Irish Examiner
Take a closer look
14 November 2015

Why you need fresh, clean air in your home - and how to get it

Saturday, November 14, 2015

Kya deLongchamps looks at the science behind getting fresh, clean air into the home and the health consequences when there is insufficient ventilation in your home.

Our indoor environments can become as polluted as a city street without proper management.

The exhausts created by breathing, cooking, dust and dander, as well as off-gassing from synthetic finishes and excess chemistry in cleaning products, are carried around as a microscopic, dirty soup.

Particles free floating in the air, together with the inevitable moisture generated from kitchens and bathrooms, influence not only our comfort levels at home but can be pulled into our lungs and affect health too.

For anyone with a respiratory disorder, the quality of the air in the house can have serious impact on everyday quality of life.

The gift of air exchange

Every house needs to 'breathe' – to allow fresh air to permeate our micro-climate, exchanging old air with new, during the day and night. The air entering through gaps in the building's envelope, via open windows, the cooker hood, trickle vents and accidentally by draughts, is generally uncontrolled and almost always inadequate, chilling the environment without efficiency while giving us a necessary flow of clean, dry, oxygen-rich air.

Open fires, despite their low performance as space heaters, incidentally provided what was termed passive stack ventilation (PSV) in older homes. Still, for houses buttoned up in the 21st-century comforts of a tight build and high insulation values, and with humidity creeping to over 55%, could you be sealing yourself into a potentially toxic box?

Serious air management

The most simplistic form of mechanical ventilation would be a fan set in a window or wall of a kitchen or bathroom to handle the burden of extra humidity that can lead to condensation or damp.

Full mechanical air exchange systems do a lot more however, conditioning and even warming a fresh exchange of air throughout the whole house. A fully ducted system of mechanical ventilation with heat recovery (MHRV) or demand controlled ventilation (DCV) uses powered fans to draw that moisture heavy, used air out of the building from every room, simultaneously replacing it with equal quantities of fresh, clean air. Exhaust grilles take the stale air out, while distribution grilles pour the fresh air back to rooms or zones in the house, while heating it at the same time.

ProAir is the only Irish manufacturer of heat recovery ventilation systems in Ireland. MD David McHugh explain the difference between demand control ventilation and MHRV. "With MHRV, the exhaust air stream helps to pre-warm the fresh air stream, while DCV continuously sucks out warm air and replaces it with cold air.

"In a typical 150m sq house, HRV represents a saving of about €400 /annum in heat recovered, but the real advantage of HRV is that it allows you to seal up your house totally and insulate it to the point where there is hardly a need for a heating system at all. Passive house standards cannot be achieved using DCV."

What about mould?

There are some issues surrounding the potential growth of mould in ducting that can be ingested back into the house.

Dave argues: “A properly designed HRV system should be installed totally within what is described as the insulation envelope of the house. Doing it this way means that all the air in the ducts will be at the same temperature as the house and condensation cannot happen within the ducting. Condensation only happens when warm moist air touches a cold surface and if there are no cold surfaces in the system, then condensation cannot happen.”

Demand control ventilation

DCV is a smart, fully ducted ventilation unit that monitors carbon dioxide, humidity and even VOCs in the house to detect if you are at home and exchanges the air as needed.

Sustainable Energy Ireland has detail in scientific crumbs for the truly interested, but in short, “sensors detect 1,100 ppm CO2, the DCV controls open the economiser damper to admit additional fresh air. When there is no one in the space and the indoor CO2 concentration drops below 400ppm, the controls drive the economiser dampers fully closed.” (SEAI).

The air is not heated in DCV, but is delivered only as needed, making this modulating system highly energy-efficient and ideal for a retrofit where passive house standards are not required.

Justin Conway of Aereco, Cork is a leading Irish supplier of DCV and explains its benefits: “DCV has approximately one-third of the ducting required by a HRV. This means it’s far easier to install, particularly in a retrofit scenario. The fan units are smaller and can be located in cupboards etc. No inlet ducting is used as wall or window inlets are used instead. This further reduces the install complexity and cost.”

