

ROOFLIGHT GOOD PRACTICE GUIDE: CONDENSATION

Condensation

Introduction

Condensation problems, particularly those associated with a new building can be difficult and are more common during colder, winter months. Whilst rooflights do not cause condensation, the way they are specified, used and fixed can contribute towards condensation problems. It is essential to identify the difference between condensation and roof leaks. Leaks are generally associated with localized fixings and isolated areas. Condensation affects roof areas. Moisture is always present in the air in the form of an invisible vapour. As warm air will 'hold' more moisture than cold air, the maximum which can be present depends on the temperature. Condensation occurs when warm air is cooled sufficiently so that air will not hold all the moisture present. The excess moisture will then condense on the coldest surfaces within a building.

Definition of Terms

Prior to discussing condensation, in a meaningful way, it is necessary to understand the following basic terms:

Vapour pressure

Water vapour is an invisible gas which exerts pressure like any other gas. The more water present, the more pressure it exerts.

Moisture content

The weight of water in a unit weight of air.

Saturation

When air contains as much water vapour as it can hold.

Relative humidity

This is the amount of water vapour in a given unit of air at a certain temperature. This is expressed as a percentage of the total amount such air will hold. As air cools, relative humidity increases. At 100% relative humidity, the air is saturated and is at its dew point.

Dew point

As the air temperature falls and becomes saturated and then as the temperature continues to fall, excess moisture will condense on cold surfaces, this is the dew point.

Night sky radiation or super cooling

A rooflight is normally the poorest insulated component in a roof as is a window in a wall. During the colder winter months when the ambient temperature is close to 0°C under a clear night sky, heat can be lost by radiation from a rooflight at a rate exceeding any heat gain from inside the building. The rooflight can then become super-cooled to a temperature of -6°C to -8°C below the air temperature. Any condensation that has formed may then freeze on the underside of the rooflight or inside the rooflight cavity in the case of a double or triple skin rooflight. When the ambient temperature or the winter sun causes the frost to melt an excessive amount of water is rapidly released. This normally occurs early to mid-morning. The water may then drip off the rooflight into the building.

Causes of Moisture Laden Air

Water is introduced during new building construction or building renovation such as an extension as either an 'ingredient', or rainwater which is absorbed into the structure before the roof is completed. Typical water volumes that can evaporate from building materials until they have dried out can be approximately:

30 kg/m² from concrete.

33 kg/m² from 100mm brickwork.

40 kg/m² from 100mm blockwork.

The water will evaporate into the air as a gas or vapour.

Moisture is generated by physical activities as sweat is generated and breathing becomes more rapid. Establishments such as swimming pools, bakeries, laundries and food preparation areas all emit moisture into the air.

Condensation and rooflights

Surface condensation will occur when warm moist air comes into contact with a cold surface such as a single skin rooflight or the outer skin of a site or factory assembled rooflight.

It was fairly common practice, at one time, to have single skin rooflights in an otherwise insulated roof, normally asbestos cement. Single skin rooflights may also be installed in the roofs of buildings that are exempt from Building Regulations or that have high internal heat gains.

Condensation can be a problem if single skin rooflights are not suitable for the activities within the building such as a change of use that generates more moisture or they have been installed when better insulated rooflights should have been used.

Condensation can also form on other cold surfaces such as windows or metal doors but may have less of an adverse effect on activities within a building than on or in rooflights.

Because water vapour exerts pressure it can be forced into the cavity of a double or triple skin rooflight if there are no measures in place to control it.

Interstitial condensation is the condensation that can occur inside a rooflight and happens when warm moist air that has penetrated into the cavity comes in contact with the cold inner surface of the external skin. This is more of a problem with Factory Assembled Insulating Rooflights (FAIRs), than with site assembled rooflights in which any water can normally drain away.

Although Filon FAIRs are fabricated to be as well sealed as possible, they are not hermetically sealed. Moisture can enter FAIRs through incorrectly located fasteners, lap sealants or splits and holes caused by mishandling for example. See TIS204 for more information.

Any condensation issues are normally encountered in new buildings, in incorrectly installed FAIRs, or incorrectly specified rooflights such as double skin when triple skin should have been used.

Stopping or reducing condensation risk

Correct rooflight type

For compliance with Building Regulations, most new rooflights should be triple skin with a specified U-value. There are some exceptions such as buildings exempt from Building Regulations and are unheated or buildings with internal processes that generate heat for example.

The requirement for triple skin may also apply to a building extension or for replacement rooflights depending upon the circumstances. In the event that triple skin rooflights are specified or should be used for compliance with Building Regulations, but double skin or even single skin rooflights are installed, then the risk of condensation forming on or in the rooflights is greatly increased.

It is strongly recommended not to reduce the rooflight specification to a poorer U-value and to install Filon rooflights in accordance with the relevant Filon Technical Information Sheet that is available to download from our website or on request from our Sales or Technical Department.

Heating

For a heated building with normal humidities, condensation is not normally a problem, but if the temperature of the lower surface of a rooflight falls below the dew point, condensation will occur.

In buildings where intermittent heating is used or it is switched off completely during the night, condensation may occur on cold, clear winter nights. It may be necessary to operate the heating for longer periods and to maintain some trace heating during the cold nights to counteract this.

The use of heating devices may also reduce condensation in new buildings or extensions that are drying out.

Ventilation

Ventilation is essential to remove excess moisture and to prevent the relative humidity from becoming unduly high. It is particularly important in buildings where high humidities can occur and in new buildings or extensions that are drying out.

Conclusion

Condensation can be prevented or reduced by installing correctly specified rooflights for the building and its activities. If there is any doubt, contact the Filon Technical Department.

Filon rooflights should be handled, fixed and sealed in accordance with our published recommendations. This is very important for FAIRs in particular.

Adequate heating and ventilation should be used as specified or as required. The use of dehumidifiers will also reduce moisture content within a building.

Our experience is that condensation problems occur when the above measures are not followed. Fault does not normally lie with the rooflight but rather how it has been used, installed or the conditions within the building.

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