

# GREEN INTERIOR DESIGN AND CONSTRUCTION

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WITH ALTERNATIVE COMPLIANCE PATHS FOR  
EAST ASIA

**LEED Reference Guide for Green Interior Design and Construction**  
**For the Design, Construction and Renovation of Commercial and**  
**Institutional Interiors Projects**  
**2009 Edition**





# PREFACE FROM USGBC

The built environment has a profound impact on our natural environment, economy, health, and productivity. Breakthroughs in building science, technology, and operations are now available to designers, builders, operators, and owners who want to build green and maximize both economic and environmental performance.

Through the LEED® green building certification program, the U.S. Green Building Council (USGBC) is transforming the built environment. The green building movement offers an unprecedented opportunity to respond to the most important challenges of our time, including global climate change, dependence on non sustainable and expensive sources of energy, and threats to human health. The work of innovative building professionals is a fundamental driving force in the green building moment. Such leadership is a critical component to achieving USGBC's mission of a sustainable built environment for all within a generation.

## USGBC MEMBERSHIP

USGBC's greatest strength is the diversity of our membership. USGBC is a balanced, consensus-based nonprofit with more than 18,000 member companies and organizations representing the entire building industry. Since its inception in 1993, USGBC has played a vital role in providing a leadership forum and a unique, integrating force for the building industry. USGBC's programs have three distinguishing characteristics:

### Committee-based

The heart of this effective coalition is our committee structure, in which volunteer members design strategies that are implemented by staff and expert consultants. Our committees provide a forum for members to resolve differences, build alliances, and forge cooperative solutions for influencing change in all sectors of the building industry.

### Member-driven

Membership is open and balanced and provides a comprehensive platform for carrying out important programs and activities. We target the issues identified by our members as the highest priority. We conduct an annual review of achievements that allows us to set policy, revise strategies, and devise work plans based on members' needs.

### Consensus-focused

We work together to promote green buildings, and in doing so, we help foster greater economic vitality and environmental health at lower costs. We work to bridge ideological gaps between industry segments and develop balanced policies that benefit the entire industry.

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# INTRODUCTION

## I. WHY MAKE YOUR BUILDING GREEN?

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## II. LEED® GREEN BUILDING RATING SYSTEM

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## III. OVERVIEW AND PROCESS

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

### When to Use LEED 2009 Alternative Compliance Paths

Alternative Compliance Paths (ACPs) to LEED credits provide additional options or approaches that address unique circumstances and accommodate advancements in science and technology. ACPs allow LEED to be more flexible and applicable to a wider range of projects. Global ACPs and Regional ACPs for East Asia are integrated into this guidance document. The LEED 2009 Interior Design and Construction (ID&C) Regional ACPs for East Asia were developed to address tenant spaces, primarily in office, retail, and institutional buildings for projects in East Asia. ACPs can be applied at the discretion of the project team, based on applicability; they are not mandatory for any project. Some ACPs are available only for projects outside the U.S., and others are available for all LEED projects regardless of location, as indicated in the credit language.

Projects may use none, some, or all of the LEED 2009 Global ACPs or Regional ACPs for East Asia and do not need to apply them consistently across credits unless noted in the credit language. Each credit category's Overview section includes a table identifying which credits have Global ACPs or an East Asia ACP.

For specific guidance on which rating system to use, see the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement.

## IV. LEED ONLINE DOCUMENTATION REQUIREMENTS

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## V. CERTIFICATION APPLICATION

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## **VI. CERTIFICATION STRATEGY**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## **VII. EXEMPLARY PERFORMANCE STRATEGIES**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## **VIII. REGIONAL PRIORITY**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## **IX. TOOLS FOR REGISTERED PROJECTS**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for this section of the Introduction.

## **X. HOW TO USE THIS REFERENCE GUIDE**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional guidance.

The LEED 2009 ID&C Alternative Compliance Path for East Asia Reference Guide Supplement is a supporting document to the LEED Global ACPs and East Asia ACPs. This guide helps project teams understand the criteria, the reasons behind them, strategies for implementation, and documentation requirements. It includes examples of strategies that can be used in each category and additional resources. It does not provide an exhaustive list of strategies for meeting the criteria or all the information that a project team needs to determine the applicability of a credit to the project.

The LEED 2009 ID&C Alternative Compliance Path for East Asia Reference Guide Supplement should be consulted in conjunction with the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement. Information in the reference guide is not repeated in this supplement, which focuses instead on the following:

- information specific to considerations for projects outside the U.S.
- new information for existing credits with new Alternative Compliance Paths

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### OVERVIEW





See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional guidance.

Project teams outside the U.S. face many of the same challenges as their American counterparts when determining where to locate a new project. However, American codes and regulations often prove difficult to apply abroad. The Global Alternative Compliance Paths for Sustainable Sites allow project teams outside the U.S. to select local equivalents to the prescribed U.S. codes and regulations for select credits. In many cases this will lower overall project costs by reducing the required documentation.

Local equivalent standards can be used in place of U.S. government regulations for SS Credit 1 (Site Selection). Project teams outside the U.S. can use a local code or regulation if it meets the intent of the credit.

A new path in Option 1 for SS Credit 3/3.1 (Alternative Transportation) allows project teams to include additional vehicle types when calculating alternative transportation use for building occupants.

 **Table 1.** SS Credits with Alternative Compliance Paths

CREDIT	TITLE	CI	RETAIL: CI
<b>SS Credit 1</b>	Site Selection		
<b>SS Credit 2</b>	Development Density and Community Connectivity		
<b>SS Credit 3</b>	Alternative Transportation		
<b>SS Credit 3.1</b>	Alternative Transportation—Public Transportation Access		
<b>SS Credit 3.2</b>	Alternative Transportation—Bicycle Storage and Changing Rooms		
<b>SS Credit 3.3</b>	Alternative Transportation—Parking Availability		

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## SITE SELECTION

	CI	RETAIL: CI
Credit	SS Credit 1	SS Credit 1
Points	1-5 points	1-5 points

### Intent

To encourage tenants to select buildings that employ best practices systems and employ green strategies.

### Requirements

#### Commercial Interiors

#### OPTION 1

Select a LEED certified building (5 points).

OR

#### OPTION 2

Locate the tenant space in a building that has in place 1 or more of the following characteristics at time of submittal (1–5 points). Each of the following options may be met by satisfying the requirements of the corresponding LEED 2009 for New Construction credit.

##### PATH 1. Brownfield Redevelopment (1 point)

A building developed on a site documented as contaminated by an ASTM E1903-97 Phase II Environmental Site Assessment or a local voluntary cleanup program. Projects outside the U.S. may use a local equivalent to ASTM E1903-97 Phase II Environmental Site Assessment.

OR

A building on a site classified as a brownfield by a local, state, tribal or national government agency, whichever is most stringent.

Effective remediation of site contamination must have been completed.

##### PATH 2. Stormwater Design—Quantity Control (1 point)

A building that prior to its development had less than or equal to 50% imperviousness and has implemented a stormwater management plan that is equal to or less than the predevelopment 1-1/2 year, 24-hour rate and quantity discharge.

OR

A building that prior to its development had more than 50% imperviousness and has implemented a stormwater management plan that reduced predevelopment 1-1/2 year, 24-hour rate and quantity discharge by 25% of the annual on-site stormwater. This mitigation can be achieved through a variety of measures such as perviousness of site, stormwater retention ponds, and harvesting of rainwater for reuse.

Stormwater values are based on actual local rainfall unless the actual exceeds the 10-year annual average local rainfall, in which case the 10-year annual average should be used.

## SS CREDIT 1



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## SS CREDIT 1

### PATH 3. Stormwater Design—Quality Control (1 point)

A building that has in place site stormwater treatment systems designed to remove at least 80% of the average annual site area's total suspended solids (TSS) and 40% of the average annual site area's total phosphorus (TP).

These values are based on the average annual loadings from all storms less than or equal to the 2-year, 24-hour storm. The building must implement and maintain best management practices (BMPs) outlined in Chapter 4, Part 2, Urban Runoff, of the EPA Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (EPA 840-B-92-002) or the local government's BMP document, whichever is more stringent.

### PATH 4. Heat Island Effect—Nonroof (1 point)

A building that provides shade (or will provide shade within 5 years of landscape installation), and/or uses light-colored or high-albedo materials with a solar reflectance index (SRI)<sup>1</sup> of at least 29, and/or has open-grid pavement areas that individually or in total equal at least 30% of the site's nonroof impervious surfaces, such as parking areas, walkways, plazas, and fire lanes.

OR

A building that has placed a minimum of 50% of parking spaces underground or covered by structured parking.

OR

A building that has an open-grid pavement system (less than 50% impervious) for 50% of the parking lot area.

### PATH 5. Heat Island Effect—Roof (1 point)

A building whose roofing has a solar reflectance index (SRI) of the following minimum values for at least 75% of the roof surface:

Roof Type	Slope	SRI
Low-sloped roof	≤ 2:12	78
Steep-sloped roof	> 2:12	29

OR

A building that has installed a vegetated roof for at least 50% of the roof area.

OR

A building that has both high-SRI roofs and vegetated roofs that satisfy the following area requirement:

$$\frac{\text{Total Roof Area}}{\text{Area}} \leq \left[ \left( \text{Area of SRI Roof} \times 1.33 \right) + \left( \text{Area of Vegetated Roof} \times 2 \right) \right]$$

<sup>1</sup> The solar reflectance index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black surface (reflectance 0.05, emittance 0.90) is 0 and a standard white surface (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

## PATH 6. Light Pollution Reduction (1 point)

A building whose nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) must have their input power reduced (by automatic device) by at least 50% between 11 PM and 5 AM. After-hours override may be provided by a manual or occupant-sensing device, provided the override lasts no more than 30 minutes.

OR

A building whose openings in the envelope (translucent or transparent) with a direct line of sight to any nonemergency luminaires must have shielding (with transmittance of less than 10%) that is controlled or closed by automatic device between 11 PM and 5 AM.

## PATH 7. Water-Efficient Landscaping—Reduce by 50% (2 points)

A building that employs high-efficiency irrigation technology OR uses harvested rainwater or recycled site water to reduce potable water consumption for irrigation by at least 50% over conventional means.

## PATH 8. Water-Efficient Landscaping—No Potable Use or No Irrigation (2 points in addition to Path 7)

A building that uses only harvested rainwater or recycled site water to eliminate all potable water use for site irrigation (except for initial watering to establish plants), OR does not have permanent landscaping irrigation systems.

## PATH 9. Innovative Wastewater Technologies (2 points)

A building that reduces the use of municipally provided potable water for building sewage conveyance by at least 50%, OR treats 100% of wastewater on-site to tertiary standards.

## PATH 10. Water Use Reduction—30% Reduction (1 point)

A building that meets the 30% reduction in water use requirement for the entire building and has an ongoing plan to require future occupants to comply.

## PATH 11. On-site Renewable Energy (1–2 points)

A building that supplies at least 2.5% (1 point) or 5% (2 points) of the building's total energy use (expressed as a fraction of annual energy cost) from on-site renewable energy systems.

## PATH 12. Other Quantifiable Environmental Performance (1 point)

A building that has in place at the time of selection other quantifiable environmental benefits.

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## SS CREDIT 1

### Retail: CI

#### OPTION 1

Select a LEED certified building (5 points).

OR

#### OPTION 2

Locate the tenant space in a building or development that has in place 1 or more of the following characteristics at time of submittal (1–5 points). Each of the following options may be met by satisfying the requirements of the corresponding LEED for Retail for New Construction credit.

##### PATH 1. Brownfield Redevelopment (1 point)

A building developed on a site documented as contaminated by an ASTM E1903-97 Phase II Environmental Site Assessment or a local voluntary cleanup program. Projects outside the U.S. may use a local equivalent to ASTM E1903-97 Phase II Environmental Site Assessment.

OR

A building on a site classified as a brownfield by a local, state, tribal or national government agency, whichever is most stringent.

Effective remediation of site contamination must have been completed.

##### PATH 2. Stormwater Design—Quantity Control (1 point)

A building that prior to its development had less than or equal to 50% imperviousness and has implemented a stormwater management plan that is equal to or less than the predevelopment 1-1/2 year, 24-hour rate and quantity discharge.

OR

A building that prior to its development had more than 50% imperviousness and has implemented a stormwater management plan that reduced predevelopment 1-1/2 year, 24-hour rate and quantity discharge by 25% of the annual on-site stormwater. This mitigation can be achieved through a variety of measures such as perviousness of site, stormwater retention ponds, and harvesting of rainwater for reuse.

Stormwater values are based on actual local rainfall unless the actual exceeds the 10-year annual average local rainfall, in which case the 10-year annual average should be used.

##### PATH 3. Stormwater Design—Quality Control (1 point)

A building that has in place site stormwater treatment systems designed to remove at least 80% of the average annual site area's total suspended solids (TSS) and 40% of the average annual site area's total phosphorus (TP).

These values are based on the average annual loadings from all storms less than or equal to the 2-year, 24-hour storm. The building must implement and maintain best management practices (BMPs) outlined in Chapter 4, Part 2, Urban Runoff, of the EPA Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (EPA 840-B-92-002) or the local government's BMP document, whichever is more stringent.

## PATH 4. Heat Island Effect—Nonroof (1 point)

A building that provides shade (or will provide shade within 5 years of landscape installation), and/or uses light-colored or high-albedo materials with a solar reflectance index (SRI)<sup>2</sup> of at least 29, and/or has open-grid pavement areas that individually or in total equal at least 30% of the site's nonroof impervious surfaces, such as parking areas, walkways, plazas, and fire lanes.

OR

A building that has placed a minimum of 50% of parking spaces underground or covered by structured parking.

OR

A building that has an open-grid pavement system (less than 50% impervious) for 50% of the parking lot area.

## PATH 5. Heat Island Effect—Roof (1 point)

A building whose roofing has a solar reflectance index (SRI) of the following minimum values for at least 75% of the roof surface:

Roof Type	Slope	SRI
Low-sloped roof	≤ 2:12	78
Steep-sloped roof	> 2:12	29

OR

A building that has installed a vegetated roof for at least 50% of the roof area.

OR

A building that has both high-SRI roofs and vegetated roofs that satisfy the following area requirement:

$$\text{Total Roof Area} \leq \left[ \left( \text{Area of SRI Roof} \times 1.33 \right) + \left( \text{Area of Vegetated Roof} \times 2 \right) \right]$$

## PATH 6. Light Pollution Reduction (1 point)

A building whose nonemergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) must have their input power reduced (by automatic device) by at least 50% during nonbusiness hours. After-hours override may be provided by a manual or occupant-sensing device, provided the override lasts no more than 60 minutes.

OR

A building whose openings in the envelope (translucent or transparent) with a direct line of sight to any nonemergency luminaires must have shielding (with transmittance of less than 10%) that is controlled or closed by automatic device during nonbusiness hours.

2. The solar reflectance index (SRI) is a measure of the constructed surface's ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black surface (reflectance 0.05, emittance 0.90) is 0 and a standard white surface (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980. Reflectance is measured according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is measured according to ASTM E 408 or ASTM C 1371.

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## SS CREDIT 1

### PATH 7. Water-Efficient Landscaping—Reduce by 50% (2 points)

A building that employs high-efficiency irrigation technology OR uses harvested rainwater or recycled site water to reduce potable water consumption for irrigation by at least 50% over conventional means.

### PATH 8. Water-Efficient Landscaping—No Potable Use or No Irrigation (2 points in addition to Path 7)

A building that uses only harvested rainwater or recycled site water to eliminate all potable water use for site irrigation (except for initial watering to establish plants), OR does not have permanent landscaping irrigation systems.

### PATH 9. Innovative Wastewater Technologies (2 points)

A building that reduces the use of municipally provided potable water for building sewage conveyance by at least 50%, OR treats 100% of wastewater on-site to tertiary standards.

### PATH 10. Water Use Reduction—30% Reduction (1 point)

A building that meets the 30% reduction in water use requirement for the entire building and has an ongoing plan to require future occupants to comply.

### PATH 11. On-site Renewable Energy (1–2 points)

A building that supplies at least 2.5% (1 point) or 5% (2 points) of the building's total energy use (expressed as a fraction of annual energy cost) from on-site renewable energy systems.

