



Sound Decisions - Good Acoustics and Choosing Green Acoustic Materials

Written by Linda Gedemer

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Acousticians will often say that people never talk about sound quality until it's bad. Good acoustics are an often-overlooked aspect of building design and until recently, green buildings were no exception. Luckily, the new LEED rating systems represent large steps in recognizing the importance of acoustics as part of the overall comfort of buildings and the role that acoustics plays in the productivity and well-being of the people who inhabit them.

LEED Requirements for Acoustics

In current and developing LEED rating systems, the United States Green Building Council (USGBC) has made provisions for earning points towards certification by meeting specific acoustic goals. The objective of this effort is to increase occupant productivity and comfort. The following sections outline these goals.

Indoor Environmental Quality (IEQ)

The USGBC states: "The U.S. Environmental Protection Agency estimates that Americans spend about 90% of their day indoors, where the air quality can be significantly worse than outside. The Indoor Environmental Quality credit category promotes strategies that can improve indoor air as well as providing access to natural daylight and view and improving acoustics."

Over the last decade in which the LEED New Construction rating system has been used and applied to projects, the rating system has not expressly included acoustical credits. Interestingly, the rating system has included one credit (IEQ Credit 2.1) for projects that perform post-occupancy surveys of the occupants' comfort in the building. This survey includes a question about the occupant's acoustic comfort. While this survey has not influenced designers or facility developers to specifically include acoustics in the building design, the post-occupancy survey results highlight the poor acoustical performance that these buildings have. Surveyed occupants reported a lack of privacy and "noisy" conditions in their sustainable projects to a higher extent than occupants in buildings that were not designed for sustainable goals. These results punctuate the importance of acoustics being included in the design to achieve the occupant comfort and productivity that are sought. No specific guidelines are established for remediation goals, but to such an extent as ASHRAE standards are referenced as the basis for LEED certification, the ASHRAE guidelines for appropriate background sound levels in occupied spaces could be applied.

Routinely, distracting noise and lack of acoustical privacy are at the top of workplace complaints. In green buildings it turns out, these acoustic issues can be even worse. In a 2006 report by the Center for the Built Environment (CBE) at UC Berkeley, surveys showed that occupants of LEED-rated and/or green buildings were found to be more satisfied with their overall indoor environment than their counterparts in non-green buildings. However, when it came to acoustics in particular, occupant satisfaction was lower in green than in non-green buildings.



Schools

LEED for Schools was the first of the rating systems to adopt direct points related to acoustic

performance. It is widely recognized that the acoustics in a classroom has a direct effect on the students' ability to learn and the teachers' ability to instruct. Scholastic achievement and development in linguistics and cognition are amongst the areas that are most negatively affected by poor acoustics. LEED for Schools IEQ Prerequisite 3 and Credit 9 address acceptable levels of reverberation and background noise.

Homes and New Construction

Though LEED for Homes and LEED for New Construction do not include credits that directly address acoustics, both systems allow Innovative Design (ID) credits in acoustics (you could reference the standard note at the end of the LEED NC ID credit description). In January 2009, a design team submitting for a LEED for Homes registered project was approved for an Innovation in Design (ID) Request associated with achieving enhanced acoustic comfort. This ID credit required that both single and multi-family homes are designed in such a way that the maximum background noise level in the home due to exterior noise sources cannot exceed 40 dBA. Similar types of ID credits have been discussed and proposed for LEED for New Construction projects.

Healthcare

As stated in the Green Guide for Healthcare EQ Credit 9.1, "Noise is a well-documented source of stress in health care settings. Noise from personnel, equipment, and visitors impacts patient privacy and sleep patterns. In turn, noise increases stress levels for patients and caregivers. Research finds that in hospitals that reduced noise levels, the patients' satisfaction with care giving increased, their sleep improved, and their blood pressure lowered; similarly, staff in low-noise environments were more positive about their jobs and indicated improved sleep". The Green Guide for Healthcare v2.2 addresses acoustics specifically in its point system and makes the following recommendations:

Specify and install flooring products to reduce footfall and cart rolling noise.

Use sound absorbing finish materials in waiting areas and other public spaces.

Specify and install ceiling tiles with Ceiling Attenuation Class (CAC) ratings of 35 or greater for spaces with noisy plenum equipment or walls that stop short of the deck.

Specify and install sound absorptive wall treatment with an NRC of 0.7 or higher.

The soon to be released LEED for Healthcare will include credits for environmental quality specifically pertaining to acoustics. Like the Green Guide for Healthcare acoustic credit, these credits will be based on the Sounds and Vibrations Design Guidelines for Hospital and Healthcare Facilities (The Joint ASA/INCE/NCAC Subcommittee 2010). The credits will include requirements for room noise levels, sound isolation, exterior noise emissions and control, and acoustical finishes.

Where Do We Go From Here?

With the importance of acoustics now outlined, let's take a look at choosing acoustic materials that can help create better acoustic environments. The good news is that choosing environmentally friend-



ly products does not have to stop short of acoustic treatments. Acoustic product manufacturers have answered the demand for green acoustic products by creating products that use recycled, rapidly renewable and fiber free materials. These manufactures have followed through by also providing low VOC adhesive to compliment their products.

Here is a sample of environmentally friendly products and their uses:

Fiber-free, micro-slotted acrylic sound absorbers. These products are ideal for sound absorption in spaces that might be using radiant heating/cooling systems. Because they don't use fiberglass or porous materials for sound absorption, they eliminate many of the concerns that those materials present. For use in ceiling or wall applications, check out DeAmp.

K-13 Spray-on acoustical finish composed of recycled fibers and low VOC binder. For use primarily on ceiling surfaces to provide direct-applied sound absorption to an exposed structural deck in an occupied space, check out International Cellulose.

Tierra rapidly renewable ceiling tiles. The industry's first biobased, rapidly renewable ceiling tile made from jute fiber. This is the only C2C silver certified ceiling tile in the world (LEED Innovation Credit). For use in open-plan offices where very good sound absorption is sought, check out Armstrong.

Ultra-touch cotton denim acoustical batt insulation. Use this in stud walls to achieve improved sound isolation of demising constructions, for example, between adjacent offices. Bonded Logic makes a product in this space.

For acoustical underlayment, there is one made from recycled car, bus, and truck tires that would have otherwise ended up in landfills and that is adhered with low VOC adhesive. For use in preventing transmission of foot traffic and other noises to the floor below, check out U.S. Rubber Recycling Inc.

Bamboo can be found in the form of sound diffusors, made from the rapidly renewable material. Studiofoam products, such as those from Auralex Acoustics, include soy components which reduce petroleum-based chemical usage by up to 60%. This can be used to reduce reverberation and help with sound absorption.

A very interesting product combines sound absorption with a water-bearing capillary tube system. These water-bearing mats are made out of flexible synthetic materials, and are installed very close to the surface of the space development surface. This enables mild temperature equalizations of the ceilings, walls, and floors. The system is comprised of 86% recycled content, has no VOC's or harmful offgasing, and consists of components made in the USA. Baswa Acoustic is one manufacturer of this product, that also requires no harmful cleaners for maintenance.

About the Author

Linda Gedemer, LEED AP, CTS is a senior consultant for the Cambridge, MA based firm Acen-tech Inc (Acoustics, Environmental Noise, AV/IT Systems), where she works as both an AV systems and an acoustic consultant. In addition, Linda is a lecturer at Loyola Marymount University where she teaches Studio Acoustics and Recording Technology for the Recording Arts Program at the School of Film and Television.