

Acoustics in Green Building Design

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LEED Rating Systems

LEED Rating Systems

What is LEED®?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria.



LEED is the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Who Uses LEED?

Architects, real estate professionals, facility managers, engineers, interior designers, landscape architects, construction managers, lenders and government officials all use LEED to help transform the built environment to sustainability. State and local governments across the country are adopting LEED for public-owned and public-funded buildings; there are LEED initiatives in federal agencies, including the Departments of Defense, Agriculture, Energy, and State; and LEED projects are in progress in 41 different countries, including Canada, Brazil, Mexico and India.

LEED Rating Systems

New Construction

LEED for New Construction and Major Renovations is designed to guide and distinguish high-performance commercial and institutional projects.

Existing Buildings

LEED for Existing Buildings: Operations & Maintenance provides a benchmark for building owners and operators to measure operations, improvements and maintenance.

Commercial Interiors

LEED for Commercial Interiors is a benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers.

Core & Shell

LEED for Core & Shell aids designers, builders, developers and new building owners in implementing sustainable design for new core and shell construction.

Schools

LEED for Schools recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces.

Retail

LEED for Retail recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces.

Healthcare

LEED for Healthcare promotes sustainable planning, design and construction for high-performance healthcare facilities.

Homes

LEED for Homes promotes the design and construction of high-performance green homes.

Neighborhood Development

LEED for Neighborhood Development integrates the principles of smart growth, urbanism and green building into the first national standard for neighborhood design.

* LEED Rating System Drafts

Review and comment on proposed final drafts of new and updated LEED Rating Systems.

LEED for Schools

LEED® for Schools for New Construction and Major Renovations



First Edition
Updated November 2007

EQ Prerequisite 3: Minimum Acoustical Performance Required

Intent

Provide classrooms that are quiet and in which teachers can speak to the class without straining their voices and students can effectively communicate with each other and the teacher.

Requirements

Design classrooms and other core learning spaces to meet the Reverberation Time (RT) requirements of ANSI Standard S12.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools. Also, design classrooms and other core learning spaces to meet the Sound Transmission Class (STC) requirements, excepting windows, which must meet an STC rating of at least 35.

AND

OPTION 1

Using the methodology described in annexes B through D of ANSI Standard S12.60-2002, achieve a maximum background noise level in classrooms and other primary learning spaces of 45 dBA.

OR

OPTION 2

Design classrooms and other core learning spaces using the methodology listed in the 2003 HVAC Applications ASHRAE Handbook, Ch. 47 on Sound and Vibration Control, and achieve an RC (N) Mark II level of 37.

Potential Technologies & Strategies

Design considerations include reducing noise from exterior to interior spaces, between spaces within the building, and within the classroom space. External to internal noise transmission can be reduced by orienting classrooms away from external noise sources and using thick and/or massive materials in walls and roofs. Also, windows should be well sealed and have adequate air gaps between sheets of glass.

LEED for Schools Rating System 1st Edition, Updated November 2007

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LEED for Schools

LEED® for Schools for New Construction and Major Renovations



First Edition
Updated November 2007

EQ Credit 9: Enhanced Acoustical Performance

1–2 Points

Intent

Provide classrooms that facilitate better teacher-to-student and student-to-student communications.

Requirements

Design classrooms and other core learning spaces to meet the Reverberation Time (RT) and Impact Insulation Class (IIC) requirements of ANSI Standard S12.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools. Also design classrooms and other core learning spaces to meet the Sound Transmission Class (STC) requirements, excepting windows, which must meet an STC rating of at least 35.

AND

OPTION 1

Using the methodology described in Standard S12.60-2002, achieve a maximum unoccupied background noise level in classrooms and other primary learning spaces of:

40 dBA (1 Point)

35 dBA (2 Points)

OPTION 2

Design classrooms and other core learning spaces using the methodology listed in the 2003 HVAC Applications ASHRAE Handbook, Chapter 47 on Sound and Vibration Control, and achieve an RC level of:

32 (1 Point)

27 (2 Points)

Potential Technologies & Strategies

Design considerations include reducing noise from exterior to interior spaces between spaces within the building and within the classroom space. External to internal noise transmission can be reduced by orienting classrooms away from external noise sources and using thick and/or massive materials in walls and roofs. Also, windows should be well sealed and have adequate air gaps between sheets of glass. See EQ Prerequisite 3 for more potential technologies and strategies.

