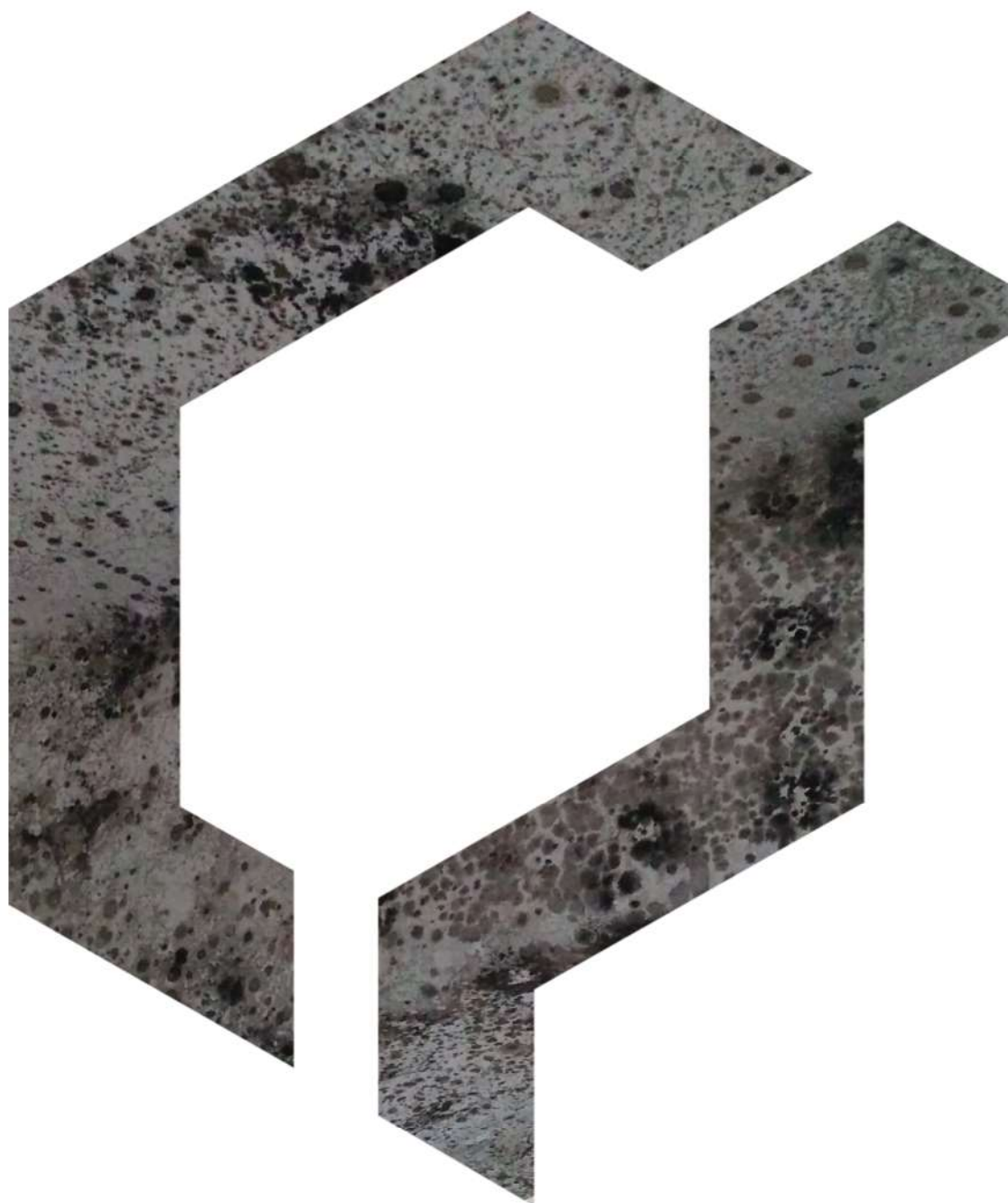


THE TRUTH ABOUT **CONDENSATION**

a complete guide to understanding condensation



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INTRODUCTION

The purpose of this book is to educate you on the causes of condensation so as to enable you to fix it yourself without the hefty, and often unnecessary, costs of calling damp specialists.

There are many unscrupulous damp 'specialists' who sell fans, chemicals and even house makeovers at huge expense. These are generally to 'shut the gate once the horse has bolted.' Some changes to your property will undoubtedly help but if air moisture is controlled then there should be no need for huge costs year after year.

In fact, once you understand the process, it is very easy to adjust lifestyle habits to almost completely eradicate air moisture.

Condensation is just one of the many forms of damp. It is far too often underestimated, and misdiagnosed due to its tendency to appear like other forms of damp.

