaning of the term humidity and its associated terms and how humidity can and does affect insulated industrial buildings and what can be done to minimise its effects.

Humidity is a basic term describing the water vapour present in the air. Relative Humidity (RH) is the amount of water vapour in the air (the ratio of the actual amount of water vapour in the air to the maximum that the air can contain at a specific temperature). Air saturation point is reached at 100% RH and the temperature at this point is classed as the dew point.

Condensation is water droplets formed by water vapour condensing when in contact with cold surfaces. This process is called distillation. At 100% RH the water vapour becomes visible as a mist. Condensation (water droplets) will form on any surface colder than the dew point (a good example is during and after a bath / shower and the effect double-glazing has in preventing windows misting).

In accordance with the requirement of Building Regulation Approved Document L2 & F, risk of condensation in buildings must be considered, and certain levels must be attained for various classifications of humidity, as defined in BS5250:2002, there are five humidity classifications for buildings, as detailed opposite. As the thermal performance of the building increases, the risk of occurrence of condensation amplifies. Condensation does not occur on metal surfaces until the relative humidity reaches 100%. However, the building must be designated a recognised humidity class and all robust details must be in excess of the designated f-factor, as indicated in the table below (also included on all CABP roof and wall cladding typical construction details);

Additional consideration should be given to corrosion prevention in all Class 5 buildings. With the exception of Class 5 High Humidity buildings we always advise the specifier / client / customer that the advantages provided by the CABP roof and wall cladding systems are more efficient than separate VCL's and breather membranes. The CABP roof and wall cladding systems' liner panel has a vapour resistance of approx 10,000 MNs/g (Mega Newtons / second / gramme), where a separate visqueen 1000 gauge offers 450 MNs/g, and Monarflex VB offers 530 MNs/g. Fundamentally this means that the standard CABP roof and wall cladding systems do not require a separate VCL or breather membrane, unless used in a Class 5 humidity construction. Please consult CA Building Products Technical Services Department for further assistance.

To prevent condensation forming on the underside of the external sheet dripping onto the insulation and impacting its thermal efficiency, the fibres of the insulation need to be protected, either with a separate breather membrane or by coating the fibres to make them water repellent. Refer to CABP Technical Note TN-06 for further information on Therma-quilt.

Condensation can be avoided by:-

- Raising the temperature of surfaces which moist air may contact, which is achieved by continuous heating of the building
- Mechanical extraction of humidity from the internal environment
- Place a VCL below the insulation to prevent moist air reaching the insulation
- Seal all penetrations and laps to minimise the passage of air from within the building into the cavity
- Install sealing strips and or inject foam into the laps of composite panels to avoid the cold spots at all side and end laps
- Place a breather membrane above the insulation to prevent the condensate dripping on to it
- Design the system to allow any condensate in the cavity to drain out to the gutters
- Coat every fibre of the insulation with silicone to prevent the insulation absorbing moisture, as Therma-quilt insulation used in the CABP roof and wall cladding systems

Note:- The CABP roof and wall cladding systems designs ensure that the insulation fills the cavity which guarantees that the insulation is in contact with the underside of the external profile (where insulation is in contact with the external sheet condensation will not occur). This exposes the open sheet corrugation to potential night sky radiation and to minimise any effect, the foam fillers used to close the profile at the ridge and eaves have exaggerated vents which ensure air flows along these cavities dissipating any moisture which may be present by natural ventilation. Any moisture in the cavity collects on the inner liner and drains out of the cavity into the gutter.

## CONDENSATION

The CABP roof and wall cladding systems are designed to limit the amount of moisture vapour, which can enter the cavity, and ensure that condensation is properly controlled, so there is no loss of thermal performance or durability.

The performance of the liner panel construction is the key to vapour control. The CA LT 17 1000S or CA 32 1000RL liner panels are completely impermeable and provide good vapour resistance as 'stand alone' components. When the liner panels are correctly sealed at side laps, end laps and fasteners this resistance increases significantly, to a value greater than can be achieved using a separate vapour control layer. This sealed liner construction prevents moisture vapour entering the cavity, if installed in accordance with the details in the appropriate CABP Installation Guide.

A test undertaken by the Building Research Establishment Report No. 16362 'Evaluation of the moisture performance of built up metal roofs', compared the moisture transmission through the lining system for three constructions, namely;

- Liner panel with side and end laps unsealed
- Liner panel with side and end laps unsealed complete with vapour control layer
- Liner panel with side and end laps sealed in accordance with CABP recommendations

Measurements were carried out in a laboratory on the above constructions. The liner vapour resistances found were, in the units used in BS5250:2002.

- Liner panel with side and end laps unsealed
  - 70MNs/g
- Liner panel with side and end laps unsealed
  - 160MNs/g complete with vapour control layer
- Liner panel with side and end laps sealed
  - 380MNs/g in accordance with CABP recommendations

There is therefore no need to incorporate a breather membrane in the CABP roof and wall cladding systems in most applications, (i.e. Class 1-4 humidity buildings in accordance with BS5250:2002).

In addition, non-hygroscopic Therma-quilt complies with all requirements of the regulations delivering U-values to 0.16W/m<sup>2</sup>K depending on the system specified. All fibres are sprayed with silicone during manufacture; therefore, any theoretical moisture in the cavity does not affect the insulation or its efficiency. Refer to CABP Technical Note TN-06 for further information.