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**THE CAUSES & EFFECTS OF CONDENSATION IN BUILDINGS**

Condensation is caused whenever air which contains a substantial amount of moisture is cooled below the temperature; this is known as the dew point of air. Air from outside, no matter how cold or wet the weather, will not cause condensation inside the building so long as the building is at least slightly warmer than the outside air. The only exception to this is condensation on cold water pipes or, occasionally on cold very heavy concrete or masonry, which may, at times be cooler than the rest of the house. Such condensation can occur on those few days when the weather becomes suddenly moist and warm, NOT in cold weather.

Condensation is, therefore caused by water added to the air within the building. Generally this is due to the activities of the inhabitants who by breathing, washing, cooking and drying clothes, add greatly to the air moisture, i.e... They raise the dew point to a higher temperature. In addition to the activities of the inhabitants, water vapors can be brought into the building by clothes or other absorbent materials which can give off water to the warm air even though they appear quite dry but cold, when brought in from the outside. Another source, which is sometimes very important, is rising damp, penetration damp or residual water of construction which keeps some of the inner surfaces of the building damp, irrespective of the activities of the inhabitants.

Therefore, condensation occurs at times when particular activities are carried out inside the building. Usually it is most common in the late evening when most of the water making activities has ended and the building begins to cool. Because the cooling of a building occurs through its walls, it is the walls which become cold and it is there that the air is cooled and condensation (dew) is formed. If it happens regularly in the same place, the consequent accumulation of water can make the walls thoroughly wet and give the appearance of penetrating or rising damp.

Condensation does not, except in the most exceptional circumstances, occur continuously, and a single occurrence will not make a wall wet in depth. The water deposited by a single condensation will be evaporated, but if the internal ventilation is poor then the moisture will remain in the air and re-appear when cooling of the building takes place

**CONDENSATION:** Condensation is by far the most common cause of dampness in buildings, probably accounting for the majority of damp problems reported. It affects both old and new buildings alike, it appears to be a more significant problem where the buildings have been modified.

Condensation is directly associated with mould growth. It is this that the occupier sees first and it gives an indication of the potential scale of the problem. Black mould is usually found on metal window frames & decorative surfaces, especially wallpapers, where it can cause severe and permanent spoiling. In many cases, the mould and its spores ('seeds') give rise to complaints about health, and cause the "musty" odor frequently associated with a damp house.

The obvious places for condensation to occur are on cold walls and floors, it can also occur in roof spaces and in sub-floor areas where there is a timber suspended floor; in the latter case it can lead to rot developing in floor timbers.

**The Cause:** It is a fact that warm air can hold more water as vapour than cool air. Condensation is caused when moisture-laden air comes into contact with a cold surface, the air is cooled to the point where it can no longer hold its burden of water. At this point, the Dewpoint, water begins to release out of the air and is seen as condensation. On impervious surfaces such as glass and gloss paint, beads or a film of water collect. On permeable surfaces such as wallpaper and porous plaster, the condensing water is absorbed into the material. Therefore, the problem is not always initially obvious.

**Recognizing Condensation:** Condensation is typically a seasonal problem occurring during the colder months of October to April. During the summer, the problem is seen to go away. During the winter, ventilation of the house is usually low because windows and doors are closed, draught proofing takes place. This allows build up of water vapor in the house, which, in some cases is sufficient to cause condensation. This condensation becomes apparent from the following symptoms:

**1. Water droplets form on cold, impervious surfaces such as glass & paint.**

1. **Slightly damp wallpaper (often not noticed).**
2. **Development of moulds, usually black mould.**

In some cases, condensation may be long term, but it is often intermittent, forming only at certain times of the day or night. In these cases, the only sign of condensation may be mould growth, as any moisture may have evaporated by the time moisture measurements are taken.

One should also be aware that the problem can occur well away from the site of most water vapor production. e.g. water vapour produced in the kitchen may diffuse through the property and travel into a cooler room where it will likely condense on a cold wall.

**The Solution/s:** The control of condensation is based on two very simple primary measures and where necessary supported by one or more secondary measures.

# Primary Measure 1 - Improve Ventilation

This will sweep away the internal moisture-laden air and replace it with drier air from the outside. Yes, external air is drier than internal air most of the year!

**Poor indoor air quality leads to;**

Condensation through increasing humidity levels often in association with the progressive sealing of buildings to save energy.

Building fabric deterioration causing damage to internal decoration & timbers.

Mould growth caused by high humidity levels, this also constitutes a health risk.

Asthma from dust mites thriving on humid conditions.

Energy waste through use of unsuitable extractor fans and open window practice despite often considerable investment in double glazing & insulation.

Ventilation can be achieved by opening a few windows, careful positioning of additional air vents, and using extractor fans, but please note;

# Negative ventilation in problem areas will have the reverse affect of creating condensation by a reduction in the room temperature.

**It is most effective to remove the water vapor from the house using a 'positive pressure system.' This consists of a slow speed fan set into the loft. It draws air into the roof space from the outside through the eaves, and gently pushes it into the property. This causes a slight internal positive pressure, continually pushing out any moisture-laden air.**

**Primary Measure 2 - Improve Heating**

Coupled with ventilation, heating should be set or applied to give a low-level background heat. This will ensure no rapid temperature changes to the environment and will cause a slight warming of cold surfaces thus reducing the risk of condensation.

**Secondary Measures -** In most cases, implementing the primary measures described above will effectively control a condensation problem. However, in more severe cases, it may be necessary to implement one or more of the following support measures;

**Remove excess water sources:** This means removing systems within the house that generate excess water vapor. e.g. bottled gas and paraffin heaters generate enormous amounts of water vapor. These alone may be responsible for the condensation. Further examples of excess water sources include the drying of clothes indoors or the venting of a clothes drier into the interior of the property.

**Insulate Cold Surfaces:** Consideration should be given to cold surfaces where possible. Some building materials have better thermal properties than others, we can advise as necessary.

Where solid walls are encountered (or cold, solid floors) these may be insulated by various dry-lining techniques or, in the least expensive case, the use of thin polystyrene sheet (Cotina) applied directly to the wall. In all cases, this will lead to a warmer surface, thus lowering the risk of condensation. It is also prudent to provide a vapour check on the warm side of the insulation to prevent problems Occurring behind and within the wall.

**Prevent possible Water Penetration:** Damp walls have poorer thermal properties than dry walls and are therefore slightly cooler, this increases the walls susceptibility to condensation.

Treating external surfaces with a silicone water-repellent, such as Safeguard Rain Check or Rain Dance can help in some cases. This prevents water penetration, thus maintaining better thermal properties of external walls.

**Use of anti-mould paint:** The most important side-effect of condensation is mould growth and the unhealthy spores that it releases into the air. The quickest way to eliminate mould growth is by the use of a good quality anti-mould paint. However, the long term aim should be to eliminate the condensation that allows the mould to grow.

The field of condensation diagnosis often proves frustrating and difficult due the the myriad of causes and sometime requires much consideration. As a damp proofing company we regularly treat severe condensation before making any comment and remedial recommendations for rising dampness.

# SPS recommended (frequently requested by estate agents/landlords) solution for condensation control is to install one of the following options;

1. Positive pressure unit in the loft space.
2. Positive pressure wall unit when no loft space.
3. Humidistat fans to the moisture making rooms.
4. Passiffier units

I hope the facts presented help your understanding and approach toward condensation control.

Please do not hesitate to contact us should you require further advice or for a free survey on your property

**Yours Faithfully**

**Mark Henderson**

**Principal Surveyor.**

Contact:

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