Select Low-Emitting Materials

What are Low-emitting Materials?

Figure 1 - Paint cans (Source: Maury McCown http://www.flickr.com/photos/maurymccown/406969312/#/)

Low-emitting materials are products that do not release significant pollutants into the indoor environment.[1] Volatile organic compounds (VOCs) are chemicals found in many common products and building materials that can escape into the air and cause illness and allergic reactions. These emissions are one of the contributors to the situation known as "sick building syndrome" (SBS) in which building occupants experience health and comfort effects. [2]

According to the EPA, concentrations of many VOCs, released by a wide variety of products, are consistently higher indoors (up to ten times) than outdoors. Paints, sealants, manufactured wood products, and adhesives as well as some furnishings and carpet systems often release VOCs. It's also important to use composite wood and agrifiber products on the interior of the building that contain no added urea-formaldehyde resins. Elevated levels of VOCs and interior pollutants have been linked to health concerns such as can cause eye, nose and throat irritation, headaches, loss of coordination, nausea, and other health problems. [3] People with respiratory problems, children and seniors are at particularly high risk to reactions from exposure.

It is also important to use composite wood and agrifiber products on the interior of the building that contain no added urea-formaldehyde resins. Formaldehyde (CH_2O) is a simple organic chemical compound consisting of hydrogen, oxygen, and carbon. It is a colorless gas with a strong odor that can cause eye, nose, skin, and lung irritations. While formaldehyde is one of the most common indoor air pollutants, new buildings are more likely to contain higher concentrations of formaldehyde.[4]

Overall, formaldehyde is widely used for manufacturing and industrial purposes, primarily because formaldehyde is a common organic compound that works as a building block to

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[1] Sustainable Sandhills. Low Emitting Materials. http://www.sustainablesandhills.org/UseLowEmittingMaterials.html (accessed April 5, 2010).
[2] EPA Indoor Air Quality (IAQ). Indoor Air Facts No. 4 (revised) Sick Building Syndrome. http://www.epa.gov/iaq/pubs/sbs.html (accessed April 4, 2010).
[3] EPA. An Introduction to Indoor Air Quality. http://www.epa.gov/iaq/voc.html (accessed April 4, 2010).
[4] The Engineered Wood Association (APA). Formaldehyde Regulations www.apawood.org/level_b.cfm?content=srv_env_form (accessed October 25, 2010).

synthesize other complex chemicals.[5] All wood species contain and emit formaldehyde. Consequently, formaldehyde is found in all wood-based products. Buildings with significant amounts of plywood and hardwood floors could contain high concentrations of formaldehyde, which can negatively impact the health and well being of occupants.

How to Incorporate Low-emitting Materials

Increased awareness of possible health risks and overall air quality concerns has led to a demand for products lower in VOCs. Low- and no-VOC products are now widely available. What is considered a "low" concentration of VOC emissions will vary according to the product type. For example, for interior paints and coatings, low-VOC emitting products have concentrations below 50 g/L. The best way to ensure that the products your company purchases are low-VOC emitters is to consult with your suppliers.[6] There are several certification programs for products such as GreenGuard, Indoor Advantage by Scientific Certification Systems, and Green Seal Standards. There are also industry-specific certification programs such as the Carpet and Rug Institute (CRI) Green Label programs that test for and certify low emissions from carpet, cushion and adhesives.

Paints and finishes are usually made from either oil-based formulas or latex (water) based, which are generally less toxic than oil-based paints.[7] Due to increased awareness of possible health risks, latex paints on the market today are equal or better in quality and durability than conventional formulas.[8] Not all latex-based formulas are low in VOC's, however, and a few oil-based products now qualify as low-VOC.

Figure 2- FSC Certification Label (Source: FSC.org)

There are many hard, low-formaldehyde flooring options on the market. Because formaldehyde occurs naturally in all wood, no wood-flooring product is 100% formaldehyde free. Therefore, non-wood hard surface flooring is the most practical and effective option. By using materials such as concrete and recycled tile, a homeowner can significantly reduce the amount of formaldehyde concentration in a home, while also preserving natural resources such as wood that are commonly used for flooring.

