



LEED v4.1 INTERIOR DESIGN AND CONSTRUCTION

Includes:

LEED ID+C: Commercial Interiors

LEED ID+C: Retail

LEED ID+C: Hospitality

January 22, 2019

U.S. Green Building Council

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INTEGRATIVE PROCESS

CREDIT: INTEGRATIVE PROCESS

ID&C

2 points

This credit 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

Option 1. Energy- and Water-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 energy- and water-related systems (1 point).

Discovery:

Energy-Related Systems

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 options associated with each of the following in terms of project and human performance, as applicable:

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

Water-Related Systems

Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads, reduce the burden on municipal supply and/or wastewater treatment systems, and accomplish related sustainability goals. Assess and estimate

the project's potential nonpotable water supply sources and water demand volumes, including the following, as applicable:

- *Fixture and fitting water demand.* Assess flow and flush fixture demand volumes, calculated in accordance with WE Prerequisite Indoor 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. Analyze how nonpotable water supply sources can contribute to the water demand components listed above.

Implementation:

Develop a Project Team Letter. Provide a dated letter on the letterhead of the Integrative Process Facilitator that summarizes the team's integrative process approach and describes the difference that this integrative approach made in terms of improving project team interaction and project performance.

- Describe the approach developed by the project team for engaging a clearly defined and manageable integrative design process beginning in pre-design and continuing throughout the design phases.
- The letter must include a separate summary for each issue area analyzed by the project team, describing how the analysis informed the design and building form decisions in the project's OPR and BOD and the eventual design of the project. Describe the most important goals for each issue area and provide clear guidance on how to evaluate the project's impact on the selected goals.

The creation of this letter should be a team effort facilitated by the Integrative Process Facilitator. The letter must be signed by all principal project team members and made available to key stakeholders including, but not limited to the owner(s), facility manager(s), tenant(s), and community members. Describe how the letter was distributed to these stakeholders and/or made publicly available.

Exemplary Performance (1 point):

Project teams may choose an additional lens through which to demonstrate the outcomes and benefits of an integrative process for an Exemplary Performance point. Optional issue areas to carry out analysis relevant to the project include: site selection, social equity, health & well-being, or another topic not yet addressed.

Site Selection

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.

- *Occupant and community well-being.* Assess the base building's ability to provide daylight and views, indoor air quality, and other indoor environmental quality characteristics. Identify community assets and the proximity of vulnerable populations surrounding the project. Assess the project's ability to provide positive social, economic, and environmental benefits for existing community members, as well as any potential negative impacts.

Social Equity

Beginning in pre-design and continuing throughout the design phases, review and then complete the LEED Project Team Checklist for Social Impact* in order to assess and select strategies to address issues of inequity within the project and its community, team and supply chain. Through research and consultation with key stakeholders, ensure that all responses within the Checklist are ultimately documented as "Yes" or "No," and complete all sections for Stakeholders and Goals.

Health & Well-being

Beginning in pre-design and continuing throughout the design phases, use the following steps to inform the design and construction documents:

- *Establish health goals.* Set clear and specific goals to promote the health of core groups, including:
 - Building occupants and users
 - Surrounding community
 - Supply chain

Develop a statement of health goals for each population, including a summary of how this health goal relates to the highest priority health need for each population.

- *Prioritize design strategies.* Select specific design and/or programming strategies to address the project's health goals. This could be accomplished by holding a stand-alone "health charrette" or by integrating health considerations into an existing green charrette.
- *Anticipate outcomes.* Identify expected impacts on population health behaviors and outcomes associated with the project's prioritized design strategies.

AND/OR

Option 2. LEED Certified Building (1 point)

Select a LEED certified building.

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)

Intent

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

Requirements

CI, RETAIL, HOSPITALITY

Locate the project 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 LEED v4 rating system).

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

Table 1. Points for LEED ND location.

Certification level	Points
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 walkability, and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging daily physical activity.

Requirements

CI, RETAIL, HOSPITALITY

Option 1. Surrounding Density (3–6 points)

Locate on a site whose surrounding existing density within a ¼-mile (400-meter) offset of the project boundary meets the values in Table 1. Use either the “separate residential and nonresidential densities” or the “combined density” values.

