



**LEED Rating System  
4<sup>th</sup> public comment draft**

# **INTERIOR DESIGN & CONSTRUCTION**

***Includes:  
Commercial Interiors  
Retail  
Hospitality***

*Credits shown in gray do not have substantive changes and are not open for public comment.*

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## INTEGRATIVE PROCESS

ID&C

### 2 point

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### Intent

To support high-performance, cost-effective project outcomes through an early analysis of the interrelationships among systems.

### Requirements

#### CI, RETAIL, HOSPITALITY

#### Site Selection and Energy-Related Systems (1 point)

Starting in predesign and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems. Use the analyses described below to inform the owner's project requirements (OPR), basis of design (BOD), design documents, and construction documents. Conduct analyses in site selection and energy-related systems (1 point).

#### Site Selection

**Discovery:** Before site selection, analyze project goals to identify and select the building site that will provide the most opportunities and fewest barriers for the tenant improvement project. Assess at least two potential locations or base building options, taking into consideration at least the following:

- *Building site attributes.* Assess the base building's location and site design characteristics.
- *Transportation.* Assess the tenant occupants' transportation needs for commuting to and from the site, including convenient access to alternative transportation that meets occupants' needs.
- *Building features.* Assess the base building's envelope, mechanical and electrical systems that will affect tenant space (e.g., controls, HVAC, plumbing fixtures, renewable energy supply), adaptability to future needs, and resilience in the event of disaster or infrastructure failure.
- *Occupants' well-being.* Assess the base building's ability to provide daylight and views, indoor air quality, and other indoor environmental quality characteristics.

**Implementation:** Document how the above analysis informed selection of a building site for the project's tenant improvement and informed the OPR and BOD and site selection for the interior design project, including the following, as applicable:

- suitability of the base building for meeting project goals relative to the building's site attributes;
- suitability of the base building site location for meeting daily occupants' commuting needs;
- suitability of the base building's mechanical and electrical systems for meeting project goals;
- capability of the tenant space for meeting the project's goals related to indoor environmental quality and occupants' well-being; and
- other systems.

Commit to the establishment and use of ongoing feedback mechanisms that provide information about tenant space performance and occupants' satisfaction. Provide documentation of methods planned to gather feedback on occupants' satisfaction.

### **Energy-Related Systems**

**Discovery:** Perform a preliminary energy analysis before the completion of schematic design that explores how to reduce energy loads for the interior design project and accomplish related sustainability goals by questioning default assumptions and testing options. Assess at least two potential options associated with each of the following in terms of project and human performance:

- *Programmatic and operational parameters.* Multifunctioning spaces, operating schedules, space allotment per person, teleworking, reducing building area, ongoing operations and maintenance issues.
- *Basic envelope attributes.* Insulation values, window-to-wall ratios, glazing characteristics, shading, window operability.
- *Lighting levels.* Interior surface reflectance values and lighting levels in occupied spaces.
- *Thermal comfort ranges.* Assess how thermal comfort range options affect HVAC sizing, project performance, and human performance.
- *Plug and process load needs.* Reducing plug and process loads through programmatic solutions such as equipment and purchasing policies or layout options.

**Implementation:** Document how the above analysis informed interior design decisions in the project's OPR and BOC and the interior design of the project, including the following, as applicable:

- building envelope and façade conditions;
- elimination and/or significant downsizing of building systems (e.g., HVAC, lighting, controls, exterior materials, interior finishes, functional program elements);
- methods planned to gather feedback on energy performance and occupants' satisfaction during operations.; and
- other systems.

Project teams may also choose Option 1 for an additional point..

### **Option 1. Water-Related Systems (1 point)**

**Discovery:** Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads and accomplish related sustainability goals. Assess and estimate the project's potential nonpotable water supply sources and water demand volumes, including the following:

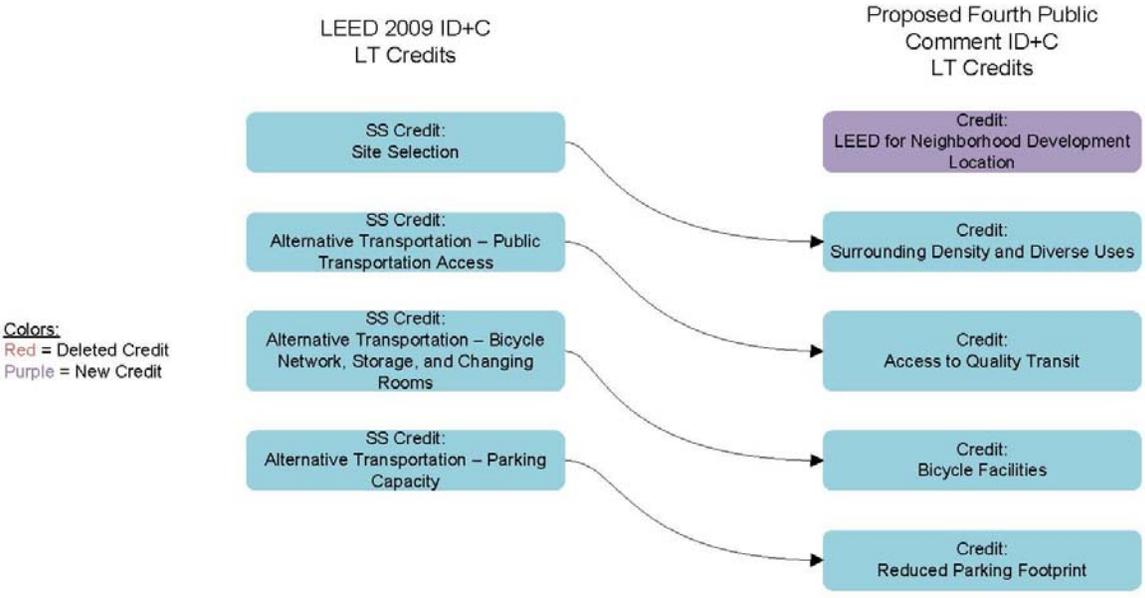
- *Fixture and fitting water demand.* Assess flow and flush fixture demand volumes, calculated in accordance with WE Prerequisite Water-Use Reduction.
- *Process water demand.* Assess kitchen, laundry, cooling tower, and other equipment demand volumes, as applicable.
- *Supply sources.* Assess all potential nonpotable water supply source volumes, such as on-site rainwater and graywater, municipally supplied nonpotable water, and HVAC equipment condensate.

**Implementation:** Document how the above analysis informed interior design decisions in the OPR and BOD. Demonstrate how at least one on-site nonpotable water supply source was used to

reduce the burden on municipal supply and/or wastewater treatment systems by contributing to the water demand components listed above. Demonstrate how the analysis informed the interior design and systems affected by the project, as applicable, for the following:

- plumbing systems;
- sewage conveyance and/or on-site treatment systems;
- process water systems;
- methods planned to gather feedback on the performance and efficiency of water-related systems during operations; and
- other systems.

# LOCATION AND TRANSPORTATION (LT)



# LT CREDIT: LEED FOR NEIGHBORHOOD DEVELOPMENT LOCATION

ID&C

**8-18 points**

This credit applies to

- Commercial Interiors (8-18 points)
- Hospitality (8-18 points)
- Retail (8-18 points)

**CI, RETAIL, HOSPITALITY**

**Intent**

To avoid development on inappropriate sites. To reduce vehicles miles traveled. To enhance livability and improve human health by encouraging daily physical activity.

**Requirements**

Locate the project in within the boundary of a development certified under LEED for Neighborhood Development (Stage 2 or Stage 3 under the Pilot or 2009 rating systems, Certified Plan or Certified Project under the 2012 rating system). :

Projects attempting this credit are not eligible to earn points under other Location and Transportation credits.

Points are awarded according to the following table.

Certification level	Points ID&C
Certified	8
Silver	10
Gold	12
Platinum	18

## LT CREDIT: SURROUNDING DENSITY AND DIVERSE USES

ID&C

### 1–8 points

This credit applies to

- Commercial Interiors (1–8 points)
- Retail (1–8 points)
- Hospitality (1–8 points)

### Intent

To conserve land and protect farmland and wildlife habitat by encouraging development in areas with existing infrastructure. To promote livability, walkability, and transportation efficiency and reduce *vehicle miles traveled*. To improve public health by encouraging daily physical activity.

### Requirements

#### CI, RETAIL, HOSPITALITY

#### Option 1. Surrounding Density (3–6 points ID&C)

Locate on a *previously developed site* whose density in the surrounding area (i.e., within a ¼-mile [400-meter] radius of the project boundary) meets or exceeds the values in Table 1. Projects may calculate surrounding density using either the “separate residential and nonresidential densities” or the “combined density” values.

The counted density must be *existing* density, not zoned density.

**Table 1a. Points for average density within 1/4 mile of project (imperial units)**

Separate residential and nonresidential densities		Combined density	Points ID&C
Residential density (DU/acre)	Nonresidential density (FAR)	Square feet per acre of buildable land	
7	0.5	22,000	3
12	0.8	35,000	6

**Table 1b. Points for average density within 400 meters of project (metric units)**

Separate residential and nonresidential densities		Combined density	Points ID&C
Residential density (DU/hectare)	Nonresidential density (FAR)	Square meters per hectare of buildable land	
17.5	0.5	5,050	3
30	0.8	8,035	6

DU = dwelling unit; FAR = floor-area ratio.

If the surrounding residential and nonresidential densities are of different point values, use a weighted average of the two.

## LT CREDIT: ACCESS TO QUALITY TRANSIT

ID&C

### 1–7 points

This credit applies to

- Commercial Interiors (1–7 points)
- Hospitality (1–7 points)
- Retail (1–7 points)

### Intent

To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with motor vehicle use.

### Requirements

#### CI, HOSPITALITY, RETAIL-NC, RETAIL-CI

Locate any *functional entry* of the project within a ¼-mile (400-meter) *walking distance* of existing or planned bus, *streetcar*, or *rideshare stops*, or within a ½-mile (800-meter) walking distance of existing or planned *bus rapid transit* stops, light or heavy rail stations, commuter rail stations or ferry terminals. The transit service at those stops and stations in aggregate must meet the minimums listed in Tables 1 and 2. Planned stops and stations may count if they are sited, funded, and under construction by the date of the certificate of occupancy and are complete within 24 months of that date.

Both weekday and weekend trip minimums must be met.

Count trips as follows:

- Trips are counted only if they are a part of a route with service in opposite directions.
- Trips in opposite directions are counted separately.
- Trips of a route that stops more than once within the required walking distance may be counted only once.
- If the inbound or outbound stops are beyond the walking distance, calculate the average walking distance.
- Weekend trips must include service on both Saturday and Sunday. To determine weekend trips, average Saturday and Sunday service.

**Table 1. Minimum daily transit service for projects with multiple transit types (bus, *streetcar*, rail, or ferry)**

Weekday trips	Weekend trips	Points ID&C (except Retail ID&C)	Points Retail ID&C
72	40	1	1
144	108	2	2
360	216	3	4

**Table 2. Minimum daily transit service for projects with commuter rail or ferry service only**

Weekday trips	Weekend trips	Points (all projects)

24	6	1
40	8	2
60	12	3

Projects served by two or more transit routes such that no one route provides more than 60% of the prescribed levels may earn one additional point, up to the maximum 3 points.

If *existing* transit service is temporarily rerouted outside the required distances for less than two years, the project may meet the requirements, provided the local transit agency has committed to restoring the routes with service at or above the prior level.

### **All Options**

For all options, provide dedicated walking or bicycling lanes toward the transit lines. The lanes must extend from the school building to at least the end of the school property and may not have any barriers (e.g., fences). School grounds may be enclosed with fences during class hours for security purposes, provided the fences are open before and after class hours for traveling students, faculty, and staff.

## LT CREDIT: BICYCLE FACILITIES

ID&C

**1 point**

This credit applies to

- Commercial Interiors (1 point)
- Hospitality (1 point)
- Retail (1 point)

### Intent

To promote bicycling and transportation efficiency and reduce vehicle miles traveled. To improve public health by encouraging utilitarian and recreational physical activity.

### Requirements

#### CI, HOSPITALITY

#### **Bicycle Network**

Locate the space in a building such that a *functional entry* and/or the bicycle storage is within a 200-yard (180-meter) *walking distance* or *bicycling distance* of a *bicycle network* that connects to at least one of the following:

- at least 10 uses (see Appendix 1); or
- a *bus rapid transit* stop, light or heavy rail station, commuter rail station, or ferry terminal.

All choices must be within a 3-miles (4800-meter) bicycling distance of the project boundary.

Planned bicycle trails or lanes may be counted if they are fully funded by the date of the certificate of occupancy and are scheduled for completion within one year of that date.

#### **Bicycle Storage and Shower Rooms**

Provide *short-term bicycle storage* for at least 2.5% or more of all tenant peak visitors, but no fewer than two storage spaces per building.

Provide *long-term bicycle storage* for at least 5% of full time equivalent (FTE) tenant occupants.

Provide at least one on-site shower with changing facility for the first 100 full-time equivalent (FTE) occupants and one additional shower for every 150 FTE occupants thereafter.

*Short-term bicycle storage* must be within 100 feet (30 meters) of any main entrance. *Long-term bicycle storage* must be within 100 feet (30 meters) of any *functional entry*.

Bicycle storage capacity may not be double-counted: storage that is fully allocated to the occupants of nonproject facilities cannot also serve project occupants.

#### RETAIL-CI

#### **Bicycle Network**

Design or locate the *project* such that a *functional entry* and/or bicycle storage is within a 200-yard (180-meter) *walking distance* or *bicycling distance* of a *bicycle network* that connects to at least one of the following:

- at least 10 diverse uses (see Appendix 1); or
- a bus rapid transit stop, light or heavy rail station, commuter rail station, or ferry terminal.

