What is Condensation?

Condensation occurs where moist air comes into contact with air, or a surface, which is at a lower temperature.

Air contains water vapour in varying quantities, its capacity to do so is related to its temperature - warm air holds more moisture than cold air. When moist air comes into contact with either colder air or a colder surface, the air is unable to retain the same amount of moisture and the water is released to form condensation in the air or on the surface.

Condensation is generally noticeable where it forms on non-absorbent surfaces (I.e. windows or tiles) but it can form on any surface and it may not be noticed until mould growth or rotting of material occurs.

Conditions for Condensation

In Britain, condensation in houses is mainly a winter problem particularly where warm moist air is generated in living areas and then penetrates to the colder parts of the building.

The moisture in the air comes from a number of sources within the house. Water vapour is produced in relatively large quantities from normal day to day activities - a 5 person household puts about 10 kg of water into the air every day (without taking into account any heating) - i.e.

- breathing (asleep) 0.3 kg
- breathing (awake) 0.85 kg
- cooking 3 kg
- personal washing 1.0 kg
- washing and drying clothes 5.5 kg
- heating - especially paraffin and flueless gas heaters. For every litre of paraffin burnt over one litre of moisture vaporises into air. Every carbon fuel produces some amount of water from combustion.
- (1 kg of water equates to about 1 litre)

Moisture can also be drawn from the structure of the building into the internal air; from below the floor or through the walls/ceilings.

Problems with the structure of the building can mean that its moisture content is unnecessary high. This can either be due to the method of original construction or as a result of structure failures.

Older houses may not have a damp proof course (DPC) which prevent soil moisture from rising up into the living areas, lack of a DPC can occur in walls or under solid floors.

Buildings may also lack or have insufficient air bricks to allow adequate underfloor ventilation.

Structure failures can range from bridged DPC's (either externally or within the cavity of the wall) to damaged roofing or gutters/down pipes.

The effect of moisture generation is made worse by keeping the moist air in the house - it is theoretically possible to avoid condensation by adequate ventilation. Usually in certain areas of a house (such as bathrooms and kitchens) the warm air contains a lot of moisture, if that air then spreads to cooler parts of the house, it will condense on any colder surface.

Up until the middle/late part of the twentieth century, most house had high natural ventilation as the level of home insulation was low. Conservation then became popular and natural ventilation was greatly reduced by the introduction of double glazing, draught excluders, fitted carpets (which prevent air movement up through suspended wooden floors) and the removal of open fire places with the introduction of central heating.

Houses have become more effectively sealed, keeping any moisture produced within the house and providing better conditions for condensation to occur. Ventilation is only effective if consistent throughout the whole envelope of the house. Condensation is encouraged by poor air circulation where stagnant air pockets form (behind furniture and in cupboards) and the first evidence is often the appearance of mould growth.

Modern life styles mean that 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 periods (morning and evening) when the structure is relatively cold while the building is still warming up.

To control condensation

First of all, you need to ensure that the amount of moisture in the air is not excessive.

Check the structure of the building:

- Check that the walls are not suffering from rising damp.
- Ensure that there is damp-proof course, that it is not bridged or damaged. A new damp course can either be installed by removing a brick at a time and inserting a physical DPC, or a chemical DPC can be injected into existing walls.
- The damp-proof course should be at least 6 inches above any outside concrete to avoid heavy rain from bouncing back up and soaking the brickwork above the DPC - consider lowering the outside surface where necessary.
- Check that any wall cavities are clear of rumble, debris can accumulate over the years and to remove it normally requires removal of a brick at each corner and racking the cavity clean. Where the dampness is restricted to one area and no other reason can be identified, it is a relatively easy task to check/clean inside the cavity.
- Check that all airbricks are clear, consider fitting additional airbricks to ventilate under suspended floors (modern practice is to fit a duct across the cavity so that the cavity itself is not vented). Older buildings may not have airbricks, consider fitting them if there are internal suspended floor.
- **Consider applying a surface finish to outside walls to prevent rain penetrating them. Either a clear waterproofing finish which can be brushed on or a paint/textured finish which will cause most of the rain to run down (check that you are allowed to change the outside appearance of your house before you start doing so).**
- Check the roof, make sure that it is sound and directing rain into the guttering, not into the structure of the building.

- Check the guttering and down pipes, make sure that they are carrying the water away and that there are no damaged/blocked guttering or drainpipes causing the external wall to become soaking wet.