Not only can condensation and its effects cause huge cosmetic damage but, more worryingly, it can adversely affect health, especially in small children, the elderly and other vulnerable groups, especially those with auto-immune conditions.

Condensation is the only form of damp that is not directly related to a structural problem. Condensation is user-based and can be eradicated by making some very simple lifestyle changes. By following this easy-to-use guide you can completely remove condensation from your home without the need for expensive or disruptive remedial works.



WHAT CONDENSATION IS

CONDENSATION IS THE NATURAL PROCESS OF CHANGING MOISTURE PARTICLES (USUALLY KNOWN AS 'STEAM') INTO LIQUID WATER. AS AIR MOISTURE TOUCHES A COLD SURFACE IT COOLS AND RELEASES THE WATER.

The process is all to do with what we call 'Relative Humidity' (RH). This is the amount of moisture air can hold. The amount is related to the temperature of the air. The hotter the air, the higher the potential relative humidity.

For example, the Amazon rain forest is at 80-90% RH, where as a cool environment such as a fridge is at 36% RH. This means that the hotter the air in your home the greater the potential RH level will be. A comfortable level for properties would be 60-70% RH.

A perfect example of the air moisture condensing is a nice cool glass of water. Once poured, droplets will quickly collect on the exterior of the glass. Your home is a larger version of the glass. Windows and exterior walls act like the glass of water creating the cold surface for the moisture to condense on.

The prime example is rain from clouds: as the clouds rise and reach the cooler atmosphere above, the moisture particles of which they consist condense and create droplets.

The moisture particles in a home also collect the dust from the air, dropping them as part of the condensing process, usually on windows and cold corners. This is what creates the typical black spots commonly associated with condensation.

Condensation is predominantly a seasonal problem affecting our homes during the winter months when the temperature difference from inside to outside is greater and our windows are rarely open. As the temperature outside is cold, to stay warm, we close all windows block all draughts and create a sealed box blocking any means of escape for the moisture we create.

But where does all this air moisture come from? It's not as though our homes appear to be full of water.

Well, the answer is deceptively simple: everyday living creates moisture. A family of four people can create a staggering 17 litres of air moisture every day. Some of the ways by which this moisture comes about are:

breathing; sweating; cooking; bathing; washing, drying and ironing clothes.

SOURCE	FAMILY OF 4	LITRES
4 PEOPLE SLEEPING (8 HOURS)		1.6
2 PEOPLE ACTIVE (16 HOURS)		1.6
BATHING		2.0
COOKING		3.2
IRONING		1.0
WASHING CLOTHES		2.0
DRYING CLOTHES		5.0

OBVIOUSLY UNDER NO CIRCUMSTANCES ARE WE SUGGESTING THAT YOU SHOULD TRY TO STOP BREATHING, BUT WE DO NEED TO ALLOW FOR THE MOISTURE WE CREATE TO ESCAPE THE PROPERTY PRIOR TO IT CAUSING DAMAGE!

FACT TO REMEMBER
THE HOTTER THE AIR THE MORE MOISTURE IT CAN HOLD.
THE AIR OUTSIDE IS DRY BECAUSE IT IS COLD;
THE AIR INSIDE IS WET BECAUSE IT IS WARM.

WHAT THE SIGNS ARE

THE FIRST SIGN OF HAVING A CONDENSATION PROBLEM IS THE PRESENCE OF WATER ON WINDOWS & WINDOW SILLS.

This will be worse on single glazed windows as they are much colder. The quantity of water can occasionally be so great that it creates puddles on window sills. In extreme cases it can run off and damage plaster, even rot wooden sills.

Another common sign is wallpaper lifting as the water soaks into the wallpaper and dilutes the adhesive.

The sign that most people recognise, a more serious problem, is when black spots appear. I so often hear people upset that a number of clothing items have been ruined due to condensation being trapped in and behind wardrobes situated on exterior walls.

As moisture cools and condenses it will also fall from the top of the room to the bottom and often settles on plaster just above skirting boards, making it seem as though the water is rising from the floor. In more extreme cases, the moisture may cover the whole wall, creating the impression that it is percolating through the wall.

The common feeling of a home being constantly cold is a symptom that generally sparks behaviour creating greater RH levels. When a person is preparing to bathe, they do not notice all the air movement in the room. Once they have finished and are preparing to dry themselves they notice a big difference as wet skin is more sensitive to the movement of air; much like licking your finger and feeling the direction of the wind.

When the air inside is high in moisture, it sticks to your clothes and skin and makes

your skin sensitive to the natural movement of air around your home. It is often at this point that people turn the heating up, allowing the air to increase its RH and moisture content. And so, the endless cycle of feeling cold continues.