### PATH 12. Other Quantifiable Environmental Performance (1 point)

A building that has in place at the time of selection other quantifiable environmental benefits.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

No new standards are referenced; see the LEED 2009 Green Interior Design and Construction Reference Guide for summaries of the U.S. EPA definition of brownfields; and ASTM E1903-97, Phase II Environmental Site Assessment. If a local equivalent to the ASTM Phase II site assessment has been selected, substitute that standard for the listed standard.

## 4. Implementation

If a local equivalent to the ASTM Phase II Environmental Site Assessment has been selected, ensure that it is the most widely used and accepted by remediation experts in the project country. It should, at a minimum, require that an environmental professional test the soil, air, and water of the project site to identify what kinds of contaminants exist and at what levels. If contaminants are found on site, follow the Implementation guidance in the LEED 2009 Green Interior Design and Construction Reference Guide.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

## 6. Calculations

There are no calculations associated with this credit.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

## 8. Examples

There are no examples for this credit.

## 9. Exemplary Performance

This path is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

Preliminary screening levels or remediation criteria may differ by region or country. Please ensure that local equivalents to ASTM meet the intent of the credit and ensure that local or regional criteria at least match the stringency of the EPA and ASTM requirements.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

SS	
CI RETAIL: CI	Credit 1 OPTION 2: PATH 1

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**SS**CI  
RETAIL: CICredit 1  
OPTION 2:  
PATH 1**12. Resources**

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

**13. Definitions**

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

## ALTERNATIVE TRANSPORTATION—PUBLIC TRANSPORTATION ACCESS

	CI	Retail: CI
Credit	SS Credit 3.1	NA
Points	6 points	NA

### Intent

To reduce pollution and land development impacts from automobile use.

### Requirements

#### Commercial Interiors

#### OPTION 1. Rail Station, Bus Rapid Transit Station & Ferry Terminal Proximity

Locate the project in a building within 1/2-mile (800 meter) walking distance (measured from a main building entrance) of an existing (or planned and funded) commuter rail, light rail, subway station, bus rapid transit<sup>1</sup> station or commuter ferry terminal.

OR

#### OPTION 2. Bus Stop Proximity

Locate the project within 1/4-mile (400 meter) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more public campus or private bus lines usable by tenant occupants.

OR

#### OPTION 3. Rideshare Proximity

Projects outside the U.S. may locate the project within 1/4-mile (400-meter) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more existing rideshare options<sup>2</sup> that meet the definition of public transportation<sup>3</sup> and are authorized by the local transit authority if one exists.

<sup>1</sup> Bus rapid transit an enhanced bus system that operates on exclusive bus lanes or other transit rights-of-way; it is designed to combine the flexibility of buses with the efficiency of rail.

<sup>2</sup> Rideshare is a transit service that involves sharing a single vehicle with multiple people, excluding large-scale vehicles such as buses and trains. The rideshare transit facility must include a signed stop and a clearly defined waiting area. Additionally, the rideshare must include an enclosed passenger seating area, fixed route service, fixed fare structure, continuous daily operation, and the ability to pick up and drop off multiple riders. Rideshare options must hold 4 or more passengers, except for human-powered conveyances which must hold 2 or more passengers.

<sup>3</sup> Public transportation consists of bus, rail, or other transit services for the general public that operate on a regular, continual basis.

## SS CREDIT 3.1



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## SS CREDIT 3



### ALTERNATIVE TRANSPORTATION

	CI	RETAIL: CI
Credit	NA	SS Credit 3.1
Points	NA	1-10 points

#### Intent

To reduce pollution and land development impacts from automobile use.

#### Requirements

Retail: CI

##### OPTION 1. Public Transportation Access (6 points)

###### PATH 1. Rail Station, Bus Rapid Transit Station & Ferry Terminal Proximity

Locate the project within 1/2-mile (800 meter) walking distance (measured from a main building entrance) of an existing (or planned and funded) commuter rail, light rail, subway station, bus rapid transit<sup>1</sup> station or commuter ferry terminal.

OR

###### PATH 2. Bus Stop Proximity

Locate the project within 1/4-mile (400 meter) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more public, campus, or private bus lines usable by tenant space occupants.

OR

###### PATH 3. Rideshare Proximity

Projects outside the U.S. may locate the project within 1/4-mile (400-meter) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more existing rideshare options<sup>2</sup> that meet the definition of public transportation and are authorized by the local transit authority if one exists.

##### OPTION 2. Bicycle Commuting (1 point)

Provide secure bicycle racks (within 200 yards of a building entrance) according to the following guidelines based on project square footage:

- Up to 5,000 sf, 2 or more bicycle racks
- 5,001–20,000 sf, 3 or more bicycle racks
- 20,001–50,000 sf, 6 or more bicycle racks
- More than 50,000 sf, 10 or more bicycle racks

AND

Institute 1 of the following: lockable changing areas, showers, bicycle maintenance program, or bicycle route assistance.

##### FOR PROJECTS THAT ARE PART OF A MULTITENANT COMPLEX

A multitenant complex is a master-planned development of stores, restaurants, and other businesses; retailers may share one or more services and/or common areas.

If bicycle racks have been provided by the development in which the project is located, the number that may be attributed to the project is determined by dividing the square footage of the retail project by the total square footage of the development (buildings only). Multiply the resulting percentage by the total number of bicycle racks. If this number does not meet the credit requirement, the project should add additional spaces.

### OPTION 3. Low-Emitting and Fuel-Efficient Vehicles (1 point)

#### PATH 1

Provide low-emitting and fuel-efficient vehicles<sup>1</sup> for 3% of the full-time equivalent shift (FTE) occupants.

Provide preferred parking<sup>2</sup> for these vehicles.

OR

#### PATH 2

Provide preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total employee parking and 5% of customer parking provided for the project. Providing a discounted parking rate is an acceptable substitute for preferred parking for low-emitting and fuel-efficient vehicles. To establish a meaningful incentive in all potential markets, the parking rate must be discounted at least 20%. The discounted rate must be available for all customers (i.e., not limited to the number of customers equal to 5% of the vehicle parking capacity), publicly posted at the entrance to the parking area, and available for a minimum of 2 years.

OR

#### PATH 3

Install alternative-fuel refueling stations for 3% of the total vehicle parking capacity of the site. Liquid or gaseous fueling facilities must be separately ventilated or located outdoors.

OR

#### PATH 4

Provide building occupants access to a low-emitting or fuel-efficient vehicle-sharing program. The following requirements must be met:

- One low-emitting or fuel-efficient vehicle must be provided for a minimum 3% of employee FTE occupants. Assuming that 1 shared vehicle can carry 8 persons, 1 vehicle per 267 employee FTE occupants is required. For buildings with fewer than 267 employee FTE occupants, at least 1 low-emitting or fuel-efficient vehicle must be provided.
- A vehicle-sharing contract must be provided that has an agreement of at least 2 years.

<sup>1</sup> For the purposes of this credit, low-emitting and fuel-efficient vehicles are vehicle that either are classified as zero-emission vehicles (ZEVs) by the California Air Resources Board or have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

<sup>2</sup> For customer parking, preferred parking refers to the parking spots that are closest to the main entrance of the project (exclusive of spaces designated for handicapped) or parking passes provided at a discounted price. For employee parking, preferred parking refers to the spots that are closest to the entrance used by employees. For projects that are part of a development for which there is no assigned parking, determine the number of parking spaces to be used in calculations by dividing the square footage of the retail project by the total square footage of the development (buildings only, excluding common areas).

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## SS CREDIT 3

- The estimated number of riders served per vehicle must be supported by documentation.
- A narrative explaining the vehicle-sharing program and its administration must be submitted.
- Parking for low-emitting and fuel-efficient vehicles must be located in the nearest available spaces in the nearest available parking area. Provide a site plan or area map clearly highlighting the walking path from the parking area to the project site and noting the distance.

### OPTION 4. Parking Availability (3 points)

#### CASE 1. Projects with an area less than 75% of the Total Building Area

##### PATH 1

Parking spaces provided to tenant must meet but not exceed minimum number required by local zoning regulations.

Preferred parking<sup>3</sup> must be provided for carpools or vanpools capable of serving 5% or more of tenant employees.

OR

##### PATH 2

No parking will be provided or subsidized for tenant employees.

#### CASE 2. Projects with an area 75% or more of the Total Building Area

Preferred parking must be provided for carpools or vanpools, capable of serving 5% of the building employees.

AND

##### PATH 1

Parking capacity must meet but not exceed minimum local zoning requirements.

Preferred parking must be provided for carpools or vanpools, capable of serving 5% of the building employees.

OR

##### PATH 2

No new parking will be added for rehabilitation projects.

### OPTION 5. Delivery Service (1 point)

Provide a delivery service for purchases made from the retail establishment.

It is not required that the delivery service be free of charge, but the cost should not be prohibitive.

### OPTION 6. Incentives (1 point)

<sup>3</sup> For employee parking, preferred parking refers to the spots that are closest to the entrance used by employees. For projects that are part of a development for which there is no assigned parking, determine the number of parking spaces to be used in calculations by dividing the square footage of the retail project by the total square footage of the development (buildings only, excluding common areas).

Provide a comprehensive incentives program for employees who carpool or use alternative transportation to get to work. Three incentives must be provided for all staff upon hire.

Potential incentives may include but are not limited to the following:

- Transit pass subsidies.
- Purchase of public transportation passes on a pretax basis.
- Preferred scheduling for carpoolers. While shifts cannot be guaranteed, a reasonable effort will be made to accommodate carpooling employees' schedules.
- An "emergency ride home" program for carpoolers and vanpoolers who must leave work unexpectedly.
- Preferred parking for carpools or vanpools.
- Discounts on bicycle accessories and maintenance at local shops.

### OPTION 7. Alternative Transportation Education (1 point)

Provide a board or computer display in the retail project, accessible to both employees and customers, that provides the following information:

- Information on carpooling programs.
- Transit trip planning assistance.
- Transit maps.
- Maps of bicycle routes and the locations of secure bicycle parking, lockers, and showers, if provided.
- Summary of the company transportation management plan.
- Contacts for more information.

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**SS**

CI

Credit 3.1

RETAIL: CI

Credit 3

**1. Benefits and Issues to Consider**

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

**2. Related Credits**

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

**3. Summary of Referenced Standards**

There are no standards referenced for this credit.

**4. Implementation**

If Option 1 (Option 1, Path 1 in Retail), Rail Station, Bus Rapid Transit Station & Ferry Terminal Proximity, is selected, see the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for implementation guidance.

If Option 3, Rideshare Proximity (Option 1, Path 3 in Retail), is selected, ensure that the vehicles that serve the project site meet the definition of rideshare provided in the Definitions section. See the LEED 2009 Green Interior Design and Construction Reference Guide for additional implementation guidance.

**5. Timeline and Team**

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

**6. Calculations**

If Option 3, Rideshare Proximity (Option 1, Path 3 in Retail), is selected, please follow the calculations instructions for Options 1 and 2 in the LEED 2009 Green Interior Design and Construction Reference Guide.

**7. Documentation Guidance**

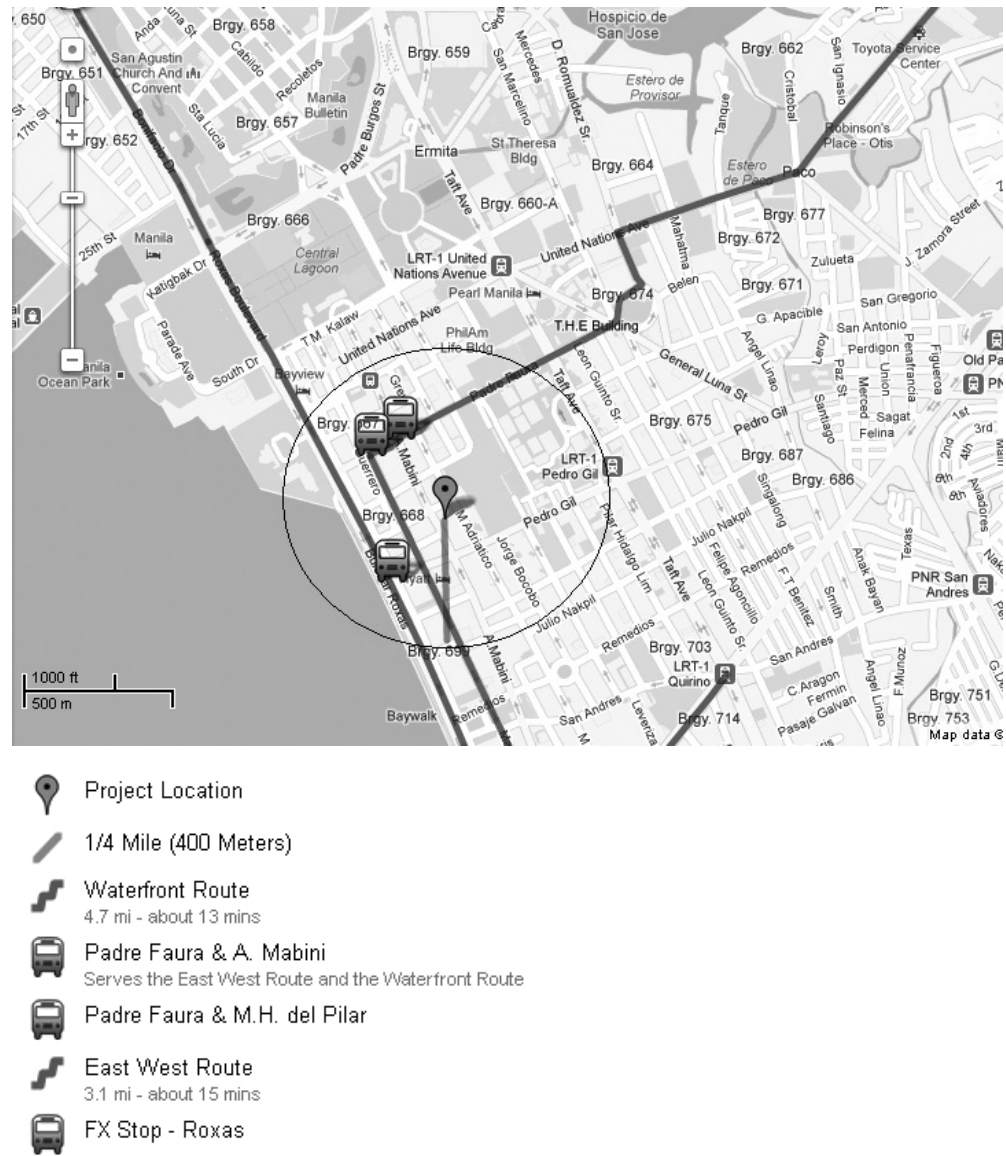
As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- Identify local rail stations, bus rapid transit stations, commuter ferry terminals, and bus or rideshare routes serving the project building.
- Develop a site vicinity plan, to scale, and label walking paths between the project building's main entrance and rail stations, bus rapid transit stations, commuter ferry terminals, and bus or rideshare stops.
- If the team anticipates rail service, obtain verification of funding for the rail project.

8. Examples

An interior fit out project in Manila is within walking distance of multiple public rideshare lines. Figure 1 shows all rideshare routes within a 1/4-mile (400-meter) walking distance from the building’s main entrance. Rideshare stop locations are clearly identified on the vicinity map. The rideshare routes also connect to additional public transportation lines that traverse the city.

Figure 1. Sample area drawing: Vicinity map identifying rideshare stop locations and route destination information





Additionally, the project team has identified the type of vehicle, rideshare stop location, and route information for each route identified in a separate table, as shown in Figure 2

SS	
CI	Credit 3.1
RETAIL: CI	Credit 3

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SS	
CI	Credit 3.1
RETAIL: CI	Credit 3

**Figure 2.** Rideshare transportation table

TRANSPORTATION TABULATION			
	SERVICE IDENTIFICATION (CORRESPONDS TO THE UPLOADED VICINITY MAP)	LOCATION	ROUTE
1		Padre Faura corner M.H. del Pilar	Sta. Cruz - Baclaran
2		Padre Faura corner A. Mabini	Divisoria - F.B. Harrison
3	FX ROUTE	Roxas Boulevard	Lawton - Baclaran/Sucut

## 9. Exemplary Performance

Project teams may earn an Innovation in Design credit for exemplary performance by complying with the requirements of 1 of the 2 options described in the Exemplary Performance section of the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement.

Projects located within 1/2 mile (800 meters) of bus rapid transit or commuter ferries are eligible for exemplary performance through Option 2, Double Transit Ridership.

