

Adhesives & “Green”

SEEING THE FOREST THROUGH THE TREES

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Green is the practice of increasing the efficiency with which companies use resources — energy, water, and materials — while reducing impacts on human health and the environment.

Low-impact building materials (such as adhesives) are used wherever feasible: for example, insulation may be made from low VOC (volatile organic compound)-emitting materials such as recycled denim or cellulose insulation, rather than the building insulation materials that may contain carcinogenic or toxic materials such as formaldehyde. To discourage insect damage, these alternate insulation materials may be treated with boric acid. Organic or milk-based paints may be used, however, a common fallacy is that "green" materials are always better for the health of occupants or the environment. Many harmful substances (including formaldehyde, arsenic, and asbestos) are naturally occurring and are not without their histories of use with the best of intentions. A study of emissions from materials by the State of California has shown that there are some green materials that have substantial emissions whereas some more "traditional" materials actually were lower emitters. Thus, the subject of emissions must be carefully investigated before concluding that natural materials are always the healthiest alternatives for occupants and for the Earth.

Volatile organic compounds (VOC) can be found in any indoor environment coming from a variety of different sources. VOC's have a high vapor pressure and low water solubility and are suspected of causing sick building syndrome type symptoms. This is because many VOC's have been known to cause sensory irritation and central nervous system symptoms characteristic to sick building syndrome, indoor concentrations of VOC's are higher than in the outdoor atmosphere, and when there are many VOC's present, they can cause additive and multiplicative effects. Green products are usually considered to contain less VOC's and be better for human and environmental health.

Effective green initiatives can lead to 1) reduced operating costs by increasing productivity and using less energy and water, and by avoiding costly fines, 2) improved public and occupant health due to improved indoor air quality, and 3) reduced environmental impacts by, for example, lessening storm water runoff and pollution.

When evaluating an adhesive product as “green” it's important to consider it within the following framework:

Regulatory Impact –

Environmental regulations, limitations, and specifications are becoming increasingly prevalent. They emanate from numerous areas. These include; international bodies, federal, state and local governments and private concerns such as architects, NGOs, and for-profit testing agencies. Currently, CARB (California Air Resources Board) regulations and LEED (Leadership in Energy and Environmental Design) certification requirements are at the forefront of regulatory issues involving adhesives. There is considerable confusion regarding both of these issues but, basically, both limit the amount of VOCs (Volatile Organic Compounds) and formaldehyde permitted in an adhesive. Additional agencies such as OSHA, DEP, and DOT impose limits on certain chemical

elements in the name of “Green” as well but these have yet to become as pervasive as those mentioned earlier. Further information on both CARB and LEED is contained in the resources section at the end of this paper.

Environmental Impact –

There is no doubt that adhesives (as well as all chemicals) impact the environment. When evaluating adhesives it’s necessary to consider the impact across the entire environmental spectrum. This includes upstream aspects such as where the adhesive is manufactured and where the raw materials for the adhesive are sourced as well as how it is manufactured and any wastes that might be created during its production. Downstream considerations are important as well; at the end of a product’s life will there be an environmental impact due to the adhesive used? It is also necessary to consider the environmental impact at the plant level. Are there health ramifications when the adhesive is in a “wet” state? Does it require mixing? Are there other hazards such as flammability, waste generation, toxicity, and airborne issues that should be addressed before the adhesive is used in manufacturing? Will it affect storm water run-off? Are there specific clean-up issues? These are all legitimate issues that are part of “green” and adhesives.

Business Impact –

At the end of the day, green adhesive initiatives must be measured in terms of impact on business. The costs (and the benefits) are myriad and often subtle. For example: a flammable contact cement may appear to have a lower cost per gallon than its waterbased counterpart but when a business takes into account the additional costs of transportation, insurance, specialized handling equipment and employee health the “green” alternative comes out ahead. On the flip side, urea formaldehyde resin may appear to be at odds with any “green” initiative but if one examines the whole picture including product cost and performance as well as environmental impact they find that UF resin is often the best of all possible choices in manufacturing. It’s also necessary to take “risk” into account. Using toxic, flammable or other non-green adhesives presents the user with considerable risk. This comes in many forms including fines and penalties from regulatory agencies, increased fire hazards and the risk of damage to a company’s reputation. Finally, embracing “green” adhesives opens the door to additional business and increased margins as a result of added value to the products being manufactured but it’s necessary to make an informed decision rather than jumping on the band wagon because it seems like a good thing to do.