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LEED for Schools

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 - ISO/TC 43/SC1 Noise
 - ISO/TC 108 Mechanical Vibration and Shock
 - ISO/TC 108/SC2 Measurement and evaluation of mechanical vibration and shock
 - ISO/TC 108/SC3 Use and calibration of vibration and shock measuring instruments
 - ISO/TC 108/SC4 Human Exposure to Mechanical Vibration and Shock
 - ISO/TC 108/SC5 Condition Monitoring and Diagnostics of Machines
 - ISO/TC 108/SC6 Vibration and Shock Generating Systems

FEATURED PRODUCTS

Classroom Acoustics



ANSI S12.60-2002 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools

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Thanks to the generous support of our partners, we are now able to make this Standard available at no cost to you! Click here to download this Standard now. You will be asked to set up a user name and password and go through the check out screen but NO credit card information is required and there is no cost to you.

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[Thermoacoustics \(with CD\)](#)
By G. W. Swift

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LEED for Schools

LEED for Schools Credit Modifications to NC v2.2

Updated on 10/16/07

34 **9** **29** **7** **Possible Points 79**

7 1 6 2 Sustainable Sites Possible Points 16

Prereq	NC	Cr	Mod	New	Description	Possible Points
Y					Prereq 1 Construction Activity Pollution Prevention	
Y					Prereq 2 Environmental Site Assessment	
					Cred 1 Site Selection	1
				1	Cred 2 Development Density and Community Connectivity	1
				1	Cred 3 Brownfield Redevelopment	1
				1	Cred 4.1 Alternative Transportation, Public Transportation Access	1
				1	Cred 4.2 Alternative Transportation, Bicycle Storage & Changing Rooms	1
				1	Cred 4.3 Alternative Transportation, Low-Emitting/Fuel Efficient Vehicles	1
				1	Cred 4.4 Alternative Transportation, Parking Capacity	1
				1	Cred 5.1 Site Development, Protect or Restore Habitat	1
				1	Cred 5.2 Site Development, Maximize Open Space	1
				1	Cred 6.1 Stormwater Design, Quantity Control	1
				1	Cred 6.2 Stormwater Design, Quality Control	1
				1	Cred 7.1 Heat Island Effect, Non-Roof	1
				1	Cred 7.2 Heat Island Effect, Roof	1
				1	Cred 8 Light Pollution Reduction	1
				1	Cred 9 Site Master Plan	1
				1	Cred 10 Joint Use of Facilities	1

4 2 1 Water Efficiency Possible Points 7

NC	Cr	Mod	New	Description	Possible Points
1				Cred 1.1 Water Efficient Landscaping, Reduce by 50%	1
1				Cred 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation	1
1				Cred 2 Innovative Wastewater Technologies	1
1				Cred 3.1 Water Use Reduction, 20% Reduction	1
			2	Cred 3.2 Water Use Reduction, 30%, 40% Reduction	2
			1	Cred 4 Process Water Use Reduction, 20% Reduction	1

5 1 11 Energy & Atmosphere Possible Points 17

NC	Cr	Mod	New	Description	Possible Points
Y				Prereq 1 Fundamental Building Systems Commissioning	
			Y	Prereq 2 Minimum Energy Performance	
Y				Prereq 3 Fundamental Refrigerant Management	
			10	Cred 1.1 Optimize Energy Performance (2pt minimum)	10
			3	Cred 2.1 On-Site Renewable Energy	3
			1	Cred 3 Enhanced Commissioning	1
			1	Cred 4 Enhanced Refrigerant Management	1
			1	Cred 5 Measurement & Verification	1
			1	Cred 6 Green Power	1

