



DPR LTD  
Condensation  
eradication  
0800 458 7751



One of our many approved systems

## Low cost whole house ventilation that meets building regulations, saves energy and prevents condensation

A positive input ventilation unit gently supplies tempered, filtered air into a home using otherwise unused heat within a roof.

The benefits of this are enormous;

- Firstly, it means that a significant proportion of external pollutants are prevented from entering the home.
- Secondly, the use of the otherwise unused heat in the roof results in the ventilation unit providing a significant net energy gain to the home.
- Thirdly, there is no better way to ventilate a home than from the inside out via a single, centrally located, supply air diffuser.

A good quality unit, fitted in your loft by our Kleenair operatives, will operate at an almost imperceptible noise level. You will hardly know its there. A properly designed and installed unit will ensure that old, contaminated, vapour laden air in your home is continuously diluted, displaced and replaced with good quality air. The result is improved indoor air quality and an environment in which condensation dampness cannot exist.

The old air exits through the thousands of air leakage points found in all homes. Indeed, positive input ventilation will even help to suppress unwanted infiltration (draughts).

The installation of a low energy positive input ventilation unit will ensure the air in your home is completely replaced with better quality air around **20 times a day**. This is the recommended rate to maintain good air quality.

### Energy benefits

Your roof is an energy source.

South east to south west facing tiles or slates absorb energy from the sun. Even the loft space itself is a substantial source of energy. During the heating season it will almost always be warmer than outside because of solar gain and conduction and convection losses from the home. Positive input ventilation units use the tiles/slates and/or the loft space itself to pre-warm the incoming air before delivering it into the home.

The input air enters your home at ceiling level, usually on your landing. This method re-circulates the warm air that rises and collects there as well as reducing the heat loss to your loft.

The slight pressurisation effect created helps reduce infiltration of unheated air through the leakage points found in all homes, having a consequential energy benefit.

In simple terms, a good quality low energy positive input ventilation unit will provide a significantly greater amount of energy into the home than the energy it consumes in the form of electricity, providing a considerable net energy gain.

DPR Kleenair System is a trading name of DPR Ltd. A Kleenair System is a varied range of integrated methods to improve ventilation in to the home via electro mechanical and fixed non electro mechanical ventilation units. Systems can be installed directly to roof voids, walls, ceilings, basements and sub-floors. DPR Kleenair is not one particular product - it is a range of quality ventilation systems approved for DPR Kleenair fitment by DPR Ltd.

### WHAT SOME OF OUR PAST KLEENAIR CUSTOMERS HAVE SAID:

*"I did not believe the system would really get rid of my condensation and black mould.... how wrong I was. My home is clean and free of damp mould. Thankyou for the prompt and effective work you did."*

Mrs Midgley . Pontefract

*"Brilliant idea. So pleased I don't now have to keep redecorating. After 10 days my problems were solved. I have recommended this system to my friends and family"* Harry Smith. Doncaster

*"Thankyou for fitting my Kleenair system. It really has done just the trick. Wish we had known about this years ago as we could have saved money on redecorating mouldy walls"* Mr & Mrs Stuart. Leeds

*"Your staff did a very quick and clean job without mess. My house is now mould free and I don't have any morning mopping up of water on my windows. So pleased."* Ray & Fiona Davis. Huddersfield

## Condensation & Mould Growth

DPR can fix, stop, prevent and resolve any condensation or mould problem.



Please note the detrimental health effects known to be caused by airborne moulds also known as toxic moulds (media reported) are:

Proven: Irritation of eyes nose and throat, dermatitis, exacerbation of asthma and allergies increase.

Reported: Fever, Flu like symptoms, Fatigue, Coughing up blood, Nose bleeds, Dizziness, Headaches, Diarrhoea, Vomiting and Liver damage.

Health aspects of moulds: TOXICOSIS – Some fungi produce toxic substances called mycotoxins. These are present in fungal spores and hyphae. Moulds produce a large number of volatile organic compounds – this gives us the typical 'mouldy' odour experienced in condensed properties.

Dampness in buildings is a serious problem. Water can enter buildings in a number of ways to cause superficial and structural damage. Conditions in a damp property are often unpleasant, uncomfortable and unhealthy.