All choices must be within a 3-mile (4800-meter) bicycling distance of the project boundary.

Planned bicycle trails or lanes may be counted if they are fully funded by the date of the certificate of occupancy and are scheduled for completion within one year of that date.

### **Bicycle Storage and Shower Rooms**

Provide two *short-term bicycle storage* spaces for every 5,000 square feet (465 square meters), but no fewer than two storage spaces per tenant space.

Provide *long-term bicycle storage* for at least 5% of full-time equivalent (FTE) employees, but no fewer than two storage spaces per building in addition to the short-term bicycle storage spaces.

*Short-term bicycle storage* must be within 100 feet (30 meters) of any main entrance. *Long-term bicycle storage* must be within 100 feet (30 meters) of any *functional entry*.

Bicycle storage capacity may not be double-counted: storage that is fully allocated to the occupants of nonproject facilities cannot also serve project occupants.

Provide a bicycle maintenance program or route assistance. Any maintenance program must be intended for employees and may include coupons for yearly bicycle tune-ups for those who ride to work or on-site supplies for basic self-repairs (e.g., tire pump, patch kit). Route assistance must be intended for employees and customers and may include a map identifying bicycle routes to the project site, posted on the property in a location that is easily accessible to employees and customers; the map could also be posted online.

For projects that are part of a master plan development only If bicycle storage has been provided by the development in which the project is located, determine the number of spaces that may be attributed to the project by dividing the floor area of the retail project by the total floor area of the development (buildings only) and multiplying the percentage result by the total number of spaces. If this number does not meet the credit requirement, the project must provide additional bicycle storage.

## LT CREDIT: REDUCED PARKING FOOTPRINT

ID&C

(1–2 points)

This credit applies to

- Commercial Interiors (1–2 points)
- Hospitality (1–2 points)
- Retail (1–2 points)

### Intent

To minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.

### Requirements

#### CI, HOSPITALITY, RETAIL

Do not exceed the minimum local zoning ordinance requirements for parking capacity.

Provide parking capacity that is a percentage reduction from the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 3rd edition, Tables 18-2 through 18-4.

#### Case 1. Baseline Location

Projects that have not earned points under LT Credit Surrounding Density and Diverse Uses or LT Credit Quality Transit 20% (1 point) or 40% (2 points) reduction from the baseline.

#### Case 2. Dense and/or Transit-Served Location

Projects earning 1 or more points under either LT Credit Surrounding Density and Diverse Uses or LT Credit Quality Transit must achieve a 40% (1 points) or 60% (2 points) reduction from the baseline.

#### For All Projects

The credit calculations must include all existing and new parking spaces that are leased or owned by the project, including parking that is outside the project boundary but is used by the project. On-street parking in public rights-of-way is excluded from these calculations.

For projects that use pooled parking, calculate compliance using the project's share of the pooled parking.

Provide preferred parking for carpools or vanpools for 5% of the total parking spaces after reductions are made from the base ratios. Preferred parking is not required if no on-site parking is provided.

Mixed-use projects should determine the percentage reduction by first determining the reductions for each use and then aggregating the spaces provided for each use.

Do not count parking spaces for fleet and inventory vehicles unless these vehicles are regularly used by employees for commuting as well as business purposes.

#### For All Projects

The project site boundary must include all existing and new parking spaces controlled by the building owner.

For projects that use pooled parking, the following conditions apply.

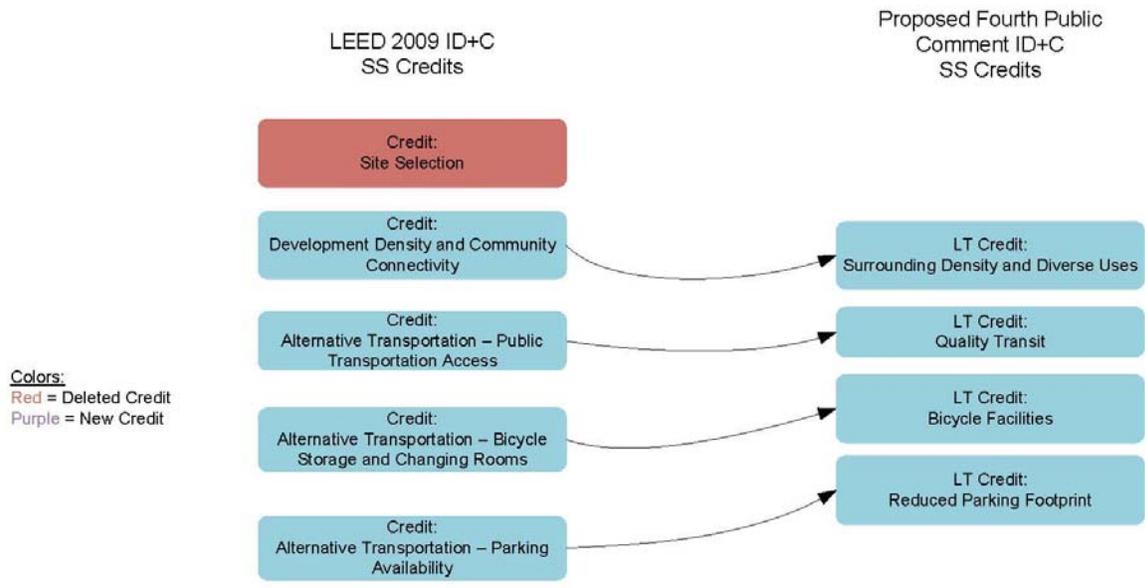
- If the project has designated and reserved spaces, calculate compliance using the project's share of the pooled parking.
- If the project does not have designated and reserved spaces, the entire pool of parking must meet the credit thresholds. For example, if the parking for a mall meets the credit thresholds, then a project using the pooled parking can earn points.

Provide preferred parking for carpools or vanpools for 5% of the total parking spaces after reductions are made from the base ratios.

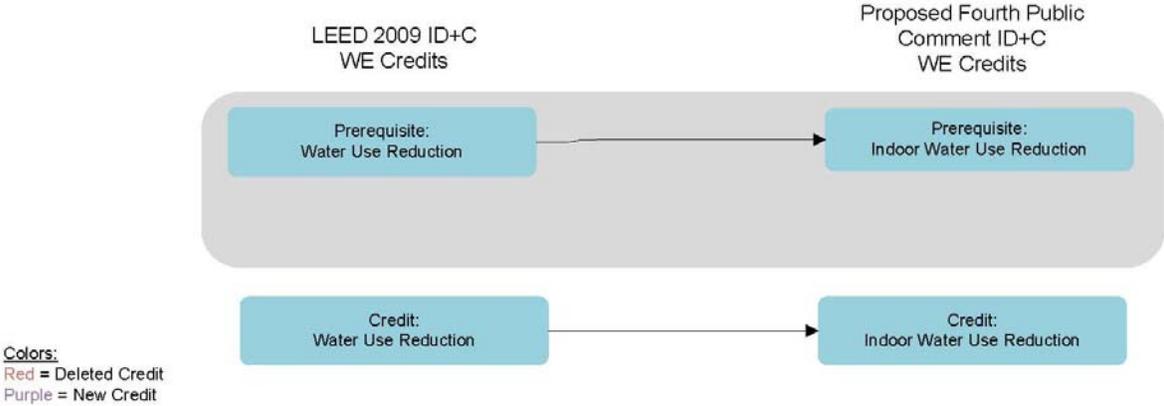
Mixed-use projects should determine the percentage reduction by first determining the reductions for each use and then aggregating the spaces provided for each use.

Do not count parking spaces serving fleet and inventory vehicles unless these vehicles are regularly used by employees for commuting as well as business purposes.

# SUSTAINABLE SITES (SS)



# WATER EFFICIENCY (WE)



## WE PREREQUISITE: INDOOR WATER USE REDUCTION Required

### ID&C

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### Intent

To reduce indoor water consumption.

### Requirements

#### CI, CI-RETAIL, CI-HOSPITALITY

#### Building Water Use

For the fixtures and fittings listed in Table 1, as applicable to the project scope, reduce aggregate water consumption by 20% from the baseline. Base calculations on the volumes and flow rates shown in Table 1.

All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labeling must be WaterSense labeled (or a local equivalent for projects outside the United States).

#### ID&C only

Projects where fixtures or fixture fittings are not within the tenant spaces are exempt from this prerequisite.

**Table 1. Baseline water consumption of fixtures and fittings**

<i>Fixture or fitting</i>	<i>Baseline (imperial units)</i>	<i>Baseline (metric units)</i>
Toilet (water closet)*	1.6 gpf	6 lpf
Urinal*	1.0 gpf	3.8 lpf
Public lavatory (restroom) faucet	0.5 gpm at 60 psi** all others except private applications	1.9 lpm at 415 kPa, all others except private applications
Private lavatory faucets	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Kitchen faucet (excluding faucets used exclusively for filling operations)	2.2 gpm at 60 psi	8.3 lpm at 415 kPa
Showerhead*	2.5 gpm at 80 psi per shower stall	9.5 lpm at 550 kPa per shower stall

\* WaterSense label available for this product type  
 gpf = gallons per flush  
 gpm = gallons per minute  
 psi = pounds per square inch

lpf = liters per flush  
 lpm = liters per minute  
 kPa = kilopascals

### Appliance and Process Water Use

Install appliances, equipment, and processes within the project scope that meet the requirements listed in the tables below .

**Table 2. Standards for appliances**

<i>Appliance</i>	<i>Requirement</i>
Residential clothes washers	ENERGY STAR or performance equivalent
Commercial clothes washers	CEE Tier 3A
Residential dishwashers (standard and compact)	ENERGY STAR or equivalent
Prerinse spray valves	≤ 1.3 gpm (4.9 lpm)
Ice machine	ENERGY STAR or equivalent and use either air-cooled or closed-loop cooling, such as chilled or condenser water system

gpm = gallons per minute

lpm = liters per minute

**Table 3. Standards for processes**

<i>Process</i>	<i>Requirement</i>
Heat rejection and cooling	No once-through cooling with potable water for any equipment or appliances that reject heat
Cooling towers and evaporative condensers	Equip with <ul style="list-style-type: none"> <li>• makeup and blowdown meters</li> <li>• conductivity controllers and overflow alarms</li> <li>• efficient drift eliminators that reduce drift to maximum of 0.002% of recirculated water volume for counterflow towers and 0.005% of recirculated water flow for cross-flow towers</li> </ul>

### Retail and Hospitality Only

In addition, water-consuming appliances, equipment, and processes must meet the requirements listed in Tables 4 and 5.

**Table 4. Standards for appliances**

<i>Kitchen equipment</i>		<i>Requirement (imperial units)</i>	<i>Requirement (metric units)</i>
Dishwasher	Undercounter	≤ 1.6 gal/rack	≤ 6.0 liters/rack
	Stationary, single tank, door	≤ 1.4 gal/rack	≤ 5.3 liters/rack
	Single tank, conveyor	≤ 1.0 gal/rack	≤ 3.8 liters/rack
	Multiple tank, conveyor	≤ 0.9 gal/rack	≤ 3.4liters/rack
	Flight machine	≤ 180 gal/hour	≤ 680 liters/hour
Food steamer	batch	≤ 6 gal/hour/pan	≤ 23 liters/hour/pan
	Cook-to-order	≤ 10 gal/hour/pan	≤ 38 gal/hour/pan
Combination oven,	Countertop or stand	≤ 3.5 gal/hour/pan	≤ 13 gal/hour/pan
	Roll-in	≤ 3.5 gal/hour/pan	≤ 13 gal/hour/pan

**Table 5. Process requirements**

Discharge water temperature tempering	<p>Where local requirements limit discharge temperature of fluids into drainage system, use tempering device that runs water only when equipment discharges hot water</p> <p>OR</p> <p>Provide thermal recovery heat exchanger that cools drained discharge water below code-required maximum discharge temperatures while simultaneously preheating inlet makeup water</p> <p>OR</p> <p>If fluid is steam condensate, return it to boiler</p>
Venturi-type flow-through vacuum generators or aspirators	Use no device that generates vacuum by means of water flow through device into drain

## WE CREDIT: INDOOR WATER USE REDUCTION

ID&C

### 2–12 points

This credit applies to

- Commercial Interiors (2–12 points)
- Retail (2–12 points)
- Hospitality (2–12 points)

### Intent

To reduce indoor water consumption.

### Requirements

#### CI, CI-RETAIL, CI-HOSPITALITY

Further reduce fixture and fitting water use from the calculated baseline in WE Prerequisite Indoor Water Use Reduction. Additional potable water savings can be earned above the prerequisite level using alternative water sources. Include fixtures and fittings necessary to meet the needs of the occupants. Some of these fittings and fixtures may be outside the tenant space (for Commercial Interiors) or project boundary (for New Construction). Points are awarded according to Table 1.

**Table 1. Points for reducing water use**

Percentage reduction	Points (ID&C)	Points (CI Retail)	Points (CI Hospitality)
25%	2	2	2
30%	4	4	4
35%	6	6	6
40%	8	8	8
45%	10	10	10
50%	12	--	11

#### Retail and Healthcare only

Meet the percentage reduction requirements above.

AND

**Appliance and Process Water** install equipment within the project scope that meets the minimum requirements in Table 2, 3, 4, or 5. One point is awarded for meeting all applicable requirements in any one table. All applicable equipment listed in each table must meet the standard.

Schools, Retail, and Healthcare projects can earn a second point for meeting the requirements of two tables.

#### **Table 2. Compliant commercial washing machines**

To use Table 1, the project must process at least 120,000 lbs (57 606 kg) of laundry per year.