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

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

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

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

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

AND/OR

Option 2. Diverse Uses (1–2 points)

Construct or renovate a building or a space within a building such that the building's main entrance is within a ½-mile (800-meter) walking distance of the following number of uses (see Appendix 1), as listed below. .

Table 1. Points for proximity to uses

Uses	Points
4-7	1
≥ 8	2

The following restrictions apply:

- A use counts as only one type (e.g., a retail store may be counted only once even if it sells products in several categories).
- No more than two uses in each use type may be counted (e.g. if five restaurants are within walking distance, only two may be counted).
- The counted uses must represent at least three of the five categories, exclusive of the building's primary use.

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-CI

Locate any *functional entry* of the project within a ¼-mile (400-meter) *walking distance* of existing or planned bus, *streetcar*, or *informal transit stops*, or within a ½-mile (800-meter) walking distance of existing or planned *bus rapid transit stops*, passenger rail stations (i.e. light, heavy, or commuter rail), or commuter ferry terminals. The transit service at those stops and stations in aggregate must meet the minimums listed in Table 1. 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.

- For each qualifying transit route, only trips in one direction are counted towards the threshold.
- For weekend trips, only trips on the day with the higher number of trips are counted towards the threshold.
- If a qualifying transit route has multiple stops within the required walking distance, only trips from one stop are counted towards the threshold.
- Privately-run shuttles are only acceptable if the service is also made available to the public.

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

Weekday trips	Weekend trips	Points
72	30	2
100	70	3
144	108	5
250	160	6
360	216	7

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.

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 distance 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 diverse 10 uses (see Appendix 1); or
- a *bus rapid transit* stop, passenger rail station, or ferry terminal.

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

Provide *long-term bicycle storage* for at least 5% of regular project occupants but no fewer than 2 spaces per project in addition to the short-term bicycle spaces.

Short-term bicycle storage must be within 200 feet (60 meters) walking distance of any main entrance.

Long-term bicycle storage must be within 300 feet (90 meters) walking distance 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. Zero lot line projects may count publicly available bicycle parking towards their short-term storage requirements if it meets the maximum allowable walking distance.

Indoor storage is acceptable as long as it meets the walking distance requirements. Vertical distance travelled by elevator is exempt from being counted towards the walking distance.

On-site bicycle sharing stations within the project boundary may count for 50% of the long-term and short-term bicycle storage space.

Provide at least one on-site shower with changing facility for the first 100 regular project occupants and one additional shower for every 150 regular project occupants thereafter. The following guidance should be applied when determining the number of showers needed for projects with a large number of occupants.

HOSPITALITY, RETAIL

Provide at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter, up to 999 regular building occupants.

- one additional shower for every 500 regular building occupants, for the additional 1,000 – 4,999 regular building occupants
- one additional shower for every 1,000 regular building occupants, for the additional 5,000 + regular building occupants

CI

Provide a total of at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter, up to 999 regular building occupants.

- one additional shower for every 500 regular building occupants, for the additional 1,000 – 4,999 regular building occupants
- one additional shower for every 1,000 regular building occupants, for the additional 5,000 + regular building occupants

RETAIL-CI

Bicycle Network

Meet Bicycle Network requirements for all projects.

Bicycle Storage and Shower Rooms

Meet walking distance to bicycle storage requirements for all projects.

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 regular project occupants, but no fewer than two storage spaces per building in addition to the short-term bicycle storage spaces.

Provide a bicycle maintenance program for employees or bicycle route assistance for employees and customers. Route assistance must be provided in a manner easily accessible to both employees and customers.

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

Option 1. No Off-Street Parking (1 point)

Do not provide off-street parking.

OR

Option 2. Reduce Parking (1 point)

Do not exceed the minimum local code requirements for parking capacity.

Provide parking capacity that is a 30% reduction below the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 4th edition, Table 11-12.

