

# Ventilation Considerations

## Modern Living

In a world of increasing environmental concerns and rising energy prices the modern home has become much more energy efficient. This is generally a good thing but there can be some associated drawbacks with this new way of living. Up until the late 1960's there was natural ventilation in many homes largely due to the absence of double glazing. This took the form of poorly fitting windows, doors and open fire places. Modern practices, designed to prevent drafts, save heat and keep energy bills low have inadvertently eliminated all natural ventilation.

- Double glazing
- Draught excluders
- Fitted carpets (which prevent air movement up through suspended wooden floorboards)
- Central heating (and the removal or blocking up of open fire places)

Buildings have become, in effect, sealed from any natural flow of air. This provides better conditions for condensation build up; airborne contaminants from flooring materials, furnishings and cleaning products. The air exhaled by the occupants and any tobacco smoke can build up and can affect health adversely. Damp can arise from the many sources of water vapour in the modern house. Current building regulations require ventilation be fitted to new homes to maintain a flow of healthy fresh air through the house and prevent internal air contamination and damp. However ventilation accessories are often omitted from replacement windows because their function is not fully understood and because of the increased costs. And yet indoor air quality and effective ventilation is more important now than ever, not only for the buildings but for its occupants.

## The Repercussions of Air Tight Homes

*"Fresh Air is healthy, stale air is not. Please explain?!"*

The usual concentration of oxygen in the atmosphere is 20.9%. Without adequate ventilation this level is reduced surprisingly quickly by breathing and combustion. The air we breathe is a mixture of gases including nitrogen, oxygen, carbon dioxide, water, argon, and trace gases. Each day we inhale around 14,000 litres of air as we take about 26,000 breaths (that is equivalent to about 150 full bathtubs). As we process a breath of air we remove a certain amount of the oxygen and exhale any unwanted gases. If the house or room does not allow the air to be replenished with fresh air the oxygen levels drop as we re-inhale the same air again and again. This is obviously unhealthy. If there is a smoker in the house the used air will also contain some very toxic gases which will be breathed by all the occupants in the house. There are many articles on the physiological, biological and physical affects of poor air quality.

*"Moisture is produced in abundance in modern living conditions. Inadequate ventilation will cause damp, mould and rot."*

Sources of moisture:

### Breathing, Perspiring

An average person inhales and exhales a volume of half a litre of air with every breath. The exhaled air is at 100% humidity. This means that two sleeping adults produce 1 ½ pints of moisture every 8 hours which is absorbed as water vapour into the atmosphere. We perspire 24 hours per day (this partly explains why we need to consume 3 litres (5 ½ pints) a day, 1 litre of which should come from the food we eat).

### Cooking, Tea Making

Saucepans and kettles generate steam which is absorbed by the surrounding air. An average gas cooker can produce approximately 1 ½ pints of moisture per hour by burning gas.

### Washing Up, Laundry

The vapour cloud given off by hot water is rapidly absorbed into the atmosphere

### Bathing, Washing and Wet Clothing

These are major sources of water vapour in the home. Even cold water evaporates into the atmosphere.

## Home Heating

A flue-less gas heater can produce up to 2 to 3 pints of moisture per hour. Paraffin heaters produce 8 pints of moisture for every 9 pints of fuel burned.

## Indoor Plants

Often overlooked as a source of water vapour. Not only from plants but the soil they are in.

## Flushing Toilets

Water is atomised every time you flush. Water and the other are expelled into the atmosphere without being seen. Time to move your toothbrush to another room!

## Pets and Animals

Pets also emit moisture and odours in the home. Aquariums and fish tanks are yet another source of water evaporation.

## Fridge and Freezer

Fridges remove moisture from the fridge mechanics and expel this moisture at the rear as vapour near the condensing coil.

To illustrate how much water vapour is in the air, fill a glass from the cold tap. Water droplets will form on the outside of the glass as moisture from the air condenses on the cold surface, like dew on a cold morning.

The normal moisture content of air is dependant on air temperature the warmer the air the greater capacity to hold moisture average humidity is about 40% to 60% with optimum humidity being 50% for a healthy human environment. Humidity falling lower than 40% is also adverse to a healthy environment but excess moisture in the air will be absorbed into the fabric of the building causing damp and rot. Hence roofs are vented as are wooden suspended floors.