Project teams that select Option 3, Rideshare Proximity, are not eligible for exemplary performance under the Innovation in Design section.

## 10. Regional Variations

There are no regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

**Bus rapid transit** is an enhanced bus system that operates on exclusive bus lanes or other transit rights-of-way; it is designed to combine the flexibility of buses with the efficiency of rail.

**Rideshare** is a transit service that involves sharing a single vehicle with multiple people, excluding large-scale vehicles such as buses and trains. The rideshare transit facility must include a signed stop and a clearly defined waiting area. Additionally, the rideshare must include an enclosed passenger seating area, fixed route service, fixed fare structure, continuous daily operation, and the ability to pick up and drop off multiple riders. Rideshare vehicles must hold 4 or more passengers, except for human-powered conveyances, which must hold 2 or more passengers.

**Public transportation** consists of bus, rail, or other transit services for the general public that operate on a regular, continual basis.

# ENERGY AND ATMOSPHERE










## Overview

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional guidance.

Buildings are a major consumer of energy and electricity across the globe, and predicting and lowering energy consumption in buildings are significant components of LEED. Because energy modeling is a very complex process that involves the use of computer-generated models and stringent energy standards, project teams outside the U.S. seeking to use an alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 in EA Prerequisite 2 (Minimum Energy Performance) and EA Credit 1 (Optimize Energy Performance) must first submit to a review process, as outlined later in this document.

Project teams seeking to achieve EA Credit 4 (Green Power) may now purchase renewable power from local sources as long as it meets the major Green-e Energy program criteria.

 **Table 1.** EA Credits with Alternative Compliance Paths

CREDIT	TITLE	CI	RETAIL: CI
<b>EA Prerequisite 1</b>	Fundamental Commissioning of Building Energy Systems		
<b>EA Prerequisite 2</b>	Minimum Energy Performance		
<b>EA Prerequisite 3</b>	Fundamental Refrigerant Management		
<b>EA Credit 1.1</b>	Optimize Energy Performance—Lighting Power		
<b>EA Credit 1.2</b>	Optimize Energy Performance—Lighting Controls		
<b>EA Credit 1.3</b>	Optimize Energy Performance—HVAC		
<b>EA Credit 1.4</b>	Optimize Energy Performance—Equipment and Appliances		
<b>EA Credit 1.5</b>	Optimize Energy Performance—Building Envelope		
<b>EA Credit 2</b>	Enhanced Commissioning		
<b>EA Credit 3</b>	Measurement and Verification		
<b>EA Credit 4</b>	Green Power		
<b>EA Credit 5</b>	On-Site Renewable Energy		

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## MINIMUM ENERGY PERFORMANCE

	CI	RETAIL: CI
Credit	EA Prerequisite 2	EA Prerequisite 2
Points	Required	Required

### Intent

To establish the minimum level of energy efficiency for the tenant space systems to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

#### Commercial Interiors, Retail: CI

Design portions of the building as covered by the tenant's scope of work to comply with ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda<sup>1</sup>), and complete the following:

- Comply with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda<sup>1</sup>). Projects outside the U.S. may use a USGBC approved equivalent standard.
- Achieve the prescriptive requirements (Sections 5.5 or 5.6, 6.5, 7.5 and 9.5 or 9.6) or performance requirements (Section 11) of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda<sup>1</sup>) or USGBC approved equivalent.
- Reduce connected lighting power density 10% below that allowed by ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) or USGBC approved equivalent using either the Space-by-Space Method or by applying the whole building lighting power allowance to the entire tenant space.
- Install ENERGY STAR® qualified equipment for 50% (by rated-power) of ENERGY STAR eligible equipment installed as part of the tenant's scope of work. This requirement includes appliances, office equipment, electronics, and commercial food service equipment. Equipment that meets the same requirements as ENERGY STAR qualified products but does not bear the ENERGY STAR label is acceptable. Projects outside the U.S. may use a local equivalent to ENERGY STAR. Excluded are heating, ventilating and air conditioning (HVAC), lighting, and building envelope products.

Projects in California may use Title 24-2005, Part 6 in place of ANSI/ASHRAE/IESNA Standard 90.1-2007.

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

## EA PREREQUISITE 2

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

**EA**

CI

Prerequisite 2

RETAIL: CI

Prerequisite 2

**1. Benefits and Issues to Consider**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this prerequisite.

**2. Related Credits**

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this prerequisite.

**3. Summary of Referenced Standards**

See the LEED 2009 Green Interior Design and Construction Reference Guide for a summary of ANSI/ASHRAE/IESNA Standard 90.1–2007, referenced in this prerequisite.

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 must be approved by USGBC as an equivalent standard, using the process described in the Implementation section.

**4. Implementation**

The following process is used to determine the equivalency of a local standard to ANSI/ASHRAE/IESNA Standard 90.1–2007.

1. A group interested in determining equivalency of a particular standard should email a request to USGBC through [commonlanguage@usgbc.org](mailto:commonlanguage@usgbc.org).
2. USGBC will collaborate with the group to establish a method for creating an equivalency study and a timeline for completion.
3. The group will conduct the study.
4. USGBC will review the study and bring its recommendation to the LEED International Roundtable with approval by the LEED Steering Committee.
5. Typically, the group putting forward the standard will cover the cost of the study and USGBC review.
6. Priority of USGBC review will be determined based on market transformation potential and representation of the country on the LEED International Roundtable.
7. Approval of equivalency will be determined by the LEED Steering Committee and communicated to the group.
8. Upon approval by the LEED Steering Committee, the equivalency will be made available to projects through a USGBC-administered LEED Interpretation.

Additional information on the LEED International Roundtable can be found at [www.usgbc.org](http://www.usgbc.org).

Demonstrate that equipment purchases conform to standards at least as stringent as ENERGY STAR by substituting appropriate benchmarks and metrics that use a local standard for establishing a baseline, and measure performance relative to that baseline. Additional information on the ENERGY STAR labeling program can be found at [http://www.energystar.gov/index.cfm?c=products.pr\\_how\\_earn](http://www.energystar.gov/index.cfm?c=products.pr_how_earn).

The following areas must be addressed to demonstrate equivalency with ENERGY STAR:

Appliances	Other Commercial Equipment	Computers and Electronics
Modified energy factor	Idle energy rate	Power supply efficiency
Water factor	Energy efficiency rate	Efficiency and performance
Product capacity	Potable water use limit	Total energy consumption
Energy factor	Cooking energy efficiency rate	Active power
Standby power	Maximum daily energy consumption	Idle state
Volume of water per cycle	Energy use limit	Operational mode efficiency
Energy use per year	Harvest rate	Digital front-end efficiency
Energy efficiency ratio	Testing protocols	Testing protocols
Testing protocols		

EA	
CI	Prerequisite 2
RETAIL: CI	Prerequisite 2

The following equipment is included in the scope and must be accounted for in the credit calculation:

Appliances	Other Commercial Equipment	Computers and Electronics
Clothes washers	Vending machines	Audiovisual equipment
Dishwashers	Commercial food service equipment, including fryers, griddles, hot food holding cabinets, ice machines, kitchen packages, and steam cookers	Battery chargers
Freezers		Computers
Refrigerators		Displays
Water coolers		Enterprise servers
		External power adapters
		Imaging equipment
		Televisions

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this prerequisite. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations associated with this prerequisite.

## 7. Documentation Guidance

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 is desired must be determined equivalent to the U.S. standard, as described in the Implementation section.

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this prerequisite.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations associated with this prerequisite.

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EA	
CI	Prerequisite 2
RETAIL: CI	Prerequisite 2

## 9. Exemplary Performance

This prerequisite is not eligible for exemplary performance under the Innovation and Design of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this prerequisite.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this prerequisite.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this prerequisite.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this prerequisite.

## OPTIMIZE ENERGY PERFORMANCE—HVAC

	CI	RETAIL: CI
Credit	EA Credit 1.3	EA Credit 1.3
Points	5-10 points	5-10 points

### Intent

To achieve increasing levels of energy conservation beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

Commercial Interiors, Retail: CI

#### OPTION 1

Implement 1 or both of the following strategies:

- **Equipment Efficiency—(5 points)**  
Install heating, ventilation and air conditioning (HVAC) systems that comply with the efficiency requirements outlined in the New Building Institute's Advanced Buildings™ Core Performance™ Guide Sections 1.4: Mechanical System Design, 2.9: Mechanical Equipment Efficiency and 3.10: Variable Speed Control.
- **Appropriate Zoning and Controls: (5 points)**  
Zone tenant fit out of spaces to meet the following requirements:
  - Every solar exposure must have a separate control zone.
  - Interior spaces must be separately zoned.
  - Private offices and special occupancies (conference rooms, kitchens, etc.) must have active controls capable of sensing space use and modulating the HVAC system in response to space demand.

OR

#### OPTION 2

Reduce design energy cost compared with the energy cost budget for regulated energy components described in the requirements of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda<sup>1</sup>). Projects outside the U.S. may use a USGBC approved equivalent standard.

AND

##### PATH 1 (5 points)

Demonstrate that HVAC system component performance criteria used for tenant space are 15% better than a system in minimum compliance with ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) or USGBC approved equivalent.

OR

##### PATH 2 (10 points)

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

## EA CREDIT 1.3



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## EA CREDIT 1.3

Demonstrate that HVAC system component performance criteria used for tenant space are 30% better than a system that is in minimum compliance with ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda) or USGBC approved equivalent.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

EA	
CI	Credit 1.3
RETAIL: CI	Credit 1.3

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

See the LEED 2009 Green Interior Design and Construction Reference Guide for a summary of ANSI/ASHRAE/IESNA Standard 90.1–2007, referenced in this credit.

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 must be approved by USGBC as an equivalent standard, using the process described in the Implementation section.

## 4. Implementation

The following process is used to determine the equivalency of a local standard to ANSI/ASHRAE/IESNA Standard 90.1–2007.

1. A group interested in determining equivalency of a particular standard should email a request to USGBC through [commonlanguage@usgbc.org](mailto:commonlanguage@usgbc.org).
2. USGBC will collaborate with the group to establish a method for creating an equivalency study and a timeline for completion.
3. The group will conduct the study.
4. USGBC will review the study and bring its recommendation to the LEED International Roundtable with approval by the LEED Steering Committee.
5. Typically, the group putting forward the standard will cover the cost of the study and USGBC review.
6. Priority of USGBC review will be determined based on market transformation potential and representation of the country on the LEED International Roundtable.
7. Approval of equivalency will be determined by the LEED Steering Committee and communicated to the group.
8. Upon approval by the LEED Steering Committee, the equivalency will be made available to projects through a USGBC-administered LEED Interpretation.

Additional information on the LEED International Roundtable can be found at [www.usgbc.org](http://www.usgbc.org).

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
CI	Credit 1.3
RETAIL: CI	Credit 1.3

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations associated with this credit.

## 7. Documentation Guidance

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 is desired must be determined equivalent to the U.S. standard, as described in the Implementation section.

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

## 8. Examples

See the LEED 2009 Interior Design and Construction Reference Guide for an example relating to this credit.

## 9. Exemplary Performance

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for guidance on exemplary performance for this credit.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC’s LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

## OPTIMIZE ENERGY PERFORMANCE—EQUIPMENT AND APPLIANCES

	CI	RETAIL: CI
Credit	EA Credit 1.4	EA Credit 1.4
Points	1-4 points	1-4 points

### Intent

To achieve increasing levels of energy conservation beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

Commercial Interiors, Retail: CI

For all ENERGY STAR® eligible equipment and appliances installed as part of the tenant's scope of work, achieve one of the following percentages (by rated power). Equipment that meets the same requirements as ENERGY STAR® qualified products but does not bear the ENERGY STAR® label is acceptable. Projects outside the U.S. may use a local equivalent to ENERGY STAR®.

Percent Installed ENERGY STAR Qualified Equipment of ENERGY STAR Eligible Equipment	Points
70%	1
77%	2
84%	3
90%	4

This requirement applies to appliances, office equipment, electronics, and commercial food service equipment. Excluded are HVAC, lighting, and building envelope products.

## EA CREDIT 1.4



**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

EA	
CI	Credit 1.4
RETAIL: CI	Credit 1.4

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit. If a local equivalent has been selected for ENERGY STAR, substitute that standard.

## 3. Summary of Referenced Standards

No new standards are referenced; see the LEED 2009 Green Interior Design and Construction Reference Guide for a summary of the standards referenced in this credit.

## 4. Implementation

Demonstrate that equipment purchases conform to standards at least as stringent as ENERGY STAR by substituting appropriate benchmarks and metrics that use a local standard for establishing a baseline, and measure performance relative to that baseline. Additional information on the ENERGY STAR labeling program can be found at [http://www.energystar.gov/index.cfm?c=products.pr\\_how\\_earn](http://www.energystar.gov/index.cfm?c=products.pr_how_earn).

The following areas must be addressed to demonstrate equivalency with ENERGY STAR:

Appliances	Other Commercial Equipment	Computers and Electronics
Modified energy factor	Idle energy rate	Power supply efficiency
Water factor	Energy efficiency rate	Efficiency and performance
Product capacity	Potable water use limit	Total energy consumption
Energy factor	Cooking energy efficiency rate	Active power
Standby power	Maximum daily energy consumption	Idle state
Volume of water per cycle	Energy use limit	Operational mode efficiency
Energy use per year	Harvest rate	Digital front-end efficiency
Energy efficiency ratio	Testing protocols	Testing protocols
Testing protocols		

The following equipment is included in the scope and must be accounted for in the credit calculation:

Appliances	Other Commercial Equipment	Computers and Electronics
Clothes washers	Vending machines	Audiovisual equipment
Dishwashers	Commercial food service equipment, including fryers, griddles, hot food holding cabinets, ice machines, kitchen packages, and steam cookers	Battery chargers
Freezers		Computers
Refrigerators		Displays
Water coolers		Enterprise servers
		External power adapters
		Imaging equipment
		Televisions

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

Project teams wishing to use a local benchmark should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

EA	
CI	Credit 1.4
RETAIL: CI	Credit 1.4

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations relating to this credit.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for an example relating to this credit.

## 9. Exemplary Performance

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for guidance on how to achieve exemplary performance in this credit.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

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## OPTIMIZE ENERGY PERFORMANCE—BUILDING ENVELOPE

## EA CREDIT 1.5

	CI	RETAIL: CI
Credit	NA	EA Credit 1.5
Points	NA	1 point

### Intent

To achieve increasing levels of energy conservation beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

### Requirements

#### OPTION 1. PERFORMANCE COMPLIANCE PATH

Demonstrate a 15% reduction in the heat loss and heat gain of the proposed building envelope compared with the baseline building performance rating per ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda<sup>1</sup>) for the building envelope components such as glazing, insulation, roofing, and slab using a modeling protocol or overall UA (U factor  $\times$  Area) calculation. Projects outside the U.S. may use a USGBC approved equivalent standard.

OR

#### OPTION 2. PRESCRIPTIVE COMPLIANCE PATH

Comply with the prescriptive measures for building envelopes of ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006. The building must meet the following requirements:

- The building in which project is located must be less than 20,000 square feet (1,800 square meters).
- The building must be retail occupancy.
- The project 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. Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

<sup>1</sup> Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

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EA	
CI	NA
RETAIL: CI	Credit 1.5

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Retail Supplement for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Retail Supplement for a list of credits related to this credit.

## 3. Summary of Referenced Standards

See the LEED 2009 Green Interior Design and Construction Retail Supplement for a summary of ANSI/ASHRAE/IESNA Standard 90.1–2007, referenced in this credit.

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 must be approved by USGBC as an equivalent standard, using the process described in the Implementation section.

### ASHRAE/ASHRAE/IESNA Standard 90.1–2007, Appendixes B and D

American National Standards Institute

American Society of Heating, Refrigerating and Air-Conditioning Engineers

Illuminating Engineering Society of North America

[www.ashrae.org](http://www.ashrae.org)

Appendix B of the standard identifies U.S. and global climate zones. Appendix D provides U.S. and global climatic data that can be used to determine the climate zone for the project location.

## 4. Implementation

### Option 1

The following process is used to determine the equivalency of a local standard to ANSI/ASHRAE/IESNA Standard 90.1–2007.