OR

Option 3. Carshare (1 point)

Provide dedicated parking for carshare vehicles. Provide at least one vehicle parking space for every 100 occupants, rounded up. If the project has fewer than 100 occupants, provide one carshare vehicle parking space.

Existing carshare vehicles located in nearby on- or off-street parking areas do not contribute to credit achievement.

OR

Option 4. Unbundling Parking (1 point)

Sell parking separately from all property sales or leases.

Implement a daily parking fee at a cost equal to or greater than the daily cost of municipal public transit.

For All Projects

The credit calculations must include all existing and new off-street 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.

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 U.S.).

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 (IP units)</i>	<i>Baseline (SI 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

Projects located where standard supply pressure is different than the LEED baseline supply pressure may calculate the water consumption of flow fixtures and fittings at the local standard supply pressure; the supply pressure must be consistent in the baseline and proposed case.

Appliance and Process Water Use

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

Existing appliances intended for reuse in the project are not required to meet the requirements in Table 2.

Table 2. Standards for appliances

<i>Appliance</i>	<i>Requirement</i>
Residential clothes washers	ENERGY STAR or performance equivalent*
Commercial clothes washers	ENERGY STAR or performance equivalent
Residential dishwashers (standard and compact)	ENERGY STAR or performance equivalent*
Prerinse spray valves	≤ 1.3 gpm (4.9 lpm)
Ice machine	ENERGY STAR or performance 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

*Projects in Europe may install residential appliances meeting the EU A+++ label.

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"> • makeup water meters • conductivity controllers and overflow alarms • 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

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 (IP units)</i>	<i>Requirement (SI 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	≤ 3.4 liters/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 liters/hour/pan
Combination oven,	Countertop or stand	≤ 3.5 gal/hour/pan	≤ 13 liters/hour/pan
	Roll-in	≤ 3.5 gal/hour/pan	≤ 13 liters/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. Points are awarded according to Table 1.

Table 1. Points for reducing water use

Percentage reduction	Points (Commercial Interiors)	Points (Retail)	Points (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 Hospitality 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.

Retail projects can earn a second point for meeting the requirements of two tables.

Table 2. Compliant commercial washing machines

To use Table 2, the project must process at least 120,000 lbs (57 606 kg) of laundry per year.

<i>Washing machine</i>	<i>Requirement (IP units)</i>	<i>Requirement (SI units)</i>
On-premise, minimum capacity 2,400 lbs (1 088 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 (IP units)</i>	<i>Requirement (SI units)</i>
Dishwasher	Undercounter	ENERGY STAR	ENERGY STAR or performance equivalent
	Stationary, single tank, door	ENERGY STAR	ENERGY STAR or performance equivalent
	Single tank, conveyor	ENERGY STAR	ENERGY STAR or performance equivalent
	Multiple tank, conveyor	ENERGY STAR	ENERGY STAR or performance equivalent
	Flight machine	ENERGY STAR	ENERGY STAR or performance equivalent
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	Disposer	3-8 gpm, full load condition, 10 minute automatic shutoff; or 1 gpm, no-load condition	11–30 lpm, full load condition, 10-min automatic shutoff; or 3.8 lpm, no-load condition
	Scrap collector	Maximum 2 gpm makeup water	Maximum 7.6 lpm makeup water
	Pulper	Maximum 2 gpm makeup water	Maximum 7.6 lpm makeup water

	Strainer basket	No additional water usage	No additional water usage
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gpm = gallons per minute

gph = gallons per hour

lpm = liters per minute

lph = liters per hour

Table 4. Compliant laboratory and medical equipment

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

<i>Lab equipment</i>	<i>Requirement (IP units)</i>	<i>Requirement (SI 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, 28.5 liters/DIN tray For 1220-mm sterilizer, 28.35 liters/DIN tray
Sterile process washer	0.35 gal/U.S. tray	1.3 liters/DIN 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 0-2013 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

- 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.

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. ASTM E2947-16: Standard Guide for Building Enclosure Commissioning provides additional guidance.

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

Commissioning Authority Qualifications

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 nor a subcontractor to the 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.