## Poisonous Gases and Vapours

Carbon dioxide might be grabbing all the headlines but it is carbon monoxide that is the killer. The emission of carbon monoxide from badly serviced heating systems in poorly ventilated rooms has caused death in extreme cases. In some areas radioactive Radon gas can permeate up from the ground and build up in poorly ventilated houses. Methane and second-hand tobacco smoke which contains over 4,000 chemicals, including 43 known cancer-causing (carcinogenic) compounds and 400 other toxins. These include nicotine, tar, and carbon monoxide, as well as formaldehyde, ammonia, hydrogen cyanide, arsenic, and DDT. Volatile organic compounds (VOCs) are gases or vapours emitted by various solids or liquids, many of which have short and long-term adverse health effects. Household products that emit VOC's include paint, paint strippers, cleaning supplies, pesticides, glues and adhesives, building materials and furnishings. Consequently, concentrations of many VOCs are higher indoors (up to ten times higher) than outdoors. VOCs are compounds that have high enough vapour pressures under normal conditions to significantly vaporize and enter the atmosphere. A wide range of carbon-based molecules, such as aldehydes, ketones and other light hydrocarbons are VOCs.

## Other Causes of Household Air Pollution

Electrical devices and some man made products such as Nylon, rubber and plastic produce positive ions which attract atmospheric pollutants, dust particles and harmful airborne matter into interior spaces, all obviously unhealthy. Conversely, negative ions enhance your feeling of well being. Mother Nature constantly produces negative ions outside the home, from rainfall and wind for example, but not having adequate ventilation means negative ions will not get in. To experience the affect of negative ions take a shower or turn on a cold tap and place your head close to where the water is striking the surface of the sink; you will smell a sweet cold odour. This indicates the presence of negative ions, the same as after a rain storm, sitting by the sea or a waterfall. That is why the Victorians recuperated near the sea and why you find a shower invigorating.

## Odours

We emit odour 24/7 through perspiration and breathing as do all pets and animals. Any material that is in a moisture-laden atmosphere will give off a musty odour as does any room closed for a period of time from the main house without adequate ventilation.

- Cooking (and the food ingredients)
- Toilet
- Porches + boot rooms (which home coats and shoes)
- Cleaning chemicals used around the home
- Tobacco smoke
- Open fire
- Naked flames used for heating or show.

## Regulations, Recommendations and Figures

It is the law that ventilation be provided in every new house or extension built onto an existing property and any rented property. The calculation for ventilation required for a new home takes into account the size of the dwelling, amount and types of rooms etc. This is too complicated to explain here. The recommendation for ventilation in existing properties is approximately 4000mm<sup>2</sup> (one large vent) of fresh air for a habitable room like a living room or bedroom and 2000mm<sup>2</sup> (one small vent) for a non habitable room like a toilet, Bathroom, cloak room or porch. If there is no ventilation except the habitable room then 8000mm<sup>2</sup> is recommended (two large vents). Recently specifications have changed adding new terminology now trickle vents have a measured air flow in equivalent area (EA) requiring further explanation. Home owners can easily become confused making it difficult for the salesperson to justify the product and additional expense when replacing the windows and doors. To illustrate this point please consider a typical scenario:

### *Sales person*

"Here you are Mrs Smith all your windows incorporating eco glass to save you on your heating bill fitted and guaranteed for only £3500"

### *Mrs Smith*

"Yes that looks good but what are these trickle vents on your quote?"

### *Sales person*

"They allow you have ventilation in your home all of the time. It's a good idea and helps stop condensation"

### *Mrs Smith*

"I am replacing the windows because they are draughty and my windows don't cause condensation at the moment"

### *Sales person*

"The new windows will be air tight, and this may cause condensation to form on them which is why we have the trickle vents. Trickle vents aren't draughty, you can close them if you wish"

### *Mrs Smith*

"Why should I spend money on something that I will not use? I want lower heating bills. That's why I want new windows but to buy new windows with a hole in them to let air in! No thank you! "

Faced with this scenario the sales person often omits the trickle vents as it complicates and may jeopardise the sale, especially when condensation on the windows is mentioned. In brand new houses occupants often fill the vents with cotton wool and close them without realising that the bricks, timber, concrete and other materials in average three bedroom houses absorb approximately 1500 gallons of water during construction. This water will dissipate into the internal air during the drying out period and can take up to a year. Occupants of bed-sits which are built to building regulations will have fire doors with fire strips so smoke cannot enter or leave the room. Obviously neither does fresh air but even if trickle ventilation is fitted tenants often close them due to the afore-mentioned misunderstanding of their real purpose.

