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The ability of a home to offer a pleasant and safe environment for its occupants is affected by many factors, with indoor air quality being one such factor.

Indoor air quality is influenced by a mixture of gases and airborne particles that may be pollutants, but it is important to note that not all pollutants will contribute to poor indoor air quality and this will depend on the:

- type of pollutant;
- amount and rate of release of the pollutant from the source; and
- degree of ventilation occurring in a home.

Indoor air quality delivers a level of comfort or discomfort for its occupants that spans short to long term periods. Poor indoor air quality will affect some people more than others as this reflects an individual's degree of sensitivity towards particular pollutants.

The Building Regulations have seen a predominance of sealing around windows, doors and exhaust fans in utility rooms, to achieve an increased energy rating for the building fabric of a home. However, this response reduces air movement that occurs as leakage between outdoors and indoors and as good ventilation can assist in improving indoor air quality consideration should be given to room zoning, and the placement and type of windows and doors that encourages air flow.

Occupants can significantly affect indoor air quality of their home through:

- use of household cleaning agents;
- personal care products and pesticides;
- selection of furniture and window coverings;
- generation of tobacco smoke; and
- ventilation and cleanliness of a home.

However, so too can the choice of material selection during the construction and renovation of a home affect indoor air quality, particularly the choice of paints, adhesives, flooring and cabinetry.

What materials can influence indoor air quality?

Volatile organic compounds (VOCs), a range of chemical substances that become airborne, or volatile, at room temperature. They are given off by most paints, paint strippers, wood preservatives and glues;

Formaldehyde, a common VOC, is released from some manufactured wood products such as plywood, wall panelling, particleboard, fibreboard and furniture made with these products;

Respirable particles from fireplaces, wood stoves, kerosene heaters, tobacco smoke and other combustion sources;

Carbon monoxide and nitrogen dioxide from unflued kerosene and gas space heaters, leaking chimneys and boilers, gas water heaters, wood stoves, fireplaces, gas stoves, automobile exhaust from attached garages;

Xylene and toluene solvents in paints, glues and carpets as well as polyurethane;

Vinyl chloride monomer styrene in vinyl floor coverings, blinds, textiles, synthetic rubber underlay, two part fillers and paints;

Isocyanates in polyurethanes, glues and fillers;

Glycol Ether and derivatives used as solvents in water based paints, varnishes and glues;

Epoxy resins used in tile, wood and metal glues, cement and surface binder 'Natural' materials are generally preferable to synthetic, however some natural materials can have significant environmental and health impacts; and

Timbers can be treated with chemicals against biological attack and to increase durability.

How can you reduce pollutants entering the home?

Choose untreated products or those that contain low pollutant emissions.

If manufactured wood products such as MDF or particleboard are used, cover all surfaces and edges with laminates or seal them with low emitting paint or varnish to reduce emissions of formaldehyde. Look for those made with phenol formaldehyde rather than urea formaldehyde as they are less harmful.

Purchase building materials that have low emissions and ensure provision for adequate ventilation both during construction and after occupancy.

Select materials which have been pre-dried, are quick drying, use water as the solvent or are classed as zero or low VOC.

If too little fresh air enters a home, pollutants can accumulate to levels that can pose health and comfort problems.

Externally flue gas stoves or heaters.

Buy only 'low-NOx' heaters.

Follow the correct installation and maintenance procedures for chimneys and flues to prevent combustion gases and particles entering the room.

Ventilation can conflict with energy efficiency principles so the design should enable occupants to open and close the building as necessary and to facilitate good cross ventilation when desired.

In cooler climates consider using air preheated by the sun for ventilation, or flush the house at the warmest time of the day. In hot climates flush the house with cooler night time air.

Where termite barriers are required select barriers that are made from granite or stainless steel instead of chemical barriers.

Give consideration to using alternative floor coverings for the home such as: ceramic tiles, concrete, timber finished with plant based hard oils or waxes instead of polyurethane finishes, linoleum or cork glued with natural rubber latex, sisal, coir, jute or seagrass matting.

Where carpet is selected ask the supplier to unroll and air out the carpet in a well-ventilated area before installation and opt for mechanical fixing. If adhesives are needed ask for low-emitting water based adhesives to be used.

Increasing the amount of fresh air in the home will reduce exposure to most chemicals released from carpet.

What can you do if the pollutant material needs to be retained?

Separate problem materials from occupants by using air barriers or sealers such as coatings.

Laminates can be used to seal composite wood products.

Where asbestos or old lead paint cannot be removed, seal it with paint.

Construct a garage that stands separate to the home, or ensure that any internal door to the garage is well sealed.

Make sure the flue outlets of gas, water heaters and room heaters are kept away from open windows.

Keep gas releasing products such as solvents, paints and glues in sealed containers or cupboards, preferably outdoors, and use them outdoors whenever possible. Dispose of them correctly.

Considerations for Renovating

You should also be aware that not all traditional materials are safe. Old paint contains high levels of lead and creosote wood preservative is highly toxic. Always check before disturbing existing materials and take the necessary precautions if harmful substances are found.

Useful websites

Ecospecifier is a Building product database – membership required for unlimited access to product range. <http://www.ecospecifier.org/content/view/full/43>

Australian Green Procurement contains a database of building products - free
<http://www.greenprocurement.org/database/main.jsf>

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