Interior Design and Construction projects are responsible for completing the above tasks for all systems and equipment included in their scope, including items furnished by the base building, but modified or relocated as part of tenant fit-out. Information such as sequences of operations, schedules, equipment setpoints, and outside air requirements for tenant equipment and spaces must be coordinated with base building requirements.

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

Comply with ANSI/ASHRAE/IESNA Standard 90.1–2016, with errata or a USGBC-approved equivalent standard.

ASHRAE 90.1-2016 Compliance pathways in Section 4.2.1.1 include compliance with all mandatory provisions, and compliance with one of the following:

- Prescriptive provisions of Sections 5 through 10
- Section 11 *Energy Cost Budget Method*
- Normative Appendix G *Performance Rating Method*. When using Appendix G, the Performance Cost Index (PCI) shall be less than or equal to the Performance Cost Index Target (PCI_t) in accordance with the methodology provided in Section 4.2.1.1. Document the PCI, PCI_t, and percentage improvement using metrics of cost or greenhouse gas (GHG) emissions.

For projects using Normative Appendix G Performance Rating Method:

- Greenhouse gas emissions: The total greenhouse gas emissions, in terms of carbon dioxide equivalents, shall be calculated for the baseline building performance rating and for the proposed building performance rating, and the percentage improvement shall be determined using carbon dioxide equivalent emissions.

US and Canada:

- use U.S. Environmental Protection Agency's (EPA) regional grid mix coefficients to calculate GHG emissions by energy source; or
- use hourly emissions profiles from U.S. Environmental Protection Agency's (EPA) AVoided Emissions and geneRation Tool (AVERT)

International:

- use national grid mix coefficients from the International Energy Agency CO₂ Emissions from Fuel Combustion 2017 report to calculate GHG emissions by energy source
 - ISO 52000-1:2017: Greenhouse gas emission factors for each building energy source shall be determined consistently with ISO Standard 52000-1:2017 and published for the country or region where the project is located
- Exception to Mandatory Measures requirements: For ASHRAE 90.1-2016 mandatory controls provisions that are quantified in the Appendix G *Performance Rating Method*, (e.g. lighting occupancy sensor controls, lighting daylighting controls, automated receptacle controls, etc.), projects may model the *Proposed Building Performance* control parameters identically to the

Baseline Building Performance control parameters in lieu of compliance with the mandatory provisions.

- Exceptional Calculations modeled in accordance with Section G2.5 may be modeled to document minimum prerequisite compliance.
- Only on-site or on-campus renewable energy that meets ASHRAE Standard 90.1-2016 Section G 2.4.1 requirements for on-site renewable energy may be used to meet minimum ASHRAE Standard 90.1-2016 performance requirements.

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

4-5 points

This credit applies to

- Commercial Interiors (4-5 points)
- Retail (4-5 points)
- Hospitality (4-5 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 0–2013 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

1–24 points

This credit applies to

- Commercial Interiors (1–24 points)
- Retail (1–24 points)
- Hospitality(1–24 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 using one of the following metrics:

- kBtu per square foot-year (kWh per square meter-year) of site energy use
- KBtu per square foot-year (kWh per square meter-year) of source energy use
- pounds per square foot-year (Kg per square meter-year) of greenhouse gas emissions
- energy cost per square foot-year (cost per square meter-year)

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.

Select one of the options below.

Option 1. Tenant-Level Energy Performance Compliance (1–24 points)

Demonstrate a Performance Cost Index (PCI)¹ below the Performance Cost Index Target (PCI_t) calculated in accordance with Section 4.2.1.1 of ANSI/ASHRAE/IESNA Standard 90.1-2016, Appendix G, Table 4.2.1.1. For mixed use projects, the required PCI shall be calculated by using an area weighted average of the building types.

Calculate the PCI, PCI_t, and percentage improvement using metrics of cost and greenhouse gas (GHG) emissions. For each energy source serving the project, the GHG emission factors must be identical for the Baseline and Proposed building models.

LEED points are calculated based on the project percent improvement PCI below the PCI_t using metrics of cost and GHG emissions. Total points have been divided equally between the metrics of energy cost and greenhouse gas emissions. Points are awarded according to Table 1 and Table 2.