1. A group interested in determining equivalency of a particular standard should email a request to USGBC through [commonlanguage@usgbc.org](mailto:commonlanguage@usgbc.org).
2. USGBC will collaborate with the group to establish a method for creating an equivalency study and a timeline for completion.
3. The group will conduct the study.
4. USGBC will review the study and bring its recommendation to the LEED International Roundtable with approval by the LEED Steering Committee.
5. Typically, the group putting forward the standard will cover the cost of the study and USGBC review.
6. Priority of USGBC review will be determined based on market transformation potential and representation of the country on the LEED International Roundtable.
7. Approval of equivalency will be determined by the LEED Steering Committee and communicated to the group.
8. Upon approval by the LEED Steering Committee, the equivalency will be made available to projects through a USGBC-administered LEED Interpretation.

Additional information on the LEED International Roundtable can be found at [new.usgbc.org](http://new.usgbc.org)

## Option 2

If Option 2 is selected, identify the proper climate zone for the project location by using ANSI/ASHRAE/IESNA Standard 90.1–2007, Appendixes B and D.

Appendix B, Table B-3, gives the climate zones of major U.S. and Canadian cities and select international cities, plus the thermal criteria and climate type definitions for each zone. If the project location is not included in Table B-3, use the climate zone definitions in Table B-4.

Appendix D provides a more extensive list of U.S., Canadian, and international cities. The data in this appendix can be used to determine the proper climate zone for the project location.

See the LEED 2009 Green Interior Design and Construction Retail Supplement for additional implementation guidance.

EA	
CI	NA
RETAIL: CI	Credit 1.5

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Retail Supplement for guidance related to this credit. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Retail Supplement for calculations associated with this credit.

## 7. Documentation Guidance

Any local alternative to ANSI/ASHRAE/IESNA Standard 90.1–2007 is desired must be determined equivalent to the U.S. standard, as described in the Implementation section.

See the LEED 2009 Green Interior Design and Construction Retail Supplement for documentation guidance related to this credit.

## 8. Examples

A project team in Beijing consults ANSI/ASHRAE/IESNA Standard 90.1–2007, Appendix B, to determine the appropriate climate zone for compliance with Option 3 of the credit.

Table B-3 does not give a climate zone for Beijing. The project team finds Beijing in Table D-2, which lists the values for heating degree-days to base 65°F (HDD65) as 5252, and cooling degree-days to base 50°F (CDD50) as 4115. The team uses these values to determine Beijing's climate zone as defined in Appendix B, Section B2 and Table B-4.

The project team finds that Beijing is in a “moist climate” because its warmest month has a mean temperature higher than 72°F (22.2°C) and is therefore too warm to be a “marine climate,” and annual rainfall data indicate that the city is not in a “dry climate.”

Finally, the project team uses the values found in Table D-2 for HDD65 (5252) and CDD50 (4115) in Table B-4 and determines that Beijing is in Zone 4A (“mixed-humid”) because the CDD50 value is 4500 or less, and the HDD65 value is between 3600 and 5400.

## 9. Exemplary Performance

See the LEED 2009 Green Interior Design and Construction Retail Supplement for guidance on exemplary performance for this credit.

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EA	
CI	NA
RETAIL: CI	Credit 1.5

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Retail Supplement for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Retail Supplement for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Retail Supplement for resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Retail Supplement for definitions of terms used in this credit.

## GREEN POWER

	CI	RETAIL: CI
Credit	EA Credit 4	EA Credit 4
Points	5 points	5 points

### Intent

To encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

### Requirements

#### Commercial Interiors

#### OPTION 1

Engage in at least a 2-year renewable energy contract to provide at least 50% of the tenant's electricity from renewable sources, as defined by the Center for Resource Solutions' Green-e energy product certification requirements or an equivalent.

All purchases of green power must be based on the quantity of energy consumed, not the cost, as determined by the annual electricity consumption results of EA Credit 1, Optimize Energy Performance.

If the green power is not Green-e Energy certified, equivalence must exist for both major Green-e Energy program criteria: 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

OR

#### OPTION 2

Engage in at least a 2-year renewable energy contract to purchase at least 8 kilowatt hours per square foot per year (86 kilowatt hours per square meter per year) from renewable electricity sources as defined by the Center for Resource Solutions (CRS) Green-e Energy's product certification requirements or an equivalent.

All purchases of green power must be based on the quantity of energy consumed, not the cost.

If the green power is not Green-e Energy certified, equivalence must exist for both major Green-e Energy program criteria: 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

## EA CREDIT 4



**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## EA CREDIT 4

### Retail: CI

#### OPTION 1

Engage in at least a 2-year renewable energy contract to provide at least 50% of the building's electricity from renewable sources, as defined by the Center for Resource Solutions' Green-e energy product certification requirements or an equivalent.

All purchases of green power must be based on the quantity of energy consumed, not the cost, as determined by the annual electricity consumption results of EA Credit 1.3, Option 2, Optimize Energy Performance.

If the green power is not Green-e Energy certified, equivalence must exist for both major Green-e Energy program criteria: 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

OR

#### OPTION 2

Engage in at least a 2-year renewable energy contract to purchase at least 8 kilowatt hours per square foot per year (86 kilowatt hours per square meter per year) from renewable electricity sources as defined by the Center for Resource Solutions Green-e Energy's product certification requirements, or an equivalent.

Green power can be purchased on a centralized basis and credit attributed to a certain retail project. However, the same power cannot be credited to another LEED project.

If the green power is not Green-e Energy certified, equivalence must exist for both major Green-e Energy program criteria: 1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

EA	
CI	Credit 4
RETAIL: CI	Credit 4

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

No new standards are referenced; see the LEED 2009 Green Interior Design and Construction Reference Guide for a summary of Green-e. If a local equivalent to Green-e is selected, ensure that the power performance and independent, third-party verification requirements are equivalent to those of Green-e.

## 4. Implementation

See the LEED 2009 Green Interior Design and Construction Reference Guide Implementation section for more information on establishing Green-e equivalency and for more information on other approaches to achieving this credit.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations associated with this credit.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

## 8. Examples

There are no examples for this credit.

## 9. Exemplary Performance

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance on exemplary performance for this credit.

## 10. Regional Variations

Renewable energy certificates (RECs) make it possible to substitute green energy even if the project does not have access to green power through the local utility or a competitive electricity marketer. RECs are now widely available in nearly all U.S. states but less prevalent in other countries. Projects outside the U.S. have the option of meeting this credit either by establishing Green-e equivalency, as detailed in the Implementation section of the LEED 2009 Green Interior Design and Construction Reference Guide, or by purchasing U.S.-based Green-e certified RECs.

## 11 Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

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EA	
CI	Credit 4
RETAIL: CI	Credit 4

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

# MATERIALS AND RESOURCES

## MR OVERVIEW

### OVERVIEW

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional guidance.

The responsible harvest or extraction of materials used in building products is of universal importance, as is the way they are transported to the project site. Because some transportation methods cause significantly less environmental harm than others, a new option has been added to MR Credit 5 (Regional Materials) to allow for items that are shipped long distances via rail and water. The option involves calculating a weighted total distance rather than using a simple 500-mile (800-kilometer) radius.

 **Table 1.** MR Credits with Alternative Compliance Paths

CREDIT	TITLE	CI	RETAIL: CI
<b>MR Prerequisite 1</b>	Storage and Collection of Recyclables		
<b>MR Credit 1.1</b>	Tenant Space—Long-Term Commitment		
<b>MR Credit 1.2</b>	Building Reuse—Maintain Interior Nonstructural Elements		
<b>MR Credit 2</b>	Construction Waste Management		
<b>MR Credit 3.1</b>	Materials Reuse		
<b>MR Credit 3.2</b>	Materials Reuse—Furniture and Furnishings		
<b>MR Credit 4</b>	Recycled Content		
<b>MR Credit 5</b>	Regional Materials		
<b>MR Credit 6</b>	Rapidly Renewable Materials		
<b>MR Credit 7</b>	Certified Wood		

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## REGIONAL MATERIALS

	CI	RETAIL: CI
Credit	MR Credit 5	MR Credit 5
Points	1-2 points	1-2 points

### Intent

To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the regional economy and reducing the environmental impacts resulting from transportation.

### Requirements

Commercial Interiors, Retail: CI

#### OPTION 1 (1 point)

Use a minimum of 20% of the combined value of construction and Division 12 (Furniture and Furnishings) materials and products that are manufactured<sup>1</sup> regionally within a radius of 500 miles (800 kilometers).

OR

Use a minimum of 20% of the combined value of construction and Division 12 (Furniture and Furnishings) materials and products that are manufactured regionally within a 500 mile (800 kilometer) total travel distance of the project site using a weighted average determined through the following formula:

$(\text{Distance by rail}/3) + (\text{Distance by inland waterway}/2) + (\text{Distance by sea}/15) + (\text{Distance by all other means}) \leq 500 \text{ miles [800 kilometers]}$

OR

#### OPTION 2 (2 points)

Meet the requirements for Option 1.

AND

Use a minimum of 10% of the combined value of construction and Division 12 (Furniture and Furnishings) materials and products extracted, harvested or recovered, as well as manufactured, within 500 miles of the project.

OR

Use a minimum of 10% of the combined value of construction and Division 12 (Furniture and Furnishings) materials and products extracted, harvested or recovered, as well as manufactured regionally within a 500 mile (800 kilometer) total travel distance of the project site using a weighted average determined through the following formula:

$(\text{Distance by rail}/3) + (\text{Distance by inland waterway}/2) + (\text{Distance by sea}/15) + (\text{Distance by all other means}) \leq 500 \text{ miles [800 kilometers]}$

<sup>1</sup> Manufacturing refers to the final assembly of components into the building product that is furnished and installed by the tradesmen. For example, if the hardware comes from Dallas, the lumber from Vancouver, and the joist is assembled in Kent, Washington, then the location of the final assembly is Kent, Washington.

## MR CREDIT 5



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**MR**

CI

Credit 5

RETAIL: CI

Credit 5

**1. Benefits and Issues to Consider**

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

**2. Related Credits**

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

**3. Summary of Referenced Standards**

There are no standards referenced for this credit.

**4. Implementation**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for implementation guidance related to this credit.

**5. Timeline and Team**

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

**6. Calculations**

Follow the instructions in the LEED 2009 Green Interior Design and Construction Reference Guide for determining the total materials cost, the percentage of regional materials in assembly items, and the total percentage of local materials used in the project.

If project materials traveled via different modes to the project site, consider the total weighted distance that the project's materials have traveled by rail or water, from extraction or harvest through manufacturing to installation at the project site. The project team must determine the means of transportation for each leg of that journey.

Calculate the weighted average of materials transported to the project site according to the following equation:

$$\text{Total weighted distance} = (DR/3) + (DI/2) + (DS/15) + DO$$

where

DR= distance by rail

DI = distance by inland waterway

DS= distance by sea

DO= distance by other transportation modes

If the result is 500 miles (800 kilometers) or less, the material qualifies as a regional product.

**7. Documentation Guidance**

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

1. Compile a list of product purchases manufactured, extracted, or harvested regionally.
2. Record manufacturers' names and product costs for all applicable materials installed at the project site.
3. Record distances and transportation modes for each product, from extraction or harvest

through fabrication and delivery to the project site.

4. Where appropriate, retain cutsheets that document materials' origin and manufacture within a 500-mile (800-kilometer) total weighted distance of the project site.
5. Where appropriate, maintain a list of materials costs, excluding labor and equipment, for CSI Divisions 03-10, 31 (Section 31.60.00 Foundations), and 32 (Sections 32.10.00 Paving, 32.30.00 Site Improvements, and 32.90.00 Planting); including Division 12 is optional.

MR	
CI	Credit 5
RETAIL: CI	Credit 5

## 8. Examples

A project in Berlin has imported wood from Norway. The wood was harvested in a forest outside Harestua and transported by truck to Oslo, where it was placed on a ship bound for Germany. Upon arriving at port in Kiel, Germany, the wood was loaded onto a train to Leipzig, where it was milled for use on the project. The finished wood product was transported by truck to the project site in Berlin.

First, the team determines the travel distances for each leg of the trip (Figure 1).

**Figure 1.** Example transport of wood from harvest to project site (generated using Google® Maps)



Then the team divides each distance by the divisors in the total weighted distance equation (see Calculations), as shown in Table 1. Transport by truck falls under “other” and thus has no divisor.

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**MR**

CI Credit 5

RETAIL: CI Credit 5

**Table 1.** Example determination of weighted distance for wood products

Mode	Leg	Actual distance	Calculation	Weighted distance
Truck	Harestua to Oslo	41 km (25 miles)	41 (25)	41 km (25 miles)
Ship	Oslo to Kiel	682 km (424 miles)	682/15 (424/15)	45 km (28 miles)
Rail	Kiel to Leipzig	454 km (285 miles)	454/3 (285/3)	151 km (95 miles)
Truck	Leipzig to Berlin (project)	190 km (118 miles)	190 (118)	190 km (118 miles)
Total		1367 km (852 miles)		427 km (266 miles)

Because the total weighted distance traveled is less than 500 miles (800 km), the wood qualifies as a regional material.

## 9. Exemplary Performance

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance on exemplary performance for this credit.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

An **inland waterway** is a navigable body of water, such as a river, canal, or lake, that is deep, wide, and slow enough for a vessel to pass.

# INDOOR ENVIRONMENTAL QUALITY

## IEQ OVERVIEW

### Overview

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional guidance.










Approaches to indoor environmental quality issues often vary by country. Because of differences in climate, ventilation systems, and environmental standards, many of the prescribed approaches to the credits in the Indoor Environmental Quality section have been difficult to apply outside the U.S. New language allows for local equivalents to many of the standards referenced in IEQ credits.

IEQ Prerequisite 1 (Indoor Air Quality Performance) and its associated credits now have multiple alternatives to help project teams outside the U.S. earn points while maintaining the technical rigor and stringency of the requirements. Many project teams will be able to use CEN standards in place of the ASHRAE; others may choose a local equivalent to ASHRAE. CEN standards and local equivalents are also available for IEQ Credits 6.2, 7, 7.1, and 7.2 (Thermal Comfort).









IEQ Credits 3.1 (Construction Indoor Air Quality Management Plan During Construction) and 5 (Indoor Chemical and Pollutant Source Control) are expanded to allow projects in East Asia to use filtration media defined by Chinese Standard GB/T 14295-2008 (空气过滤器) or GB/T 13554-2008 (高效空气过滤器). IEQ Credit 4.3 (Low-Emitting Materials—Flooring Systems) accommodates products that meet widely used VOC testing requirements.

Finally, local equivalent standards can be used for IEQ Prerequisite 2 (Environmental Tobacco Smoke Control prerequisite).

 **Table 1.** IEQ Credits with Alternative Compliance Paths

CREDIT	TITLE	CI	RETAIL: CI
<b>IEQ Prerequisite 1</b>	Minimum Indoor Air Quality Performance		
<b>IEQ Prerequisite 2</b>	Environmental Tobacco Smoke (ETS) Control		
<b>IEQ Credit 1</b>	Outdoor air Delivery Monitoring		
<b>IEQ Credit 2</b>	Increased Ventilation		
<b>IEQ Credit 3.1</b>	Construction Indoor Air Quality Management Plan—During Construction		
<b>IEQ Credit 3.2</b>	Construction Indoor Air Quality Management Plan—Before Occupancy		
<b>IEQ Credit 4.1</b>	Low-Emitting Materials—Adhesives and Sealants		
<b>IEQ Credit 4.2</b>	Low-Emitting Materials—Paints and Coatings		
<b>IEQ Credit 4.3</b>	Low-Emitting Materials—Flooring Systems		

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CREDIT	TITLE	CI	RETAIL: CI
<b>IEQ Credit 4.4</b>	Low-Emitting Materials—Composite Wood and Agrifiber Products		
<b>IEQ Credit 4.5</b>	Low-Emitting Materials—Systems Furniture and Seating		
<b>IEQ Credit 4.6</b>	Low-Emitting Materials—Ceiling and Wall Systems		
<b>IEQ Credit 5</b>	Indoor Chemical and Pollutant Source Control		
<b>IEQ Credit 6.1</b>	Controllability of Systems —Lighting		
<b>IEQ Credit 6.2</b>	Controllability of Systems —Thermal Comfort		
<b>IEQ Credit 6</b>	Controllability of Systems —Lighting and Thermal Comfort		
<b>IEQ Credit 7.1</b>	Thermal Comfort —Design		
<b>IEQ Credit 7.2</b>	Thermal Comfort —Verification		
<b>IEQ Credit 8.1</b>	Daylight and Views—Daylight		
<b>IEQ Credit 8.2</b>	Daylight and Views—Views		

## MINIMUM INDOOR AIR QUALITY PERFORMANCE

	CI	RETAIL: CI
Credit	IEQ Prerequisite 1	IEQ Prerequisite 1
Points	Required	Required

### Intent

To establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

### Requirements

#### Commercial Interiors

Meet the minimum requirements of Section 4 through 7 of ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda<sup>1</sup>).