- Check solid floors to ensure that damp is not coming up through it, if it is, you may need to introduce or replace a damp proof membrane underneath it (potentially a big job) or fit a more suitable floor covering.

- Check that there are no leaking water pipes or tanks within the house.

Once you are happy with the structure of the building, look at your life style within the building:

- Try not to breath (NO - just joking !!)

- After a bath or shower, try to ventilate the room to the outside, not to the rest of the house - just opening a window (and closing the door) will help.

- Dry clothes out of doors or in a cool area of the premises - this latter suggestion may sound strange, it will take longer but less moisture will be held in the air at any one time.

- While drying clothes indoors, ventilate the room.

- When people come in with wet coats, hang them outside the living area to dry. A good reason for a porch.

- Try to increase the change of air in the premises - increase ventilation. Add forced ventilation/extraction to areas which produce a lot of moisture (kitchen, bathroom). Extractor fans are available with an air-moisture switch so that they operate automatically while the moisture in the air is above a set amount. Other units (more expensive/complicated) are available which remove the moist air but reuse the thermal energy which would otherwise be wasted.

- Consider changing the fuel you use, electric is the driest, paraffin probably the wettest.

- Consider using a dehumidifier - domestic types are now available and can remove a surprising amount of water from the air.

If condensation persists after you have sorted out the basic structure of the building and your life style, there are still some other changes to try.

- In Britain, condensation will almost always occur with single glazed windows. The inside surfaces of these windows can be almost the same as the outside temperature, overnight in winter their temperature can drop below freezing; often the inside window sill will be awash first thing in the morning.

- Simple secondary glazing consisting of little more than a sheet of glass (or plastic) screwed to the window frame with a seal in between can be fitted. This is relatively cheap (especially if purchased second hand - remember that window frames tend to be a standard size, so the chap down the road having double glazing fitted, may have secondary glazing which will fit your windows). Fixed secondary glazing must not be installed on all opening windows in a room as some ventilation is essential. DIY kits are available which allow the secondary glazing to be temporary removed or opened to allow the original window to be opened for ventilation.

- Alternatively new double-glazing windows can be considered. Although much more expensive than simple secondary glazing, there are additional benefits; existing wooden or metal windows will need continuous maintenance and repair - with new double glazed

windows, you get new window frames which will probably be low maintenance or maintenance free.

- Although secondary or double-glazing is unlikely to eliminate all condensation, they should reduce it to an acceptable amount.

- Some decorative materials always have cold surfaces, (i.e. ceramic tiles, mirrors etc.) and are well known for the formation of condensation. Unfortunately we tend to use tiles in the kitchen and bathroom, two rooms where high humidity are likely. There is not much you can do where this occurs other than keeping the room (and so the tiles) evenly heated throughout the day or improve ventilation.

- Some wall surfaces can also be a problem. Where the wall is papered the situation may be made worse if there are many layers of paper, (this can just acts like blotting paper) so strip off all the layers and re-paper the wall.

- Things can also be improved by lining the wall with thin expanded polystyrene (normally available from your wallpaper stockist) before you hang new wallpaper.

- Painted walls can also have a cold surface. If you do not want to paper it, consider lining it with wooden panelling or another material such as cork tiles. Alternatively a wall can be insulated by fitting a false wall with a layer of insulation behind and the front either being panelled or covered with plasterboard so that the new surface can be papered. However, remember that with all these 'covering up' methods, they possibly just hide and do not cure the problem. If the wall is suffering from rising or other damp problems, with the passage of time, the damp will cause damage to the lining (wet rot to the timber etc.) and this will not be seen until it is really serious.

- Ceilings under the roof should not suffer too much from condensation providing adequate roof insulation is fitted. If there is no or little roof insulation, additional insulation should be installed (for some groups of people, there are financial grants in the UK for such work - check with the Local Authority or advice centre for details). Additional insulation will not only reduce condensation, but also reduce energy loss and so save money.

- Where ceilings have a high gloss finish, consider covering with cork or fibre tiles; alternatively wooden panelling can be installed.

- Solid floors (i.e. a slab of concrete) are often cold because of their large thermal mass (they take a long time to warm up). Even vinyl floor tiles tend to be cold, however there are a number of 'warm' flooring available such as cork or cushion tiles. Thin wood flooring can be fitted on most existing solid floors.

It is unlikely that a British home can be condensation free, however by keeping your property properly maintained and thinking about your lifestyle and decoration, you should be able to live with condensation without it ruining your life.