GENERAL INFORMATION

Use of TC-417 to Control Condensation in Metal Buildings

Definitions:

a) 'Metal building' refers to any structure substantially, or fully, clad in metal panels on both the walls and roof, and in which the panels constitute the vapour barrier for part or all of the structure. The metal will most likely be galvanised steel, primed steel or "galvalum";

b) 'Unconditioned' building refers to any structure that contains no provision for heating and/or cooling;

c) 'Conditioned' building refers to any structure that is heated and/or cooled to maintain temperatures other than ambient.

TC-417 can contribute to condensation control in general building construction. Such control is often a side benefit gained when the product is installed for thermal and/or acoustic purposes.

Note: The information concerning condensation control in metal buildings that follows is general in nature only. We strongly emphasise that no decision to use **TC-417** thermal and acoustic insulation specifically for condensation control in any building be made until:

a) Our relevant test data is obtained;

b) A qualified, local HVAC engineer or building envelope specialist, familiar with the project, is retained to interpret our data and to make recommendations concerning the use of our material.

Moisture within a Building

All buildings contain air borne moisture to a greater or lesser degree. It can be a product of one or more of the following:

- Atmospheric humidity;
- Occupants and their activities;
- Damp walls due to wind blown rain;
- Damp areas below grade;
- Vehicular traffic in and out of building;
- Materials stored within the building;
- General building usage.

Condensation within a Building

- Condensation within a building is caused by moist air within the structure coming into contact with a substrate that is subjected to drier, colder air outside;
- The temperature, adjacent to the substrate, at which condensation begins to form is called the "dew point";
- The problem is essentially one experienced in cool temperate and cold climates and is to be distinguished from high humidity present in buildings in hot, humid climates;
- This information sheet will focus on condensation problems experienced within buildings situated in cool temperate and cold climates.

Any building not built to modern standards of energy conservation will almost certainly experience excessive humidity and condensation problems when upgraded to better energy conservation standards unless care is taken to properly "engineer" the job.

The primary factors are:

- Provision of adequate ventilation;
- Provision of adequate air movement. It is particularly important to eliminate dead air spaces at the ceiling level in buildings where the ceiling is the underside of the roof structure;

- Proper use of vapour retarders;
- Proper use of insulation.

Adequate, controlled ventilation is necessary in any building that is "tight" in terms of unwanted airflow. Failure to provide proper ventilation may result in condensation problems that cannot be corrected by other means.

A critical component of good ventilation is the reduction or elimination of dead air spaces in locations prone to gather warm, humid air such as under roofs. (see diagram a) right).

When dealing with a **conditioned** building in cool to cold temperate climates, the following rules **must** be observed if condensation during cold weather is to be avoided:

- At least **67% of the total insulation value shall be on the outside of the vapour barrier** (more properly called the vapour retarder);
- If the building substrate is at all porous (as in wood frame buildings) a vapour retarder **must** be placed on the warm side of the insulation;
- In the case of roofs, no matter what the substrate, and in all metal buildings, the roof, and all metal walls, are considered to be a vapour retarder, so the 67% rule must be followed;
- It is particularly critical that this rule be followed in terms of a pitch roof (see diagram b) right), or where the interior humidity is habitually high.

Notes:

- It is not generally considered good practice to place insulation between two vapour retarders (or barriers), as moisture is quite likely to enter the insulation over time. If and when it does, it will remain trapped. Trapped moisture reduces, or in the worst case destroys, the insulation value and contributes to corrosion and rot problems.
- However in the case of metal buildings with little or no insulation on the outside of the roof and walls there is no alternative but to add the insulation on the inside and then install another vapour retarder.
- Any vapour retarder placed over insulation on the inside of a metal building must be very carefully installed to eliminate the possibility of air leakage to the substrate. In addition, the retarder must be durable enough to withstand possible damage from the activities normally taking place in the structure. If the retarder is breached so that air can enter the insulation it must be patched at once to keep condensation from forming in the insulation and on the substrate. This is particularly critical if the ambient exterior temperature is lower that that inside the structure.

Avoiding Condensation Problems in Energy Efficient Buildings

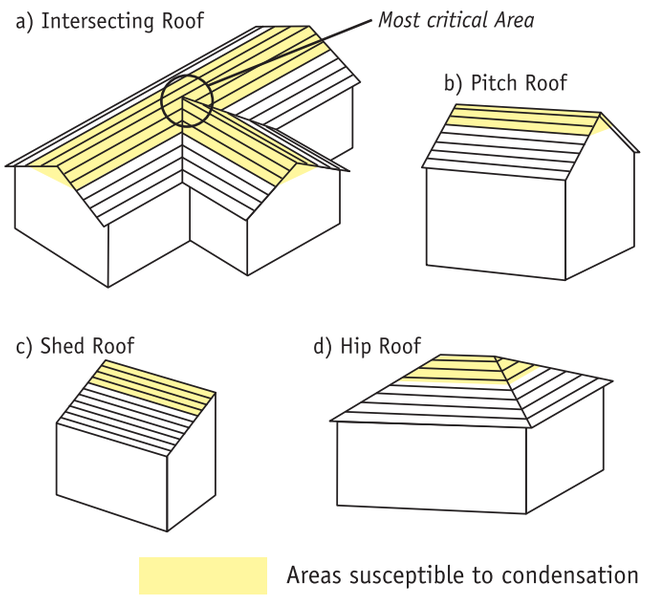
One of the most cost effective ways to improve energy efficiency of any building, new or existing, is to increase the quantity and/or thermal value of the insulation used. However, as noted earlier, unless proper precautions are taken this may result in increased condensation problems.

Our **TC-417** thermal and acoustic insulation is one of the very best choices that can be made because of its monolithic nature and its ability to conform to the substrate, no matter how complex. This ability to conform can, with proper, careful installation, eliminate or very greatly reduce the existence of dead air spaces adjacent to the cold, impermeable substrate.

Pitch Roof Variations

In all pitch roofs the most critical area in terms of condensation is a band extending downward from the peak. This area is dead in terms of air movement, so it is essential that it be well ventilated with frequent forced air changes. The rate of change required to keep condensation under control will be determined by the inside to outside temperature differential and the ambient humidity.

We strongly recommend that an HVAC professional be consulted in terms of any specific situation where uncertainty in terms of ventilation is a factor.



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