It is not uncommon to survey two rooms of a shared house and record two different readings. One double room with a window locked open 10mm may have a temperature of 21 degrees Celsius with an RH reading of 65%. Another similar room with a window closed and small fan heater constantly running may have a temperature of 32 degrees Celsius and an RH of 94%. In this scenario, the second room would more than likely exhibit all the classic signs and symptoms of condensation.

FACT TO REMEMBER

WET SKIN WILL PERCEIVE THE MOVEMENT OF AIR MORE ACUTELY THAN DRY SKIN: SOMETIMES THIS APPEARS TO BE A DRAUGHT ORIGINATING FROM AN UNINSULATED WINDOW FRAME OR DOOR BUT IT CAN ALSO BE THE OFTEN IMPERCEPTIBLE MOVEMENT OF AIR AROUND THE HOME

BLACK MOULD



THIS IS THE DISGUSTING BIT.

The black mould you may see within a room suffering from condensation is, quite simply put, the bacterium that lives in our mouths. As we breathe out the bacteria is expelled out of the body and into the surrounding air via the moisture particles we breathe out.

As a child, most of us played the game of breathing on glass and writing in the condensed liquid on cold windows. Well, this liquid was simply the water from our mouths. I can remember as a child writing in the water on the bus window...I try to block out that memory as the terror of realisation comes now I know what I was wiping!

Condensation mould is not only black though; it presents itself in a variety of colours for us to get upset about. Typically, hues may range from blacks and greys, whites and even through to more vivid yellows and greens.

But why?

The answer is simple: each bacterium present within the air comes from a different source: skin, food, animals, faeces, agriculture and our general environment. Prolonged exposure to certain bacteria can cause serious respiratory defects, the effects of which will often be more pronounced and serious upon the young, the elderly and those with pre-existing respiratory and/or auto-immune conditions.

The first indication of a respiratory condition brought on by exposure to mould is a feeling of a cold or stuffy nose each morning. This is your immune system reacting to the bacteria in the air. Exposure to these conditions over prolonged periods of time can lead to the emergence of asthma and bronchitis.

It is, therefore, important not only to eradicate any condensation-based mould in the property, but to ensure it does not return, by understanding the origins of condensation and taking assertive steps to combat and correct them.

FACT TO REMEMBER
IF A PROPERTY HAS BLACK MOULD IT IS
SUFFERING THE ILL EFFECTS OF CONDENSATION.
BLACK MOULD ONLY COMES FROM MOISTURE
CREATED WITHIN THE BUILDING.

ORIGINS



FIFTY OR MORE YEARS AGO, CENTRAL HEATING WAS NOT AS COMMON AS IT IS TODAY.

Houses were designed with chimneys and sash windows to allow for the burning of fuels on open fires and to provide adequate ventilation. As the wind passed over the chimney it created a natural suction designed to draw smoke out. This suction also forced the air through the gaps in the sash window, ensuring constant movement of air and preventing build-up of moisture inside the structure. In many modern buildings, however, we seal in all the draughts: this keeps us warm but does not give us clean air to breathe.