Important Note: Condensation along with all damp problems is a health risk. We recommend that a survey is carried out immediately if any damp problem is suspected.

One of the most common causes of dampness in buildings is condensation which can often lead to the appearance of mould growth. It is the presence of water condensed on walls, ceilings and other cold surfaces which support mould growth.

Throughout the UK the living conditions of a large majority of the population have been adversely affected by condensation. Its occurrence together with the subsequent mould growth has been the largest single complaint received by local authorities during the past twenty years.

In industrial premises the effects of condensation and mould growth are also well-known and have created their own particular problem especially in breweries and food processing factories.

### The Problem

The problem of condensation, particularly in dwelling houses, is very much a problem of today and results from a series of relatively simple, totally invariable conditions, and is directly related to standards and methods of heating, ventilating and insulating buildings along with the occupants lifestyle.

### What is Condensation?

Air normally contains water vapour in varying quantities and its capacity to do so is related to temperature - warm air holding more water than cold air. Air is saturated when it cannot contain any more water vapour at the existing temperature; under these conditions it is said to have a relative humidity (RH) of 100%. If the temperature of the air falls until saturation point occurs the air is at

a critical temperature at which it cannot hold any more water - this temperature is known as the dew point. Any further fall in temperature will result in water vapour being forced to condense out as liquid water. The amount of water vapour



condensing out will be the equivalent to the amount of vapour excess of 100% RH of the air at its new temperature. Therefore, when warm air comes into contact with either colder air or a cold surface the warm air is cooled, i.e. depressing the temperature of the air to a level at which it can no longer contain all the water vapour and some of it is discarded as condensation or liquid water.

Condensation in a building usually occurs when warm air comes into contact with a cold surface. The air is cooled below its saturation point causing its excess water vapour to change into liquid water. The condensed water usually appears as water droplets or water film on non-absorbent surfaces such as windows or tiles. This form of condensation is SURFACE CONDENSATION. It is obvious and always occurs on the surfaces which are at or below the dew point of the air immediately adjacent.

Condensation can also occur within the fabric of the building due to the internal air permeating through the structure because of its greater pressure. Water vapour in the air exerts a pressure which contributes to the total pressure of the air.

The more moisture present in the air the greater the contribution of water vapour to the total pressure of the air referred to as vapour pressure. Air inside a heated building usually contains more moisture than does the external air.

This means it is at a higher pressure which tends to force the warm air through the structure taking the moisture with it. Most building materials, except metals, plastics and certain lined elements, are to some extent permeable and do not obstruct the movement of moist air through the structure. The warm moist air will eventually cool below its dew point within the fabric of the building resulting in condensation. This form of condensation is INTERSTITIAL CONDENSATION.

Interstitial Condensation is rather more complex than the surface condensation and presents a greater hazard because the resulting high moisture content can often go undetected for long periods until serious structural damage has developed such as timber decay. It will also render ineffective any insulation within the component where it occurs.

#### Conditions for Condensation

Condensation in dwelling houses is mainly a winter problem particularly where warm moist air is generated in living areas and then penetrated to colder parts of the building.

Water vapour is produced in relatively large quantities from a number of activities. It can also rise from damp ground under buildings and in some cases penetrate timber floors and pass freely up the cavities of brick walls into roof space. The severity and effects of condensation will then depend on the type and nature of building construction and the extent of the vapour barriers created in each design.

In timber frame buildings and wall the external cladding is liable to become wet by interstitial condensation as water vapour passes through the structure. This has caused failure of the applied painted coatings in a number of ways (loss of adhesion, blistering and chemical change) with consequent disfigurement. The use of impermeable roofing felt to prevent water vapour reaching the cladding has redirected the condensation process as moisture will condense on the sarking and drain into the framing timbers.



The traditional design of roofs has induced the occurrence of condensation, especially in the winter. In a flat or decked roof construction the waterproof roof membrane is also a vapour barrier. The water vapour is then prevented from permeating to the external environment. Condensation is then induced to occur within the roof deck or condense under the roof sheeting and drip from it.

Condensation will also occur in low pitched roof constructions particularly when the ceiling follows the slope of the roof. The wetting of ceilings with condensation will also occur when the cold air through either convection process or percolating from the external atmosphere lowers the temperature of ceilings and condenses water vapour from the underlying rooms. The effects are made apparent when little or no provision is made for ventilation of the roof space.