<i>Washing machine</i>	<i>Requirement (imperial units)</i>	<i>Requirement (metric units)</i>
On-premise, minimum capacity 2,400 lbs (10 886 kg) per 8-hour shift	Maximum 1.8 gals per pound *	Maximum 7 liters per 0.45 kilograms *

\* Based on equal quantities of heavy, medium, and light soil laundry.

**Table 3. Standards for commercial kitchen equipment**

To use Table 3, the project must serve at least 100 meals per day of operation. All process and appliance equipment listed in the category of kitchen equipment and present on the project must comply with the standards.

<i>Kitchen equipment</i>		<i>Requirement (imperial units)</i>	<i>Requirement (metric units)</i>
Dishwasher	Undercounter	ENERGY STAR	ENERGY STAR performance equivalent
	Stationary, single tank, door	ENERGY STAR	ENERGY STAR performance equivalent
	Single tank, conveyor	ENERGY STAR	ENERGY STAR performance equivalent
	Multiple tank, conveyor	ENERGY STAR	ENERGY STAR performance equivalent
	Flight machine	150 gph and ≤ 1 gal/100 9" dishes	568 lph and ≤ 6 liters/100 23cm dishes
Food steamer	Batch (no drain connection)	≤ 2 gal/hour/pan including condensate cooling water	≤ 7.5 liters/hour/pan including condensate cooling water
	Cook-to-order (with drain connection)	≤ 5 gal/hour/pan including condensate cooling water	≤ 19 liters/hour/pan including condensate cooling water
Combination oven,	Countertop or stand	≤ 1.5 gal/hour/pan including condensate cooling water	≤ 5.7 liters/hour/pan including condensate cooling water
	Roll-in	≤ 1.5 gal/hour/pan including condensate cooling water	≤ 5.7 liters/hour/pan including condensate cooling water
Food waste disposer	Grinder	1 gpm, no-load condition; 3–8 gpm, full load condition; 10-minute automatic shutoff	4 lpm, no-load condition; 11–30 lpm), full load condition; 10-minute automatic shutoff
	Scrap collector	Maximum 2 gpm makeup water	Maximum 8 lpm makeup water

	Pulper	Maximum 2 gpm makeup water	Maximum 8 lpm makeup water
	Strainer basket	No additional water usage	No additional water usage

gpm = gallons per minute

gph = gallons per hour

lpm = liters per minute

lph = liters per hour

To use Table 4, the project must be a medical or laboratory facility.

**Table 4. Compliant laboratory and medical equipment**

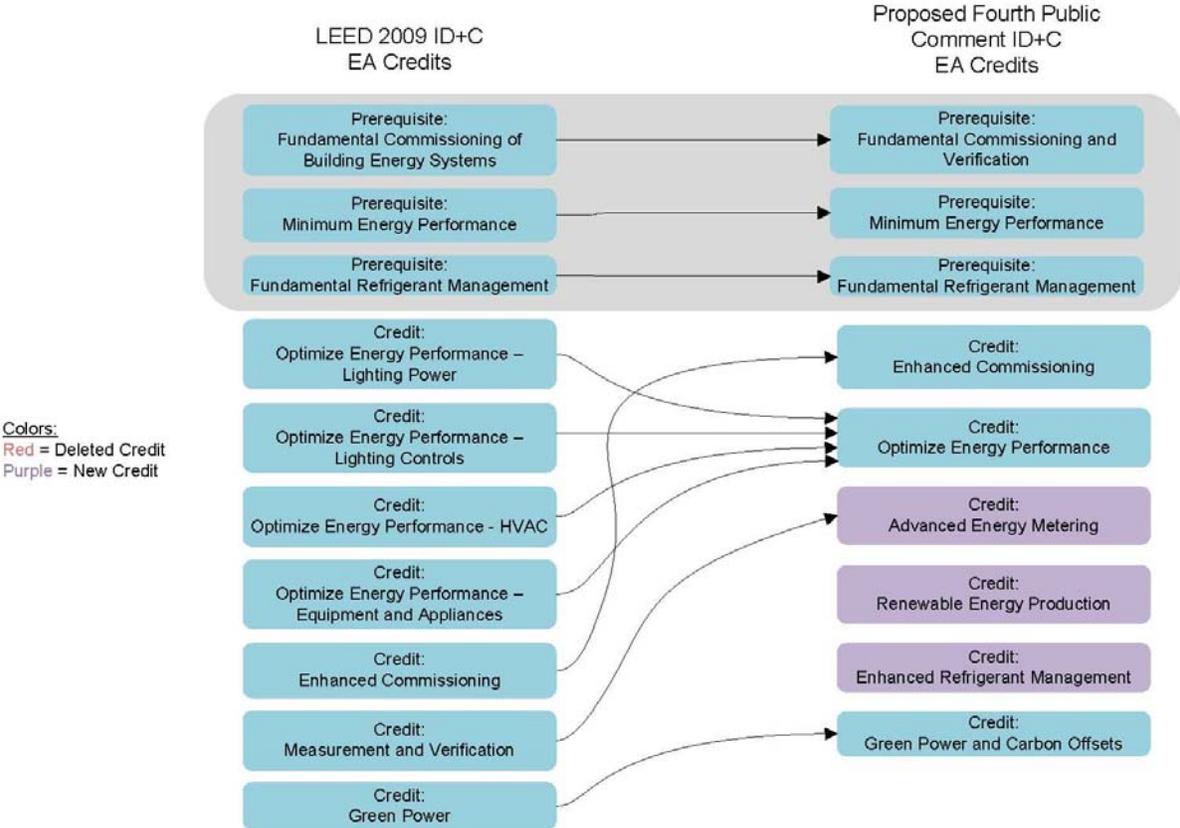
<i>Lab equipment</i>	<i>Requirement (imperial units)</i>	<i>Requirement (metric units)</i>
Reverse-osmosis water purifier	75% recovery	75% recovery
Steam sterilizer	For 60-inch sterilizer, 6.3 gal/U.S. tray For 48-inch sterilizer, 7.5 gal/U.S. tray	For 1520-mm sterilizer, 24 liters/U.S. tray For 1220-mm sterilizer, 28 liters/U.S. tray
Sterile process washer	0.35 gal/U.S. tray	1.3 liters/U.S. tray
X-ray processor, 150 mm or more in any dimension	Film processor water recycling unit	
Digital imager, all sizes	No water use	

**Table 5. Compliant municipal steam systems**

To use Table 5, the project must be connected to a municipal or district steam system that does not allow the return of steam condensate.

<i>Steam system</i>	<i>Standard</i>
Steam condensate disposal	Cool municipally supplied steam condensate (no return) to drainage system with heat recovery system or reclaimed water
OR	
Reclaim and use steam condensate	100% recovery and reuse

# ENERGY AND ATMOSPHERE



## **EA PREREQUISITE: FUNDAMENTAL COMMISSIONING AND VERIFICATION Required**

### **ID&C**

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### **Intent**

To support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

#### **Commissioning Process Scope**

Complete the following commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

Requirements for exterior enclosures are limited to inclusion in the owner's project requirements (OPR) and basis of design (BOD), as well as the review of the OPR, BOD and project design. NIBS Guideline 3-2006 for Exterior Enclosures provides additional guidance.

- Develop the OPR.
- Develop a BOD.

The commissioning authority (CxA) must do the following:

- Review the OPR, BOD, and project design.
- Develop and implement a Cx plan.
- Confirm incorporation of Cx requirements into the construction documents.
- Develop construction checklists.
- Develop a system test procedure.
- Verify system test execution.
- Maintain an issues and benefits log throughout the Cx process.
- Prepare a final Cx process report.
- Document all findings and recommendations and report directly to the owner throughout the process.

The review of the exterior enclosure design may be performed by a qualified member of the design or construction team (or an employee of that firm) who is not directly responsible for design of the building envelope.

#### **Commissioning Authority**

By the end of the design development phase, engage a commissioning authority with the following qualifications.

- The CxA must have documented commissioning process experience on at least two building projects with a similar scope of work. The experience must extend from early design phase through at least 10 months of occupancy;
- The CxA may be a qualified employee of the owner, an independent consultant, or an employee of the design or construction firm who is not part of the project's design or construction team, or a disinterested subcontractor of the design or construction team.
- For projects smaller than 20,000 square feet (1,860 square meters), the CxA may be a qualified member of the design or construction team. In all cases, the CxA must report his or her findings directly to the owner.

Project teams that intend to pursue EA Credit Enhanced Commissioning should note a difference in the CxA qualifications: for the credit, the CxA may not be an employee of the design or construction firm.

### **Current Facilities Requirements and Operations and Maintenance Plan**

Prepare and maintain a current facilities requirements and operations and maintenance plan that contains the information necessary to operate the building efficiently. The plan must include the following:

- a sequence of operations for the building;
- the building occupancy schedule;
- equipment run-time schedules;
- setpoints for all HVAC equipment;
- set lighting levels throughout the building;
- minimum outside air requirements;
- any changes in schedules or setpoints for different seasons, days of the week, and times of day;
- a systems narrative describing the mechanical and electrical systems and equipment;
- a preventive maintenance plan for building equipment described in the systems narrative; and
- a commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities.

### Data Centers only

For small projects with computer room peak cooling loads less than 2,000,000 Btu/h (600 kW) or a total computer room peak cooling load less than 600,000 Btu/h (175 kW), the CxA may be a qualified employee of the design or construction team .

## **EA PREREQUISITE: MINIMUM ENERGY PERFORMANCE Required**

### **ID&C**

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### **Intent**

To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

##### **Option 1. Tenant-Level Energy Simulation**

Demonstrate a 3% improvement in the proposed performance rating compared with the baseline performance rating for portions of the building within the tenant's scope of work. Calculate the baseline according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata (or a USGBC-approved equivalent standard for projects outside the United States), using a simulation model for all tenant project energy use.

Projects must meet the minimum percentage savings before application of renewable energy systems.

The proposed design must meet the following criteria:

- compliance with the mandatory provisions of ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata, or a USGBC–approved equivalent standard for projects outside the United States);
- inclusion of all energy consumption and costs within and associated with the tenant project; and
- comparison against a baseline tenant project that complies with Standard 90.1–2010, Appendix G, with errata but without addenda (or a USGBC-approved equivalent standard outside the United States).

Exception: the baseline project envelope must be modeled according to Table G3.1(5) (baseline), Sections a–e, and not Section f.

Document the energy modeling input assumptions for unregulated loads. Unregulated loads should be modeled accurately to reflect the actual expected energy consumption of the tenant project.

If unregulated loads are not identical for both the baseline and the proposed performance ratings, follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1–2010, G2.5) or use the COMNET modeling guidelines and procedures to document measures that reduce unregulated loads.

Projects that are connected to district energy systems (DES) must follow LEED's DES requirements and modeling guidelines.

#### **Retail only**

For Option 1, Whole-Building Energy Simulation, process loads for retail may include refrigeration equipment, cooking and food preparation, clothes washing, and other major support appliances.. Many of the industry standard baseline conditions for commercial kitchen equipment and refrigeration are defined

in Appendix 3, Tables 1–4. No additional documentation is necessary to substantiate these predefined baseline systems as industry standard.

OR

### **Option 2. Prescriptive Compliance: ASHRAE 50% Advanced Energy Design Guide**

Comply with the mandatory and prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata (or a USGBC-approved equivalent standard for projects outside the United States).

Comply with the HVAC and service water heating requirements, including equipment efficiency, economizers, ventilation, and ducts and dampers, in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone, as applicable to the project's scope:

- ASHRAE 50% Advanced Energy Design Guide for Small to Medium Office Buildings, for office buildings smaller than 100,000 square feet (10 000 square meters);
- ASHRAE 50% Advanced Energy Design Guide for Medium to Large Box Retail Buildings, for retail buildings with 20,000 to 100,000 square feet (2 000 to 10 000 square meters);
- ASHRAE 50% Advanced Energy Design Guide for K–12 School Buildings; or
- ASHRAE 50% Advanced Energy Design Guide for Large Hospitals.
  - Over 100,000 square feet (10 000 square meters)

For projects outside the United States, consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

### **Option 3. Prescriptive Compliance: Advanced Buildings™ Core Performance™ Guide**

Comply with the mandatory and prescriptive provisions of ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata (or USGBC approved equivalent standard for projects outside the United States).

Comply with Section 1: Design Process Strategies, Section 2: Core Performance Requirements, and the following six strategies from Section 3: Enhanced Performance Strategies, as applicable. Where standards conflict, the more stringent of the two shall take precedence. For projects outside the United States, consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

- 3.2 Daylighting and Controls
- 3.3 Additional Lighting Power Reductions
- 3.4 Plug Loads/Appliance Efficiency
- 3.5 Supply Air Temperature Reset (VAV)
- 3.9 Premium Economizer Performance
- 3.10 Variable Speed Control

To be eligible for Option 3, the project must be less than 100,000 square feet (10 000 square meters).

## **EA PREREQUISITE: FUNDAMENTAL REFRIGERANT MANAGEMENT Required**

### **ID&C**

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### **Intent**

To reduce stratospheric ozone depletion.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC phase-out conversion before project completion. Phase-out plans extending beyond the project completion date will be considered on their merits.

Existing small HVAC&R units (defined as containing less than 0.5 pound [225 grams] of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound (225 grams) of refrigerant, are exempt.

## **EA CREDIT: ENHANCED COMMISSIONING**

ID&C

### **5 points**

This credit applies to

- Commercial Interiors (5 points)
- Retail (5 points)
- Hospitality (5 points)

### **Intent**

To further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

#### **Option 1. Enhanced Commissioning (4 points)**

Projects must complete the following commissioning process (CxP) activities for mechanical, electrical, domestic hot water, and renewable energy systems and assemblies in accordance with ASHRAE Guideline 0–2005 and ASHRAE Guideline 1.1–2007 for HVAC&R systems, as they relate to energy, water, indoor environmental quality, and durability.

