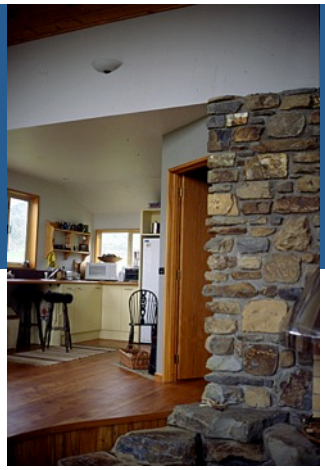
Healthy Indoor Climates



Your Third Skin

It is often said that our clothes are our second skin, and from that we can imagine our home as being our third skin. All three protect us from the elements; regulate our body temperature; breathe as our skin does, absorbing and releasing moisture and air; and filter pollutants.

A healthy skin means constant exchange between the outside and inside. Everyone knows the discomfort of sticky, clinging, smelly synthetic clothes. Extend that perception to the buildings you live and work in. As well as keeping you warm and dry, a house that "breathes" will also regulate humidity levels and filter pollutants through the materials it is made of or through the gaps between the materials.

The indoor climate consists of four different components – air quality, temperature, moisture and electro-climate. For a healthy indoor climate each of these has several elements that need to be considered.

Air Quality

Dust – use materials that do not create or accumulate dust and reduce clutter. Clean with damp cloths. Have a no shoes inside policy and wash or air bedding regularly.
Bacteria and viruses – these thrive in humidity conditions over 70%: good air exchange and hygroscopic materials help reduce the humidity. Direct sunlight (UV light) also disinfects surfaces.
Moulds – moulds thrive in places with poor air circulation such as in mattresses and cupboards, behind furniture or under carpets; allow for ventilation to these areas. Although moulds prefer damp conditions, they can survive dry periods easily.
Smell – you can detect damp, mould, and chemicals through smell. A room ideally should have no odour, or a low, pleasant one.
Ventilation – this replaces stale air, and transfers heat to other parts of the building. Use rising heat or cross ventilation to do this naturally.
Air diffusion – air can be diffused through breathing surfaces, filtering pollutants as it goes through. Some indoor plants, such as the Peace Lily pictured can absorb pollutants in the air.
Atmospheric pressure – tightly sealed buildings and air conditioning can affect the pressure in a building, causing discomfort.

Temperature

Radiated heat – this is the best form of heat, heating surfaces rather than the air. Sources are the sun, fire, bar and radiator heaters.
Convected heat – this heats the air itself, so feels warmer but stuffier. The air tends to circulate more, taking dust etc. with it.
Conducted heat – heat can be conducted through a material. Metal is the best conductor but can get very hot.
Thermal storage – materials with high thermal mass absorb excess radiant heat and re-radiate it when temperatures drop, creating a more even internal temperature.

Thermal insulation – insulation prevents heat coming in when the outside air is hot, and prevents heat from escaping when outside temperatures drop.
Surface temperature – a warm surface temperature is more important than a warm air temperature. Gently radiating heat from surfaces is ideal for heating a building.
Air temperature – a cooler air temperature keeps you from becoming drowsy.
Temperature gradients – heated air moves upwards as cooler air sinks. A vertical temperature gradient of no more than 2 degrees Celsius is best. Bedrooms are better to be cooler than living rooms, with minimum temperatures in these rooms for good health being 16 degrees Celsius and 20 degrees Celsius respectively.

Moisture

Air humidity – if the air is too dry, then people will experience health problems. Air conditioning systems tend to dry the air out. High humidity encourages mould and viruses and dust mites. The ideal relative humidity range should be 30 – 50 %.
Moisture content of materials – excess moisture in building materials leads to mould and fungal growth, and accelerates decay.
Hygroscopicity of materials – natural materials with natural finishes can absorb excess moisture in the air and release it when the humidity drops. This helps regulate the indoor humidity.
Condensation – if excess moisture in the air cannot be absorbed by the building surfaces, then condensation forms on the nearest cold surface, usually windows or other un-insulated surfaces. This can cause mould problems. In rooms that create excess moisture it is best to have extra ventilation, venting directly to the outside.
Isolation – surfaces that can get very cold, such as glass or metal, can be isolated from the outside temperatures by way of double-glazing or thermal breaks. This helps prevent condensation, but you still need to keep moisture controlled at the source.

Electro-climate

Electric fields – whenever there is a source of electricity – mains power supply and wiring, generators and batteries – there will be an electric field. Even if an appliance is plugged in with the switch off, there may still be a field. An object of metal or wood can have fields induced into them if they are close enough.
Magnetic fields – these exist when a current is running, when an appliance is on.

The above often are present together and called electro-magnetic fields.

Radiation – Electro-magnetic radiation occurs at higher frequencies when the electric and magnetic fields can no longer be separated. This includes radio and microwaves. Metal elements in a building can focus and intensify the radiation.

Charges – the air is charged with positive and negative ions, and the balance can be disturbed by electrical equipment or synthetic surfaces, creating too many positive ions. The air before a thunderstorm is positively charged and can cause an uncomfortable feeling. Lightning restores the balance and immediate relief is felt. Plants can help restore the balance of negative ions indoors. Rubbing against synthetic surfaces (including clothes) can develop a positive static charge in your body or an object. This can make you irritable or be released as a small shock. Earth yourself by walking barefoot on damp grass, or gardening.

Terrestrial Radiation – The earth has its own static magnetic field which is beneficial to living organisms provided it is not distorted by rock formations. Living inside, this field can be blocked by concrete or blocked and distorted by metals.

Cosmic Radiation – the effect of radiation from deep space is not fully known, some may be beneficial, some quite harmful. Certainly infra-red rays (heat) from the sun are essential to life on earth.