For project percent improvement for the cost metric, on-site renewable energy may be subtracted from proposed energy cost prior to calculating proposed building performance per ASHRAE Standard 90.1-2016 Section G 2.4.1.

Table 1. Points for percentage improvement in energy performance – % Cost PCI below PCI_t (12 points)

ID+C	Points
2%	2
5%	3
8%	4
12%	5
15%	6
18%	7
21%	8
24%	9
27%	10
30%	11
33%	12
36%	EP

On-site renewable energy may be subtracted from proposed greenhouse gas emissions prior to calculating proposed building performance per ASHRAE Standard 90.1-2016 Section G 2.4.1. New off-site renewable energy as defined in EA credit Renewable Energy may be subtracted from proposed greenhouse gas emissions prior to calculating proposed building performance.

Table 2. Points for percentage improvement in energy performance – % Greenhouse Gas Emissions PCI below PCI_t (12 points ID+C)

ID+C	Points
2%	2
5%	3
9%	4
13%	5
18%	6
24%	7
32%	8
40%	9
50%	10
65%	11
80%	12
100%	EP

Retail only

For all process loads, define a clear baseline to compare with proposed improvements. The baselines in Appendix 3, Tables 1–4, represent industry standards and may be used without additional documentation. 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 90.1–2016, with errata (or a USGBC-approved equivalent standard for projects outside the U.S.), 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.

OR

Option 2. Prescriptive Compliance (1–15 points)

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

To be eligible for Option 2, projects must use the ASHRAE 90.1-2016 Prescriptive compliance path in EA Prerequisite Minimum Energy Performance. To be eligible for ASHRAE Advanced Energy Design Guide (AEDG) envelope and lighting strategies, the project space must meet the Scope requirements of the applicable AEDGs (or combination of AEDGs for mixed use). To be eligible for AEDG HVAC strategies, the entire building where the project is located must meet the Scope requirements of the applicable AEDGs.

Base Building Systems (1-5 points)

For base building systems that serve the project, as well as any applicable improvements that are part of the project, document compliance with the following according to base building type and climate zone.

Building Envelope (1-2 points)

- Advanced Energy Design Guides
 - Comply with the recommendations in the appropriate ASHRAE 50% Advanced Energy Design Guide for all roofs, walls, floors, slabs, doors, vestibules, and continuous air barriers. (1 point)

AND / OR

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

OR

- Climate Zones 1 – 2:
 - Thermal Mass Enclosure: More than 70% of opaque above-grade wall area meets ASHRAE 90.1-2016 definition for “mass wall”; and more than 70% of floor area meets ASHRAE 90.1-2016 definition for “mass floor” (1 point)

AND / OR

- Demonstrate a 25% envelope UA reduction beyond ASHRAE 90.1-2016 prescriptive envelope requirements (1 point)

OR

- Climate Zones 3 – 8:
 - Demonstrate an envelope UA reduction beyond ASHRAE 90.1-2016 prescriptive envelope requirements:
 - 25% UA reduction (1 point)
 - 50% UA reduction (1 point)

HVAC and Service Water Heating Equipment Efficiency Systems (1 - 3 points)

- Advanced Energy Design Guides: For all base building and tenant HVAC systems that serve the project, comply with the *HVAC efficiency and control* recommendations in the appropriate ASHRAE 50% Advanced Energy Design Guide. (3 points)

OR

- Demonstrate an improvement beyond ASHRAE/ASHRAE/IESNA Standard 90.1–2016 prescriptive requirements for the following base building and tenant systems serving the project space:
 - Reduction in fan power total allowance of 30% (1 point)

AND / OR

- Improvement in efficiency for at least 75% of the combined cooling, heating, and service water heating capacity:
 - 15% (1 point)
 - 30% (2 points)

Electric resistance heating except heat pump auxiliary heat must be included in total capacity.

Tenant Systems (1-10 points)

Interior Lighting Systems (1–5 points)

- Lighting Power Density (1–3 points)
Reduce connected lighting power density below that allowed by ASHRAE/IESNA Standard 90.1–2016, 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 3.