Table Key:

- No change from NC
- Clarification on requirements
- Modification, deletion or addition to requirements
- New credit or prerequisite

12 1 Materials & Resources Possible Points 13

NC	Cr	Mod	New	Description	Possible Points
			Y	Prereq 1 Storage & Collection of Recyclables	
			1	Cred 1.1 Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1
			1	Cred 1.2 Building Reuse, Maintain 95% of Existing Walls, Floors & Roof	1
			1	Cred 1.3 Building Reuse, Maintain 50% of Interior Non-Structure Elements	1
			1	Cred 2.1 Construction Waste Management, Divert 50%	1
			1	Cred 2.2 Construction Waste Management, Divert 75%	1
			1	Cred 3.1 Materials Reuse, Specify 5%	1
			1	Cred 3.2 Materials Reuse, Specify 10%	1
			1	Cred 4.1 Recycled Content, Specify 10% PC + PI	1
			1	Cred 4.2 Recycled Content, Specify 20% PC + PI	1
			1	Cred 5.1 Regional Materials, 10% Extracted, Processed and Manufactured Locally	1
			1	Cred 5.2 Regional Materials 20% Extracted, Processed and Manufactured Locally	1
			1	Cred 6 Rapidly Renewable Materials	1
			1	Cred 7 Certified Wood	1

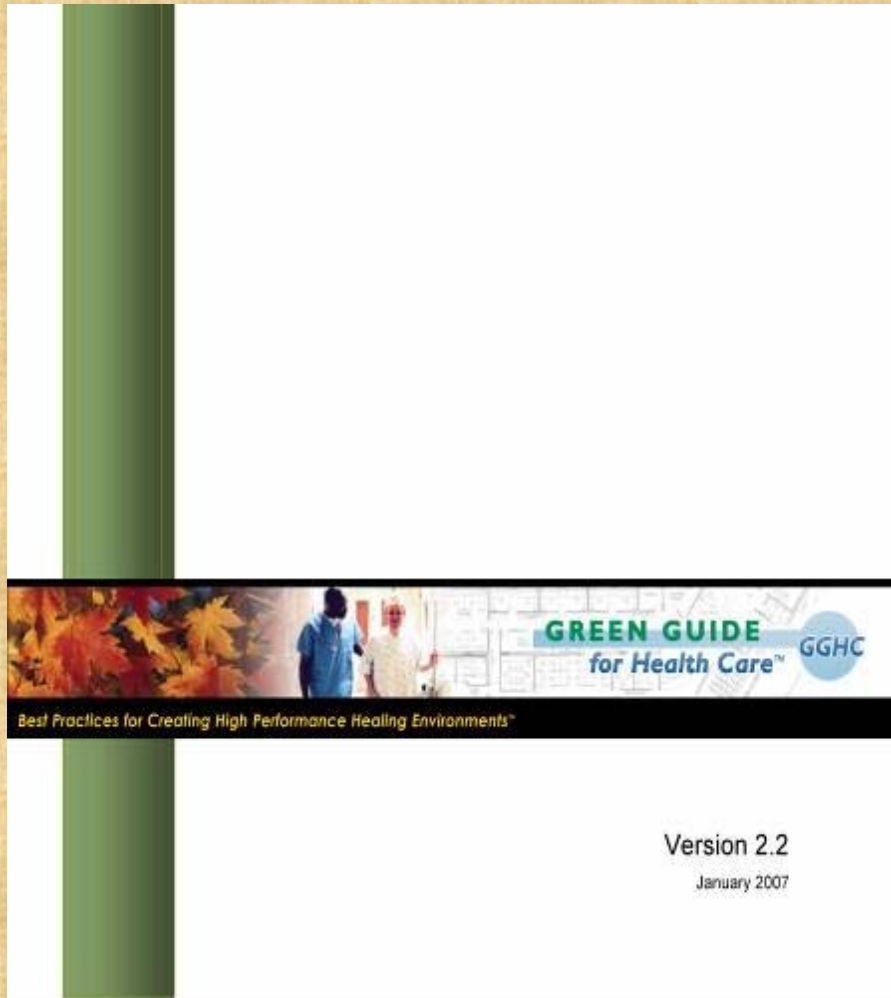
5 2 10 3 Indoor Environmental Quality Possible Points 20