AND

#### CASE 1. Mechanically Ventilated Spaces

##### OPTION 1. ASHRAE Standard 62.1-2007 or Non-U.S. Equivalent

Mechanical ventilation systems must perform according to the ventilation rate procedure.

Modify or maintain existing building outside-air ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE Standard 62.1-2007 (with errata but without addenda<sup>1</sup>). Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007 for breathing zone minimum ventilation rates.

OR

##### OPTION 2. CEN Standard EN 15251: 2007

Projects outside the U.S. may modify or maintain each outside air intake, supply air fan and/or ventilation distribution system to supply at least the outdoor air ventilation rate required by Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics.

If the project team cannot meet the outside air requirements of the above standards, document the space and system constraints that make it not possible, complete an engineering assessment of the system's maximum cubic feet per minute (cfm) capability toward meeting the requirements of the above standards, and achieve those levels, with a minimum of 10 cfm (0.28 cubic meters per minute) per person. All other requirements must be met.

#### CASE 2. Naturally Ventilated Projects

Naturally ventilated buildings must comply with ASHRAE Standard 62.1-2007 Section 5.1 (with errata but without addenda<sup>1</sup>).

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this prerequisite may do so at their discretion. Addenda must be applied consistently across all LEED credits

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## IEQ PREREQUISITE 1

### Retail: CI

Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addenda<sup>1</sup>). Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007 for breathing zone minimum ventilation rates.

AND

#### CASE 1. Mechanically Ventilated Spaces

##### OPTION 1. ASHRAE Standard 62.1-2007 or Non-U.S. Equivalent

Modify or maintain the existing outside air ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1-2007 (with errata but without addenda<sup>1</sup>). Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007 for breathing zone minimum ventilation rates.

OR

##### OPTION 2. CEN Standard EN 15251: 2007

Projects outside the U.S. may modify or maintain each outside air intake, supply air fan and/or ventilation distribution system to supply at least the outdoor air ventilation rate required by Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics.

If the project team cannot meet the outside air requirements of the above standards, document the space and system constraints that make it not possible, complete an engineering assessment of the system's maximum cubic feet per minute (cfm) capability toward meeting the requirements of the above standards, and achieve those levels, with a minimum of 10 cfm (0.28 cubic meters per minute) per person. All other requirements must be met.

OR

#### CASE 2. Naturally Ventilated Spaces

Naturally ventilated buildings must comply with ASHRAE Standard 62-2007, Section 5.1 (with errata but without addenda<sup>1</sup>).

Modify or maintain the existing outside air ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE Standard 62.1-2007 (with errata but without addenda<sup>1</sup>). If the project team cannot meet the outside air requirements of ASHRAE 62.1-2007 (with errata but without addenda<sup>1</sup>), document the space and system constraints that make it not possible, complete an engineering assessment of the system's maximum cubic feet per minute (cfm) capability toward meeting the requirements of ASHRAE 62.1-2007 (with errata but without addenda<sup>1</sup>), and achieve those levels, with a minimum of 10 cfm (0.28 cubic meters per minute) per person. All other requirements must be met.

<sup>1</sup> Project teams wishing to use addenda approved by ASHRAE for the purposes of this prerequisite may do so at their discretion. Addenda must be applied consistently across all LEED credits

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this prerequisite.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this prerequisite.

## 3. Summary of Referenced Standards

CEN Standard EN15251: 2007, Annex B, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics.

### Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Annex B of the standard, when used in conjunction with the identified sections of CEN Standard EN 13779: 2007, is considered equivalent to ASHRAE 62.1-2007 for the purposes of this prerequisite.

### CEN Standard EN 13779: 2007, Ventilation for nonresidential buildings, Performance requirements for ventilation and room conditioning systems

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This standard identifies the requirements for ventilation and room-conditioning systems and is used in conjunction with CEN Standard EN 15251: 2007, Annex B. All sections of this standard are applicable except Sections 7.3, Thermal environment; 7.6, Acoustic Environment; A.16; and A.17; these topics are addressed elsewhere in the LEED rating system.

## 4. Implementation

### Mechanically Ventilated Spaces

#### OPTION 1

Local standards for projects outside the United States will be compared with ASHRAE 62.1-2007 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to ASHRAE 62.1-2007 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

In order to demonstrate equivalency using a local standard, the local standard must address all of the critical outdoor air ventilation requirements of ASHRAE 62.1-2007.

#### Design Outdoor Air Rate requirements (ASHRAE 62.1-2007, Section 6.2):

This section outlines the minimum outdoor air intake rates required for all occupied spaces and the Ventilation Rate Procedure (VRP), which is used to calculate these rates. The VRP is a prescriptive procedure in which the design outdoor air intake flows are determined based on space type/application, occupancy level, floor area, and system type. The procedure calculates the outdoor airflow required in the breathing zone, for the zone, and at the system level.

The procedure accounts for zone air distribution effectiveness (ASHRAE 62.1-2007, Section 6.2.2.2) based on the supply air delivery method and the supply air temperature for the space

IEQ	
CI	Prerequisite 1
RETAIL: CI	Prerequisite 1

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## IEQ

CI	Prerequisite 1
RETAIL: CI	Prerequisite 1

under consideration.

The procedure accounts for system ventilation effectiveness (ASHRAE 62.1-2007, Section 6.2.3 – 6.2.5) based on the various air-handling units supplying outdoor air to the building or a combination of spaces. Specific requirements are included for multiple zone recirculating systems (ASHRAE 62.1-2007, Section 6.2.5) to account for the mixture of re-circulated air and outdoor air to more than one zone/space.

### Indoor Air Quality Procedure (ASHRAE 62.1-2007, Section 6.3)

To use the IAQ Procedure or claim equivalency with the IAQ Procedure, follow the Pilot Credit language from Pilot Credit 68, available in the LEED Pilot Credit library on the website at [www.usgbc.org/pilotcredits](http://www.usgbc.org/pilotcredits).

#### OPTION 2

Annex B of CEN Standard EN 15251:2007 identifies multiple components for determining the recommended outdoor air ventilation rate of a mechanically ventilated building.

To determine the appropriate amount of outdoor air needed in a building, EN 15251:2007 uses a calculation based on recommended ventilation rates for diluting emissions from people and building materials.

To determine the ventilation rate: Use Table B.1 in Annex B of CEN Standard EN 15251:2007 to find the appropriate percentage of dissatisfied building occupants and select Category I, II, or III based on the building design and applicable local codes. Then, determine the appropriate building emissions level corresponding to the materials used in the building. Table B.2 provides recommended ventilation rates for various space types.

See the 2009 Green Interior Design and Construction Reference Guide for further implementation guidance.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this prerequisite. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

To show compliance for mechanically ventilated spaces, use the calculations in the selected standard's user manual and the IEQ calculators located in Credit Resources in LEED Online.

## 7. Documentation Guidance

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- For projects using Case 1, Option 1,
  - Demonstrate that the local standard is equivalent to the breathing zone minimum ventilation rates of ASHRAE 62.1-2007, by addressing each of the critical requirements identified in Implementation.
    - If the local standard contains deviations or omissions for sections specified under Implementation, provide relevant information to justify the omissions or deviations, or explain that the project will follow the ASHRAE standard for the specific requirement.
    - Requirements not relevant to the proposed building type do not need to be included in

the equivalency review.

- Demonstrate compliance with the applicable sections of the local standard.
- For projects using Case 1, Option 2, demonstrate compliance with the applicable sections of CEN Standard EN 15251: 2007.
- Track building HVAC system maintenance.

IEQ	
CI	Prerequisite 1
RETAIL: CI	Prerequisite 1

## 8. Examples

See the LEED 2009 Interior Design and Construction Reference Guide for an example relating to this prerequisite.

## 9. Exemplary Performance

This prerequisite is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

There are no regional variations associated with this prerequisite.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on Operations and Maintenance considerations relating to the ventilation rate procedure.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

### Websites

#### Comité Européen de Normalisation

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See the LEED 2009 Green Interior Design and Construction Reference Guide for additional resources related to this prerequisite.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this prerequisite.

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## ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL

	CI	RETAIL: CI
Credit	IEQ Prerequisite 2	IEQ Prerequisite 2
Points	Required	Required

### Intent

To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS).

### Requirements

#### Commercial Interiors

#### OPTION 1

Locate tenant space in a building that prohibits smoking by all occupants and users, within 25 feet (8 meters) of entries, outdoor air intakes and operable windows.

OR

#### OPTION 2

##### CASE 1. Non-Residential Projects

Confirm that smoking is prohibited in the portions of the tenant space not designated as a smoking space, all other building areas served by the same HVAC system, and the common areas used by occupants. Ensure that ETS cannot migrate by either mechanical or natural ventilation from other areas of the building.

If the occupants are permitted to smoke, provide one or more designated smoking rooms designed to contain, capture and remove ETS from the building. At a minimum, each smoking room must be directly exhausted to the outdoors, with no recirculation of ETS-containing air to nonsmoking areas, enclosed with impermeable deck-to-deck partitions, and operated at a negative pressure compared with surrounding 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) when the doors to the smoking rooms are closed.

Verify performance of the smoking rooms differential air pressure by conducting 15 minutes of measurement, with a minimum of 1 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 rooms closed. Conduct the testing with each space configured for worst case conditions of transport of air from the smoking rooms (with doors closed) to adjacent spaces.

##### CASE 2. Multi-Unit Residential Buildings

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.

## IEQ PREREQUISITE 2

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ PREREQUISITE 2

Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway.<sup>1</sup>

Demonstrate acceptable sealing of residential units by conducting a blower door test in accordance with ANSI/ASTM-779-99, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization. Projects outside the U.S. may use a local equivalent to ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization.

Use the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems (HERS) Required Verification and Diagnostic Testing) of the California Low Rise Residential Alternative Calculation Method Approval Manual. Projects outside the U.S. may use a local sampling methodology, whichever is more stringent. Residential units must demonstrate less than 1.25 square inches of leakage area per 100 square feet (8 square centimeters of leakage per 10 square meters) of enclosure area (i.e., sum of all wall, ceiling and floor areas).

<sup>1</sup> 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, Case 1 above, considering the residential unit as the smoking room.

## OPTION 1

Locate tenant space in a building that prohibits smoking by all occupants and users within 25 feet (8 meters) of entries, outdoor air intakes, and operable windows.

Prohibit on-property smoking within 25 feet (8 meters) of entries, outdoor air intakes, and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas, or prohibit smoking on the entire property. If the 25-foot (8 meter) requirement cannot be followed due to code or landlord rules, provide documentation that proves such regulations are in place.

If outdoor space, public or private, is used for business purposes, regardless of zero lot line, this space needs to follow the no-smoking regulation outlined in this credit. Examples of such spaces include sidewalk seating, patios or decks, and/or stands for purchasing goods whereas smoking must be prohibited within 25 feet (8 meters) of such spaces.

OR

## OPTION 2

## CASE 1. Non-Residential Projects

Confirm that smoking is prohibited in the portions of the tenant space not designated as a smoking space, all other building areas served by the same HVAC system, and the common areas used by occupants. Ensure that ETS cannot migrate by either mechanical or natural ventilation from other areas of the building.

If the occupants are permitted to smoke, provide designated smoking rooms designed to contain, capture, and remove ETS from the building. At a minimum, each smoking room must be directly exhausted to the outdoors, with no recirculation of ETS-containing air to nonsmoking areas, enclosed with impermeable deck-to-deck partitions, and operated at a negative pressure compared with surrounding spaces of at least an average of 5 Pascals (Pa) (0.02 inches of water gauge) and with a minimum of 1 Pa (0.004 inches of water gauge) when the doors to the smoking rooms are closed.

Verify performance of the smoking rooms' differential air pressure by conducting 15 minutes of measurement, with a minimum of 1 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 rooms closed. Conduct the testing with each space configured for worst-case conditions of transport of air from the smoking rooms (with doors closed) to adjacent spaces.

## CASE 2. Multi-Unit Residential Buildings

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.

Weather-strip all doors in the residential units leading to common hallways to minimize

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## IEQ PREREQUISITE 2

air leakage into the hallway<sup>1</sup>.

Demonstrate acceptable sealing of residential units by conducting a blower door test in accordance with ANSI/ASTM-779-99, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization. Projects outside the U.S. may use a local equivalent to ANSI/ASTM-E779-03, Standard Test Method for Determining Air Leakage Rate By Fan Pressurization.

Use the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems [HERS] Required Verification and Diagnostic Testing) of the California Low Rise Residential Alternative Calculation Method Approval Manual, found at [http://www.energy.ca.gov/title24\\_1998\\_standards/residential\\_acm/CHAPTER07.pdf](http://www.energy.ca.gov/title24_1998_standards/residential_acm/CHAPTER07.pdf). Projects outside the U.S. may use a local sampling methodology, whichever is more stringent. Residential units must demonstrate less than 1.25 square inches of leakage area per 100 square feet (8 square centimeters of leakage per 10 square meters) of enclosure area (i.e., sum of all wall, ceiling, and floor areas).

1 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, Case 1 above, considering the residential unit as the smoking room.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this prerequisite.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this prerequisite.

## 3. Summary of Referenced Standards

No new standards are referenced; see the LEED 2009 Green Interior Design and Construction Reference Guide for a summary of the standards referenced in this prerequisite. If a local equivalent to ANSI/ASTM-E779-03 has been selected, substitute that standard for the listed standard.

## 4. Implementation

Local standards for projects outside the United States will be compared with ANSI/ASTM-E779-03 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to ANSI/ASTM-E779-03 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

Any local alternative standard to ANSI/ASTM-E779-03 must provide at least the following information:

- Air-change rate
- Air-leakage rate
- Test pressure difference

See the 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional implementation guidance related to this prerequisite.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this prerequisite. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

There are no calculations required for this prerequisite.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this prerequisite.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for an example on installing a compliant smoking room.

## 9. Exemplary Performance

This prerequisite is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

IEQ	
CI	Prerequisite 2
RETAIL: CI	Prerequisite 2

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## IEQ

CI

Prerequisite 2

RETAIL: CI

Prerequisite 2

### 10. Regional Variations

Smoking laws vary. Some countries ban smoking within certain building types, for example, and cities, municipalities, or towns may have their own laws on smoking. Consult local laws before establishing a smoking policy for the project building.

### 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this prerequisite.

### 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this prerequisite.

### 13. Definitions

**Air-change rate** is the air-leakage rate in volume per hour divided by the building space volume, expressed in identical volume units.

**Air-leakage rate** is the volume of air movement across the building envelope over a unit of time.

**Test pressure difference** is the measured pressure difference across the building envelope.

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of other terms used in this prerequisite.

## OUTDOOR AIR DELIVERY MONITORING

## IEQ CREDIT 1

	CI	RETAIL: CI
Credit	IEQ Credit 1	IEQ Credit 1
Points	1 point	1 point

### Intent

To provide capacity for ventilation system monitoring to help promote occupants' comfort and well-being.

### Requirements

#### Commercial Interiors, Retail: CI

Install permanent monitoring systems to ensure that ventilation systems maintain design minimum requirements. Configure all monitoring equipment to generate an alarm when the airflow values or carbon dioxide (CO<sub>2</sub>) levels vary by 10% or more from the design values, via either a building automation system alarm to the building operator or a visual or audible alert to the building occupants.

AND

#### CASE 1. Mechanically Ventilated Spaces

Monitor CO<sub>2</sub> concentrations within all densely occupied spaces (those with a design occupant density of 25 people or more per 1,000 square feet) [95 square meters]. CO<sub>2</sub> monitors must be between 3 and 6 feet (1 and 2 meters) above the floor.

Provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow with an accuracy of plus or minus 15% of the design minimum outdoor air rate, as based on the value determined in IEQ Prerequisite 1: Minimum Indoor Air Quality Performance, for mechanical ventilation systems where 20% or more of the design supply airflow serves nondensely occupied spaces.