These systems, especially where the house is very airtight, must be carefully balanced by a design engineer to ensure fresh air enters in the same quantity as exhausted air leaves. “DCV does not use any inlet ducting and as a result there is no risk of introducing mould spores or Legionella into the incoming air in a house.

The system has a tendency to dry out houses because it works to create a negative pressure within the building envelope. This can help preserve the building fabric and is a particularly useful feature for protected or period buildings.”

Clearing the air

* Ensure any trickle vents in windows or walls and mechanical fans in kitchens and bathrooms are working properly.

* Give your carbon monoxide alarm a test before winter, and if you don’t have one, install one this weekend. www.carbonmonoxide.ie.

* Every house has rapid ventilation capability (RVC). In a large room, open a window at either end for even 20 minutes twice a week to allow a lively cross breeze. The ideal time is when you are dusting and vacuuming, kicking up an invisible veil of airborne rubbish.

* Washing up liquid, lemon juice, bicarbonate of soda, white vinegar and the odd dose of bleach can handle just about anything you throw at them in terms of germ control. Use a trigger spray onto a cloth rather than broadcast spraying of polishes and cleaners heaving with Phthalates and bisphenol.

*Defeat dust, mites, mould, pollens and other allergens, upgrade to a vacuum cleaner with HEPA filter technology to finely clean the air passing through the machine. High traffic areas like halls benefit from daily attention. Dust walls and shelving with the soft head from time to time.

* A household of just four people can generate as much as 24 pints of airborne moisture a day through perspiration and breathing. Concentrate on the bathroom and kitchen where a humidistat-controlled electric fan will kick on when the air becomes laden with moisture.

* The cost of a radon measurement for your home is €56.90. epa.ie.

* Acres of carpet, however gorgeous, will in time be the single, filthiest ingredient in your house. Being a sponge for petro-chemical and biological rubbish on the feet, and the gentle rain of skin flakes that make up most dust, carpet hides more than innocent stains and dirt.

* There are 4,000 chemicals released by smoking a cigarette. Take it outside for now and work on quitting entirely. Quit.ie (HSE).

FUNGAL FOOTNOTE

MOST of us have heard of volatile organic compounds or VOCs, but there is another worrying family of airborne bio-hazards — mould volatile organic compounds (MVOCs) that may be present in your home.

As mould actively grows it releases not only spores, but a biological gas directly into the atmosphere.

The worst form of these growths is black mould, or Stachybotrys Chartarum. For those susceptible, these gases can trigger an allergic reaction when breathed, including everything from mild skin rashes to serious respiratory problems.

There's a firm link between asthma and domestic mould proven in multiple medical studies. The trouble with mould, is that you may not realise it's present in the house at all, and if you spot it — chances are it's prolific. Damp behind skirting, beneath floors or behind an inadequately sealed bath or shower can provide warm, moist conditions for mould to quietly thrive, releasing invisible microscopic irritants into the air.

If your HRV or DCV is not properly commissioned and maintained with cleaning and filter changes, long reaches of ducting can become cold and damp enough to suffer condensation and to breed these tiny fungi. Generally, mould is found during renovations or when large pieces of furniture in humid rooms are moved away from a plastered wall. It's a versatile little devil and can set up home on insulation, underlay, wood and plasterboard.

If you suspect mould growth (and even if you can't see it), have the air quality of your home tested. Dedicated firms include Glenside Environmental Services, glenenv.ie (Cork & Dublin). Where mould is found it can be professionally dealt with, or cleaned off while wearing full protective gear, with a soap and disinfectant scrub.

There are also DIY testing kits available online from Irish air quality inspection firms from around €55, including Mould Busters, www.mouldbusters.ie.

The single most important thing after eradication is to identify why the growth happened in the first place — that is — dealing with excess humidity, condensation and damp.