NC	Cr	Mod	New	Description	Possible Points
			Y	Prereq 1 Minimum IAQ Performance	
			Y	Prereq 2 Environmental Tobacco Smoke (ETS) Control	
			Y	Prereq 3 Minimum Acoustical Performance	
			1	Cred 1 Outdoor Air Delivery Monitoring	1
			1	Cred 2 Increased Ventilation	1
			1	Cred 3.1 Construction IAQ Management Plan, During Construction	1
			1	Cred 3.2 Construction IAQ Management Plan, Before Occupancy	1
			4	Cred 4 Low-Emitting Materials (4-points available for 6 potential strategies)	4
			1	Cred 4.1 Low-Emitting Materials, Adhesives & Sealants	1
			1	Cred 4.2 Low-Emitting Materials, Paints & Coatings	1
			1	Cred 4.3 Low-Emitting Materials, Flooring Systems	1
			1	Cred 4.4 Low-Emitting Materials, Composite Wood & Agrifiber Products	1
			1	Cred 4.5 Low-Emitting Materials, Furniture and Furnishings	1
			1	Cred 4.6 Low-Emitting Materials, Ceiling and Wall Systems	1
			1	Cred 5 Indoor Chemical & Pollutant Source Control	1
			1	Cred 6.1 Controllability of Systems, Lighting	1
			1	Cred 6.2 Controllability of Systems, Thermal Comfort	1
			1	Cred 7.1 Indoor Environmental Comfort, Design	1
			1	Cred 7.2 Indoor Environmental Comfort, Verification	1
			3	Cred 8.1 Daylight & Views, Daylight 75%, 90% of Classrooms, 75% other	3
			1	Cred 8.2 Daylight & Views, Views for 50% of other Spaces	1
			2	Cred 9 Enhanced Acoustical Performance	2
			1	Cred 10 Mold Prevention	1

1 4 1 Innovation & Design Possible Points 6

NC	Cr	Mod	New	Description	Possible Points
			4	Cred 1.1 Innovation in Design	4
			1	Cred 2 LEED Accredited Professional	1
			1	Cred 3 The School As A Teaching Tool	1

LEED for Healthcare



LEED® For Healthcare Rating System

For Public Comment

November 2007

LEED for Healthcare Rating System Draft
November 2007

LEED for Healthcare



GREEN GUIDE
for Health Care™ GGHC

NEWS RELEASE

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USGBC and GGHC Working Together to Green the Healthcare Industry Organizations collaborate to provide tools and resources for healthcare buildings

December 4, 2007 (Washington, DC) - The U.S. Green Building Council (USGBC) and the Green Guide for Health Care (GGHC) have entered into an agreement to help green the healthcare industry by fostering best practices and ensuring the health care industry has the tools and resources it needs to build green. Green hospital buildings are healthier for the patients, doctors and nurses; use less energy and water; and have less of an impact on the environment.

"The healthcare industry is by far one of the more important sectors that can benefit from the practice of green building design and construction," said Rick Fedrizzi, President, CEO & Founding Chair, U.S. Green Building Council. "Patients in green hospitals have greater emotional well-being, require less pain medication and other drugs, and have shorter hospital stays."

Following four years of close collaboration, USGBC and GGHC signed the memorandum of understanding in September 2007 agreeing to work together on the development of tools, educational programs, and other activities to support green health care building. USGBC and GGHC will jointly develop health care-related resource materials, education and training events; identify a prioritized research agenda; and continue to collaborate on developing future health care-related green building tools. USGBC will administer the LEED for Healthcare certification process and the GGHC will continue to act as a change agent and tool developer dedicated to empowering the health delivery industry to take a leadership position in the world of green building and operation. As such, the *Green Guide* will continue to develop the next generation of the GGHC tools.

