

USGBC's LEED (Leadership in Energy and Environmental Design) Guidelines

EA Credit 1: Optimize Energy Performance

1–10 Points

Intent

Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements

Select one of the three compliance path options described below. Project teams documenting achievement using any of the three options are assumed to be in compliance with EA

Prerequisite

- **OPTION 1 — WHOLE BUILDING ENERGY SIMULATION (1–10 Points)**
Demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2004 (without amendments) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard. The minimum energy cost savings percentage for each point threshold is as follows:

New Buildings Existing Building Renovations Points

10.5%	3.5%	1
14%	7%	2
17.5%	10.5%	3
21%	14%	4
24.5%	17.5%	5
28%	21%	6
31.5%	24.5%	7
35%	28%	8
38.5%	31.5%	9
42%	35%	10

Appendix G of Standard 90.1-2004 requires that the energy analysis done for the Building

Performance Rating Method include ALL of the energy costs within and associated with the building project. To achieve points using this credit, the proposed design—

- must comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) in Standard 90.1-2004 (without amendments);
- must include all the energy costs within and associated with the building project; and
- must be compared against a baseline building that complies with Appendix G to Standard 90.1-2004 (without amendments). The default process energy cost is 25% of the total energy cost for the baseline building. For buildings where the process energy cost is less than 25% of the baseline building energy cost, the LEED submittal must include supporting documentation substantiating that process energy inputs are appropriate.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and

escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting exempt from the lighting power allowance

(e.g. lighting integral to medical equipment) and other (e.g. waterfall pumps). Regulated (nonprocess) energy includes lighting (such as for the interior, parking garage, surface parking, façade, or building grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

For EA Credit 1, process loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ASHRAE 90.1-2004 G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions.

OR

- **OPTION 2 — PRESCRIPTIVE COMPLIANCE PATH (4 Points)**
Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004. The following restrictions apply:
 - Buildings must be under 20,000 square feet
 - Buildings must be office occupancy
 - Project teams must fully comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located

OR

- **OPTION 3 — PRESCRIPTIVE COMPLIANCE PATH (1 Point)**
Comply with the Basic Criteria and Prescriptive Measures of the Advanced Buildings

Benchmark™ Version 1.1 with the exception of the following sections: 1.7 Monitoring and Trend-logging, 1.11 Indoor Air Quality, and 1.14 Networked Computer Monitor Control. The following restrictions apply:

- Project teams must fully comply with all applicable criteria as established in Advanced

Buildings Benchmark for the climate zone in which the building is located.

Potential Technologies & Strategies

Design the building envelope and systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance as compared to a baseline building.

If a local code has demonstrated quantitative and textual equivalence following, at a minimum, the U.S. Department of Energy standard process for commercial energy code determination, then the results of that analysis may be used to correlate local code performance with ASHRAE 90.1- 2004. Details on the DOE process for

commercial energy code determination can be found at www.energycodes.gov/implement/determinations_com.stm.

Caulks and sealants can help to indirectly conserve and optimize a building's energy efficiency, thus leading to improved measurements against this criteria.

EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Required

Intent

Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke (ETS).

Requirements

- **OPTION 1**
 - Prohibit smoking in the building.
 - Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.

OR

- **OPTION 2**
 - Prohibit smoking in the building except in designated smoking areas.
 - Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows.
 - Locate designated smoking rooms to effectively contain, capture and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors with no re-circulation of ETS-containing air to the non-smoking area of the building, and enclosed with impermeable deck-to-deck partitions. With the doors to the smoking room closed, operate exhaust sufficient to create a negative pressure with respect to the adjacent spaces of at least an average of 5 Pa (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge).
 - Performance of the smoking room differential air pressures shall be verified by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. The testing will be conducted with each space configured for worst case conditions of transport of air from the smoking rooms to adjacent spaces with the smoking rooms' doors closed to the adjacent spaces.

OR

- **OPTION 3 (For residential buildings only)**
 - Prohibit smoking in all common areas of the building.
 - Locate any exterior designated smoking areas at least 25 feet away from entries, outdoor air intakes and operable windows opening to common areas.
 - Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in walls, ceilings and floors in the residential units, and by sealing vertical chases adjacent to the units.

- All doors in the residential units leading to common hallways shall be weather-stripped to minimize air leakage into the hallway.
- If the common hallways are pressurized with respect to the residential units then doors in the residential units leading to the common hallways need not be weather-stripped provided that the positive differential pressure is demonstrated as in Option 2 above, considering the residential unit as the smoking room. Acceptable sealing of residential units shall be demonstrated by a blower door test conducted in accordance with ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization, AND use the progressive sampling methodology defined in Chapter 4 (Compliance Through Quality Construction) of the Residential Manual for Compliance with California's 2001 Energy Efficiency Standards

(www.energy.ca.gov/title24/residential_manual). Residential units must demonstrate less than 1.25 square inches leakage area per 100 square feet of enclosure area (i.e. sum of all wall, ceiling and floor areas).