“Green” is not a fad. Increasingly it has become a way of life for companies across all business spectrums. Adhesives play a small role in a much bigger picture but by understanding their role we can understand “green” within a much larger context.

RESOURCES

More information on formaldehyde from the EPA.

Associations and Councils

Build It Green – A non-profit organization that promotes healthy, energy and resource-efficient buildings in California and supports collaborations that will accelerate the adoption of green building practices. www.builditgreen.org

Green Building Initiative, Inc. – Formed a strategic partnership with NAHB to bring green building to the mainstream. GBI is an accredited standards developer under ANSI. In 2004, the organization was licensed to bring Green Globes to the U.S. (from Canada) and is working to establish the Green Globes program through ANSI for residential and commercial green building

practices. www.theGBI.org; www.greenglobes.com

The Institute for Market Transformation to Sustainability (MTS) – Coalition of sustainable product manufacturers, environmental groups, state and local government leaders driving market awareness of sustainable products to accelerate transformation. Details the SMART® Consensus Sustainable Product Standards for building products, fabric, apparel, textiles and flooring, with a list of product criteria prepared through an ANSI accredited consensus process. www.mts.sustainableproducts.com

The Natural Step is a non-profit that works to accelerate global sustainability by guiding companies, communities and governments in the redesign of their activities towards sustainability.

The Sustainable Furnishings Council – A non-profit industry coalition founded in 2006 to promote sustainable practices among manufacturers, retailers and consumers. The Council is committed to minimizing carbon emissions, waste stream pollutants, un-recyclable content and use of primary materials. They have created a public tagging program to identify sustainable product choices. www.sustainablefurnishings.org

U.S. Green Building Council (USGBC) – A national non-profit organization of community leaders working to make green buildings accessible to all within a generation. USGBC is dedicated to expanding green building practices and education. Its Green Building Rating Systems are guidelines for New Construction and Major Renovation (NC), Commercial Interiors (CI), Existing Buildings (EB) and others. www.usgbc.org

Green Building Programs (with varying levels of certifications)

Whole Building/Remodel

Built Green – An environmentally friendly residential building program in Washington State. Their web site offers easy to understand rating systems and building practices. The Built Green logo assures that a home meets the criteria of the Built Green checklist. www.builtgreen.net

Green Globes – A green building assessment and rating system used in the U.S. and Canada. It offers an online interactive tool which allows one to input changes and keep assessments current. It is licensed under the Green Building Initiative, Inc. www.greenglobes.com

Green Point Rated – A “report card” for new home construction. Allows home buyers to evaluate a home’s green features. If it meets a minimum of 50 points, the home may display the Green Point Rated label. Homes are evaluated by independent certified raters. The program is sponsored by Build It Green of California. www.builditgreen.org

Leadership in Energy and Environmental Design (LEED) – A whole-building approach to sustainability through a points achievement system based on performance in sustainable site development, water and energy efficiency, indoor air quality and material resources. The program is sponsored by the U.S. Green Building Council. LEED has a variety of programs targeted to new construction, existing buildings, core and shell, commercial interiors, with LEED for homes, schools, hospitals, laboratories and neighborhoods in development. www.usgbc.org

National Green Building Program – An education, verification and certification program that allows builders anywhere to build green homes. The program features an online scoring tool which shows builders how to score points in seven categories. Homes are inspected by local green experts and documentation is sent to the National Association of Home Builders Research Center for review and potential certification. www.nahbgreen.org

Certifications

Adhesives, Paints

Green Seal – An independent non-profit concerned with safeguarding the environment and transforming the marketplace by promoting the manufacture, purchase and use of environmentally responsible products and services and by greening the production chain. Uses life cycle analysis in its evaluation of products. Follows ISO procedures for environmental labeling. Federal agencies are required to use Green Seal's consensus standards when making purchases with federal funds which in turn is influencing state purchasing programs. Product categories include adhesives, cleaners, paints and coatings, window and door, floor care and more. www.greenseal.org

Air Quality

CARB (California Air Resources Board) – A state governing board appointed by the Governor to oversee air quality issues for the state. They are charged with protecting public health through the reduction of air pollutants. CARB is known for setting stringent standards for air quality. The airborne toxic control measure (ACTM) to reduce formaldehyde emissions from composite wood products has been submitted to be codified into California Codes, with an implementation date of January 1, 2009. www.arb.ca.gov