Table 3. Points for percentage reduction in lighting power density

Percentage below standard LPD	Points
15%	1
30%	2
45%	3

Daylighting Controls (1–2 points)

- Daylighting Controls (1-2 points)
Install daylight-responsive controls for a given percentage of connected lighting load (lighting in non-regularly occupied space with occupant sensor controls may be excluded from connected lighting load).
 - 35% (1 point)
 - 70% (2 points)

Equipment and Appliances (1–5 points)

Install a percentage (by rated power) of eligible equipment and appliances meeting the following requirements:

- ENERGY STAR equipment including appliances, office equipment, electronics, and commercial food service equipment (lighting and building envelope products are excluded from this credit). (Electronic Product Environmental Assessment Tool (EPEAT) equipment may be used in lieu of Energy Star equipment where applicable).
- Prescriptive commercial kitchen and refrigeration equipment requirements listed in Appendix 3, Table 1.

The project scope of work must include at least 0.25 Watts per square foot of eligible equipment to apply this strategy, either limited to the eligible equipment within the project scope of work, or including all new and existing equipment. For existing equipment, ENERGY STAR or EPEAT requirements may be referenced to the date of purchase of the equipment.

Percent of Eligible Equipment Installed by Rated Power:

- 20% (1 point)
- 40% (2 points)
- 60% (3 points)
- 80% (4 points)
- 100% (5 points)

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. At a minimum, energy consumption must be tracked at one-month intervals.

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

Option 2. Advanced Metering (2 points)

Install *advanced energy metering* for the following:

- all 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

ID&C

1–5 points

This credit applies to

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

Intent

To reduce the environmental and economic harms associated with fossil fuel energy and reduce greenhouse gas emissions by increasing self-supply of renewable energy and the use of grid-source, renewable energy technologies and carbon mitigation projects.

Requirements

CI, RETAIL, HOSPITALITY

Use on-site renewable energy systems, procure renewable energy offsite, or purchase Energy Attribute Certificates (EACs) or carbon offsets to meet or offset annual building greenhouse gas emissions.

Projects may choose one or more strategies for renewables procurement from the categories below. Points achieved in each category may be added for up to a total of 5 points.

Environmental benefits of all procurement must be retained by the project.

All off-site qualifying resources must be contracted, owned, or leased for at least 10 years or the remainder of the tenant lease term, whichever is greater.

Existing off-site renewables, EACs and carbon offsets must be procured from projects that have come online or been built within the last 15 years.

Table 1. Points for Renewables Procurement

Points	On-Site Renewables	New Off-Site Renewables	Existing Off-Site Renewables	Green-e Certified: EACs & Carbon Offsets	EACs & Carbon Offsets
1	2%	20%	60%	100%	150%
2	6%	40%	80%	200%	
3	15%	60%	100%	300%	
4	35%	80%			
5	60%	100%			
EP	100%				

New Off-site Renewables: built within the last year or contracted prior to renewable energy project development.

Existing Off-site Renewables: contracted from an existing renewable energy provider.

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

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 refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to 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:

IP units	SI units
$\frac{LCGW}{P} + \frac{LCOD}{P} \times 10^5 \leq 100$	$\frac{LCGW}{P} + \frac{LCOD}{P} \times 10^5 \leq 13$
Calculation definitions for LCGWP + LCODP x 10 ⁵ ≤ 100 (IP units)	Calculation definitions for LCGWP + LCODP x 10 ⁵ ≤ 13 (SI units)
LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life	LCODP = [ODPr x (Lr x Life +Mr) x Rc]/Life
LCGWP = [GWPr x (Lr x Life +Mr) x Rc]/Life	LCGWP = [GWPr x (Lr x Life +Mr) x 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 ₂ /Ton-Year)	LCGWP: Lifecycle Direct Global Warming Potential (kg CO ₂ /kW-year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO ₂ /lbr)	GWPr: Global Warming Potential of Refrigerant (0 to 12,000 kg CO ₂ /kg r)
ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lb CFC 11/lbr)	ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 kg CFC 11/kg r)
Lr: Refrigerant Leakage Rate	Lr: Refrigerant Leakage Rate

(2.0%)	(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:

IP units	SI 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 [$\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}] / Q_{total} \leq 100$ (IP units)	Calculation definitions for [$\sum (LCGWP + LCODP \times 10^5) \times Q_{unit}] / Q_{total} \leq 13$ (SI 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 (2.72 kg of refrigerant per kW) 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.