#### CASE 2. Naturally Ventilated Spaces

Monitor CO<sub>2</sub> concentrations within all naturally ventilated spaces. CO<sub>2</sub> monitors must be between 3 and 6 feet (1 and 2 meters) above the floor. One CO<sub>2</sub> sensor may be used to monitor multiple nondensely occupied spaces if the natural ventilation design uses passive stacks or other means to induce airflow through those spaces equally and simultaneously without intervention by building occupants.

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## IEQ

CI	Credit 1
RETAIL: CI	Credit 1

### 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

### 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

### 3. Summary of Referenced Standards

**CEN Standard EN15251: 2007, Annex B, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics**

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This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Annex B of the standard, when used in conjunction with the identified sections of CEN Standard EN 13779: 2007, is considered equivalent to ASHRAE 62.1–2007 for the purposes of this credit.

**CEN Standard EN 13779: 2007, Ventilation for nonresidential buildings, Performance requirements for ventilation and room conditioning systems**

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This standard identifies the requirements for ventilation and room-conditioning systems and is used in conjunction with CEN Standard EN 15251: 2007, Annex B. All sections of this standard are applicable except Sections 7.3, Thermal environment; 7.6, Acoustic Environment; A.16; and A.17.

### 4. Implementation

Local standards for projects outside the United States will be compared with ASHRAE 62.1–2007 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to ASHRAE 62.1–2007 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

If a local equivalent to ASHRAE 62.1 – 2007 was selected in IEQ Prerequisite 1 to determine the design minimum outdoor air rate, ensure that the same equivalent standard is used in this credit.

See the LEED 2009 Green Interior Design and Construction Reference Guide for implementation guidance.

### 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

### 6. Calculations

There are no calculations required for this credit.

### 7. Documentation Guidance

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- Indicate the locations of airflow monitors and CO<sub>2</sub> sensors on floor plans, schematics, and elevations (where applicable). Incorporate checks of ventilation systems into mechanical schedules.
- Commission ventilation systems and monitor them for excess energy use.
- Check alarm systems for mechanical ventilation systems to verify settings according to either CEN Standard EN 13779: 2007 or the local equivalent to ANSI/ASHRAE 62.1–2007.
- Calibrate any building automation systems used in the project according to manufacturers' guidelines. Routine function checks of alarm systems are recommended.

IEQ	
CI	Credit 1
RETAIL: CI	Credit 1

## 8. Examples

There are no examples for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on Operations and Maintenance considerations relating to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

### Websites

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See the LEED 2009 Green Interior Design and Construction Reference Guide for additional resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.



## INCREASED VENTILATION

	CI	RETAIL: CI
Credit	IEQ Credit 2	IEQ Credit 2
Points	1 point	1 point

**Intent**

To provide additional outdoor air ventilation to improve indoor air quality (IAQ) for improved occupant comfort, well-being and productivity.

**Requirements**

Commercial Interiors, Retail: CI

## CASE 1. Mechanically Ventilated Spaces

## OPTION 1. ASHRAE Standard 62.1-2007 or Non-U.S. Equivalent

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2007 (with errata but without addenda<sup>1</sup>) as determined by IEQ Prerequisite 1, Minimum Indoor Air Quality Performance. Projects outside the U.S. may use a local equivalent to ASHRAE Standard 62.1-2007, if the same is used for IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

OR

## OPTION 2. CEN Standard EN 15251: 2007

Projects outside the U.S. may earn this credit by increasing breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates required by Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics, as determined by IEQ Prerequisite 1: Minimum Indoor Air Quality Performance.

## CASE 2. Naturally Ventilated Spaces

Determine that natural ventilation is an effective strategy for the project by following the flow diagram process shown in Figure 2.8 of the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual 10: 2005, Natural Ventilation in Non-Domestic Buildings.

AND

## OPTION 1. CIBSE or Non-U.S. Equivalent

Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space.

PATH 1. Use CIBSE Applications Manual 10: 2005, Natural Ventilation in Non-domestic

<sup>1</sup> Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

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## IEQ CREDIT 2

Buildings. Projects outside the U.S. may use a local equivalent.

PATH 2. Use CIBSE AM 13:2000, Mixed Mode Ventilation Projects outside the U.S. may use a local equivalent.

OR

### OPTION 2. Airflow Model

Use a macroscopic, multizone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2007, section 6 (with errata but without addenda<sup>1</sup>), for at least 90% of occupied spaces. Projects outside the U.S. may use Annex B of Comité Européen de Normalisation (CEN) Standard EN 15251: 2007, or a local equivalent to section 6 of ASHRAE Standard 62.1-2007 to define the minimum ventilation rates.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

**CEN Standard EN15251: 2007, Annex B, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics**

Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Annex B of the standard, when used in conjunction with the identified sections of CEN Standard EN 13779: 2007, is considered equivalent to ASHRAE 62.1–2007 for the purposes of this credit.

## 4. Implementation

### Mechanically Ventilated Spaces

Local standards for projects outside the United States will be compared with ASHRAE 62.1–2007 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to ASHRAE 62.1–2007 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

If a local equivalent to ASHRAE 62.1 – 2007 was selected in IEQ Prerequisite 1 to determine the design minimum outdoor air rate, ensure that the same equivalent standard is used in this credit.

### Naturally Ventilated Spaces

Local standards for projects outside the United States will be compared with the CIBSE Applications Manual 10: 2005 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to the CIBSE Applications Manual 10:2005 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

Project teams may demonstrate compliance in either of two ways:

- Use a local equivalent to the compliance path in the CIBSE Applications Manual 10: 2005 (AM10), Chapter 2, which specifies the opening sizes for operable windows, trickle vents, and louvers.
- Demonstrate, via a macroscopic, multizone analytic model, that room-by-room airflow rates meet the minimum ventilation rates required by CEN Standard EN 15251: 2007, Annex B, or a local equivalent to ASHRAE Standard 62.1–2007, Section 6.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

IEQ	
CI	Credit 2
RETAIL: CI	Credit 2

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**IEQ**

CI

Credit 2

RETAIL: CI

Credit 2

**6. Calculations****Mechanically Ventilated Spaces**

Use the calculations in the selected standard's user manual and the IEQ Prerequisite 1 calculators, available on the LEED Resources & Tools page of the USGBC website. The same calculations are used to document IEQ Prerequisite 1.

See the LEED 2009 Green Interior Design and Construction Reference Guide for calculations associated with this credit.

**7. Documentation Guidance**

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

**8. Examples**

There are no examples for this credit.

**9. Exemplary Performance**

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

**10. Regional Variations**

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

**11. Operations and Maintenance Considerations**

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

**12. Resources**

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

**Websites****Comité Européen de Normalisation**

<http://www.cen.eu>

CEN seeks to foster the European economy in global trading, the welfare of European citizens, and the environment by removing trade barriers for European industry and consumers. It provides a platform for the development of European standards and other technical specifications. To purchase CEN standards, visit the Products section on the CEN website.

See the LEED 2009 Green Interior Design and Construction Reference Guide for additional resources related to this credit.

**13. Definitions**

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

## CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN— DURING CONSTRUCTION

### IEQ CREDIT 3.1

	CI	RETAIL: CI
Credit	IEQ Credit 3.1	IEQ Credit 3.1
Points	1 point	1 point

#### Intent

To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.

#### Requirements

##### Commercial Interiors

Develop and implement an IAQ management plan for the construction and preoccupancy phases of the tenant space as follows:

- During construction, meet or exceed the recommended design approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- Protect stored on-site and installed absorptive materials from moisture damage.
- If permanently installed air handlers are used during construction, filtration media must be used at each return air grille that meets one of the following criteria below. Replace all filtration media immediately prior to occupancy.
  - Filtration media with a minimum efficiency reporting value (MERV) of 8 as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda<sup>1</sup>).
  - Filtration media is Class F5 or higher, as defined by CEN Standard EN 779-2002, Particulate air filters for general ventilation, Determination of the filtration performance.
  - Projects in East Asia may use filtration media classified as medium efficiency (中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器).
  - Filtration media with a minimum dust spot efficiency of 30% or higher and greater than 90% arrestance on a particle size of 3–10 µg.

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ CREDIT 3.1

### Retail: CI

Develop and implement an IAQ management plan for the construction and preoccupancy phases of the building as follows:

- During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- Protect stored on-site and installed absorptive materials from moisture damage.
- If permanently installed air handlers are used during construction, filtration media must be used at each return air grille that meets one of the following criteria below. Replace all filtration media immediately prior to occupancy.
  - Filtration media with a minimum efficiency reporting value (MERV) of 8 as determined by ASHRAE Standard 52.2-1999 (with errata but without addenda<sup>1</sup>).
  - Filtration media is Class F5 or higher, as defined by CEN Standard EN 779-2002, Particulate air filters for general ventilation, Determination of the filtration performance.
  - Projects in East Asia may use filtration media classified as medium efficiency (中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器).
  - Filtration media with a minimum dust spot efficiency of 30% or higher and greater than 90% arrestance on a particle size of 3–10 µg.

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### Chinese Standard GB/T 14295-2008 (空气过滤器)

<http://www.sac.gov.cn/>

[http://www.sac.gov.cn/sac\\_en/](http://www.sac.gov.cn/sac_en/)

This national standard is administered by the People's Republic of China's National HVAC and Purification Equipment Standardization Technical Committee and issued by the Standardization Administration and the General Administration of Quality Supervision, Inspection and Quarantine.

This standard presents methods for testing air cleaners for two performance characteristics: the device's capacity for removing particles from the air stream (counting efficiency and arrestance) and the device's resistance to airflow.

This standard also includes air filter terminology and definitions, classification and markings, requirements, test methods, inspection rules and product labeling, packaging, transportation and storage. This standard applies to filters that are used in ventilation, air conditioning and air purification systems or equipment under conditions of normal temperature and humidity.

The classifications range from roughing filters (粗效过滤器) to Sub-HEPA filters (亚高效过滤器). Higher-efficiency filters are addressed in Chinese Standard GB/T 13554-2008 (高效空气过滤器) High Efficiency Particulate Air Filter, which covers high efficiency particulate air filters (高效空气过滤器) and ultra-low penetration air filters (超高效空气过滤器).

### Chinese Standard GB/T 13554-2008 (高效空气过滤器)

<http://www.sac.gov.cn/>

[http://www.sac.gov.cn/sac\\_en/](http://www.sac.gov.cn/sac_en/)

This national standard is issued by the Standardization Administration and the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China.

This standard covers higher-efficiency air filters than GB/T 14295-2008 (空气过滤器) and the classifications range from high efficiency particulate air filters (高效空气过滤器) to ultra-low penetration air filters (超高效空气过滤器).

This standard also includes air filter terminology and definitions, classification and markings, requirements, test methods, inspection rules and product labeling, packaging, transportation and storage. This standard applies to HEPA and ULPA filters that are used in supply air and exhaust air purification systems or equipment under conditions of normal temperature and humidity.

IEQ	
CI	Credit 3.1
RETAIL: CI	Credit 3.1

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## IEQ

**Table 1. Chinese Air Filter Classifications from Highest to Lowest Efficiency**

Chinese Standard	Air Filter Classification: Chinese	Air Filter Classification: English	LEED Credit Requirement
GB/T 13554-2008	超高效空气过滤器	Ultra-low penetration air filters (ULPA)	Meets requirements of IEQc3.1 & IEQc5
GB/T 13554-2008	高效空气过滤器	High efficiency particulate air filters (HEPA)	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	亚高效过滤器	Sub-HEPA (high efficiency particulate air) filter	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	高中效过滤器	high efficiency filter	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	中效过滤器	medium efficiency filter	Meets requirements of IEQc3.1
GB/T 14295-2008	粗效过滤器	roughing filter	Not allowed

### CEN Standard EN 779: 2002, Particulate air filters for general ventilation, Determination of the filtration performance

Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries for determining filter class for all filtration media.

## 4. Implementation

### HVAC Protection

Protect all HVAC equipment from both dust and odors and seal all duct and equipment openings with plastic. If the system must be operated to maintain service to occupied portions of the building or to protect finished work, protect the return (negative pressure) side of the system. If the returns cannot be closed, install and maintain temporary filters over the grilles and openings. All filtration media must be medium efficiency (中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器) or have a minimum dust spot efficiency of 30% and at least 90% arrestance on a particle size of 3–10 µg. If an unducted plenum over the construction zone must be used, isolate it by having all ceiling tiles in place. Check for leaks in the return ducts and air handlers and make needed repairs promptly. The contractor should avoid using the mechanical rooms for construction storage.

See the 2009 Green Interior Design and Construction Reference Guide for additional implementation guidance.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

## 6. Calculations

There are no calculations required for this credit.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for an example of an indoor air quality management plan. Ensure that the plan includes HVAC protection and specifies filters that are medium efficiency (中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器) or have a minimum dust spot efficiency of 30% and at least 90% arrestance on a particle size of 3–10 µg.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation and Design section of the LEED 2009 rating system.

## 10. Regional Variations

There are no regional variations applicable to this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

**Counting efficiency** is the capability of air filters to capture particles measured by the concentration of test aerosol. It is the ratio between the change in the concentration of aerosol from upstream to downstream air flow and the concentration of aerosol at upstream air flow.

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

IEQ	
CI	Credit 3.1
RETAIL: CI	Credit 3.1

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## LOW-EMITTING MATERIALS—FLOORING SYSTEMS

## IEQ CREDIT 4.3

	CI	RETAIL: CI
Credit	IEQ Credit 4.3	IEQ Credit 4.3
Points	1 point	1 point

### Intent

To 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

Commercial Interiors, Retail: CI

#### OPTION 1

All flooring must comply with the following as applicable to the project scope:

- All carpet installed in the building interior must meet one of the following requirements:
  - Meets the testing and product requirements of the Carpet and Rug Institute Green Label Plus<sup>1</sup> program.
  - Maximum VOC concentrations are less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice. The additional VOC concentration limits listed in Section 9.1a must also be met.
  - Maximum VOC concentrations meet the California requirements specified above based on the following:
    - California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point
    - Projects outside the U.S. may use the German AgBB/DIBt testing method and all testing methods based on AgBB/DIBt method (GUT, EMICODE, Blue Angel) using test results obtained at the 3 day or 7 day or 14 day time point. For caprolactam, if test results obtained at the 3 day or 7 day time point is used, the emission concentration must be less than ffl of the concentration limit specified above because the emission may not have peaked at the measured time points.

If a European testing method (AgBB/DIBt GUT, EMICODE, Blue Angel) had used parameters for calculating test results different from those specified in the referenced California method, then the European test results for carpets or floorings need to be converted into California air concentrations by

<sup>1</sup> The Green Label Plus program for carpets and its associated VOC emissions criteria in micrograms per square meter per hour, along with information on testing method and sample collection developed by the Carpet and Rug Institute (CRI) in coordination with California's Sustainable Building Task Force and the California Department of Public Health, are described in Section 9, Acceptable Emissions Testing for Carpet, DHS Standard Practice CA/DHS/EHLB/R-174, dated 07/15/04. This document is available at [http://www.dhs.ca.gov/ps/deodc/ehlb/iaq/VOCS/Section01350\\_7\\_15\\_2004\\_FINAL\\_PLUS\\_ADDENDUM-2004-01.pdf](http://www.dhs.ca.gov/ps/deodc/ehlb/iaq/VOCS/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdf) (also published as Section 01350 Section 9 [dated 2004] by the Collaborative for High Performance Schools [<http://www.chps.net>]).

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ CREDIT 4.3

multiplication with 0.7.

- All carpet cushion installed in the building interior must meet the requirements of the Carpet and Rug Institute Green Label program.
- All carpet adhesive must have less than 50 g/L VOC.
- All hard surface flooring installed in the building interior must meet one of the following requirements:
  - Meet the requirements of the FloorScore<sup>2</sup> standard (current as of the date of this rating system, or more stringent version) by an independent third party.
  - Demonstrate maximum VOC concentrations less than or equal to those specified in the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda, using the office scenario as defined in Table 7.5 within the practice.
  - Maximum VOC concentrations meet the California requirements specified above based on the following:
    - California Department of Public Health (CDPH) Standard Method V1.1-2010 using test results obtained at the 14 day time point
    - Projects outside the U.S. may use the German AgBB/DIBt testing method and all testing methods based on AgBB/DIBt method (GUT, EMICODE, Blue Angel) using test results obtained at the 3 day or 7 day or 14 day time point. For caprolactam, if test results obtained at the 3 day or 7 day time point is used, the emission concentration must be less than 1/3 of the concentration limit specified above because the emission may not have peaked at the measured time points.