EPA Significant New Alternatives Policy (SNAP) Program – Evaluates and regulates alternatives to ozone-depleting chemicals being phased out by the Clean Air Act, to facilitate a smooth transition away from depleting compounds to substitutes with lower risks to human health and the environment. Includes substitutes for aerosols, solvents, adhesives, coatings, cleaners and more. www.epa.gov/snap

GREENGUARD – The GREENGUARD Environmental Institute (GEI) is an industry-independent non-profit organization that oversees the GREENGUARD Certification program, committed to improving indoor air quality (IAQ). As an ANSI Accredited Standards Developer, GEI establishes indoor air standards for products, environments and buildings. They currently have three 3rd party certified programs: GreenGuard IAQ Certified for low-emitting building materials, furnishings and finishing systems; GreenGuard for Children and Schools and GreenGuard for Building Construction (mold prevention). www.greenguard.org

Carpets

The Carpet and Rug Institute (CRI) Green Label/Green Label Plus – CRI launched the Green Label program in 1992 to test carpet, cushions and adhesives for VOCs and to identify products with low emissions. The Green Label Plus sets an even higher standard for indoor air quality. Testing is performed by Air Quality Services, an independent lab, with methodologies developed with

the U.S. EPA and adopted by the American Society of Testing and Materials (ASTM). www.carpet-rug.org

Energy

Green-e Power – Nation's leading independent program for the sale of renewable energy and verification of greenhouse gas emission reduction in the retail market. Allows consumers to identify environmentally superior energy options and businesses to communicate the purchase and/or generation of certified renewable energy. A program of the Center for Resource Solutions. www.green-e.org

Forests

American Tree Farm System (ATFS) – Program of the American Forest Foundation, a national non-profit committed to sustaining forests, watershed and healthy habitats through private stewardship. Has established standards and guidelines for becoming a certified Tree Farm. Targeted mainly to small, non-industrial forest owners. www.treefarmssystem.org

Canadian Standards Association National Standard for Sustainable Forest Management – Voluntary standard developed by an open and transparent multi-stakeholder consensus-based process, linking forest management to forest certification through performance, systems and public participation requirements. CSA is a non-profit developer of standards and codes. www.csa.ca

Forest Stewardship Council (FSC) – International organization promoting responsible stewardship of the world's forests through third-party certification of forest management and chain of custody. This is currently the only forest certification recognized by the LEED program. www.fsc.org

Sustainable Forest Initiative, Inc. – An independent organization created to direct all aspects of the SFI program including chain of custody certification and labeling, marketing and promotion. The comprehensive system of principles, objectives and performance measures was developed by foresters, conservationists and scientists to combine the growth and harvesting of trees with long-term protection of forests, wildlife, plants, soil and water quality. www.sfiprogram.org

Furniture, Cabinetry, Components

Composite Panel Association (CPA) – Conducts product testing and 3rd party certification programs. Offers the first ANSI accredited Environmentally Preferable Product (EPP) certification program for composite panels that are 100% recycled and low emitting. The EPP Grademark program was developed to provide independent certification of wood composite products that are environmentally preferable through recycled and recovered materials and adherence to lower formaldehyde emissions than government regulations. www.compositepanel.org

Business & Institutional Furniture Manufacturer's Association (BIFMA) – Develops standards that support safe and healthy sustainable environments in accordance with ANSI, including furniture emissions standards. BIFMA collaborates with state and federal government departments, academics, research councils and other stakeholders. www.bifma.org

KCMA's Environmental Stewardship Program (ESP) – In 2006, KCMA established the ESP program to help cabinet

manufacturers demonstrate their commitment to sustainability and to create identifiable environmentally friendly products for consumers. ESP is a voluntary program. When certification requirements are met, manufacturers can display the ESP seal on their products. www.kcma.org

Multiple Certification Areas

Scientific Certification Systems – A third-party provider of certification, auditing and testing services and standards, applicable to manufacturing sectors such as office furniture systems, components, building materials, carpet, flooring, paints, finishes and wood products, as well as forest management operations and chain of custody certification of wood products. The SCS Sustainable Choice® certification indicates product has been evaluated from initial extraction through manufacturing, distribution, use and disposal (life cycle analysis). The SCS Indoor Advantage® is an indoor air quality performance standard. www.scscertified.com