Condensation will often occur in brick cavity walls where moist air in the construction and external cold air circulate in a confined space. The temperature of the moist air is lowered, reaching the dew point and moisture is deposited on the coldest nearby surface, in some cases causing water to drip from the surfaces.

Condensation will also occur under suspended floors where the temperature of humid air in the floor space is lowered by cold air moving in through ventilators and water is then condensed on the underside of floor. This will often induce timber decay of the wooden floor.

#### The Causes of Condensation

In dwelling houses condensation is related to modern living standards, economic pressure and change in building design.

1. The main cause of condensation is naturally the generation of moist warm air by domestic activities. Moist air can come from cooking, bathing, washing and drying clothes as well as paraffin heaters and flueless gas heaters - up to 17 litres of water can be produced daily in some homes . Usually in certain areas such as bathrooms and kitchens where moist, warm air can then spread to cooler parts of the house to condense on cold surfaces.

The effect of moisture generation is further aggravated by the way houses are ventilated - it is theoretically possible to avoid condensation by adequate ventilation. Up to about the late 1960's there was natural ventilation in many homes because of the lack of double glazing, poorly fitting windows and doors, open fire places. Present attitudes have eliminated natural ventilation by the use of double glazing, draught excluders, fitted carpets (preventing air movement up through suspended wooden floorboards) and the removal of open fire places with the introduction of central heating. To put it simply the greater ventilation the greater heat capacity required to replace heat loss in this way - buildings have been effectively sealed and provided better conditions for condensation to occur.



Ventilation is only effective if consistent throughout the whole inside of the house. Further problems are encouraged by poor ventilation where stagnant air pockets are created. There is a real danger of condensation occurring where air is left undisturbed behind furniture and cupboards, often recognised by the appearance of mould growth.

Many houses remain unoccupied and unheated throughout the greater part of the day, allowing the fabric of the building to cool down. The moisture producing activities are then concentrated into a relatively short period. This sudden increase in warm air can produce condensation as the air comes into contact with the relatively cold structure which is still warming up.

2. Economic Pressure - dramatic increases in fuel prices force many occupiers to under use heating systems, not heat unused rooms and seal all draughts and reduce ventilation as described previously.

Background heating is often provided by flueless gas and paraffin heaters as a way of trying to heat and save costs. Excessive quantities of moisture are produced from such heaters. For every litre of paraffin burnt over one litre of moisture vaporises into air.

3. Due to changes in building design - many dwelling houses now have central heating systems where open fire places have been removed, thus reducing natural ventilation.

Windows without controllable ventilation became popular and permanent ventilators were not used in rooms without a flue.

Modern changes in roof design, including elimination or overhanging eaves and lowering the pitch, also reduced ventilation and increased the likelihood of condensation.

### Mould Growth

Mould growth will appear on any damp surfaces such as plaster, wallpaper and timber and is associated with condensation problems in many buildings. It is unacceptable because of appearance (unsightly growths of various colours - greens, yellows, pinks, black, grey or white), odour (musty and damp), and fears of health and hygiene considerations (particularly in food processing industries).

Moulds are simple fungi from several groupings in the fungal classification system. A typical life cycle is shown in figure 5 where spores are produced under asexual and sexual reproduction. It is sexual reproduction of fungi which allows genetic modification to adapt and tolerate changes in the environment such as humidity, temperature and food requirements.

There are three principal features common to the broad range of mould fungi:

1. Simple food requirements: able to exist on non-nutrient materials such as plaster and brick which have traces of contaminating organic matter.
2. Produce vast number of spores which allow rapid adaptation to particular environments.

3. Grow very quickly under suitable conditions.



The main requirement for the development and growth is a source of moisture although food, oxygen and a suitable temperature are also important. It is available water which is critical to mould development and different materials at the same moisture content often have different water availability.

Moulds can be regarded as hydrophilic fungi (tolerating high water availability) although individual species have their own optimum requirements for moisture. In most situations where surface condensation occurs and the relative humidity of the internal atmosphere exceeds 70% mould growth will be established.