- Review contractor submittals.
- Include systems manual requirements in construction documents.
- Include operator and occupant training requirements in construction documents.
- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after substantial completion.
- Develop an on-going commissioning plan.

OR

#### **Option 2. Monitoring-Based Commissioning (5 points)**

Achieve Option 1.

Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems.

Include the procedures and measurement points in the commissioning plan. Address the following:

- roles and responsibilities;
- measurement requirements (meters, points, metering systems, data access);
- the points to be tracked, with frequency and duration for trend monitoring;
- the limits of acceptable values for tracked points and metered values (where appropriate, predictive algorithms may be used to compare ideal values with actual values);
- the elements used to evaluate performance, including conflict between systems, out-of-sequence operation of systems components, and energy and water usage profiles;
- an action plan for identifying and correcting operational errors and deficiencies;

- training to prevent errors;
- planning for repairs needed to maintain performance;
- the frequency of analyses in the first year of occupancy (at least quarterly);

Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design.

## EA CREDIT: OPTIMIZE ENERGY PERFORMANCE

ID&C

### 1–25 points

This credit applies to

- Commercial Interiors (1–25 points)
- Retail (1–25 points)
- Hospitality(1–25 points)

### Intent

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

### Requirements

#### CI, RETAIL, HOSPITALITY

Establish an energy performance target no later than the schematic design phase. The target must be established as KBtu per square foot-year (kW per square meter-year) of source energy use.

Select one of the options below.

#### **Option 1. Tenant-Level Energy Simulation (1–25 points)**

Analyze efficiency measures during the design process and account for the results in design decision-making. Analysis can include energy simulation of efficiency opportunities, energy simulation analyses for similar projects, or published data from energy analyses performed for similar projects (such as AEDGs).

Analyze efficiency measures focused on load reduction and HVAC-related strategies; passive measures are acceptable. Project the potential energy savings and cost implications for all affected systems.

Follow the criteria in EA Prerequisite Minimum Energy Performance to demonstrate a percentage improvement in the proposed tenant project performance rating compared with the baseline.

Table 1. Points for percentage improvement in energy performance

<i>Interior construction</i>	<i>Points</i>
4%	4
5%	6
6%	8
7%	10
8%	11
9%	12
10%	13
11%	14
12%	15
13%	16

14%	17
15%	18
16%	19
17%	20
18%	21
20%	22
22%	23
24%	24
28%	25

#### Retail only

For all process loads, define a clear baseline to compare with proposed improvements. No additional documentation is necessary to substantiate the predefined baseline systems covered in Appendix 3, Tables 1–4 as industry standard. Calculate the baseline and design as follows:

- *Appliances and equipment.* For appliances and equipment not covered in Appendix 3, Tables 1–4 indicate hourly energy use for proposed and budget equipment, along with estimated daily use hours. Use the total estimated appliance/equipment energy use in the energy simulation model as a plug load. Reduced use time (schedule change) is not a category of energy improvement in this credit. ENERGY STAR ratings and evaluations are a valid basis for performing this calculation.
- *Display lighting.* For display lighting, use the space by space method of determining allowed lighting power under ANSI/ASHRAE/IESNA Standard 90.1–2010, with errata (or a USGBC-approved equivalent standard for projects outside the United States), to determine the appropriate baseline for both the general building space and the display lighting.
- *Refrigeration.* For hard-wired refrigeration loads, model the effect of energy performance improvements with a simulation program designed to account for refrigeration equipment.

#### Option 2. Prescriptive Compliance (1–16 points)

Use any combination of the strategies in any or all of the categories below.

For base building systems that serve the project, as well as any applicable improvements that are part of the project, implement and document compliance with the applicable recommendations and standards (except for measurement and verification) in Chapter 4, Design Strategies and Recommendations by Climate Zone, for the appropriate ASHRAE 50% Advanced Energy Design Guide and climate zone. For projects outside the United States, consult ASHRAE/ASHRAE/IESNA Standard 90.1–2010, Appendixes B and D, to determine the appropriate climate zone.

#### Building Envelope (2–4 points)

- Building Envelope, Opaque (2 points)  
Comply with the recommendations in ASHRAE 50% Advanced Energy Design Guide for all roofs, walls, floors, slabs, doors, vestibules, and continuous air barriers.
- Building Envelope, Glazing (2 points)

Comply with the recommendations in ASHRAE 50% Advanced Energy Design Guide for all vertical fenestration.

**HVAC Systems (2 points)**

- HVAC Equipment Efficiency (2 points)  
For all base building HVAC systems that serve the project, comply with the recommendations in ASHRAE 50% Advanced Energy Design Guide.
- HVAC Zoning and Controls (2 points)  
For the tenant fit-out of spaces, provide a separate control zone for each solar exposure and interior space. Provide controls capable of sensing space conditions and modulating the HVAC system in response to space demand for all private offices and other enclosed spaces (e.g., conference rooms, classrooms).

**Interior Lighting Power (1–4 points)**

- Lighting Power Density (1–4 points)  
Reduce connected lighting power density below that allowed by ASHRAE/IESNA Standard 90.1–2010, either using the space-by-space method or applying the whole-building lighting power allowance to the entire tenant space. Points are awarded according to Table 2.

Table 2. Points for percentage reduction in lighting power density

Percentage below standard LPD	Points
10%	1
15%	2
20%	3
25%	4

**Interior Lighting Controls (1–2 points)**

- Daylighting Controls (1 point)  
Install daylight-responsive controls in all regularly occupied daylit spaces within 15 feet (4.5 meters) of windows and under skylights for at least 25% of the connected lighting load. Daylight controls must switch or dim electric lights in response to daylight illumination in the space.
- Occupancy Sensor Lighting Controls (1 point)  
Install occupancy sensors for at least 75% of the connected lighting load.

**Equipment and Appliances (1–2 points)**

- ENERGY STAR Equipment and Appliances (1–2 points)  
Install ENERGY STAR appliances, office equipment, electronics, and commercial food service equipment (HVAC, lighting, and building envelope products are excluded from this credit). Calculate their percentage of the total ENERGY STAR–eligible products in the project. Points are awarded according to Table 3.

Table 3. Points for installing ENERGY STAR equipment and appliances

<i>Percentage of ENERGY STAR products</i>	<i>Points</i>
70%	1
90%	2

Retail only

Comply with the prescriptive measures in Appendix 3, Tables 1–4, for 90% of total energy consumption for all process equipment in addition to recommendations outlined in Option 2.

## EA CREDIT: ADVANCED ENERGY METERING

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1-2 points)
- Retail (1-2 points)
- Hospitality (1-2 points)

### Intent

To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.

### Requirements

#### CI, RETAIL, HOSPITALITY

#### **Option 1. Metering** (1 point)

Install new or use existing tenant-level energy meters to provide tenant-level data representing total tenant energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc.). Utility-owned meters are acceptable.

Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification from the Green Building Certification Institute (GBCI) or typical occupancy, whichever comes first. At a minimum, energy consumption must be tracked at one-month intervals or at utility billing intervals.

This commitment must carry forward for five years or until the building changes ownership or lessee.

#### **Option 2. Advanced Metering** (2 points)

Install *advanced energy metering* for the following:

- all whole-building energy sources used in the tenant space; and
- any individual energy end uses that represent 10% or more of the total annual consumption of the tenant space.

The advanced energy metering must have the following characteristics.

- Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location.
- Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if appropriate.
- The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure.
- The system must be capable of storing all meter data for at least 18 months.
- The data must be remotely accessible.
- All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use.

## EA CREDIT: RENEWABLE ENERGY PRODUCTION

ID&C

### 1–3 points

This credit applies to

- Commercial Interiors (1–3 points)
- Retail (1–3 points)
- Hospitality (1–3 points)

### Intent

To reduce the environmental and economic harms associated with fossil fuel energy by increasing self-supply of renewable energy.

### Requirements

#### CI, RETAIL, HOSPITALITY

Use tenant renewable energy systems to offset the project's energy cost. Calculate the project's percentage of renewable energy by the following equation:

$$\% \text{ renewable energy} = \frac{\text{Equivalent cost of usable energy produced by renewable energy system}}{\text{Total building annual energy cost}}$$

Use the project's annual energy cost, calculated in EA Prerequisite Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use and cost.

The use of solar gardens or community renewable energy systems is allowed if both of the following requirements are met.

- The project owns the system or has signed a lease agreement for a period of at least 10 years.
- The system is located with the same utility service area as the facility claiming the use.

Credit is based on the percentage of ownership or percentage use assigned in the lease agreement. Points are awarded according to Table 2.

Table 2. Points for renewable energy

<i>Percentage renewable energy</i>	<i>Points (CI, Retail CI, Hospitality)</i>
1%	1
3%	2
5%	3

Projects that are connected to district energy systems (DES) must follow LEED's DES requirements.

## EA CREDIT: ENHANCED REFRIGERANT MANAGEMENT

ID&C

**1 point**

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

**Intent**

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

**Requirements**

CI, HOSPITALITY, HEALTHCARE

### Option 1. No Refrigerants or Low-Impact Refrigerants (1 point)

Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50.

OR

### Option 2. Calculation of Refrigerant Impact (1 point)

Select heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment refrigerants that minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The combination of all new and existing base building and tenant HVAC&R equipment that serve the project must comply with the following formula:

Imperial units	Metric units
$\frac{LCGW}{P} + \frac{LCOD}{P} \times \frac{10}{5} \leq 100$	$\frac{LCGW}{P} + \frac{LCOD}{P} \times \frac{10}{5} \leq 13$
<b>Calculation definitions for <math>LCGW + LCOD \times 10^5 \leq 100</math> (Imperial units)</b>	<b>Calculation definitions for <math>LCGW + LCOD \times 10^5 \leq 13</math> (Metric units)</b>
$LCODP = [ODPr \times (Lr \times Life + Mr) \times Rc] / Life$	$LCODP = [ODPr \times (Lr \times Life + Mr) \times Rc] / Life$
$LCGW = [GWPr \times (Lr \times Life + Mr) \times Rc] / Life$	$LCGW = [GWPr \times (Lr \times Life + Mr) \times Rc] / Life$
LCODP: Lifecycle Ozone Depletion Potential (lb CFC 11/Ton-Year)	LCODP: Lifecycle Ozone Depletion Potential (kg CFC 11/(kW/year))
LCGWP: Lifecycle Direct Global Warming Potential (lb CO <sub>2</sub> /Ton-Year)	LCGWP: Lifecycle Direct Global Warming Potential (kg CO <sub>2</sub> /kW-year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO <sub>2</sub> /lbr)	GWPr: Global Warming Potential of Refrigerant (0 to 12,000 kg CO <sub>2</sub> /kg r)
ODPr: Ozone Depletion Potential of Refrigerant	ODPr: Ozone Depletion Potential of Refrigerant

(0 to 0.2 lb CFC 11/lbr)	(0 to 0.2 kg CFC 11/kg r)
Lr: Refrigerant Leakage Rate (2.0%)	Lr: Refrigerant Leakage Rate (2.0%)
Mr: End-of-life Refrigerant Loss (10%)	Mr: End-of-life Refrigerant Loss (10%)
Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of gross AHRI rated cooling capacity)	Rc: Refrigerant Charge (0.065 to 0.65 kg of refrigerant per kW of AHRI rated or Eurovent Certified cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)	Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)

For multiple types of equipment, calculate a weighted average of all base building HVAC&R equipment, using the following formula:

Imperial units	Metric units
$\frac{\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}}{Q_{total}} \leq 100$	$\frac{\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}}{Q_{total}} \leq 13$

Calculation definitions for [ $\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}$ ] / $Q_{total}$ $\leq 100$ (Imperial units)	Calculation definitions for [ $\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}$ ] / $Q_{total}$ $\leq 13$ (Metric units)
Qunit = Gross AHRI rated cooling capacity of an individual HVAC or refrigeration unit (Tons)	Qunit = Eurovent Certified cooling capacity of an individual HVAC or refrigeration unit (kW)
Qtotal = Total gross AHRI rated cooling capacity of all HVAC or refrigeration	Qtotal = Total Eurovent Certified cooling capacity of all HVAC or refrigeration (kW)

### RETAIL CI

Meet Option 1 or 2 for all HVAC systems.

Stores with commercial refrigeration systems must comply with the following.

- Use only non-ozone-depleting refrigerants.
- Select equipment with an average HFC refrigerant charge of no more than 1.75 pounds of refrigerant per 1,000 Btu/h (580 grams of refrigerant per 300 W) total evaporator cooling load.
- Demonstrate a predicted store-wide annual refrigerant emissions rate of no more than 15%. Conduct leak testing using the procedures in GreenChill's best practices guideline for leak tightness at installation.

Alternatively, stores with commercial refrigeration systems may provide proof of attainment of EPA GreenChill's silver-level store certification for newly constructed stores.

Projects that are connected to district energy systems (DES) must follow LEED's DES requirements.

## EA CREDIT: GREEN POWER AND CARBON OFFSETS

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–2 points)
- Hospitality (1–2 points)

### Intent

To encourage the reduction of greenhouse gas emissions through the use of grid-source, renewable energy technologies and carbon mitigation projects.

### Requirements

#### CI, RETAIL, HOSPITALITY, HEALTHCARE

Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specify the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs).

Green power and RECs must be Green-e Energy certified or the equivalent. RECs can only be used to mitigate the effects of Scope 2, electricity use.

Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide–equivalent basis and must be Green-e Climate certified, or the equivalent.

For U.S. projects, the offsets must be from greenhouse gas emissions reduction projects within the United States.

Determine the percentage of green power or offsets based on the quantity of energy consumed, not the cost. Points are awarded according to Table 1.

**Table 1. Points for energy from green power or carbon offsets**

<i>Percentage of total energy addressed by green power, RECs and/or offsets</i>	<i>Points</i>
50%	1
100%	2

Projects that are connected to district energy systems (DES) must follow LEED's DES requirements.