Potential Technologies & Strategies Prohibit smoking in commercial buildings or effectively control the ventilation air in smoking rooms. For residential buildings, prohibit smoking in common areas, design building envelope and systems to minimize ETS transfer among dwelling units.

EQ Credit 3.2: Construction IAQ Management Plan: Before Occupancy

1 Point

Intent

Reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants.

Requirements

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the pre-occupancy phase as follows:

- **OPTION 1 — Flush-Out**
 - After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

OR

 - If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cu.ft. of outdoor air per sq.ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm/sq.ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy.

These conditions shall be maintained until a total of 14,000 cu.ft./sq.ft. of outside air has been delivered to the space.

OR

- OPTION 2 — Air Testing
 - Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the Reference Guide.
 - Demonstrate that the contaminant maximum concentrations listed below are not exceeded.

CONTAMINANT MAXIMUM CONCENTRATION

Formaldehyde 50 parts per billion

Particulates (PM10) 50 micrograms per cubic meter

Total Volatile Organic Compounds (TVOC) 500 micrograms per cubic meter

* 4-Phenylcyclohexene (4-PCH) 6.5 micrograms per cubic meter

Carbon Monoxide (CO) 9 part per million and no greater than 2 parts per million above outdoor levels

* This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing material are installed as part of the base building systems.

- For each sampling point where the maximum concentration limits are exceeded conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.
- The air sample testing shall be conducted as follows:
 1. All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 2. The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 3. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq.ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
 4. Air samples shall be collected between 3 feet and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum 4-hour period. Potential Technologies & Strategies Prior to occupancy, perform a building flush-out or test the air contaminant levels in the building. The flush-out is often used where occupancy is not required immediately upon substantial completion of construction. IAQ testing can minimize schedule impacts but may be more costly. Coordinate with Indoor Environmental Quality Credits 3.1 and 5 to determine the appropriate specifications and schedules for filtration media.

EQ Credit 4.1: Low-Emitting Materials: Adhesives & Sealants

1 Point

Intent

Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements

All adhesives and sealants used on the interior of the building (defined as inside of the weatherproofing system and applied on-site) shall comply with the requirements of the following reference standards:

- Adhesives, Sealants and Sealant Primers: South Coast Air Quality Management District

(SCAQMD) Rule # 1168. VOC limits are listed in the table below and correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

Architectural Applications VOC Limit [g/L less water] Specialty Applications VOC Limit [g/L less water]

Indoor Carpet Adhesives 50 PVC Welding 510

Carpet Pad Adhesives 50 CPVC Welding 490

Wood Flooring Adhesives 100 ABS Welding 325

Rubber Floor Adhesives 60 Plastic Cement Welding 250

Subfloor Adhesives 50 Adhesive Primer for Plastic 550

Ceramic Tile Adhesives 65 Contact Adhesive 80

VCT & Asphalt Adhesives 50 Special Purpose Contact Adhesive 250

Drywall & Panel Adhesives 50 Structural Wood Member Adhesive 140

Cove Base Adhesives 50 Sheet Applied Rubber Lining Operations 850

Multipurpose Construction Adhesives 70 Top & Trim Adhesive 250

Structural Glazing Adhesives 100

Substrate Specific Applications VOC Limit [g/L less water] Sealants VOC Limit [g/L less water]

Metal to Metal 30 Architectural 250

Plastic Foams 50 Nonmembrane Roof 300

Porous Material (except wood) 50 Roadway 250

Wood 30 Single-Ply Roof Membrane 450

Fiberglass 80 Other 420

Sealant Primers VOC Limit [g/L less water]

Architectural Non Porous 250

Architectural Porous 775

Other 750

- Aerosol Adhesives: Green Seal Standard for Commercial Adhesives GS-36 requirements in effect on October 19, 2000.

Aerosol Adhesives: VOC weight [g/L minus water]

General purpose mist spray 65% VOCs by weight

General purpose web spray 55% VOCs by weight

Special purpose aerosol adhesives (all types) 70% VOCs by weight

Potential Technologies & Strategies

Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Common products to evaluate include: general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives, and cove base adhesives.

Local Criteria

To find out state and local regulations visit your state government site. States that currently have VOC regulations in place include:

CA, WA, NY, PA, NJ, MD, DE, DC, ME, CT, MA, NH, RI, VT, VA