

## WHY IS VENTILATION NECESSARY?

Today's homes are designed and built to improve energy efficiency. However, these often called "airtight" homes may actually cause health problems due to the stale air and pollutants they retain.

**Airtight Homes:** Homes designed and built in recent years are more airtight and energy efficient than in the past. To obtain this airtight design, house wraps, newly designed windows and doors, sealing caulks and other insulating materials are used to create a seal for optimum energy efficiency. The resulting benefit is fewer drafts, which lowers the cost to heat and air-condition a home. But pollutants retained in airtight buildings can be hazardous to their occupants and can jeopardize structural integrity. That's why Panasonic stresses a "build tight and ventilate right" platform. Proper mechanical ventilation design can address poor indoor air quality, while retaining energy efficiency.

### Biological Pollutants

Biological pollutants, to some degree, are found in all homes. This includes mold, mildew, pollen, dustmites, pet dander, viruses and bacteria. Accumulation of these "biological pollutants" can result in hazardous health effects for its occupants, as well as structural damage to the building.

Most biological pollutants tend to flourish in a humid, moist environment. Some examples of moisture sources inside the home include tubs and showers, whirlpool baths, cooking, washing machines, dishwashers, fish tanks, plumbing leaks, defective gutters, inadequate water proofed basements or crawl spaces, and even human breathing.

Proper ventilation is used to combat the accumulation of moisture from these sources, in wall cavities, cracks and crevices, which can lead to the growth of various forms of mold and mildew. A continued build-up can adversely affect anyone with asthma or allergies. Furthermore, it can also lead to the deterioration and destruction of structure supports and walls from the inside out.

### Volatile Organic Compounds (VOCs)

Volatile Organic Compounds are carbon-based compounds that easily evaporate. These types of gases are released from building materials, carpets, furniture and many other solid household items as part of aging, decomposition or curing, all of which are natural processes known as "outgassing". Some other household items that emit "VOCs" include hair sprays, paints, lacquers, finishes, oven cleaners and other cleaning solvents, pesticides, etc. Often colorless and odorless, VOCs can ultimately sensitize certain people to react to them.



FIG. A: Pollutants accumulate in a poorly ventilated building

Pesticides are designed to kill pests and not humans or pets. But that does not mean that prolonged exposure to pesticides isn't harmful. In fact, prolonged exposure to concentrated amounts of pesticides have shown to cause immune-system damage, headaches, dizziness, nausea, muscle spasms and multiple chemical sensitivity (MCS). So, it is important to limit prolonged exposure to these types of materials.

Metals such as lead, mercury, cadmium and arsenic are commonly found in older paints, made prior to 1980, new exterior paints and chemically treated lumber.

Minerals that accumulate in the home include asbestos and calcium. Asbestos is usually found in older homes. Calcium can collect in humidifiers, which can then become an air-borne pollutant and can be inhaled.

Radon is a radioactive gas that is released from the natural decay of the mineral radium, which is usually found in small amounts in the soil. Radon is only a problem if it seeps into the home and accumulates. Prolonged exposure of high amounts of radon has been shown to contribute to lung cancer.

Smoking contaminates the air with nicotine, tars, acetaldehyde, nitrogen dioxide and carbon monoxide. These chemicals can accumulate in the home, not only affecting smokers but non-smokers as well.

### Ways to improve indoor air quality

The first step to improve indoor air quality should be to reduce or remove the source of the pollutants. For example, paints, solvents or other chemicals should not be stored in the home but rather in a garage or shed. If the garage is attached to the home, make sure there is an airtight seal between the garage and living quarters. This will prevent pollutants from entering the house. Another safeguard is to use building materials and cleaning products with a low level of toxicity.

Unfortunately, indoor pollutants are virtually impossible to eliminate completely, creating the need for a second step to improve indoor air quality – mechanical ventilation. Mechanical ventilation is used to remove stale, moist, polluted air and replace it with fresh outside air. Two widely used methods in today's building industry are continuous and intermittent ventilation.

Most industry experts agree that we should not rely on natural pressures and passive ventilation through vents, leaks or holes in the building envelope. Such ventilation relies heavily on wind and weather conditions and is neither consistent nor reliable.

### Continuous Ventilation

Sometimes referred to as general, central, whole-house or primary ventilation, continuous ventilation is used to remove stale air and provide fresh air on a slow, continuous basis. A well-designed airtight home can generally use low volume continuous ventilation.

### Intermittent Ventilation

Sometimes referred to as spot, local or secondary ventilation, intermittent ventilation, is used to capture and remove pollutants quickly at the source. Pockets of excessive moisture and pollutants can build up in the bathroom, kitchen, utility room, garage and home office. This secondary process serves to exhaust these problem areas quickly, before "bad air" can spread throughout the house. Just as important as continuous ventilation, intermittent ventilation complements the effort to improve indoor air quality.

Intermittent ventilation quickly ventilates contaminated areas and often uses less energy, which results in less exposure to occupants than the slower continuous ventilation process. Both systems exhaust pollutants from the air, but intermittent ventilation is more effective in concentrated areas.



FIG. B: Indoor air quality maintained with proper mechanical ventilation

**Ideally, an airtight home designed with both continuous and intermittent ventilation will contribute to a healthy and comfortable living environment for the entire family.**