

## Hazardous Materials in Construction

### Overview

Green Building and Sustainable Design have become established principles in the Design and Construction world for over a generation. In the US, non-profit organizations such as US Green Building Council and Green Globes have developed rating systems to evaluate and certify new and renovated buildings meeting sustainable design criteria. The newest version of USGBC rating system (V3.0) has added categories to maintain and improve the health of occupants of Buildings. Credits include improvement of air quality by monitoring CO2 levels in the air delivered by HVAC systems.

### Materials of Concern

The traditional emphasis of sustainable design has been the reduction of energy use and the responsible stewardship of resources. As sustainable practices have become established, however, there is an increased acknowledgement of building materials of concern and avoidance of the use of materials which can cause adverse health effects on building occupants. High-profile examples include drywall imported from China, which was found to have concentrations of formaldehyde (a known carcinogen)<sup>1</sup> and was removed from hundreds of buildings. Currently studies are underway to determine materials which affect the immune system and endocrine disruptors<sup>2</sup>; these cause auto-immune disorders which have seen an increase in diagnosis over the past generation.

### Resources

Responsible procurement policies can protect building occupants from being exposed to hazardous materials in products and building materials. Environmentally preferable purchasing programs developed by the Environmental Protection Agency (EPA), General Services Administration (GSA) and other government and industry groups, can play an important role in shifting the market and promoting safer products. Two important programs are:

#### EPA's Environmentally Preferred Projects (EPP)

(<http://www.gsa.gov/portal/category/27119>) provides information in a number of categories, with the goal of addressing federal acquisition regulations requiring environmentally preferable products, including bio-based products and reduced carbon production. Electronic Product Environmental Assessment Tool (EPEAT) products are energy-efficient and have positive environmental attributes, such as recycled content components and the elimination of toxic components.

#### GSA's Green Procurement Compilation (GPC)

(<http://www.gsa.gov/portal/content/198257>) is a purchasing resource which consolidates and organizes information from federal environmental programs for comparison and reference.

These resources and others can identify environmentally friendly products to use, and materials which may be of concern and which should be avoided.

### Specific Hazardous Materials

There are many potentially hazardous materials which may be found in building materials, and it is incumbent upon designers, specifiers, building operators and managers to determine the components of building products using the aforementioned tools and other resources when making selections. Common materials of concern in building materials include (but are not limited to):

**Polyvinyl Chloride (PVC)** is a hazardous plastic that during its lifecycle releases hazardous chemicals. PVC can be used in piping, insulation, flooring, fabrics, ceilings and many other products.

**Halogenated Flame Retardants (HFRs)** are chemicals added to materials to improve their resistance to heat and flames, a number of which have been identified as hazardous. HFRs can be used in heating, ventilation and cooling systems, furniture and electronics.

**Respirable Silica** is a respiratory irritant, and long-term exposure can cause pulmonary disease. Silica is found in many cementations and earthen building materials.

**Radioactive Isotopes** are used in ionization-type smoke detectors and in compact fluorescent lamps. Isotopes can emit radioactive particles, which can cause radiation poisoning and other illnesses.

**Asphalt** is used in adhesives, and in common roofing materials. Asphalt fumes are an irritant, and prolonged exposure is hazardous.

**Cadmium** is used as a rust inhibitor. The fumes caused by heating can be hazardous.

**Glass Fiber** is used in insulation and is used in reinforcement in plastics. Glass fiber is an eye, skin, and respiratory irritant.

**Mineral Wool** is used in insulation and as reinforcement in building products. Mineral wool is an eye, skin, and respiratory irritant, and may contain silica, asbestos and other hazardous materials.

Other materials which are not used in new materials or devices but which may be encountered include lead, mercury, asbestos and polychlorinated biphenyls (PCBs), whose hazardous characteristics are widely recognized.

### Conclusion

Many building materials contain hazardous substances which should be avoided. Building professions should use available resources to identify, specify and select non-hazardous alternatives.

### Reference:

- (1) Aral MM, Guan, J Analysis of Chinese Drywall Emissions a Deterministic Analysis, Multimedia Environmental Simulation Laboratory, Georgia Institute of Technology, 2013
- (2) Rudel RA, Perovich LJ. Endocrine Disrupting Chemicals in Indoor and Outdoor Air. Atmos Environ (1994) 2009;43(1):170-181.