If a European testing method (AgBB/DIBt GUT, EMICODE, Blue Angel) had used parameters for calculating test results different from those specified in the referenced California method, then the European test results for carpets or floorings need to be converted into California air concentrations by multiplication with 0.7.

Mineral-based finish flooring products such as tile, masonry, terrazzo, and cut stone without integral organic-based coatings and sealants and unfinished/untreated solid wood flooring qualify for credit without any IAQ testing requirements. However, associated site-applied adhesives, grouts, finishes and sealers must be compliant for a mineral based or unfinished/untreated solid wood flooring system to qualify for credit.

- Concrete, wood, bamboo, and cork floor finishes such as sealer, stain, and finish must meet the requirements of South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, effective January 1, 2004.
- Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005, and rule amendment date of January 7, 2005.
- For carpet adhesive, concrete, wood, bamboo and cork floor finishes, and tile setting adhesives, compliance can be demonstrated with test results of:
  - Total volatiles fraction, based on one of the following, provided that water and exempt compounds are subtracted from total volatiles test results and the mass

## IEQ CREDIT 4.3

VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168:

- ASTM D2369
- EPA method 24
- ISO 11890 part 1
- Total volatile organic compounds fraction, based on one of the following, provided that all VOCs with a boiling point up to 280°C (536°F) are included, and exempt compounds are subtracted from total volatiles test results and the mass VOC content is calculated consistent with SCAQMD Rule 1113 and Rule 1168.
  - ASTM D6886
  - ISO 11890 part 2

OR

### OPTION 2

All flooring products must meet the testing and product requirements of the California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

Mineral-based finish flooring products such as tile, masonry, terrazzo, and cut stone without integral organic-based coatings and sealants and unfinished/untreated solid wood flooring qualify for credit without any IAQ testing requirements. However, associated site-applied adhesives, grouts, finishes and sealers must be compliant for a mineral-based or unfinished/untreated solid wood flooring system to qualify for credit.

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**IEQ**

CI	Credit 4.3
RETAIL: CI	Credit 4.3

**1. Benefits and Issues to Consider**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

**2. Related Credits**

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

**3. Summary of Referenced Standards****AgBB: Health-related Evaluation of Emissions of Volatile Organic Compounds (VOC and SVOC) from Building Products**

Umwelt Bundes Amt

<http://www.umweltbundesamt.de/produkte-e/bauprodukte/agbb.htm>

This is the German method for VOC testing and evaluation. The evaluation scheme sets quality standards relevant to health for future manufacture of indoor building products and fosters the development of products with particularly low emissions. It is not aimed at subsequent evaluation of products already installed.

**ASTM D2369: Standard Test Method for Volatile Content of Coatings**

<http://www.astm.org/>

According to the ASTM website, “This test method is the procedure of choice for determining volatiles in coatings for the purpose of calculating the volatile organic content in coatings under specified test conditions. The weight percent solids content (nonvolatile matter) may be determined by difference. This information is useful to the paint producer and user and to environmental interests for determining the volatiles emitted by coatings.”

**ASTM D6886: Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography**

<http://www.astm.org/>

According to the ASTM website, “This test method is for the determination of the weight percent of individual volatile organic compounds in low VOC content waterborne latex air-dry coatings. The method is intended primarily for analysis of waterborne coatings in which the material VOC content is below 5 weight percent. The method has been used successfully with higher VOC content waterborne coatings.”

**California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers**

<http://www.cal-iaq.org/>

This is the emissions-testing standard for California. The practice applies to any material belonging to a product category generally used in an enclosed indoor environment. Examples include paints, other architectural coatings, sealants, adhesives, wall coverings, floor coverings, wood paneling, and furniture components, whether used in public and commercial office buildings, schools, medical buildings, residences, or other building types.

**California Department of Public Health (CDPH) Standard Method V1.1-2010**

<http://www.cdph.ca.gov/>

This is the emissions-testing and evaluation standard for California Specification Section 01350. The standard is applicable to the full range of building products including paints and adhesives that can be tested in small-scale chambers.

## **EPA Test Method 24, Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings**

<http://www.epa.gov/>

EPA Test Method 24 provides testing parameters for identifying volatile content in coatings. This testing method references several ASTM sampling methods.

## **ISO 11890-1: 2007, Paints and varnishes, Determination of volatile organic compound (VOC) content, Part 1, Difference method**

<http://www.iso.org/>

According to the ISO website, “ISO 11890-1:2007 specifies a method for the determination of the volatile organic compound (VOC) content of paints, varnishes and their raw materials. This part may be used where the expected VOC content is greater than 15 % by mass. When the expected VOC content is greater than 0,1 % by mass and less than 15 % by mass, ISO 11890-2 should be employed.”

## **ISO 11890-2: 2006, Paints and varnishes, Determination of volatile organic compound (VOC) content, Part 2, Gas-chromatographic method**

<http://www.iso.org/>

According to the ISO website, “ISO 11890-2:2006 specifies a method for the determination of the volatile organic compound (VOC) content of paints, varnishes and their raw materials. ISO 11890-2 is preferred if the expected VOC content is greater than 0,1 % by mass and less than about 15 % by mass. When the VOC content is greater than about 15 % by mass, the less complicated method given in ISO 11890-1 may be used.”

## **4. Implementation**

If the German AgBB/DIBt testing method or a testing method based on AgBB/DIBt method (GUT, EMICODE, Blue Angel) is used, use test results from the three-day, seven-day, or 14-day time point.

See the Implementation section of IEQ Credit 4.1 in the LEED 2009 Green Interior Design and Construction Reference Guide for complete implementation guidance related to this credit.

## **5. Timeline and Team**

See the Timeline and Team section of IEQc4.1 in the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit.

## **6. Calculations**

There are no calculations required for this credit.

## **7. Documentation Guidance**

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- Maintain a list of each carpet, carpet cushion, and carpet adhesive installed in the building interior. Record the VOC content for each adhesive. If a European testing method has been selected, ensure that it meets the testing requirements outlined in the rating system.
- Maintain a list of each hard surface flooring product, tile setting adhesive, finishes, and grout installed in the building interior. Record the VOC content for each tile setting adhesive and grout.

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IEQ	
CI	Credit 4.3
RETAIL: CI	Credit 4.3

IEQ	
CI	Credit 4.3
RETAIL: CI	Credit 4.3

## 8. Examples

A project team in Paris wants to use a linoleum flooring product that is marked with both the Blue Angel and the GUT logos. The team compares the product data sheet with the referenced testing standards. The product meets the AgBB/DIBt VOC testing standards and therefore qualifies for credit.

**Figure 1.** Example product data sheet on emissions

LINOLEUM				
Produktbeschreibung nach EN 548			Marmorette 2.5mm	Marmorette 3.2mm
Konstruktion	Belagsart	EN 548	Linoleum mit LPX Finish	Linoleum mit LPX Finish
	Musterung		marmoriert	marmoriert
	Gesamtdicke	EN 428	2,5 mm	3,2 mm
	Unterschicht		Jutegewebe	Jutegewebe
	Klassifizierung	EN 685	Klasse 23/34/42	Klasse 23/34/42
	Rollenbreite	EN 426	200 cm	200 cm
	Rollenlänge	EN 426	20–31 m	20–31 m
Gesamtgewicht	EN 430	2900 g / m <sup>2</sup>	3800 g / m <sup>2</sup>	
Sicherheit	Brandverhalten	EN 13501-1	Cfl – s1 *	Cfl – s1 *
	Rutsicherheit Arbeitsbereich	BGR 181	R 9	R 9
	Rutschhemmung BFU	bfu Reglement	GS 1 Klasse	
	Gleitwiderstand	EN 13893	DS (> 0,30)	DS (> 0,30)
	Blauer Engel	RAL-UZ 38	Ja	Ja
	REACH		enthält keine Stoffe die in der SVHC-Liste enthalten sind	enthält keine Stoffe die in der SVHC-Liste enthalten sind
	Allgemein Bauaufsichtliche Zulassung	Z-156.604-376	geeignet für die Verwendung in Aufenthaltsräumen	geeignet für die Verwendung in Aufenthaltsräumen
Funktion	Trittschallverbesserungsmaß	ISO 140-8	4 dB	6 dB
	Resteindruck	EN 433	≤ 0,15 mm	≤ 0,15 mm
	Farbechtheit	ISO 105-B02	Stufe ≥ 6	Stufe ≥ 6
	Durchgangswiderstand	EN 1081	–	–
	Standortisolation	VDE 0100	> 200 kOhm	> 200 kOhm
	Aufladungsspannung Begetest	EN 1815	ca. 2,0 kV	ca. 2,0 kV
	Wärmedurchlasswiderstand	EN 12667	0,015 m <sup>2</sup> K / W	0,018 m <sup>2</sup> K / W
	Wärmeableitung	EN 12524	0,17 W / mK	0,17 W / mK
	Chemikalienbeständigkeit	EN 423	Mineralöl- und Fettbeständigkeit und kurzzeitig beständig gegen verdünnte Säuren	Mineralöl- und Fettbeständigkeit und kurzzeitig beständig gegen verdünnte Säuren
	Stuhlrollen	EN 425	geeignet (Typ W)	geeignet (Typ W)
	Biegsamkeit	EN 435-A	Ø 40 mm	Ø 50 mm
	Einwirkung von Bakterien	JIS Z 2801	DLW Linoleum hat antibakterielle Eigenschaften	DLW Linoleum hat antibakterielle Eigenschaften
	Beständigkeit gegen brennende Zigaretten	EN 1399	geeignet	geeignet
	Warmwasser-Fußbodenheizung		geeignet (max. 28°C)	geeignet (max. 28°C)
	<div></div>			
Hergestellt von:		Marmorette 2.5mm	Marmorette 3.2mm	
		EN 14041 : 2004 05 1658-CPD-1003	EN 14041 : 2004 05 1658-CPD-1003	
<div></div>				

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

European VOC testing methods often vary from those used in the United States. If a European testing method has been selected, ensure that it follows the parameters of the referenced California testing methods. If the European testing methods and calculations differ, multiply the European test results for carpets or floorings by 0.7.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

Websites

**ASTM International**

<http://www.astm.org>

**Blue Angel**

[http://www.blauer-engel.de/en/blauer\\_engel/index.php](http://www.blauer-engel.de/en/blauer_engel/index.php)

**California Department of Health Services Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers**

<http://www.cal-iaq.org/>

**California Department of Public Health**

<http://www.cdph.ca.gov/>

**EMICODE**

<http://www.emicode.com/index.php?id=1&L=1>

**GUT**

<http://www.pro-dis.info/gut.html>

**International Organization for Standardization (ISO)**

<http://www.iso.org>

**Umwelt Bundes Amt**

<http://http://www.umweltbundesamt.de>

See the LEED 2009 Green Interior Design and Construction Reference Guide for additional resources related to this credit.

**U.S. Environmental Protection Agency (EPA)**

<http://www.epa.gov>

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms identified in this credit.

### IEQ

CI	Credit 4.3
RETAIL: CI	Credit 4.3

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.



## INDOOR CHEMICAL AND POLLUTANT SOURCE CONTROL

## IEQ CREDIT 5

	CI	RETAIL: CI
Credit	IEQ Credit 5	IEQ Credit 5
Points	1 point	1 point

### Intent

To minimize building occupant exposure to potentially hazardous particulates, biological contaminants and chemical pollutants that degrade air and water quality.

### Requirements

#### Commercial Interiors

Design to minimize and control the entry of pollutants into the tenant space and later cross-contamination of regularly occupied areas through the following strategies:

- Employ permanent entryway systems at least 10 feet (3 meters) long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entryways. Acceptable entryway systems include permanently installed grates, grills and slotted systems that allow for cleaning underneath. Roll-out mats are acceptable only when maintained on a weekly basis by a contracted service organization.
- Sufficiently exhaust each space where hazardous gases or chemicals may be present or used (e.g. garages, housekeeping and laundry areas copying and printing rooms) to create negative pressure with respect to adjacent spaces when the doors to the room are closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling. The exhaust rate must be at least 0.50 cubic feet per minute (cfm) per square foot (0.15 cubic meters per minute per square meter), with no air recirculation. The pressure differential with the surrounding spaces must be at least 5 Pascals (Pa) (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.
- In mechanically ventilated buildings, each ventilations system that supplies outdoor air shall comply with the following:
  - Particle filters or air cleaning devices shall be provided to clean the outdoor air at any location prior to its introduction to occupied spaces.
  - These filters or devices shall meet one of the following criteria:
    - Filtration media is rated at a minimum efficiency reporting value (MERV) of 13 or higher in accordance with ASHRAE Standard 52.2
    - Filtration media is Class F7 or higher, as defined by CEN Standard EN 779: 2002, Particulate air filters for general ventilation, Determination of the filtration performance
    - Projects in East Asia may use filtration media classified as high efficiency (高中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器).
    - Filtration media has a minimum dust spot efficiency of 80% or higher and greater than 98% arrestance on a particle size of 3–10 µg.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ CREDIT 5

- Clean air filtration media shall be installed in all air systems after completion of construction and prior to occupancy.

### Retail: CI

Design to minimize and control the entry of pollutants into the tenant space and later cross-contamination of regularly occupied areas through the following strategies:

- Employ permanent entryway systems at least 10 feet (3 meters) long in the primary direction of travel to capture dirt and particulates entering the building at all high-volume exterior entryways or in spaces where there is a transition into conditioned space, such as a loading dock.
- Sufficiently exhaust each space where hazardous gases or chemicals may be present or used (e.g., garages, housekeeping and laundry areas, copying and printing rooms) to create negative pressure with respect to adjacent spaces when the doors to the room are closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling. The exhaust rate must be at least 0.50 cubic feet per minute (cfm) per square foot (0.15 cubic meters per minute per square meter), with no air recirculation. The pressure differential with the surrounding spaces must be at least 5 Pascals (Pa) (0.02 inches of water gauge) on average and 1 Pa (0.004 inches of water) at a minimum when the doors to the rooms are closed.
- In mechanically ventilated buildings, install new air filtration media in regularly occupied areas prior to occupancy; these filters must meet one of the following criteria:
  - Filtration media is rated at a minimum efficiency reporting value (MERV) of 13 or higher in accordance with ASHRAE Standard 52.2.
  - Filtration media is Class F7 or higher, as defined by CEN Standard EN 779: 2002, Particulate air filters for general ventilation, Determination of the filtration performance.
  - Projects in East Asia may use filtration media classified as high efficiency (高中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器).
  - Filtration media has a minimum dust spot efficiency of 80% or higher and greater than 98% arrestance on a particle size of 3–10 µg.

Filtration should be applied to process both return and outside air that is delivered as supply air.

- Provide containment drains plumbed for appropriate disposal of hazardous liquid wastes in spaces where water and chemical concentrate mixing occurs (e.g., housekeeping, janitorial laboratories) for maintenance, or laboratory purposes.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

**Chinese Standard GB/T 14295-2008 (空气过滤器)** .

<http://www.sac.gov.cn/>

[http://www.sac.gov.cn/sac\\_en/](http://www.sac.gov.cn/sac_en/)

This national standard is administered by the People's Republic of China's National HVAC and Purification Equipment Standardization Technical Committee and issued by the Standardization Administration and the General Administration of Quality Supervision, Inspection and Quarantine.

This standard presents methods for testing air cleaners for two performance characteristics: the device's capacity for removing particles from the air stream (counting efficiency and arrestance) and the device's resistance to airflow.

This standard also includes air filter terminology and definitions, classification and markings, requirements, test methods, inspection rules and product labeling, packaging, transportation and storage. This standard applies to filters that are used in ventilation, air conditioning and air purification systems or equipment under conditions of normal temperature and humidity.

The classifications range from roughing filters (粗效过滤器) to Sub-HEPA filters (亚高效过滤器). Higher-efficiency filters are addressed in Chinese Standard GB/T 13554-2008 High Efficiency Particulate Air Filter, which covers high efficiency particulate air filters (高效空气过滤器) and ultra-low penetration air filters (超高效空气过滤器).

**Chinese Standard GB/T 13554-2008 (高效空气过滤器)**

<http://www.sac.gov.cn/>

[http://www.sac.gov.cn/sac\\_en/](http://www.sac.gov.cn/sac_en/)

This national standard is issued by the Standardization Administration and the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China.