The susceptibility of material to mould growth will vary as mentioned previously. For instance it has been demonstrated that mould will develop on cheese and leather at 76% RH. It will not develop on wood below 85% RH nor on cotton or glass below 96% RH. The longer surfaces are under conditions of high moisture or local high humidity the greater the probability of mould growth developing. In a number of structures there may be a local or adjacent high humidity at the walls of the buildings sufficient for mould growth whereas the internal environment may not be experiencing relative humidity above 70%.

There have been approximately one hundred species of fungi detected in dwelling houses. The species commonly encountered were Penicillium, Cladosporium, Rhizopus, Mucor. Fungi specifically encountered on paint and plaster were for example Cladosporium cladosporioides, Aspergillus niger, Penicillium purpurogenum and Mucor plumbeus.

The appearance of mould growth in buildings often suggests poor standards of property maintenance and/or domestic activities encouraging condensation. Prolonged exposure to mould growth will cause disintegration and disruption of certain painted surfaces. Paper and certain fibre building fabrics may also be softened and deteriorate as some mould species are capable of digesting cellulose.

#### The Cost of Unchecked Condensation

A paper in the British Medical Journal, Vol. 298, June 1989, stressed the higher incidence of ill health in damp buildings with accompanying mould growth and it is now accepted that air pollution is a major reason for the huge increase in asthma sufferers of whom children are often the most vulnerable.

The use of the DPR Kleenair anti condensation unit is by far the most cost effective method of eliminating condensation

The direct cost of a condensation and mould growth problem where only one room has to have mould cleaning or redecorating is at least £250 per year, and in many cases is much more than this, If for example more than one room is involved. Sometimes window frames need to be repainted and repaired, or even replaced. The occupants' clothes and other belongings may go mouldy and need to be replaced. In extreme cases the occupant may take a Landlord to the Courts and compensation payments of several thousand pounds may result.



In addition these direct costs, there is a substantial 'hidden' cost which relates to administration. In the case of Local Authorities and Housing Associations for instance, a Surveyors time is consumed in repeatedly being subjected to the Tenants complaints. In some instances Surveyors productivity is impaired by this disruption and aggravation.

Condensation is an increasingly serious problem in dwelling houses and offices. It affects over 50% of Buildings in the UK.

Accompanying condensation there is an increase in the presence of mould growth and many of the household pollutants. Input ventilation systems are a cost effective way to eradicate condensation and black mould problems.

We at DPR have supplied and installed proven Input Ventilation Anti-Condensation Units for an ever increasing number of Local Authorities and Housing Associations on a continual basis. We have practical expertise second to none and our high quality installation service means you can rely on the effectiveness of the equipment and its installation.

1. The loft space which contains warmer air mixing with air drawn in through eaves.
2. The warmer fresh air is then drawn into the unit where it passes through a special air filter.
3. The filtered air is introduced into the property through the diffuser grille, located centrally at ceiling level in the landing of the property, and is circulated around the property.
4. The fresh air then mixes with the warm air in the property, thus combating the condensation.
- 5-7. The stagnant air is then expelled through natural leakage points in the property. This also serves to help prevent cold draughts entering the property.

Energy conservation is the responsibility of all of us.

Conventional extractor fans potentially waste over a million kilowatts of energy every year - which is comparable to the total output of two large power stations! Replacing conventional extractor fans with heat recovery systems would save at least half of that energy loss. Input ventilation anti condensation units are a successful and cost-effective way to cure condensation. Input ventilation with heat recovery offers you even more benefit because it can save over 80% of heat which would otherwise be wasted by transferring it to the incoming fresh air supply.

#### Anti-Mould Products

Condensation and black mould are a serious hazard to health. The Environmental Protection Act 1990 puts the onus on all landlords to ensure that their properties are designed and maintained to a standard that prevents conditions arising which can lead to any defect causing damage to the health or personal property of the tenant. Condensation and black mould fall very much into this category. Under the Act, Landlords also have a Duty of Care to their tenants, to ensure that the premises are constructed and maintained free from defects which might cause personal injury or damage to the property of the occupant. It is a proven medical fact that black mould can cause respiratory problems and condensation and dampness can aggravate asthma suffering as well as causing mental distress. It is therefore vital that black mould is cleaned off and condensation problems eradicated as quickly as possible.