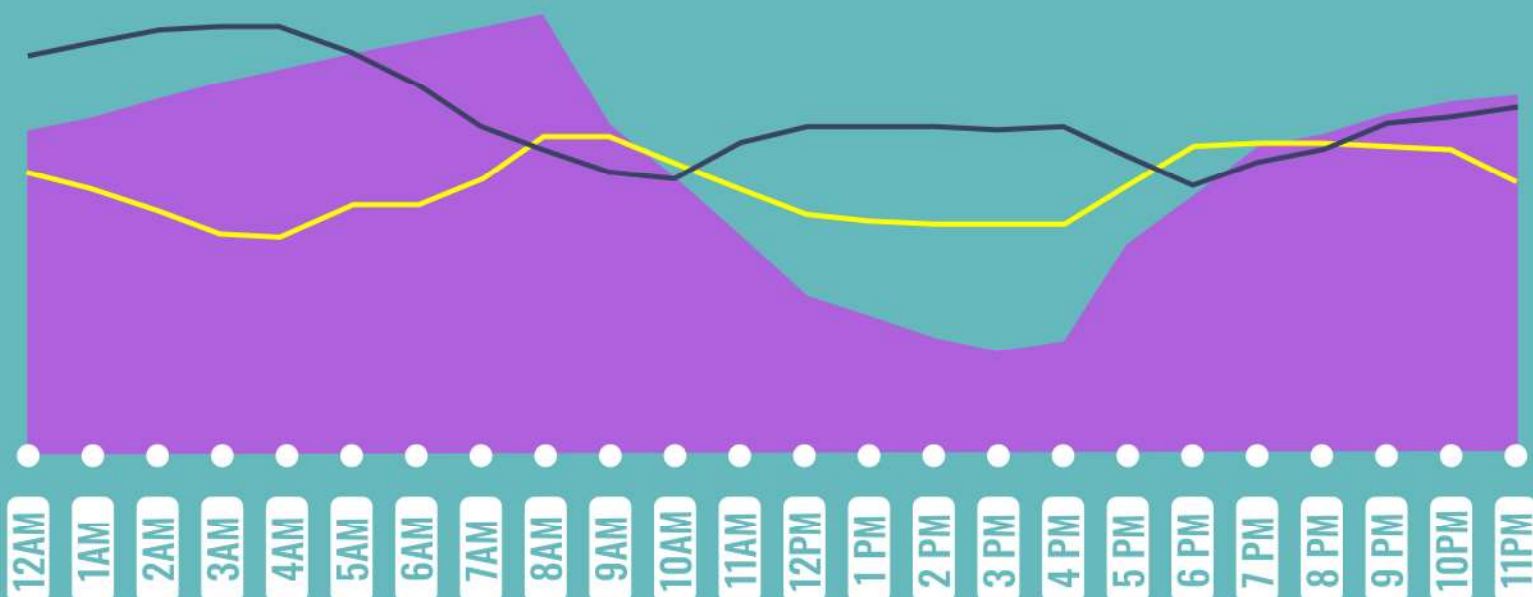
ORIGINS CONTINUED

The graph below illustrates the two common periods that a household would have its the central heating on. Standard hours of usage are generally considered to be from 4 am to 8 am then 4 pm to 10 pm with an average household temperature setting of 24°C (75F). Under such conditions, the household will reach its optimum point for condensation production between 1am and 4 am.

In this graph, it is clearly visible how temperature affects the levels of humidity. It is during the dropping temperature that you get the steep rise in moisture levels. As hot air holds greater amounts of moisture and cold air cannot, when heating is turned off, the RH increases and the pressure gets so great that the air is forced to release the water.

It is during these periods of the day that the damage happens: water droplets appear on cold surfaces and deposit bacteria.