Lean and Green

Environmental Protection Agency (EPA) – Has a free, downloadable document entitled "The Lean and Environmental Toolkit," which contains modified lean tools such as VSM and 5S to include environmental considerations. www.epa.gov/lean

The Green Suppliers Network – A joint effort of the U.S. EPA and the U.S. Department of Commerce National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP) program. Manufacturers of all sizes can join the network, they commit to participating in a Lean and Clean review of a product or process line. The Green Suppliers Network review team conducts a technical review at the facility and trains staff on the Lean and Clean Advantage, combining the "lean" enterprise of the supplier's local MEP center with the "clean" expertise of the supplier's state environmental programs. www.epa.gov/e3/about-e3s-green-suppliers-network

Codes of Interest

ASHRAE 189 – This is a Proposed Standard for the Design of High Performance Buildings. It uses many of the LEED measurements but incorporates others such as lifecycle costs and integrated design. The standard could be adopted by local jurisdictions to establish a foundational green building standard. www.ASHRAE.org

Green Seal (GS) 11 and 03 – Standards for paints and anti-corrosive paints.

Green Seal (GS) 36 – Standard for aerosol adhesives.

www.greenseal.org

International Organization for Standardization (ISO) 14000 – A "family" of Environmental Management Standards. ISO 14001 Provides generic requirements -- applicable to any organization or business -- for implementing an environmental management system (EMS), following good environmental practices and striving for continual improvement. Creates a common reference for communicating about environmental management issues between organizations and their customers, regulators, the public and other stakeholders. The intention of ISO 14001 is to provide a framework for a holistic, strategic approach to an organization's environmental policy, plans and actions. ISO 14004 provides general EMS guidelines. www.iso.org/store.html

International Organization for Standardization (ISO) 14021 – Environmental Labels and Declarations—Self-Declared Environmental Claims – Gives requirements for self-declared claims including statements, symbols and graphics in regards to products, and qualification for use of some common terms.

State of California Green Building Action Plan, Executive Order S-20-04 – Calls for public buildings to be 20% more energy efficient by 2015 and directs all new state buildings and major renovations to be LEED-NC (New Construction) Silver or higher (another equal or higher standard is acceptable as approved by the Green Action Team).
www.gov.ca.gov

South Coast Air Quality Management District (SCAQMD)

Rule #1168 – For Adhesives, Sealants and Sealant Primers.

Rule #1113 – For Architectural Coatings

www.aqmd.gov/home/regulations/rules

Reading

Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value and Build Competitive Advantage by Daniel C. Esty and Andrew S. Winston.

Outlines 10 different areas of “Green” and the business consequences. Allows one to get a sense of which issues relate to your particular business. It presents strategies for taking advantage of the green movement to create value in your business.

Lean and Green by Pamela J. Gordon.

Profiles 20 leading (large-size) organizations who have melded sustainability factors into their business practices with impressive results. Lines out four-steps to creating a green organization and gives numerous examples.

Web Sites

www.constructionmanagementdegree.com – Contains one of the largest actively maintained resources that lists every accredited school offering a degree in Construction Management.

www.buildinggreen.com – Contains the online version of the GreenSpec® Directory with over 2,000 listings of environmentally preferred products. **Building Green** is also an independent publisher of green design information. They publish a hardcopy of the GreenSpec® as well as Environmental Building News.

www.calrecycle.ca.gov – The **California Integrated Waste Management Board** site offers a wealth of information related to recycling, reducing waste and re-use of products. The Sustainable Building Section 01350 contains specific language on environmental and health issues for building projects including “project selection guidelines and emission-testing protocols to distinguish low-emitting materials.” (To find Section 01359, click on “Index” on the homepage and then “Green Building.”)

www.energystar.gov – **ENERGY STAR** is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, intended to help Americans choose energy efficient products and practices for home and business. The site contains an

ENERGY STAR product list, tips and resources.

www.epa.gov/greenerproducts – The EPA's **Environmentally Preferable Purchasing** program encourages and assists federal agencies in the purchase of environmentally preferable products. Because of the government's tremendous purchasing power, this program in turn stimulates the market for green products. On this site, under Products and Services, it lists environmental attributes to look for relevant to specific categories, such as Building and Construction. Has a database of over 600 products.

www.mbdc.com – A site devoted to the **cradle to cradle** design model, with information targeting the transformation of industry and products. **MBDC** stands for the firm of McDonough Braungart Design Chemistry. William McDonough, an architect, introduced the concept of cradle to cradle.