This standard covers higher-efficiency air filters than GB/T 14295-2008 and the classifications range from high efficiency particulate air filters (高效空气过滤器) to ultra-low penetration air filters (超高效空气过滤器).

This standard also includes air filter terminology and definitions, classification and markings, requirements, test methods, inspection rules and product labeling, packaging, transportation and storage. This standard applies to HEPA and ULPA filters that are used in supply air and exhaust air purification systems or equipment under conditions of normal temperature and humidity.

IEQ	
CI	Credit 5
RETAIL: CI	Credit 5

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ

**Table 1 Chinese Air Filter Classifications from Highest to Lowest Efficiency**

CI	Credit 5
RETAIL: CI	Credit 5

Chinese Standard	Air Filter Classification: Chinese	Air Filter Classification: English	LEED Credit Requirement
GB/T 13554-2008	超高效空气过滤器	Ultra-low penetration air filters (ULPA)	Meets requirements of IEQc3.1 & IEQc5
GB/T 13554-2008	高效空气过滤器	High efficiency particulate air filters (HEPA)	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	亚高效过滤器	Sub-HEPA (high efficiency particulate air) filter	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	高中效过滤器	high efficiency filter	Meets requirements of IEQc3.1 & IEQc5
GB/T 14295-2008	中效过滤器	medium efficiency filter	Meets requirements of IEQc3.1
GB/T 14295-2008	粗效过滤器	roughing filter	Not allowed

CEN Standard EN 779: 2002, Particulate air filters for general ventilation, Determination of the filtration performance

### Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries for determining filter class for all filtration media.

### 4. Implementation

In mechanically ventilated buildings, ensure that all installed filtration media are high efficiency (高中效过滤器) or higher as defined by Chinese standard GB/T 14295-2008 (空气过滤器) or have a minimum dust spot efficiency of 80% and at least 98% arrestance on a particle size of 3–10 µg.

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for additional implementation guidance related to this credit.

### 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for guidance related to this credit.

### 6. Calculations

There are no calculations required for this credit.

### 7. Documentation Guidance

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- Retain drawings showing the location and size of all permanent entryway systems and/or walk-off mats.
- Detail deck-to-deck partitions or hard-lid conditions at rooms known to have contaminants.

- Review negative pressure calculations at hazardous chemical areas to assure proper depressurization as the project evolves.
- Maintain product literature for filters, showing compliance with the requirements. 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for an example detailing an isolation area for hazardous gases or chemicals.

IEQ	
CI	Credit 5
RETAIL: CI	Credit 5

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

Websites

**Comité Européen de Normalisation**

<http://www.cen.eu>

## 13. Definitions

**Counting efficiency** is the capability of air filters to capture particles measured by the concentration of test aerosol. It is the ratio between the change in the concentration of aerosol from upstream to downstream air flow and the concentration of aerosol at upstream air flow.

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.



## CONTROLABILITY OF SYSTEMS—LIGHTING AND THERMAL COMFORT

## IEQ CREDIT 6

	CI	RETAIL: CI
Credit	NA	Credit 6
Points	NA	1 point

### Intent

To provide a high level of lighting system and thermal comfort control<sup>1</sup> for retail individual workstations to promote the productivity, comfort, and well-being of tenant occupants.

### Requirements

#### Retail: CI

Provide individual lighting controls for 90% (minimum) of retail employees in office and administrative spaces, enabling adjustments to suit individual task needs and preferences.

#### AND

Provide individual thermal comfort controls for 50% (minimum) of retail employees in office and administrative spaces to enable adjustments to suit individual task needs and preferences. Operable windows may be used in lieu of individual controls for occupants located 20 feet (6meters) inside and 10 feet (3 meters) to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE Standard 62.1–2007, paragraph 5.1, Natural Ventilation (with errata but without addenda<sup>2</sup>).

Conditions for thermal comfort are described in IEQ credit 7.1: Thermal Comfort—Design and include the primary factors of air temperature, radiant temperature, air speed and humidity.

<sup>1</sup> Thermal comfort control is the ability to alter at least 1 of these primary factors in the occupant's local environment: air temperature, radiant temperature, air speed, and humidity.

<sup>2</sup> Project teams wishing to use addenda approved by ASHRAE for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ CREDIT 6.2

### CONTROLABILITY OF SYSTEMS—THERMAL COMFORT

	CI	RETAIL: CI
Credit	Credit 6.2	NA
Points	1 point	NA

#### Intent

To provide a high level of thermal comfort system control<sup>1</sup> for individual occupants or groups in multi-occupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.

#### Requirements

##### Commercial Interiors

Provide individual controls for 50% (minimum) of the tenant occupants to enable adjustment to suit individual needs and preferences. Operable windows may be used in lieu of individual controls for occupants located 20 feet (6 meters) inside and 10 feet (3 meters) to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE Standard 62.1-2007 paragraph 5.1 Natural Ventilation (with errata but without addenda<sup>2</sup>).

Conditions for thermal comfort are described in IEQ credit 7.1: Thermal Comfort—Design and include the primary factors of air temperature, radiant temperature, air speed and humidity.

Provide comfort system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences.

<sup>1</sup> For the purposes of this credit comfort system control is defined as control over at least 1 of these primary factors in the occupant's local environment: air temperature, radiant temperature, air speed and humidity.

<sup>2</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for information on environmental and economic issues related to this credit.

IEQ	
CI	Credit 6.2
RETAIL: CI	Credit 6

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for a list of credits related to this credit.

## 3. Summary of Referenced Standards

**CEN Standard EN15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics**

Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Used in conjunction with ISO Standard 7730: 2005, it is considered equivalent to ASHRAE 55–2004 for the purposes of this credit.

**ISO Standard 7730: 2005, Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria**

International Organization for Standardization

<http://www.iso.org>

This standard “presents methods for predicting the general thermal sensation and degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments” and should be used in conjunction with CEN Standard EN 15251: 2007.

See the LEED 2009 Green Interior Design and Construction Reference Guide for additional standards referenced in this credit.

## 4. Implementation

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for implementation guidance related to this credit.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for guidance related to this credit.

## 6. Calculations

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for calculations relating to this credit.

## 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for documentation guidance related to this credit.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for an example relating to this credit.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

**IEQ**

CI

Credit 6.2

RETAIL: CI

Credit 6

**9. Exemplary Performance**

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

**10. Regional Variations**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for regional variations associated with this credit.

**11. Operations and Maintenance Considerations**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for Operations and Maintenance considerations related to this credit.

**12. Resources**

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for resources related to this credit.

**13. Definitions**

See the LEED 2009 Green Interior Design and Construction Reference Guide and the Retail Supplement for definitions of terms used in this credit.

## THERMAL COMFORT—DESIGN

## IEQ CREDIT 7.1

	CI	RETAIL: CI
Credit	IEQ Credit 7.1	IEQ Credit 7.1
Points	1 point	1 point

### Intent

To provide a comfortable thermal environment that promotes occupant productivity and well-being.

### Requirements

#### Commercial Interiors, Retail: CI

Design heating, ventilating and air-conditioning (HVAC) systems to meet the requirements of one of the options below.

#### OPTION 1. ASHRAE Standard 55-2004 or Non-U.S. Equivalent

Meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda<sup>1</sup>). Demonstrate design compliance in accordance with the Section 6.1.1 documentation. Projects outside the U.S. may use a local equivalent to ASHRAE Standard 55-2004 Thermal Comfort Conditions for Human Occupancy Section 6.1.1.

#### OPTION 2. ISO 7730: 2005 & CEN Standard EN 15251: 2007

Projects outside the U.S. may earn this credit by designing heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of International Organization for Standardization (ISO) 7730: 2005 Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria; and CEN Standard EN 15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics.

<sup>1</sup> Project teams wishing to use ASHRAE approved addenda for the purposes of this credit may do so at their discretion. Addenda must be applied consistently across all LEED credits.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

IEQ	
CI	Credit 7.1
RETAIL: CI	Credit 7.1

## 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

## 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

## 3. Summary of Referenced Standards

### **CEN Standard EN15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics**

Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Used in conjunction with ISO Standard 7730: 2005, it is considered equivalent to ASHRAE 55-2004 for the purposes of this credit.

### **ISO Standard 7730: 2005, Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria**

International Organization for Standardization

<http://www.iso.org>

This standard “presents methods for predicting the general thermal sensation and degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments” and should be used in conjunction with CEN Standard EN 15251: 2007.

## 4. Implementation

Local standards for projects outside the United States will be compared with ASHRAE 55-2004 in terms of scope, metrics, and thresholds. Project teams that wish to ensure acceptance of a proposed equivalent to ASHRAE 55-2004 prior to submission for review may choose to submit a Formal Inquiry for a Credit Interpretation Ruling for a single project, or a LEED Interpretation for multi-project use.

In order to demonstrate equivalency using a local standard, the local standard must address all of the critical requirements of ASHRAE 55-2004, identified below.

### **Factors Affecting Thermal Comfort** (ASHRAE 55-2004, Section 5.1):

There are six primary factors for defining conditions for thermal comfort for occupants. The six factors are metabolic (MET) rate, clothing insulation, air temperature, radiant temperature, air speed, and humidity.

In order to demonstrate equivalency, the local standard shall:

- Define acceptable thermal comfort conditions.
- Include a well-defined procedure to determine thermal comfort conditions.
  - The procedure shall define an acceptable thermal comfort zone.
    - At least 80% of occupants must be satisfied within the zone.
  - The procedure shall include the following parameters in the calculation:
    - Operative Temperature or a combination of air temperature and radiant temperature.

- Humidity
- Air Speed
  1. Require a maximum air speed threshold for supply air systems (40 fpm [0.203 meters per second] is recommended but variances are allowed up to 10%).
- Local Thermal Discomfort
  1. Address temperature variations due to draft, vertical temperature differences, and radiant asymmetry. Thresholds for these may differ from ASHRAE 55-2004 within an acceptable range

IEQ	
CI	Credit 7.1?
RETAIL: CI	Credit 7.1

See the LEED 2009 Green Interior Design and Construction Reference Guide for additional implementation guidance related to this credit.

## 5. Timeline and Team

See the LEED 2009 Green Interior Design and Construction Reference Guide for guidance related to this credit. Project teams wishing to use a local equivalent should contact USGBC early in the design phase to ensure that the alternative standard is acceptable.

## 6. Calculations

There are no calculations required for this credit.

## 7. Documentation Guidance

As a first step in preparing to complete the LEED Online documentation requirements, work through the following measures. Refer to LEED Online for the complete descriptions of all required documentation.

- For projects using a local equivalent in Option 1, the local standard shall address all the issues identified under Implementation.

If the selected equivalent standard contains deviations or omissions for sections specified under Implementation, provide relevant data to justify the omissions or deviations.

## 8. Examples

See the LEED 2009 Green Interior Design and Construction Reference Guide for examples relating to this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

IEQ	
CI	Credit 7.1
RETAIL: CI	Credit 7.1

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

**13. Definitions**

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

## THERMAL COMFORT—VERIFICATION

	CI	RETAIL: CI
Credit	IEQ Credit 7.2	IEQ Credit 7.2
Points	1 point*	1 point*

\*1 point in addition to IEQ credit 7.1

### Intent

To provide for the assessment of occupant thermal comfort over time.

### Requirements

#### Commercial Interiors

Achieve IEQ Credit 7.1: Thermal Comfort – Design

Provide a permanent monitoring system and process for corrective action to ensure that building performance meets the desired comfort criteria as determined by IEQ Credit 7.1: Thermal Comfort—Design.

Agree to conduct a thermal comfort survey of tenant space occupants within 6 to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the tenant space including an assessment of overall satisfaction with thermal performance and identification of thermal comfort problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the tenant space. This plan should include measurement of relevant environmental variables in problem areas in accordance with the standard used for design in IEQ Credit 7.1: Thermal Comfort—Design.

#### Retail: CI

Achieve IEQ Credit 7.1, Thermal Comfort—Design

AND

Provide a permanent monitoring system and process for corrective action to ensure that building performance meets the desired comfort criteria as determined by IEQ Credit 7.1, Thermal Comfort—Design.

Agree to conduct a thermal comfort survey of tenant space employees within 6 to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the tenant space including an assessment of overall satisfaction with thermal performance and identification of thermal comfort problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the tenant space. This plan should include measurement of relevant environmental variables in problem areas in accordance with the standard used for design in IEQ Credit 7.1: Thermal Comfort—Design.

**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

## IEQ CREDIT 7.2

## IEQ

CI	Credit 7.2
RETAIL: CI	Credit 7.2

### 1. Benefits and Issues to Consider

See the LEED 2009 Green Interior Design and Construction Reference Guide for information on environmental and economic issues related to this credit.

### 2. Related Credits

See the LEED 2009 Green Interior Design and Construction Reference Guide for a list of credits related to this credit.

### 3. Summary of Referenced Standards

**CEN Standard EN15251: 2007, Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics**

Comité Européen de Normalisation

<http://www.cen.eu>

This standard outlines the parameters used in many EU countries to design and assess energy performance of buildings. Used in conjunction with ISO Standard 7730: 2005, it is considered equivalent to ASHRAE 55–2004 for the purposes of this credit.

**ISO Standard 7730: 2005, Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria**

International Organization for Standardization

<http://www.iso.org>

This standard “presents methods for predicting the general thermal sensation and degree of discomfort (thermal dissatisfaction) of people exposed to moderate thermal environments” and should be used in conjunction with CEN standard EN 15251: 2007.

### 4. Implementation

See the LEED 2009 Green Interior Design and Construction Reference Guide for implementation guidance related to this credit.

### 5. Timeline and Team

The design and engineering team are primarily responsible for achieving this credit, which is based on the requirements of the standard chosen in IEQ Credit 7.1. Additionally, a member of the building operations team, an owner agent, or a commissioning authority should carry out the follow up survey to meet the requirements of this credit.

See the LEED 2009 Green Interior Design and Construction Reference Guide for additional guidance relating to this credit.

### 6. Calculations

There are no calculations associated with this credit.

### 7. Documentation Guidance

See the LEED 2009 Green Interior Design and Construction Reference Guide for documentation guidance related to this credit.

### 8. Examples

There are no examples for this credit.

## 9. Exemplary Performance

This credit is not eligible for exemplary performance under the Innovation in Design section of the LEED 2009 rating system.

## 10. Regional Variations

See the LEED 2009 Green Interior Design and Construction Reference Guide for regional variations associated with this credit.

## 11. Operations and Maintenance Considerations

See the LEED 2009 Green Interior Design and Construction Reference Guide for Operations and Maintenance considerations related to this credit.

## 12. Resources

See USGBC's LEED Resources & Tools (<http://www.usgbc.org/leed/tools>) for additional resources and technical information.

See the LEED 2009 Green Interior Design and Construction Reference Guide for resources related to this credit.

## 13. Definitions

See the LEED 2009 Green Interior Design and Construction Reference Guide for definitions of terms used in this credit.

IEQ	
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**IMPORTANT!** This reference guide supplement contains only the reference guide sections that pertain to projects using the LEED 2009 Global Alternative Compliance Paths or East Asia ACPs. Use this supplement alongside the LEED Reference Guide for Green Interior Design and Construction and the Retail Supplement for complete credit information. For the omitted sections, refer to the main reference guide.

**Air-change rate** is the air-leakage rate in volume per hour divided by the building space volume, expressed in identical volume units.

**Air-leakage rate** is the volume of air movement across the building envelope over a unit of time.

**Bus rapid transit** is an enhanced bus system that operates on exclusive bus lanes or other transit rights-of-way; it is designed to combine the flexibility of buses with the efficiency of rail.

An **inland waterway** is a navigable body of water, such as a river, canal, or lake, that is deep, wide, and slow enough for a vessel to pass.

**Public transportation** consists of bus, rail, or other transit services for the general public that operate on a regular, continual basis.

**Rideshare** is a transit service that involves sharing a single vehicle with multiple people, excluding large-scale vehicles such as buses and trains. The rideshare transit facility must include a signed stop and a clearly defined waiting area. Additionally, the rideshare must include an enclosed passenger seating area, fixed route service, fixed fare structure, continuous daily operation, and the ability to pick up and drop off multiple riders. Rideshare vehicles must hold 4 or more passengers, except for human-powered conveyances, which must hold 2 or more passengers.

**Test pressure difference** is the measured pressure difference across the building envelope.