TABLE 1
TWO HEATING PERIODS AVERAGING 24C DURING WINTER

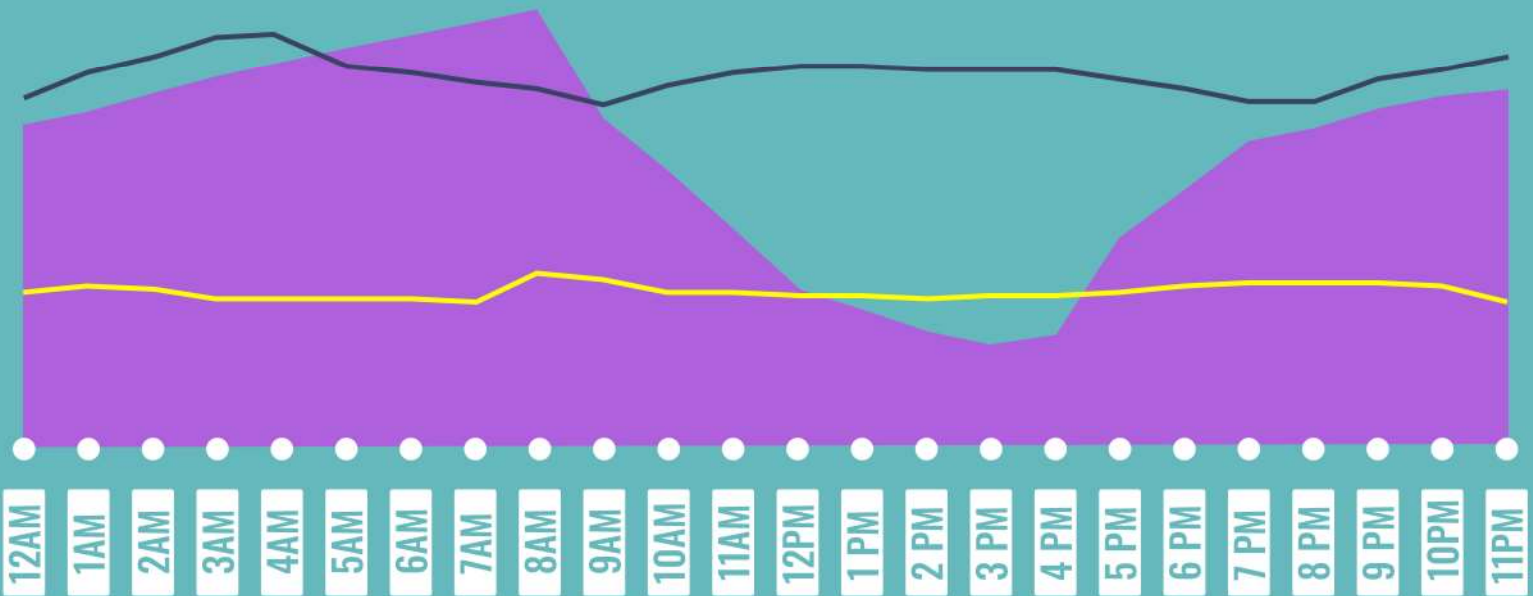


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To prevent this damage occurring, it is recommended that the temperature setting is lowered to 21°C but kept on for longer periods. The following graph, on the next page, shows how this affects the RH levels, reducing rapid drops in temperature and, therefore, condensation production.

TABLE 2
ONE HEATING PERIODS AVERAGING 19C DURING WINTER



Another point is that of dust. We have mentioned that dust particles are collected by moisture particles. Dust is 70% dead skin and harbours the bacteria living on our bodies. As the moisture interacts with the bacteria it creates the perfect opportunity for mould growth. This also indicates that all areas that can collect dust can also, if wet, grow mould.

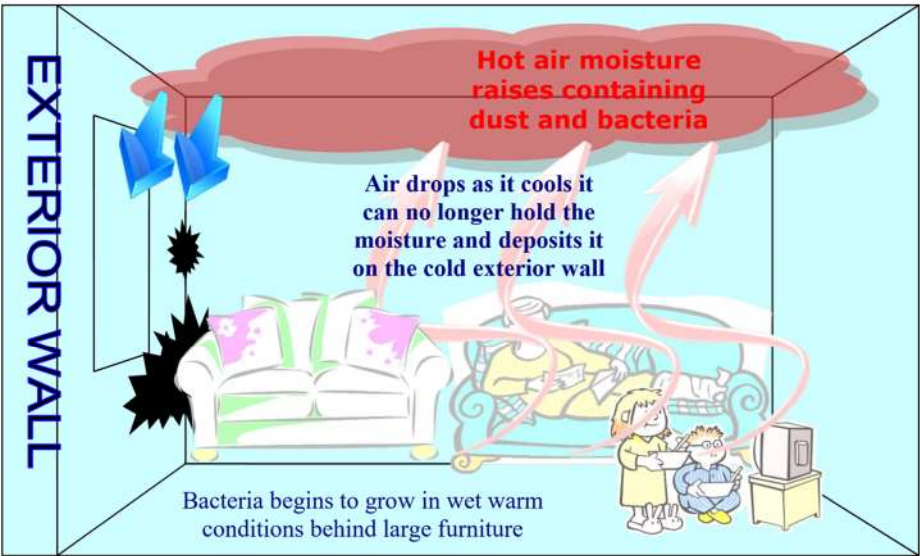
If we don't allow a means of escape for the moisture we create, our air becomes saturated. Bedsits, flats and bungalows are more prone to a build-up of moisture due to the fact there is less space to contain the moisture created. Working families too are more prone as the building is locked up during the day for security yet closed at night also as it is too cold.

Litres	Per
17	Day
119	Week
515	Month
3090	6 months

The diagram below demonstrates the typical movement of air in a room. If a radiator is situated on the opposite wall to the window it will speed up the air movement; if it is situated beneath a window it will slow down the movement and attempt to warm the exterior wall.

It is important to check that you do not have any unnecessary sources of moisture, e.g. roof leaks or plumbing defects, as this will only exacerbate the problem.

Many people whose homes suffer from condensation will buy a dehumidifier. This will help to remove water from the air but will not remove any bacteria from the air.



FACT TO REMEMBER

DEHUMIDIFIERS WILL ONLY REMOVE WATER FROM THE AIR; THEY WILL NOT REMOVE THE BACTERIA. IF YOU USE A DEHUMIDIFIER, YOU WILL STILL BE CIRCULATING THE SAME STALE AIR DAY AFTER DAY.

ERADICATING — CONDENSATION

This is usually the point in a survey that people get suspicious or angry as they find it hard to believe that such a serious problem could so simply be controlled.

Generally, the activities which create the most moisture in a house are performed during the evening or the morning. In order to rid the property of excessive moisture, cross-ventilation has to occur during the period when moisture is being created, or during the day when the property is vacant.