## Two Products with Synergy

For ventilation to work properly a minimum of two vents is needed. One in isolation will do very little, more than one vent allows cross ventilation, fresh air in and stale air out. If only a single outside wall is available then one vent should be at least 600mm above internal floor level and the other at least 1.6m above internal floor level. The difference in air temperature from floor to ceiling will aid in the air circulation through the vents.

## Trickle Vent

Used in toilets, porches, conservatories, cloak rooms, living rooms, kitchens, bedrooms and hallways etc. They are available in many colours and designs normally fitted in to the sash, vent (opener) or head of a window or door. You simply control with a finger touch lever to open or close the vent. Can easily be retro fitted to an existing window or door with a series of holes ranging depending on trickle vent design and size from 8mm to 13mm. Circular clear plastic vents can be fitted into the glass but this will affect the longevity of a double glazed unit, not a common solution anymore and very expensive to buy and fit.

## Humidity Wall Vent (Auto Vent)

This vent is fitted through an outside wall. This vent opens and closes depending on the moisture content thereby not wasting heat. It is particularly good for bathrooms as it avoids the need for a noisy fan. A combination of auto vents and trickle vents will work together allowing moisture laden air to be exchanged for fresh air and will minimise the energy wasted. In a house of multi occupancy (HMO) or bed-sit the auto vent is the superior solution. When the door is opened and closed the auto vent also automatically opens allowing an exchange of air adding a second benefit to the primary role.

## Summary of the Two Benefits

*First* - is eliminating damp that will form in corners of rooms, behind furniture, on windows and external walls (especially if north facing) and mould (fungi) on window seals and internal window cills. Not forgetting damp clothes, bed linen and creatures that thrive in these conditions such as silver fish, lice and house mites. There have been approximately one hundred species of fungi detected in dwelling houses. The species commonly encountered were Penicillium, Cladosporium, Rhizopus, and Mucor. Fungi specifically encountered on paint and plaster was: Cladosporium cladosporioides, Aspergillus niger, Penicillium purpurogenum and Mucor plumbeus.

*Second* - is the exchange of air. Air quality is very important. We need fresh air to be healthy. It also helps with our moods and our general well being and allows a good night's sleep. Fresh air also helps to eliminate positive ions, chemicals, particles, dust, viruses and air borne spores that can come from house materials, damp surfaces, people and their activities. Fresh air will replenish negative ions and oxygen. Studies show even house plants benefit from clean air that contain less of the pollutants that was found in an average dwelling. Pets would also be affected by many of the chemicals found especially from second hand tobacco smoke and modern materials.

**Please Note** - Mechanical ventilation that uses a motorised fan to extract air from the kitchen can not be solely replaced with trickle ventilation as all trickle vents are for background ventilation and will not remove cooking smells or toilet odour efficiently. If a gas appliance is fitted then permanently open ventilation is mandatory as it can be a life saver some 10,000mm<sup>2</sup> is the minimum where the gas appliance is located.

When gas does not burn properly, as with other fuels such as coal, wood or oil, excess carbon monoxide is produced, which is poisonous. You can't see it. You can't taste it. You can't even smell it. But carbon monoxide can kill without warning in just a matter of hours.

You are particularly at risk when you are asleep because you cannot recognise the early symptoms of carbon monoxide poisoning. These include tiredness, drowsiness, headache, nausea, pains in the chest and stomach pains. These symptoms can mimic many common ailments and may easily be confused with flu or simple tiredness.

**Every year about 20 people die from carbon monoxide poisoning in the U. K. Many others also suffer ill health.**

- \* Your appliance was poorly installed
- \* Your appliance has not been checked for safety or maintained regularly
- \* Non-CORGI-registered (now called GAS SAFE) engineers to install or maintain your appliances
- \* your appliance is not working properly
- \* there is not enough fresh air in the room
- \* your chimney or flue gets blocked up

Auto Vent Fitted on an Outside Wall (Available in our eBay Shop)  
Trickle Vent Fitted in to Windows and Doors

- \* Silent in operation
- \* Relatively low cost purchase and cost free operation
- \* Unobtrusive
- \* Minimising the escape of warm air
- \* Fit and forget product
- \* Can be closed in very cold weather
- \* No power required
- \* Auto vent opens when certain humidity level is reached
- \* Draught free
- \* Minimum external acoustic impact
- \* Easy installation

In a bedroom especially a bed-sit, fitting a trickle vent to a window and an Auto vent fitted in the outside wall allows cross ventilation. Optimum results will be achieved in air circulation, minimising moisture and air quality related problems, minimising the loss of valuable heat while retaining maximum intruder security.