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.
- 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 including expected diversion rates for each material stream.

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. Include materials destined for ADC in the calculations as waste. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.

MR CREDIT: 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

1-5 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, 260.12.

- 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: BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION— ENVIRONMENTAL PRODUCT DECLARATIONS

ID&C

1-2 points

This credit applies to

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

Intent

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

Requirements

CI, RETAIL, HOSPITALITY

Achieve one or more of the options below, for a maximum of 2 points.

Option 1. Environmental Product Declaration (EPD) (1 point)

Use at least 10 different permanently installed products sourced from at least three different manufacturers that meet one of the disclosure criteria below.

- Life-cycle assessment and environmental product declarations.
 - Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.
 - Product-specific Type III EPD -- Internally Reviewed. Products with an internally critically reviewed LCA in accordance with ISO 14071. Products with product-specific internal EPDs which conform to ISO 14025, and EN 15804 or ISO 21930 and have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.
 - Industry-wide Type III EPD -- Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. Products with industry-wide EPDs, which conform to ISO 14025, and EN 15804 or ISO 21930 and have at least a cradle to gate scope are valued as one whole product for the purposes of credit achievement calculation.
- Environmental Product Declarations which conform to ISO 14025 and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - Product-specific Type III EPD -- Products with third-party certification (Type III), including external verification and external critical review in which the manufacturer is explicitly recognized as the participant by the program operator are valued as 1.5 products for the purposes of credit achievement calculation.
- USGBC approved program – Products that comply with other USGBC approved environmental product declaration frameworks.

Option 2. Multi-Attribute Optimization (1 point)

Use products that comply with one of the criteria below for 10%, by cost, of the total value of permanently installed products in the project or use at least 10 permanently installed products sourced from at least three different manufacturers. Products will be valued as below.

Life Cycle Impact Reduction Action Plan (value at 50% by cost or ½ product)

The manufacturer has produced a product specific LCA using EN 15804 or ISO 21930 for the product and has provided a publicly available action plan to mitigate or reduce life cycle impacts. The action plan must be product-specific using the specified PCR functional unit, be critically reviewed, and must include the following information:

- Description of the LCA conducted including the dataset, software or platform used by manufacturer to complete the analysis.
- Identification of the largest life cycle impact areas identified in the analysis and a narrative description of the impact areas targeted for reduction in the action plan.
- Description of specific steps anticipated in implementation of the action plan. Include proposed changes in formulation or manufacturing processes that are planned as part of impact reduction strategy.
- Specific dates and a full timeline for completion of all the steps described in the action plan.

Life Cycle Impact Reductions in Embodied Carbon.

Products that have demonstrated environmental impact reductions for the specified functional unit based on a current third-party EPD or verified LCA that conforms to the comparability requirements of ISO 14025 and ISO 21930.

- The comparative analysis must show impact reduction in the global warming potential (GWP) impact category and must include a narrative describing how reductions in impacts were achieved. The published comparisons must be third-party verified (value at 100% by cost or 1 product).
- The comparative analysis must show impact reduction(s) of at least 10% in the global warming potential (GWP) impact category and must include a narrative describing how the impact reductions were achieved. The published comparisons must be third-party verified (value at 150% by cost or 1.5 products).
- The comparative analysis must show impact reduction(s) of at least 20% in the global warming potential (GWP) impact category, and demonstrate at least 5% reduction in two additional impact categories. A narrative describing how the impact reductions were achieved is required. The published comparisons must be third-party verified (value at 200% by cost or 2 products).