Use the project's annual energy cost, calculated in EA Prerequisite Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use and cost.

# MATERIALS AND RESOURCES (MR)

## MR PREREQUISITE: STORAGE AND COLLECTION OF RECYCLABLES Required

### ID&C

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### Intent

To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.

### Requirements

#### CI, HOSPITALITY CI

Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.

#### RETAIL CI

Conduct a waste stream study to identify the retail project's top five recyclable waste streams, by either weight or volume, using consistent metrics. Based on the waste stream study, list the top four waste streams for which collection and storage space will be provided. If no information is available on waste streams for the project, use data from similar operations to make projections. Retailers with existing stores of similar size and function can use historical information from their other locations.

Provide dedicated areas accessible to waste haulers and building occupants for the separation, collection, and storage of recyclable materials for at least the top four recyclable waste streams identified by the waste study. Locate the collection and storage bins close the source of recyclable waste. If any of the top four waste streams are batteries, mercury-containing lamps, or electronic waste, take appropriate measures for safe collection, storage, and disposal.

## **MR PREREQUISITE: CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLANNING**

### **Required**

#### **ID&C**

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

#### **Intent**

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

#### **Requirements**

##### **CI, RETAIL CI, HOSPITALITY CI**

Develop and implement a construction and demolition waste management plan:

- Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent.
- Specify whether materials will be separated or comingled and describe the diversion strategies planned for the project. Describe where the material will be taken and how the recycling facility will process the material.

Provide a final report detailing all major waste streams generated, including disposal and diversion rates.

Alternative daily cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.

## **MR CREDIT: TENANT SPACE—LONG-TERM COMMITMENT**

ID&C

**1 point**

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### **Intent**

To encourage choices that will conserve resources and reduce environmental harm from materials manufacturing and transport for tenants' relocation.

### **Requirements**

#### **CI, RETAIL CI, HOSPITALITY CI**

The occupant or tenant must commit to remain in the same location for at least 10 years.

## MR CREDIT: INTERIORS LIFE-CYCLE IMPACT REDUCTION

ID&C

### 1-4 points

This credit applies to

- Commercial Interiors (1-4 points)
- Retail (1-5 points)
- Hospitality (1-4 points)

### Intent

To encourage adaptive reuse and optimize the environmental performance of products and materials.

### Requirements

#### CI, RETAIL CI, HOSPITALITY CI

#### **Option 1. Interior Reuse (2 points)**

Reuse or salvage interior nonstructural elements for at least 50% of the surface area. Hazardous materials that are remediated as a part of the project must be excluded from the calculation.

AND/OR

#### **Option 2. Furniture Reuse (1 point)**

Reuse, salvage, or refurbish furniture and furnishings for at least 30% of the total furniture and furnishings cost.

AND/OR

#### **Option 3. Design for Flexibility (1 point ID&C, 2 points Retail CI)**

Conduct an integrative planning process to increase the useful life of the project space. Increase project space flexibility, ease of adaptive use, and recycling of building materials while considering differential durability and premature obsolescence over building design life and individual component service lives. Use at least three of the following strategies.

- Install accessible systems (floor or ceiling) for at least 50% of the project floor area to allow for flexible use of space and access to systems (under floor distribution systems) not entangled with other building systems.
- Design at least 50% of interior nonstructural walls, ceilings, and floors to be movable or demountable.
- Ensure that at least 50%, by cost, of nonstructural materials have integral labels (radio frequency identification, engraving, embossing, or other permanent marking) containing information on material origin, properties, date of manufacture, in compliance with Canadian Standards Association CSA Z782-06 Guideline for Design for Disassembly and Adaptability in Buildings.
- Include in at least one major component or systems purchase contract a clause specifying sub-contractor, vendor, or on site take back system.
- Ensure that at least 50% of nonstructural materials, by cost, are reusable or recyclable, as defined by the Federal Trade Commission Guide for Use of Environmental Marketing Claims, 260.7(d).

- Implement flexible power distribution (i.e., plug-and-play) systems for at least 50% of the project floor area so that lighting, data, voice, and other systems can be easily reconfigured and repurposed.

Implement a flexible lighting control system with plug and play components such as wall controls, sensors, and dimming ballasts for a minimum of 50% of the lighting load. The system shall allow for reconfiguring and repurposing of luminaires and controls without rewiring such as having the capability to group and assign luminaires into zones and change those zones as needed. Also, the system shall be flexible so that as a space changes functions, the lighting levels can change to suit the needs of the space without rewiring or removing or adding luminaires.

## MR CREDIT: MATERIAL DISCLOSURE AND OPTIMIZATION

ID&C

### 1 points

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### Intent

To encourage disclosure about environmental attributes and increase the use of products and materials with environmentally, economically, and socially preferable life-cycle impacts.

### Requirements

#### CI, CI RETAIL, CI HOSPITALITY

Select one of the options below. Include in the credit calculations all furniture and furnishings within the project's scope of work.

#### **Option 1. Life-Cycle Impact Disclosure (1 point)**

Use at least 20%, by cost, permanently installed nonstructural products and elements that meet at least one of the criteria below. Piping, pipe insulation, ducts, duct insulation, conduit, plumbing fixtures, faucets, showerheads, and lamp housings may be included if they are included consistently in the credit. Exclude wood products purchased for temporary use on the project. The scope of any environmental product declaration (EPD) must be at least cradle to gate.

- *Industry-wide (generic) EPD.* Materials with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized by the program operator, are valued at cost. All environmental product declarations must be consistent with International Standards Organization (ISO) 14025, 14040, 14044, and 21930.
- *Product-specific declaration.* Materials with a publicly available, critically reviewed life-cycle assessment compliant with ISO 14044 are valued at half their cost. Materials with third-party certification (Type III), including external verification, are valued at twice their cost.

OR

#### **Option 2. Nonstructural Prescriptive Attributes (1 point)**

Use at least 50%, by cost, permanently installed nonstructural products that meet at least one of the attributes below. If only part of a product or material meets the requirements, count only that fraction, based on weight. Piping, pipe insulation, ducts, duct insulation, conduit, plumbing fixtures, faucets, showerheads, and lamp housing may be included if they are included consistently in cost-based Materials and Resources credits. Exclude wood products purchased for temporary use on the project .

- *Recycled content.* Use nonstructural products with recycled content purchased from a manufacturer (producer) that has a closed-loop product recycling program. Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer (post industrial) recycled content, based on cost.
- *Local sourcing .* Use nonstructural building products that are manufactured and purchased within 100 miles (180 kilometers) of the project site.

## MR CREDIT: RESPONSIBLE EXTRACTION OF RAW MATERIALS

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–2 points)
- Hospitality (1–2 points)

### Intent

To protect ecosystems, respect cultural and community values, and improve land use through responsible extraction of raw materials used for building products and materials.

### Requirements

#### **CI, RETAIL CI, HOSPITALITY CI**

Use permanently installed new building products and materials that meet applicable responsible extraction criteria. Calculate compliance using one of the options below. Exclude products and materials containing recycled content, salvaged, reused, or refurbished materials. For composite materials and assemblies, if only part of the product or material meets the requirements, count only that fraction, based on weight.

#### Responsible extraction criteria

*Mined or quarried materials.* For raw materials that are mined or quarried using practices covered in the Framework for Responsible Mining or USGBC-approved equivalent, obtain signed letters from the owners of the manufacturing companies and their raw materials suppliers, stating that they have reviewed and understood the Framework for Responsible Mining and publicly declared their commitment to responsible mining. Each raw material supplier must provide an independently audited checklist listing all of the Framework for Responsible Mining's Leading Edge Issues, and identifying which Leading Edge measures they are currently taking.

*Bio-based materials.* Bio-based raw materials must meet ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material. New wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent. Other bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard.

*Other extracted materials.* For raw materials that are not mined, quarried, or bio-based, extraction and manufacture must meet all applicable laws for the exporting and receiving countries, including human rights laws. Product manufacturers must make publicly available a 3<sup>rd</sup> party verified corporate sustainability report that includes the following:

- a commitment to long-term ecologically responsible land use;
- a commitment to reducing environmental harms from extraction and/or manufacturing processes;
- evidence of their economic and social support of adjacent communities;
- a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria;
- their labor practices; and
- their governance structure.

### Option 1. Total Materials Cost Method (1-2 points)

Calculate compliant building products and materials by percentage of total materials cost for 10% (1 point) or 20% (2 points). Determine value of each compliant material according to Table 1.

OR

**Option 2. Percentage of Individual Materials (1-2 points)**

Calculate compliant building products and materials for 50% of one material type (1 point) or two material types (2 points). Determine value of each compliant material according to Table 1.

Table 1. Material value by source

<b>Material source</b>	<b>Must meet sustainable extraction criteria</b>	<b>Value assigned to material</b>
Extracted and manufactured within 100 miles (160 kilometers); project is within United States or Canada	No	100% of material cost
Extracted and manufactured domestically	Yes	150% of material cost
Extracted and manufactured within 100 miles (160 kilometers)	Yes	200% of material cost
Imported materials	Yes	100%

CI, Retail CI, Hospitality CI only

Meet the requirements of the credit above and include furniture and furnishings within the project's scope of work.

## MR CREDIT: MATERIAL INGREDIENT REPORTING

ID&C

### 1 point

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### Intent

To increase the use of products and materials with disclosed chemical ingredient data.

### Requirements

#### CI, RETAIL CI, HOSPITALITY CI

Use any combination of products and materials, the sum of which constitutes at least 20%, by cost, of all interior materials that meet the requirements of one of the following options.

#### **Manufacturer's Declared Disclosure**

Use building products and materials with manufacturer-provided disclosure of chemical compounds that at a minimum identifies any content meeting the criteria of the Clean Production Action's Green Screen v1.2 Benchmark 1, Avoid Chemicals of High Concern. The disclosure statement must include homogeneous materials that make up at least 99% of the material by weight. Value compliant items at half their cost.

#### **Third Party-Certified Disclosure**

Use building products and materials that both meet the disclosure requirements in Option 1 and receive third party-certification of the disclosure. Value compliant items at cost.

#### For product formulators

Disclose the presence of chemicals that are intentionally added, plus known residuals, in concentrations of 0.01% or greater, by mass (100 parts per million) within each of the homogeneous materials. Disclosure can be either (1) listing by Chemical Abstract Service (CAS) number or (2) hazard communication based on the Green Screen v1.2 Benchmark 1, Avoid Chemicals of High Concern as of May 1, 2012.

#### CI, Retail CI, Hospitality CI only

Meet the requirements of the credit above and include furniture and furnishings within project's scope of work.

## **MR CREDIT: AVOIDANCE OF CHEMICALS OF CONCERN**

ID&C

### **1–2 points**

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–2 points)
- Hospitality (1–2 points)

### **Intent**

To reduce the presence of potentially hazardous substances from the material supply chain.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

Use at least 20% (1 point) or 30% (2 points) by cost of all building products and materials that meet the requirements of European Commission EC No. 1907/2006 Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) including Annexes I, II, IV, V, XI, XIII, XIV, and XVII or third-party verified equivalent.

For product manufacturer and chemical suppliers:

*Companies exporting to, or located in the European Union (EU) economic area:* In accordance with EC No. 1907/2006, demonstrate Registration of the substance to the European Chemical Agency (ECHA) and provide required documents including Article Communication and Notification, Chemical Safety Report (Annex I), and Safety Data Sheet (Annex II), as applicable. Products must be labeled according to CLP Regulation EC No. 1272/2008 (revision 4) Globally Harmonized System for Classification and Labeling of Chemicals (GHS) or through CE marking.

*Companies not exporting to the EU economic area:* Demonstrate registration of substance(s), Article Communication and Notification, Chemical Safety Report, and Safety Data Sheet through third party verification of EC No. 1907/2006 equivalence as if the product is exported to the EU economic area. Products must comply with CLP Regulation EC No. 1272/2008 (revision 4) Globally Harmonized System for Classification and Labeling of Chemicals (GHS).

CI, Retail CI, and Hospitality CI only

Meet the requirements of the credit above and include furniture and furnishings within the project's scope of work.

## MR CREDIT: CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–2 points)
- Hospitality (1–2 points)

### Intent

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

### Requirements

#### CI, RETAIL CI, HOSPITALITY CI

Recycle and/or salvage nonhazardous construction and demolition materials. Calculations can be by weight or volume but must be consistent throughout.

Exclude excavated soil, land-clearing debris, and alternative daily cover (ADC). Include wood waste converted to fuel (biofuel) in the calculations; other types of waste-to-energy are not considered diversion for this credit.

However, for projects outside the United States that cannot meet credit requirements using reuse and recycling methods, waste-to-energy systems may be considered waste diversion if the European Commission Waste Framework Directive 2008/98/EC and Waste Incineration Directive 2000/76/EC are followed and Waste to Energy facilities meet applicable European Committee for Standardization (CEN) EN 303 standards.