"Green hospitals seek to reduce use of and exposure to toxic chemicals and provide a healthier healing environment," said Adele Houghton, Project Manager, Green Guide for Health Care. "By employing green practices, whether incrementally or from the ground up, many hospitals are managing to lower energy bills, reduce waste and achieve healthier indoor air quality."

Numerous studies have shown dramatic increases in the health, happiness, and productivity of people who live and work in green buildings, and hospitals are no exception. Nurses, doctors, and other staff work long hours in a high-stress environment, and providing them with a safe and comfortable work place is vital both to their health and to the health of their patients. Improvements in the working environment increase staff effectiveness and satisfaction and greatly reduce errors, greatly contributing to the quality of patient care.

LEED for Healthcare

Credit Summary: Construction

Environmental Quality

<i>Title</i>	<i>Intent</i>	<i>Credit Goals</i>	<i>Source</i>
EQ 8.3 Daylight & Views: Lighting and Circadian Rhythm	Reinforce natural circadian rhythms (sleep/wake patterns) in patients and daytime staff, and promote alertness in both day-shift and night-shift staff.	In patient sleeping or holding areas, establish lighting and lighting control design solutions that allow for variation in day and night lighting characteristics as outlined in the Credit Goals. In staff areas, establish lighting to support work performance and alertness through both daytime and nighttime lighting cycles as outlined in Credit Goals.	New
EQ 9.1 Acoustic Environment: Exterior Noise, Acoustical Finishes, & Room Noise Levels	Provide building occupants with a healing environment free of disruptive levels of sound.	Design the facility's acoustic environment in accordance with the following section of the 2006 AIA/AHA Draft Interim Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities: Exterior Noise, Acoustical Finishes, and Room Noise Levels.	New
EQ 9.2 Acoustic Environment: Sound Isolation, Paging & Call Systems, & Building Vibration		In addition to the Credit Goals outlined in GGHC EQ Credit 9.1: Acoustic Environment, meet two out of the three following sections of the 2006 AIA/AHA Draft Interim Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities: Sound Isolation, Paging & Call Systems, and Building Vibration.	New

Resources

- [Speech Privacy.org](http://SpeechPrivacy.org)
- [Healthcare Acoustics.org](http://HealthcareAcoustics.org)
- Official website of ANSI S12/WG44 (Healthcare Acoustics and Speech Privacy) and the Joint ASA/INCE/NCAC Subcommittee on Healthcare Acoustics & Speech Privacy
 - Thanks to David Sykes for guidance:
david.sykes@remington-partners.com

Resources

- www.healthcareacoustics.org
- AIA/AHA Draft Interim Sound and Vibration Design Guidelines for Hospital and Healthcare Facilities, Public Draft 1 (download)
- A \$30 payment is requested to offset some of the costs of creating and maintaining this document.

Resources

- www.healthcareacoustics.org.
- September 9, 2007: AIA Presentation on Acoustics in Hospital and Healthcare Facilities (download)
- Updated for USGBC Greenbuild '07
- 2nd & 3rd Panel Presentations:
 - AIA National Conference, May '08
 - USGBC Greenbuild '08

Resources

Announced USGBC Greenbuild '07, Chicago:

- Two points for acoustics under LEED HC;
- LEED HC approval was immediate because Jan '07 Green Guide for Healthcare acceptance already provided a 9-month validation period (acoustical credits under the LEED Rating System, re: AIA/FGI Interim Guideline).
- HC acoustic credits may be used in other LEED programs as well
- LEED has an interest in "generalizing" these credits to other programs, re: consistency.

Resources

- General acceptance by the AIA (whose guidelines are accepted as code by 42 states and 7 federal agencies in the USA), and also by the USGBC's LEED Rating System (which is cited by 16 countries) provides sufficient stature for the "Interim Guideline on Acoustics" to serve as a model for the development of consistent global policy by groups in Asia (i.e., the ASJ's new committee) and Europe (i.e., through the UIA).