As previously stated, condensation is not a problem which relates inherently to the structure of the building. Certain types of buildings tolerate different RH levels. Properties that have the following features are particularly prone to condensation, due to the presence of cold surfaces for moisture to settle on:

- single glazing;
- no loft insulation;
- solid 9" brick walls;
- single thickness brick walls;
- a lean-to;
- radiators situated away from windows;
- north facing walls.

By following some of these simple steps you can adjust your daily routine to create a clean, warm and dry environment, free from condensation:

1. Cross ventilate;
2. Arrange rooms appropriately;
3. Wipe water from glass;
4. Dry clothes in a room suited for water;
5. Monitor bathing habits;
6. Monitor cooking habits.

CROSS VENTILATION

The first and most important process is to create cross ventilation. Cross ventilation is different to ventilation for one simple reason. Ventilation is to open one window. Cross ventilation is to open a window at the front of the property and one at the rear. This creates an inlet for fresh air and an outlet for wet air. Other forms of ventilation are air bricks/vents and trickle vents on windows (see the section on 'Forcing Conditions' for more information).

You will at some time have been in a property with the front and rear door open at the same time. One door will slam shut as the current of air passes through the building. The idea is to create this situation on a much smaller scale so as not to remove all heat.

If you taken the example of a typical three-bedroom semi-detached house, it should be sufficient to have one small window open to 25mm on the first floor, whilst relying on an air brick in a rear upper floor room, typically a bathroom, to create cross ventilation during typical working hours. Upon return home from work, the process of cross ventilation should have adequately renewed the previous day's air within the dwelling so that what is being heated up is fresh, dry and clean.

The time of cross ventilation is not as important as the amount of cross ventilation. A period of 4-6 hours should be considered as a minimum to allow one day's worth of moisture to escape. However, the optimum period of moisture removal would typically be between 4 pm and 10 pm: the point at which most moisture has been created and the property temperature is preparing to fall and RH potential reduces.

Some people prefer to only do this during the hours they are at home for security reasons. Conversely, some prefer to do this during the hours they are out so as to have the air flow at time they are not in.

Some modern double-glazed UPVC units have a double locking mechanism allowing the user to secure the window in an open position. To check whether your windows have this, you should inspect the locking mechanism on the window frame to see if it has two positions. The advantage of this is that it is the same lock and is therefore just as secure, enabling the occupant to choose any period in the day to cross ventilate. Even more recently windows are fitted with trickle vents: if left open they do the same job. They are very small and therefore the open time should be increased. I suggest they are opened and forgotten about.

FACT TO REMEMBER
COLD, FRESH AIR DOES NOT CAUSE ILLNESS.
BACTERIA, VIRUSES AND LOW IMMUNE SYSTEMS CAUSE ILLNESS.
NO-ONE EVER DIED FROM BREATHING FRESH AIR.

ROOM ARRANGEMENT

It is common for bulkier items of furniture to be situated on exterior walls, creating the perfect environment for mould growth. This is due to the fact that there is little or no air movement behind large furniture close to the wall and thus no method for the condensed moisture to evaporate.

As exterior walls are colder than interior walls, they create the perfect surface for condensation. Sizeable items of furniture hide this fact until water and bacteria get to levels that mould growth is apparent behind beds, chests of drawers and wardrobes, when usually the sign is that material, clothes and accessories begin to be affected by the mould growth.

It is extremely important that large furniture is positioned against internal walls as far as is possible. Where the environment prevents this, a gap of at least six inches (15cm) should be allowed for air movement.

**FACT TO REMEMBER
BULKY ITEMS OF FURNITURE
PLACED AGAINST EXTERNAL
WALLS AND HARD-TO-REACH
CORNERS ARE A PERFECT
BREEDING GROUND FOR
BACTERIA**

WIPE WATER FROM GLASS

A simple and extremely effective way of removing excess water from a property is to wipe it away from glass surfaces.

In order to maximise the effectiveness of this action, water should be wiped away from glass each morning, using tissue, and disposed of by flushing down the toilet. Many people leave the water each day: this only allows the water to be evaporated by the heating, moving it to the internal atmosphere. The next night it gathers with the next day's moisture and settles again on the window the next morning. This increases day after day.

although well intentioned, some people misguidedly wipe the water with a cloth and put the cloth on a radiator which simply serves to evaporate the water into the internal atmosphere. The next night it gathers with the next day's moisture and settles again on the window the next morning.

Once wiped and flushed the water is gone immediately. This process will only be regular during the drying out period immediately after problem is noticed. It will not necessarily be needed all year as, if all steps are followed, moisture will be removed daily.

DRYING CLOTHES

Due to inclement weather conditions, it is very often necessary to dry clothes inside the property during the winter months. Clothes are often placed on heaters, radiators and banisters to dry. It is important to remember that this is the greatest cause of condensation, as the water only evaporates to air moisture and does not leave the home.