#### Option 1. Diversion (1–2 points)

##### Path 1. Three Material Streams (1 point)

Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

OR

##### Path 2. Four Material Streams (2 points)

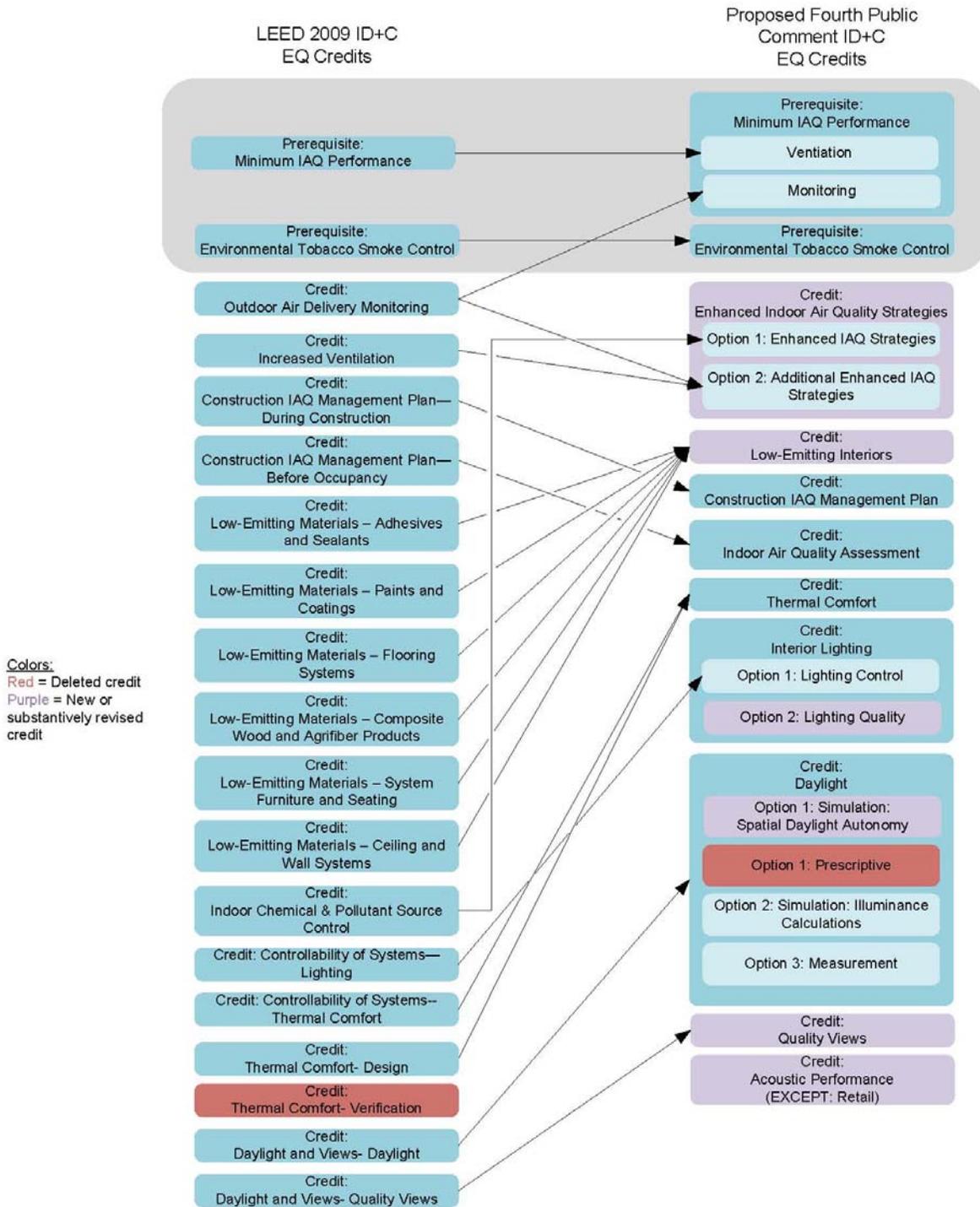
Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.

OR

#### Option 2. Reduction of Total Waste Material (2 points)

Do not generate more than 2.5 pounds of construction waste per square foot (12.2 kilograms of waste per square meter) of the building's floor area.

# INDOOR ENVIRONMENTAL QUALITY (EQ)



## **EQ PREREQUISITE: MINIMUM INDOOR AIR QUALITY PERFORMANCE Required**

ID&C

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### **Intent**

To contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

Meet the requirements for both ventilation and monitoring.

#### **Ventilation**

##### **Mechanically Ventilated Spaces**

For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), chose one of the following cases.

##### **Case 1. Systems Able to Meet Required Outdoor Airflow Rates**

Determine the minimum outdoor air intake flow for mechanical ventilation systems using the ventilation rate procedure from ASHRAE 62.1–2010 or a local equivalent, whichever is more stringent.

##### **Option 1. ASHRAE Standard 62.1–2010**

Meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent.

##### **Option 2. CEN Standards EN 15251–2007 and EN 13779–2007**

Projects outside the United States may instead meet the minimum requirements of 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; and the requirements of CEN Standard EN 13779–2007, Ventilation for nonresidential buildings, Performance requirements for ventilation and room conditioning systems, excluding Section 7.3, Thermal environment; 7.6, Acoustic environment; A.16; and A.17.

##### **Case 2. Systems Unable to Meet Required Outdoor Airflow Rates**

If meeting the outdoor airflow rates in Case 1 is not feasible because of the physical constraints of the existing ventilation system, complete an engineering assessment of the system's maximum outdoor air delivery rate. Supply the maximum possible to reach the minimum setpoint in Case 1 and not less than 10 cubic feet per minute (5 liters per second) of outdoor air per person.

##### **Naturally Ventilated Spaces**

For naturally ventilated spaces (and for mixed-mode systems when the mechanical ventilation is inactivated), determine the minimum outdoor air opening and space configuration requirements using the natural ventilation procedure from ASHRAE Standard 62.1–2010 or a local equivalent, whichever is more stringent. Confirm that natural ventilation is an effective strategy for the project by following the flow diagram in the Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10,

March 2005, Natural Ventilation in Nondomestic Buildings, Figure 2.8 and meet the requirements of ASHRAE Standard 62.1–2010, Section 4, or a local equivalent, whichever is more stringent.

### **All Spaces**

The indoor air quality procedure defined in ASHRAE Standard 62.1–2010 may not be used to comply with this prerequisite.

### **Monitoring**

#### **Case 1. Mechanically Ventilated Spaces**

For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), monitor outdoor air intake flow as follows:

- For variable air volume systems with an outdoor air intake in the project scope of work, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow with an accuracy of  $\pm 10\%$  of the design minimum outdoor airflow rate, as defined by the ventilation requirements above. An alarm must indicate when the outdoor airflow value varies by 15% or more from the outdoor airflow setpoint.
- For constant-volume systems included in the tenant scope of work, balance outdoor airflow to the design minimum outdoor airflow rate defined by ASHRAE Standard 62.1–2010 (with errata but without addenda), or higher. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device.

#### **Case 2. Naturally Ventilated Spaces**

For naturally ventilated spaces (and for mixed-mode systems when the mechanical ventilation is inactivated), comply with at least one of the following.

- Provide a direct exhaust airflow measurement device capable of measuring the exhaust airflow with an accuracy of  $\pm 10\%$  of the design minimum exhaust airflow rate. An alarm must indicate when airflow values vary by 15% or more from the exhaust airflow setpoint.
- Provide automatic indication devices on all natural ventilation openings intended to meet the minimum opening requirements. An alarm must indicate when any one of the openings is closed during occupied hours.
- Monitor carbon dioxide (CO<sub>2</sub>) concentrations within each thermal zone. CO<sub>2</sub> monitors must be between 3 and 6 feet (90 and 180 centimeters) above the floor and within the thermal zone. CO<sub>2</sub> monitors must have an audible or visual indicator or alert the building automation system if the sensed CO<sub>2</sub> concentration exceeds the setpoint by more than 10%. Calculate appropriate CO<sub>2</sub> setpoints by using the methods in ASHRAE 62.1–2010, Appendix C.

## **EQ PREREQUISITE: ENVIRONMENTAL TOBACCO SMOKE CONTROL Required**

ID&C

This prerequisite applies to

- Commercial Interiors
- Retail
- Hospitality

### **Intent**

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

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

Locate the project in a building that prohibits smoking by all occupants and users both inside the building and outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. The no-smoking policy also applies to spaces outside the property line used for business purposes.

If the requirement to prohibit smoking within 25 feet (7.5 meters) cannot be implemented because of code, provide documentation of these regulations.

Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.

## EQ CREDIT: ENHANCED INDOOR AIR QUALITY STRATEGIES

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–3 points)
- Hospitality (1–2 points)

### Intent

To promote occupants' comfort, well-being, and productivity by improving indoor air quality.

### Requirements

#### CI, RETAIL, HOSPITALITY

#### Option 1. Enhanced IAQ Strategies (1 point)

Comply with the following requirements, as applicable.

Mechanically ventilated spaces:

- entryway systems;
- interior cross-contamination prevention; and
- filtration.

Naturally ventilated spaces:

- entryway systems; and
- natural ventilation design calculations.

Mixed-mode systems:

- entryway systems;
- interior cross-contamination prevention;
- filtration;
- natural ventilation design calculations; and
- mixed-mode design calculations.

#### **A. Entryway Systems**

Install 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 high-volume exterior entrances. Acceptable entryway systems include permanently installed grates, grilles, slotted systems that allow for cleaning underneath, rollout mats, and any other materials manufactured as entryway systems with equivalent or better performance. Maintain all on a weekly basis.

#### **B. Interior Cross-Contamination Prevention**

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), using the exhaust rates determined in EQ Prerequisite Minimum Indoor Air Quality Performance or a minimum of 0.50 cfm per square foot, 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.

#### **C. Filtration**

Each ventilation system that supplies outdoor air to occupied spaces must have particle filters or air-cleaning devices that meet one of the following filtration media requirements:

- minimum efficiency reporting value (MERV) of 13 or higher, in accordance with ASHRAE Standard 52.2–2007; or
- Class F7 or higher as defined by CEN Standard EN 779–2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance.

Replace all air filtration media after completion of construction and before occupancy.

**D. Natural Ventilation Design Calculations**

Demonstrate that the system design for occupied spaces employs the appropriate strategies in Chartered Institution of Building Services Engineers (CIBSE) Applications Manual AM10, March 2005, Natural Ventilation in Non-Domestic Buildings, Section 2.4.

**E. Mixed-Mode Design Calculations**

Demonstrate that the system design for occupied spaces complies with CIBSE Applications Manual 13–2000, Mixed Mode Ventilation.

**Option 2. Additional Enhanced IAQ Strategies (1 point ID&C, 2 points Retail CI)**

Comply with the following requirements, as applicable.

Mechanically ventilated spaces (select one):

- A. exterior contamination prevention;
- B. increased ventilation;
- C. carbon dioxide monitoring; or
- D. additional source control and monitoring.

Naturally ventilated spaces:

- A. exterior contamination prevention;
- D. additional source control and monitoring; and
- E. natural ventilation room by room calculations.

Mixed-mode systems:

- A. exterior contamination prevention;
- B. increased ventilation;
- D. additional source control and monitoring; and
- E. natural ventilation room-by-room calculations.

**A. Exterior Contamination Prevention**

Design the project to minimize and control the entry of pollutants into the building. Ensure through the results of computational fluid dynamics modeling, Gaussian dispersion analyses, wind tunnel modeling, or tracer gas modeling that outdoor air contaminant concentrations at outdoor air intakes are below the thresholds listed in Table 1 (projects outside the United States must follow the EPA guideline or local equivalent, whichever is more stringent).

Table 1. Maximum concentrations of pollutants at outdoor air intakes

Pollutants	Maximum concentration	Standard
Those regulated by National Ambient Air Quality Standards (NAAQS)	Allowable annual average OR 8-hour or 24-hour average where an annual standard does not exist OR Rolling 3-month average	National Ambient Air Quality Standards (NAAQS)

**B. Increased Ventilation**

Increase breathing zone outdoor air ventilation rates to all occupied spaces by at least 30% above the minimum rates as determined in EQ Prerequisite Minimum Indoor Air Quality Performance.

**C. Carbon Dioxide Monitoring**

Monitor CO<sub>2</sub> concentrations within all densely occupied spaces. CO<sub>2</sub> monitors must be between 3 and 6 feet (90 and 180 centimeters) above the floor. CO<sub>2</sub> monitors must have an audible or visual indicator or alert the building automation system if the sensed CO<sub>2</sub> concentration exceeds the setpoint by more than 10%. Calculate appropriate CO<sub>2</sub> setpoints using methods in ASHRAE 62.1–2010, Appendix C.

**D. Additional Source Control and Monitoring**

For spaces where air contaminants are likely, evaluate potential sources of additional air contaminants besides CO<sub>2</sub>. Develop and implement a materials-handling plan to reduce the likelihood of contaminant release. Install monitoring systems with sensors designed to detect the specific contaminants. An alarm must indicate any unusual or unsafe conditions.

**E. Natural Ventilation Room-by-Room Calculations**

Follow CIBSE AM10, Section 4, Design Calculations, to predict that room-by-room airflows will provide effective natural ventilation.

## EQ CREDIT: LOW-EMITTING INTERIORS

ID&C

### 1–3 points

This credit applies to

- Commercial Interiors (1–3 points)
- Retail (1–3 points)
- Hospitality (1–3 points)

### Intent

To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

### Requirements

#### CI, RETAIL, HOSPITALITY

This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions into indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials.

#### Option 1. Product Category Calculations

Achieve the threshold level of compliance with emissions and content standards for the number of product categories listed in Table 2.

**Table 1. Thresholds of compliance with emissions and content standards for 7 categories of materials**

Category	Threshold	Emissions and content requirements
Interior paints and coatings applied on site	At least 90%, by volume, for emissions; 100% for VOC content	<ul style="list-style-type: none"> <li>• General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings</li> <li>• VOC content requirements for wet applied products</li> </ul>
Interior adhesives and sealants applied on site (including flooring adhesive)	At least 90%, by volume, for emissions; 100% for VOC content	<ul style="list-style-type: none"> <li>• General Emissions Evaluation</li> <li>• VOC content requirements for wet applied products</li> </ul>
Flooring	100%	General Emissions Evaluation
Composite wood	100% not covered by other categories	Composite Wood Evaluation
Ceilings, walls, thermal, and acoustic insulation	100%	<ul style="list-style-type: none"> <li>• General Emissions Evaluation</li> <li>• <b>Healthcare, Schools only</b> Additional insulation requirements</li> </ul>
Furniture (include in calculations if part of scope of work)	At least 90%, by cost	Furniture Evaluation

<b>Healthcare and Schools Projects only:</b> Exterior applied products	At least 90%, by volume	Exterior Applied Products
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**Table 2. Points for number of compliant categories of products**

Compliant categories	Points
NC, CS, NC Retail, DC, WDC, NC Hos projects with furniture, CI, CI Retail, CI Hos	
3	1
5	2
6	3

**Option 2. Budget Calculation Method**

If some products in a category do not meet the criteria, project teams may use the budget calculation method (Table 3).