[5] The Encyclopedia of Earth. http://www.eoearth.org/article/Industrial_uses_of_formaldehyde (accessed November 19, 2010).
[6] Natural Resource Defense Council. Greening Advisor. http://www.nrdc.org/enterprise/greeningadvisor/aq-low_voc.asp (accessed April 4, 2010).
[7] NAHB Research Center. "Low- or No-VOC Paints, Finishes and Adhesives." http://www.toolbase.org/Home-Building-Topics/Indoor-Air-Quality/low-voc-paints. (Accessed November 21, 2010).
[8] "Low- or No-VOC Paints, Finishes and Adhesives."

While installing concrete and recycled tile is the most effective approach at reducing formaldehyde in floors, certain hardwood products are also worth considering. If choosing to install new wood instead of concrete, look for products that earn the Forest Stewardship Council (FSC)-certification label. The FSC is a non-profit organization that specializes in providing certification for wood products that are produced from sustainable harvesting practices, and contain low levels of formaldehyde. FSC-certified wood floors do not include added urea-formaldehyde.[9]

Example
Rutgers University Visitor Center

The Rutgers University Visitor Center was constructed using low-emitting materials including paints and finishes. In edition, the carpets are made from recycled fibers and can be recycled into new carpet when they become worn.

Figure 3 – Stained concrete floor (source: Rutgers Center for Green Building)

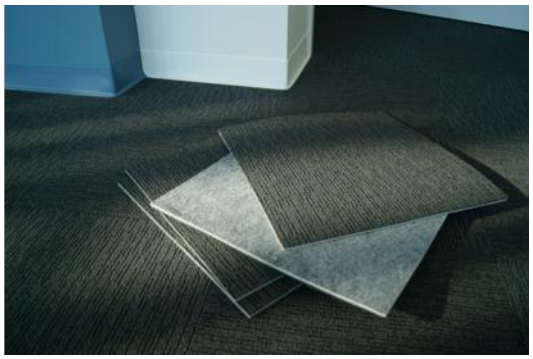

Figure 4 – Recycled carpet (source: Rutgers Center for Green Building)

Benefits

Building material and furnishing selection has a significant impact on indoor environmental quality. Benefits of selecting low-emitting materials include: [10]

- Improves indoor air quality
- Improves worker safety and health
- Reduces incidents of eye and respiratory irritation, headaches, fatigue and other symptoms of "sick building syndrome"
- Healthier environment for building occupants who are sensitive to certain products
- Reduces pollution of natural waterways

[9] Earth Source Forest Products http://www.earthsourcewood.com/site/fscbuilding.aspx (accessed October 25, 2010).
[10] Today's Green Construction. Low VOC Building Materials. http://www.todaysgreenconstruction.com/2008/07/low-voc-building-materials.html (accessed April 4, 2010).

Costs

Many low-emitting materials are cost competitive with conventional materials. Low- and no-VOC paints typically cost about the same as a manufacturer's premium line of paints.[11]

Agriboard, a term used for agricultural based products such as wheatboard or strawboard, is cost competitive with particleboard. Products such as wheatboard or strawboard do not contain formaldehyde like most particleboard does, and they are as durable.[12]

Resources

US EPA Indoor Air Quality – Green Indoor Environments
http://www.epa.gov/iaq/greenbuilding/index.html

The GREENGUARD Environmental Institute is an industry-independent, not-for-profit organization that oversees the GREENGUARD Certification programs.
http://www.greenguard.org/

CRI Green Label programs
http://www.carpet-rug.org/commercial-customers/green-building-and-the-environment/index.cfm

Scientific Certification Systems Indoor Advantage
http://www.scscertified.com/gbc/indooradvantage.php

State of NJ Department of Health and Senior Services – Indoor Environments
http://www.state.nj.us/health/iep/index.shtml

[11] Tool Base Services. http://www.toolbase.org/Technology-Inventory/Interior-Partitions-Ceilings/low-voc-paints (accessed April 4, 2010).
[12] California Sustainable Design Training. www.calrecycle.ca.gov/greenbuilding/Training/StateManual/**Materials**.doc (accessed April 4, 2010).