By following the guidelines below, clothes can be dried inside the home with minimal amounts of condensation being created:

1) Use a room which is designed to cope with high water levels, e.g a bathroom or a kitchen.

2) Ensure that bathrooms are fitted with an air vent or extractor fan. Under this circumstance, free standing clothes horses and internal washing lines are acceptable;

— ERADICATING CONDENSATION — CONT.

3) If using a kitchen, ensure that the fan is not simply a grease filter, but that it is vented out, via a tube, to the exterior of the property.

BATHING HABITS

A window should be opened wide immediately after a shower or bath has been taken and left open for 30 minutes to ensure that all excess moisture has been allowed to escape. Bathroom doors should be kept closed to avoid moisture escaping into the rest of the property.

If an extractor fan is fitted, then you should ensure that this is on during the bathing period. There are 3 types of extractor fan and it is best to familiarise yourself with the type used in your property, so as to ensure optimal usage:

1) Pull cord: this is user operated and will have to be switched on during each use;

2) Light activated: this will turn on automatically as light is activated. Some have a timer fitted that will be programmed to stay on for a period of time once light is turned off;

3) Humidistat: these fans are permanently switched on but only activate during times of high moisture and commonly also run on a timer system.

COOKING HABITS

When cooking, simply ensure either that a window is wide open or that the extractor fan is in used to remove all moisture.

To have an extractor fan fitted, please call Crownstone Group on 0208 226 5654.

FORCING THE CONDITIONS

This is the process that damp specialists use to remove the consequences of people's actions. Solutions range from the easy to install and inexpensive to the invasive and costly.

GENTLE CROSS VENTILATING SOLUTIONS

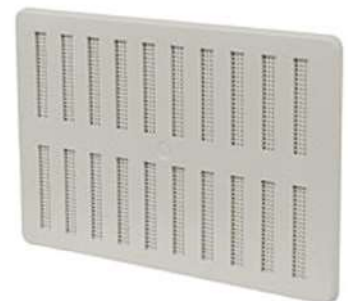
1) Air bricks are essentially a 150mm x 230mm hole through the wall. They are permanent ventilation solution designed to force cross ventilation.

Air bricks should be installed as high up the wall as possible so as to let the moisture out whilst it is still in the form of steam.

Low fitted air bricks are ineffectual, as the moisture has already turned to water by the time it reaches its escape point. Air bricks will generally be fitted in bedrooms, bathrooms, kitchens and hallways. In a normal two storey house, living rooms and dining rooms will not necessarily benefit from air bricks, however they should be considered as a viable method of ventilation for all rooms in a bungalow or flat.

To function properly, it is imperative that air bricks are not closed, covered over or taped shut. If you would like to have air bricks installed, please call Crownstone Group on 0208 226 5654.

2) A common alternative to air bricks are trickle vents. These are very small and therefore will need to remain open longer to vent the same amount of moisture as an air brick would do. If you would like to have trickle vents installed, please call Crownstone Group on 0208



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FORCING THE CONDITIONS

COMPLETE HOME VENTILATION UNITS

If problems persist, then it may be necessary to install a home ventilation unit – essentially this is an atmosphere changing machine. This machine will force the cross ventilation needed to remove all air moisture daily.

These units employ fans to gently draw air into the home, at the same time creating a small amount of pressure and forcing the wet air out through the air bricks or trickle vents. This solution will greatly improve the quality and cleanliness of the air inside your home.

These fans run 24 hours a day, typically through the autumn and winter months, from September to March. By operating on a transformer, energy consumption is reduced to a level comparable to running a single 12V battery, protecting the environment and driving down energy bills. They are also whisper quiet so as not to disturb occupants. To have a home ventilation unit fitted, please call Crownstone Group on 0208 226 5654.

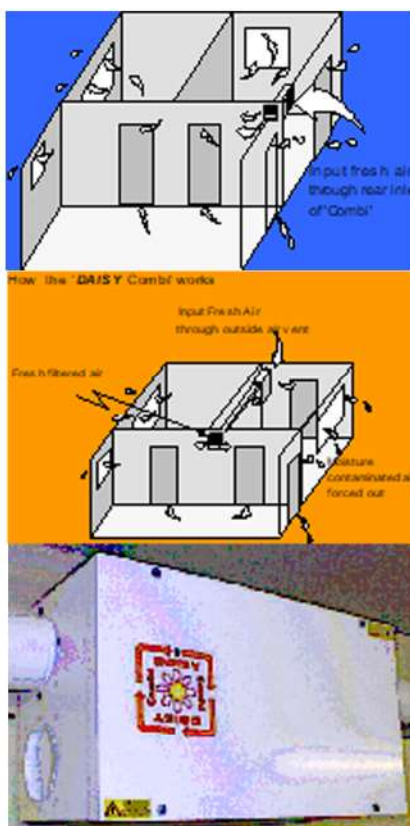
EXTRACTOR FANS

All bathrooms and kitchens should be fitted with at least a 4" extractor fan. There are 3 types:

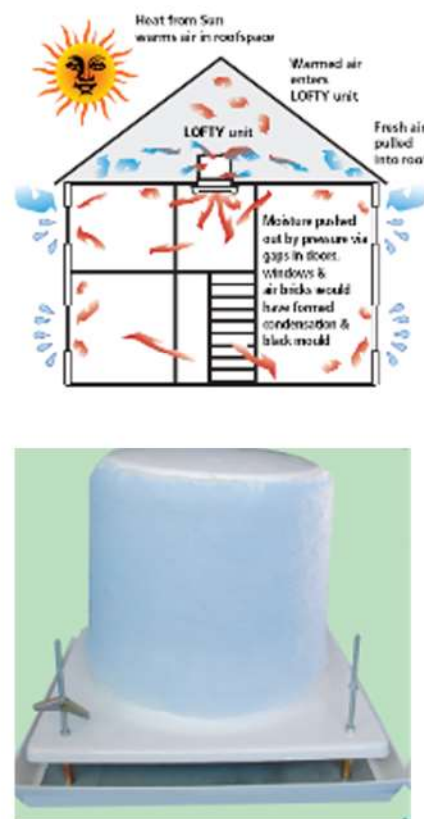
1) Pull cord: this is user operated and will have to be switched on during each use;
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3) Humidistat: these fans are permanently switched on but only activate during times of high moisture and commonly also run on a timer system.

If you do not currently have an extractor fan fitted and wish to discuss the options available to you, please call Crownstone Group on 0208 226 5654.

POSITIVE PRESSURE VENTILATION WITH NO LOFT SPACE



POSITIVE PRESSURE VENTILATION WITH LOFT SPACE



INSULATING A PROPERTY

If a property is well-insulated it will warm the surfaces up to force the condensation to the windows where it is more easily dealt with by daily wiping away. This is not removing condensation just moving it to an area where it is more easily accessible and less likely to cause permanent damage.

Areas to consider insulating are:

1. Lofts;
2. Cavity walls;
3. Solid walls, through the deployment of insulation boards.



FORCING THE CONDITIONS

LOFT INSULATION

Loft Insulation is very common and recent legislation states that the recommended depth of blanket style insulation (glass or mineral wool) for a loft is 250mm to 270 mm. If you already have insulation, but it was put in some time ago, it is worth checking the depth, as, as recently as 1995, the recommended depth of insulation was 200mm.

CAVITY WALL

Cavity wall insulation is a great way to move condensation to the windows for the entire property. This will break the connection between cold surface and warm air. Its main purpose though is to reduce the amount of heat loss thus reducing your heating bills.

SOLID WALLS

If fitted furniture is on the exterior wall it may be necessary to get insulated plaster board fitted in place of the laminate back to warm the wall up thus moving the moisture to colder surfaces. If there is no way to avoid placing large furniture on exterior walls the same thing should be fitted but to the entire wall. This is essentially a plaster board with 1 inch (25mm) of polystyrene attached. Once skimmed with plaster, insulation boards can be decorated as normal.

MOISTURE TRAPS

Dehumidifiers are effective at removing moisture from the air. This will help to remove water but will not remove any bacteria from the air.

Silica-based moisture traps can be placed at the bottom of wardrobes. These will absorb a substantial amount of water but will need to be replaced regularly. One will be needed for each localised area affected by condensation.

It is not wise to re-decorate until you are entirely sure that you have controlled or eradicated the moisture problem.

If there is no reoccurrence for a period of between four and six weeks, then it is considered safe to re-decorate. Follow these simple steps to ensure stains do not follow through:

1. Wash all mould with a strong bleach;
2. If mould has grown into the wallpaper, then it will have to be removed and replaced;
3. Seal stains using an oil-based paint (satin finish is ideal in this scenario);

These steps having been followed, then you are able to decorate as normal.

If you are unsure whether it is appropriate to redecorate, please contact Crownstone Group on 0208 226 5654 to arrange for you're a survey of your property to be carried out.

There are a range of chemicals and paints designed to stop mould growth on surfaces. In reality, should you follow the recommendations made in this book, the mould should not return and there should be no requirement to employ these costly and unnecessary measures.

AFTERCARE & REDECORATION