**Table 3. Points for percentage compliance, under budget calculation method**

Percentage of total	Points
≥ 50% and < 70%	1
≥ 70% and < 90%	2
≥ 90%	3

The budget method organizes the building interior into six assemblies:

- flooring;
- ceilings;
- walls;
- thermal and acoustic insulation;
- furniture; and
- **Healthcare, Schools only:** exterior applied products.

Include furniture in the calculations if it is part of the scope of work. Walls, ceilings, and flooring are defined as building interior products; each layer of the assembly, including paints, coatings, adhesives, and sealants, must be evaluated for compliance. Insulation is tracked separately.

Determine the total percentage of compliant materials according to Equation 1.

**Equation 1. Total percentage compliance**

Total % compliant for projects without furniture =	$\frac{(\% \text{ compliant walls} + \% \text{ compliant ceilings} + \% \text{ compliant flooring} + \% \text{ compliant insulation})}{4}$
Total % compliant for projects with furniture =	$\frac{(\% \text{ compliant walls} + \% \text{ compliant ceilings} + \% \text{ compliant flooring} + \% \text{ compliant insulation}) + (\% \text{ compliant furniture})}{5}$

**Equation 2. System percentage compliant**

Flooring, walls, ceilings, insulation % compliant =	$\frac{(\text{compliant surface area of layer 1} + \text{compliant surface area of layer 2} + \text{compliant surface area of layer 3} + \dots)}{\text{total surface area of layer 1} + \text{total surface area of layer 2} + \text{total surface area of layer 3} + \dots} \times 100$
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**Equation 3. Furniture systems compliant, using ANSI/BIFMA evaluation**

$\frac{\% \text{ compliant for furniture}}{\text{total furniture cost}} = \frac{0.5 \times \text{cost compliant with } \S 7.6.1 \text{ of ANSI/BIFMA e3-2011} + \text{cost compliant with } \S 7.6.2 \text{ of ANSI/BIFMA e3-2011}}{\text{total furniture cost}} \times 100$	X 100
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Calculate surface area of assembly layers based on the manufacturer’s documentation for application.

If 90% of an assembly meets the criteria, the system counts as 100% compliant. If less than 50% of a assembly meets the criteria, the assembly counts as 0% compliant.

Manufacturers’ claims. Both first-party and third-party statements of product compliance must follow the guidelines in CDPH SM V1.1–2010, Section 8. Organizations that certify manufacturers’ claims must be accredited under ISO Guide 65.

Laboratory requirements. Laboratories that conduct the tests specified in this credit must be accredited under ISO/IEC 17025 for the test methods they use.

**Emissions and Content Requirements**

To demonstrate compliance, a product or layer must meet all of the following requirements, as applicable.

*Inherently nonemitting sources.* Products that are inherently nonemitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

*General emissions evaluation.* Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario. The manufacturer’s or third-party certification must state the exposure scenario used to determine compliance. Claims of compliance for wet-applied products must state the amount applied in mass per surface area.

Manufacturers’ claims of compliance with the above requirements must also state the range of total VOCs after 14 days (336 hours), measured as specified in the CDPH Standard Method v1.1:

- 0.5 mg/m<sup>3</sup> or less;
- between 0.5 and 5.0 mg/m<sup>3</sup>; or
- 5.0 mg/m<sup>3</sup> or more.

Projects outside the United States may use products tested and deemed compliant in accordance with either (1) the CDPH standard method (2010) or (2) the German AgBB Testing and Evaluation Scheme (2010). Test products either with (1) the CDPH Standard Method (2010), (2) the German AgBB Testing and Evaluation Scheme (2010), (3) ISO 16000-3: 2010, ISO 16000-6: 2011, ISO 16000-9: 2006, ISO 16000-11:2006 either in conjunction with AgBB, or with French legislation on VOC emission class labeling, or (4) the DIBt testing method (2010). If the applied testing method does not specify testing details for a product group for which the CDPH standard method does provide details, use the specifications in the CDPH standard method. U.S. projects must follow the CDPH standard method.

*Additional VOC content requirements for wet-applied products.* In addition to meeting the general requirements for VOC emissions (above), on-site wet-applied products must not contain excessive levels of VOCs, for the health of the installers and other tradesworkers who are exposed to these products. To demonstrate compliance, a product or layer must meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation.

- All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural

Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

- All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
- For projects outside North America, all paints, coatings, adhesives, and sealants wet-applied on site must either meet the technical requirements of the above regulations, or comply with applicable national VOC control regulations, such as the European Decopaint Directive (2004/42/EC), the Canadian VOC Concentration Limits for Architectural Coatings, or the Hong Kong Air Pollution Control (VOC) Regulation.
- If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
- If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
- For projects in North America, methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.

*Composite Wood Evaluation.* Composite wood, as defined by the California Air Resources Board, Airborne Toxic Measure to Reduce Formaldehyde Emissions from Composite Wood Products Regulation, must be documented to have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.

Salvaged and reused architectural millwork more than one year old at the time of occupancy is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.

*Furniture evaluation.* New furniture and furnishing items must be tested in accordance with ANSI/BIFMA Standard Method M7.1–2011. Comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach. Model the test results using the open plan, private office, or seating scenario in ANSI/BIFMA M7.1, as appropriate. USGBC-approved equivalent testing methodologies and contaminant thresholds are also acceptable. For classroom furniture, use the standard school classroom model in CDPH Standard Method v1.1. Documentation submitted for furniture must indicate the modeling scenario used to determine compliance.

Salvaged and reused furniture more than one year old at the time of use is considered compliant, provided it meets the requirements for any site-applied paints, coatings, adhesives, and sealants.

### **Healthcare, Schools only**

*Additional insulation requirements.* Batt insulation products may contain no added formaldehyde, including urea formaldehyde, phenol formaldehyde, and urea-extended phenol formaldehyde.

*Exterior applied products.* Adhesives, sealants, coatings, roofing, and waterproofing materials applied on site must meet the VOC limits of California Air Resources Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, and South Coast Air Quality Management District (SCAQMD), Rule 1168, effective July 1, 2005. Small containers of adhesives and sealants subject to state or federal consumer product VOC regulations are exempt.

Projects outside North America may use either the jurisdictional VOC content requirements or comply with the European Decopaint Directive (2004/42/EC, to be updated to most current version when available) Phase II, for water-borne coatings, as analyzed according to ISO 11890 parts 1 and 2, instead of the CARB and SCAQMD regulatory standards.

Two materials are prohibited and do not count toward total percentage compliance: hot-mopped asphalt for roofing, and coal tar sealants for parking lots and other paved surfaces.

## **EQ CREDIT: CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN**

ID&C

### **1 point**

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### **Intent**

To promote the well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation.

### **Requirements**

#### **CI, RETAIL, HOSPITALITY**

Develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building. The plan must address all of the following.

During construction, meet or exceed all applicable 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 absorptive materials stored on-site and installed from moisture damage.

Do not operate permanently installed air-handling equipment during construction unless filtration media with a minimum efficiency reporting value (MERV) of 8, as determined by ASHRAE 52.2–2007, with errata (or equivalent filtration media class of F5 or higher, as defined by CEN Standard EN 779–2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance), are installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer's recommendations.

Prohibit the use of tobacco products inside the building and within 25 feet (8 meters) of the building entrance during construction.

## EQ CREDIT: INDOOR AIR QUALITY ASSESSMENT

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (1–2 points)
- Hospitality (1–2 points)

### Intent

To establish better quality indoor air in the building after construction and during occupancy.

### Requirements

#### CI, RETAIL, HOSPITALITY

Select one of the following two options, to be implemented after construction ends and the building has been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishings (e.g., workstations, partitions), must be installed, and major VOC punch list items must be finished. The options cannot be combined.

#### **Option 1. Flush-Out (1 point)**

##### **Path 1. Before Occupancy**

Install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot (4270 cubic meters of outdoor air per square meter) of floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%.

OR

##### **Path 2. During Occupancy**

If occupancy is desired before the flush-out is completed, the space may be occupied only after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot (1065 cubic meters of outdoor air per square meter) of floor area while maintaining an internal temperature of at least 60°F (15°C) and no higher than 80°F (27°C) and relative humidity no higher than 60%..

Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (cfm) per square foot of outdoor air (1.5 liters of outside air per second per square meter) or the design minimum outdoor air rate determined in EQ Prerequisite Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air (4270 cubic meters of outdoor air per square meter) has been delivered to the space.

OR

#### **Option 2. Air Testing (2 points)**

After construction ends and before occupancy, but under ventilation conditions typical for occupancy, conduct baseline IAQ testing using protocols consistent with the methods listed in Table 1. Use current versions of ASTM standard methods, EPA compendium methods, or ISO methods, as indicated. Laboratories that conduct the tests for chemical analysis of formaldehyde and volatile organic compounds must be accredited under ISO/IEC 17025 for the test methods they use. Retail projects may conduct the testing within 14 days of occupancy.

Demonstrate that contaminants do not exceed the concentration levels listed in Table 1.

Table 1. Maximum concentration levels, by contaminant and testing method

<b>Contaminant</b>	<b>Maximum concentration</b>	<b>Maximum concentration (Healthcare only)</b>	<b>ASTM and U.S. EPA methods</b>	<b>ISO method</b>
Formaldehyde	27 ppb	16.3 ppb	ASTM D5197; EPA TO-11 or EPA Compendium Method IP-6	ISO 16000-3
Particulates (PM10 for all buildings; PM2.5 for buildings in EPA nonattainment areas, or local equivalent)	PM10: 50 micrograms per cubic meter PM2.5: 15 micrograms per cubic meter	20 micrograms per cubic meter	EPA Compendium Method IP-10	ISO 7708
Ozone (for buildings in EPA nonattainment areas <sup>17</sup> )	0.075 ppm	0.075 ppm	ASTM D5149 - 02	ISO 13964
Total volatile organic compounds (TVOCs)	500 micrograms per cubic meter	200 micrograms per cubic meter	EPA TO-1, TO-15, TO-17, or EPA Compendium Method IP-1	ISO 16000-6
Target chemicals listed in CDPH Standard Method v1.1, Table 4-1, except formaldehyde	CDPH Standard Method v1.1–2010, Allowable Concentrations, Table 4-1	CDPH Standard Method v1.1–2010, Allowable Concentrations, Table 4-1	ASTM D5197; EPA TO-1, TO-15, TO-17, or EPA Compendium Method IP-???	ISO 16000-3, 16000-6
Carbon monoxide (CO)	9 ppm; no more than 2 ppm above outdoor levels	9 ppm; no more than 2 ppm above outdoor levels	EPA Compendium Method IP-3	ISO 4224

ppb = parts per billion; ppm = parts per million; µg/cm = micrograms per cubic meter

Conduct all measurements before occupancy but during normal occupied hours, with the building ventilation system started at the normal daily start time and operated at the minimum outdoor airflow rate for the occupied mode throughout the test.

For each sampling point where the concentration exceeds the limit, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met.

## **EQ CREDIT: THERMAL COMFORT**

ID&C

### **1 point**

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### **Intent**

To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

### **Requirements**

Meet the requirements for both thermal comfort design and thermal comfort control.

### **Thermal Comfort Design**

#### **CI, RETAIL, HOSPITALITY**

#### **Option 1. ASHRAE Standard 55-2010**

Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55–2010, Thermal Comfort Conditions for Human Occupancy, with errata or a local equivalent. Demonstrate design compliance in accordance with Section 6.2, Documentation.

For natatoriums, demonstrate compliance with ASHRAE HVAC Applications Handbook, 2011 edition, Chapter 5, Places of Assembly, Typical Natatorium Design Conditions, with errata.

OR

#### **Option 2. ISO and CEN Standards**

Design HVAC systems and the building envelope to meet the requirements of the following two standards:

- ISO 7730, 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, Indoor Environmental Input Parameters for Design and Assessment of Energy Performance of Buildings, addressing indoor air quality, thermal environment, lighting, and acoustics.

### **Thermal Comfort Control**

#### **CI, RETAIL, HOSPITALITY**

Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces, and for any individual occupant spaces without individual controls.

Thermal comfort controls allow occupants, whether in individual spaces or shared multioccupant spaces, to adjust at least one of the following in their local environment: air temperature, radiant temperature, air speed, and humidity.

Hospitality only

Guest rooms are assumed to provide adequate thermal comfort controls and are therefore not included in the credit calculations.

Retail only

Meet the above requirements for at least 50% of the individual occupant workspaces in office and administrative areas.

## EQ CREDIT: INTERIOR LIGHTING

ID&C

### 1–2 points

This credit applies to

- Commercial Interiors (1–2 points)
- Retail (2 points)
- Hospitality (1–2 points)

### Intent

To promote occupants' productivity, comfort, and well-being by providing high-quality lighting.

### Requirements

#### CI, HOSPITALITY

Select one or both of the following two options.

#### **Option 1. Lighting Control (1 point)**

For at least 90% of individual occupant spaces, provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel is 30% to 70% of the maximum connected lighting load.

For all shared multioccupant spaces, meet all of the following requirements.

- Provide multizone control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel).
- Lighting for any presentation or projection wall must be separately controlled.
- Locate switches or manual controls in the same space with the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires.

#### Hospitality only

Guest rooms are assumed to provide adequate lighting controls and are therefore not included in the credit calculations.

AND/OR

#### **Option 2. Lighting Quality (1 point)**

Choose four strategies from any of the following categories.

#### *Hardware*

Meet the following requirements for at least 75% of the connected lighting load.

- A. Use light fixtures with a luminance of less than  $2,500\text{cd/m}^2$  above 45 degrees from nadir. Exceptions include wallwash fixtures properly aimed at walls, as specified by manufacturer's data, and indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above.
- B. Use light sources with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect.
- C. Use lamps that last at least 24,000 hours.
- D. Use lamps that last at least 6,000 hours.
- E. Provide suspended, wall-mounted, freestanding, or partition-mounted indirect or direct-indirect ambient lighting for up to 75% of the connected lighting load.

#### *Surface Brightness*

- F. Measure reflectances using IESNA Handbook, Section 9.20, Measuring Reflectance and Transmittance. Design the lighting to meet the following thresholds for average surface brightness (weighted average of surface reflectances): 85% for ceilings, 60% for walls, and 25% for floors.
- G. If furniture is included in the scope of work, design the lighting to meet the following thresholds for average surface brightness (weighted average of surface reflectances): 45% for work surfaces, and 50% for movable partitions.

*Illuminance*

- H. Design the lighting for an average ratio of wall surface illuminance to average work plane (or surface, if defined) illuminance that does not exceed 1:10.
- I. Design the lighting for an average ratio of ceiling illuminance to work surface illuminance (excluding fenestration) that does not exceed 1:10.

**RETAIL CI**

For at least 90% of the individual occupant workspaces in office and administrative areas, provide individual lighting controls.

In sales areas, provide controls that can reduce the ambient light levels to a midlevel (30% to 70% of maximum connected lighting load).

## EQ CREDIT: DAYLIGHT

ID&C

### 1–3 points

This credit applies to

- Commercial Interiors (1–3 points)
- Retail (1–3 points)
- Hospitality (1–3 points)

### Intent

To connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space.

### Requirements

#### CI, RETAIL, HOSPITALITY

Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces.

Select one of the following three options.

#### **Option 1. Simulation: Spatial Daylight Autonomy (2–3 points)**

Spatial daylight autonomy (sDA) is the percentage of the occupied time over the course of a year when a space can be illuminated by daylight alone.

Demonstrate through annual computer simulations that at least 55%, 75%, or 90% of the regularly occupied spaces achieve spatial daylight autonomy. Use regularly occupied floor area. Healthcare projects should use the perimeter area determined under EQ Credit Quality Views. Points are awarded according to Table 1.

**Table 1. Points for daylit floor area: Spatial daylight autonomy**

<i>NC, CS, Schools, Retail, Data Centers, Warehouses &amp; Distribution Centers, CI, Hospitality</i>		<i>Healthcare</i>	
<i>Percentage of regularly occupied floor area</i>	<i>Points</i>	<i>Percentage of perimeter floor area</i>	<i>Points</i>
55%	2	75%	1
75%	3	90%	2

Calculation grids should be no more than 2 feet square and laid out across the regularly occupied area at a work plane height of 30 inches above finished floor (unless otherwise defined). Use an hourly time-step analysis based on typical meteorological year data, or an equivalent, for the nearest available weather station.

Demonstrate via an annual simulation that no more than 10% of any qualifying daylit space will receive direct sunlight for more than 250 hours per year at task level before operable blinds or shades are installed and after accounting for exterior obstructions, typical weather, and attached furniture systems.

Conduct annual sunlight exposure analysis by room, or use the discrete qualifying daylit area per floor and façade orientation. Sunlight is defined as direct illumination from the sun; do not count reflections off

other surfaces. Direct sunlight exposure can be assumed to occur for any grid point that has an hourly illumination level at least 1,000 lux higher than any directly adjacent grid point.

CS only

If the finishes in the space will not be completed, use the following default surface reflectances: 80% for ceilings, 20% for floors, and 50% for walls. Assume that the entire floor plate, except for the core, will be regularly occupied space.

OR

**Option 2. Simulation: Illuminance Calculations (1–2 points)**

Demonstrate through computer modeling that illuminance levels will be between 100 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox, for the floor area indicated in Table 2. Use regularly occupied floor area. Healthcare projects should use the perimeter area determined under EQ Credit Quality Views.

**Table 2. Points for daylit floor area: Illuminance calculation**

<i>NC, CS, Schools, Retail, Data Centers, Warehouses &amp; Distribution Centers, Hospitality, CI</i>		<i>Healthcare</i>	
<i>Percentage of regularly occupied floor area</i>	<i>Points</i>	<i>Percentage of perimeter floor area</i>	<i>Points</i>
75%	1	75%	1
90%	2	90%	2

Calculate illuminance intensity for sun (direct component) and sky (diffuse component) for clear-sky conditions as follows:

- Use the local weather data, or TMY weather data for the nearest city.
- Select one day within 15 days of September 21 and one day within 15 days of March 21 that represent the clearest sky condition.
- Use the average of the hourly value for the two selected days.

Exclude blinds from the model. Furniture may be excluded.

CS only

Assume the following default surface reflectances if the finishes in the space will not be completed: 80% for ceilings, 20% for floors, and 50% for walls. Assume that the entire floor plate, except for the core, will be regularly occupied space.

OR

**Option 3. Measurement (1 point)**

Achieve illuminance levels between 300 lux and 3,000 lux for any hour between 9 a.m. and 3 p.m. for the floor area indicated in Table 3. Use regularly occupied floor area. Healthcare projects should use the perimeter area determined under EQ Credit Quality Views.

**Table 3. Points for daylit floor area: Measurement**

<i>NC, CS, Schools, Retail, Data Centers, Warehouses &amp; Distribution Centers, Hospitality, CI</i>		<i>Healthcare</i>	
<i>Percentage of regularly occupied floor area</i>	<i>Points</i>	<i>Percentage of perimeter floor area</i>	<i>Points</i>
75	1	75	1

With furniture, fixtures, and equipment in place, measure illuminance levels as follows:

- Measure at appropriate work plane height during any hour between 9 a.m. and 3 p.m.
- Take one measurement in any regularly occupied month, and take a second as indicated in Table 4.
- For spaces larger than 150 square feet (14 square meters), take measurements on a maximum 10-foot (3-meter) square grid.
- For spaces 150 square feet (14 square meters) or smaller, take measurements on a maximum 3-foot (90-centimeter) square grid.

**Table 4. Timing of measurements for illuminance**

<i>If first measurement is taken in ...</i>	<i>take second measurement in ...</i>
January	May-September
February	June-October
March	June-July, November-December
April	August-December
May	September-January
June	October-February
July	November-March
August	December-April
September	December-January, May-June
October	February-June
November	March-July
December	April-August

## EQ CREDIT: QUALITY VIEWS

ID&C

### 1 point

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### Intent

To give building occupants a connection to the natural outdoor environment by providing quality views.

### Requirements

#### CI, RETAIL, HOSPITALITY,

Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance.

Additionally, 75% of all regularly occupied floor area must have at least two of the following four kinds of views:

- multiple lines of sight to vision glazing in different directions at least 90 degrees apart; views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing;
- unobstructed views located within the distance of three times the head height of the vision glazing; and
- views with a view factor of 3 or greater, as defined by Heschong Mahone Group, "Windows and Offices; A Study of Office Worker Performance and the Indoor Environment."

Include in the calculations any permanent interior obstructions (e.g., lab hoods, fixed partitions, demountable opaque full- or partial-height partitions). Movable furniture and partitions may be excluded.

Views into interior atria may be used to meet up to 30% of the required area.

## EQ CREDIT: ACOUSTIC PERFORMANCE

ID&C

### 2 points

This credit applies to

- Commercial Interiors (2 points)
- Hospitality (2 points)

### Intent

To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design.

### Requirements

#### CI, HOSPITALITY

For all occupied spaces, meet the following requirements, as applicable, for room noise levels, sound isolation performance, reverberation time and reverberant noise buildup, and paging, masking, and sound reinforcement systems.

#### Room Noise Levels

Room noise levels from building mechanical systems must be within the sound level ranges shown in 2011 ASHRAE Handbook, HVAC Applications, Chapter 48, Table 1; AHRI Standard 885-2008, Table 15; or a local equivalent. Calculate or measure sound levels.

For measurements, use a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation, or a local equivalent.

Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed in ASHRAE 2011 Applications Handbook, Table 6; AHRI Standard 885-2008; or a local equivalent.

#### Sound Isolation

Meet the composite sound transmission class ( $STC_c$ ) ratings listed in Table 1, or local building code, whichever is more stringent.

**Table 1. Maximum composite sound transmission class ratings for adjacent spaces**

Adjacency combinations		$STC_c$
Residence (within a multifamily residence), hotel or motel room	Residence, hotel or motel room	55
Residence, hotel or motel room	Common hallway, stairway	50
Residence, hotel or motel room	Retail	60
Retail	Retail	50
Standard office	Standard office	45
Executive office	Executive office	50
Conference room	Conference room	50
Office, conference room	Hallway, stairway	50
Mechanical equipment room	Occupied area	60

#### Reverberation Time and Reverberant Noise Buildup

Meet the reverberation time requirements in Table 3 (adapted from Table 9.1 in the Performance Measurement Protocols for Commercial Buildings<sup>1</sup>).

Table 3. Reverberation time requirements

Room type	Application	T60 (sec)
Apartment and condominium	—	< 0.6
Hotel/motel	Individual room or suite	< 0.6
	Meeting or banquet room	< 0.8
Office building	Executive or private office	< 0.6
	Conference room	< 0.6
	Teleconference room	< 0.6
	Open-plan office without sound masking	< 0.8
	Open-plan office with sound masking	0.8
Courtroom	Unamplified speech	< 0.7
	Amplified speech	< 1.0
Performing arts space	Drama theaters, concert and recital halls	Varies by application
Laboratories	Testing or research with minimal speech communication	< 1.0
	Extensive phone use and speech communication	< 0.6
Church, mosque, synagogue	General assembly with critical music program	Varies by application
Library		< 1.0
Indoor stadium, gymnasium	Gymnasium and natatorium	< 2.0
	Large-capacity space with speech amplification	< 1.5
Classroom	—	< 0.6

## Paging, Masking, and Sound Reinforcement Systems

### *Sound Reinforcement*

For all large conference rooms and auditoriums seating more than 50 persons, evaluate whether sound reinforcement and AV playback capabilities are needed.

If needed, the sound reinforcement systems must meet the following criteria:

- Achieve a minimum speech transmission index (STI) of 0.60 or a common intelligibility scale (CIS) rating 0.77 at representative points within the area of coverage to provide acceptable intelligibility.
- Have a minimum sound level of 70 dBA and must
- Maintain sound-level coverage within +/-3 dB at the 2000 Hz octave band throughout the space.

### *Masking Systems*

For projects that use masking systems, the design levels must not exceed 48 dBA. Ensure that loudspeaker coverage provides uniformity of +/-2 dBA and that speech spectra are effectively masked.

<sup>1</sup> Adapted from ASHRAE (2007d), ASA (2008), ANSI (2002), and CEN (2007)

# INNOVATION (IN)

## IN CREDIT: INNOVATION

ID&C

### 1–5 points

This credit applies to

- Commercial Interiors (1–5 points)
- Retail (1–5 points)
- Hospitality (1–5 points)

### Intent

To encourage projects to achieve exceptional or innovative performance

### Requirements

#### CI, RETAIL, HOSPITALITY

Project teams can use any combination of innovation, pilot, and exemplary performance strategies.

#### **Option 1. Innovation (1 point)**

Achieve significant, measurable environmental performance using a strategy not addressed in the LEED green building rating system.

Identify the following:

- the intent of the proposed innovation credit;
- proposed requirements for compliance;
- proposed submittals to demonstrate compliance; and
- the design approach or strategies used to meet the requirements.

AND/OR

#### **Option 2. Pilot (1 point)**

Achieve one pilot credit from USGBC's LEED Pilot Credit Library

AND/OR

#### **Option 3. Additional Strategies**

- **Innovation (1-3 points)**  
Defined in Option 1 above.
- **Pilot (1-3 points)**  
Meet the requirements of Option 2.
- **Exemplary Performance (1–2 points)**  
Achieve exemplary performance in an existing LEED 2012 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, 2012 edition. An exemplary performance point is typically earned for achieving double the credit requirements or the next incremental percentage threshold.

## **IN CREDIT: LEED ACCREDITED PROFESSIONAL**

ID&C

**1 point**

This credit applies to

- Commercial Interiors (1 point)
- Retail (1 point)
- Hospitality (1 point)

### **Intent**

To encourage the team integration required by a LEED project and to streamline the application and certification process.

### **Requirements**

#### **CI, RETAIL CI, HOSPITALITY**

At least one principal participant of the project team must be a LEED Accredited Professional (AP) with a specialty appropriate for the project.

# REGIONAL PRIORITY (RP)

## RP CREDIT: REGIONAL PRIORITY

ID&C

**4 points**

This credit applies to

- Commercial Interiors (1-4 points)
- Retail (1-4 points)
- Hospitality (1-4 points)

### Intent

To provide an incentive for the achievement of credits that address geographically specific environmental, social equity, and public health priorities.

### Requirements

#### CI, RETAIL CI, HOSPITALITY

Earn up to four of the six Regional Priority credits. These credits have been identified by the USGBC regional councils and chapters as having additional regional importance for the project's region. A database of Regional Priority credits and their geographic applicability is available on the USGBC website, <http://www.usgbc.org>.

One point is awarded for each Regional Priority credit achieved, up to a maximum of four.