Impact categories:

- global warming potential (greenhouse gases), in CO₂e;
 - depletion of the stratospheric ozone layer, in kg CFC-11e;
 - acidification of land and water sources, in moles H⁺ or kg SO₂e;
 - eutrophication, in kg nitrogen eq or kg phosphate eq;
 - formation of tropospheric ozone, in kg NO_x, kg O₃ eq, or kg ethene; and
 - depletion of nonrenewable energy resources, in MJ using CML / depletion of fossil fuels in TRACI.
- USGBC approved program -- Products that comply with other USGBC approved multi-attribute frameworks.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing cost (or number of products), up to a maximum of 200% of cost or 2 products.

For all options

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

MR CREDIT: BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – SOURCING 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 encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

Requirements

CI, RETAIL CI, HOSPITALITY CI

Responsible Sourcing of Raw Materials (1-2 points)

Use products sourced from at least three different manufacturers that meet at least one of the responsible sourcing and extraction criteria below for at least 20%, by cost, of the total value of permanently installed building products in the project (1 point).

Use products sourced from at least five different manufacturers that meet at least one of the responsible sourcing and extraction criteria below for at least 40%, by cost, of the total value of permanently installed building products in the project (2 points).

- *Extended producer responsibility.* Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.
- *Bio-based materials.* Bio-based raw materials other than wood must be tested using 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.
 - Bio-based products that meet the criteria above: value at 50% of cost multiplied by the biobased content of the product for the purposes of credit achievement calculation.
 - Bio-based products that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard: value at 100% of cost multiplied by the biobased content of the product for the purposes of credit achievement calculation.
- *Wood products.* Wood products must be certified by the Forest Stewardship Council or USGBC-approved equivalent. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- *Materials reuse.* Reuse includes salvaged, refurbished, or reused products. Products meeting materials reuse criteria are valued at 200% of their cost for the purposes of credit achievement calculation.
- *Recycled content.* Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.

- Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on weight.
- The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
- *USGBC approved program.* Other USGBC approved programs meeting responsible sourcing and extraction criteria.

For credit achievement calculation, products sourced (extracted, manufactured and purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing cost (or number of products), up to a maximum of 200% of cost, or 2 products.

For all options

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

MR CREDIT: BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – MATERIAL INGREDIENTS

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 use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

Requirements

CI, RETAIL CI, HOSPITALITY CI

Option 1. Material Ingredient Reporting (1 point)

Use at least 10 different permanently installed products from at least three different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm).

- *Manufacturer Inventory.* The manufacturer has published complete content inventory for the product following these guidelines:
 - A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN) and/or European Community Number (EC Number).
 - Materials defined as trade secret or intellectual property may withhold the name and/or CASRN/EC Number but must disclose ingredient/chemical role, amount and hazard score/class using either:
 - Greenscreen List Translator (LT) score and/or Full GreenScreen Benchmark (BM)
 - The Globally Harmonized System of Classification and Labeling of Chemicals rev.6 (2015) (GHS)
 - The hazard screen must be applied to each trade secret ingredient and the inventory lists the hazard category for each of the health hazards included in Part 3 of GHS (e.g. “GHS Category 2 Carcinogen”).
- *Health Product Declaration.* The installed product has a published and complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard.
- *Cradle to Cradle.* Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.
- *Declare.* The Declare product label meet the following requirements:
 - Declare labels designated as Red List Free or Declared.
 - Declare labels designated as LBC Compliant that demonstrate content inventory to 0.1% (1000 ppm).

- ANSI/BIFMA e3 Furniture Sustainability Standard. The documentation from the assessor or scorecard from BIFMA must demonstrate the product earned at least 3 points under 7.5.1.3 Advanced Level in e3-2014 or 3 points under 7.4.1.3 Advanced Level in e3-2012.
- Product Lens Certification
- Facts - NSF/ANSI 336: Sustainability Assessment for Commercial Furnishings Fabric at any certification level
- USGBC *approved program*. Other USGBC approved programs meeting the material ingredient reporting criteria.

Any compliant reports above with third-party verification that includes the verification of content inventory are worth 1.5 products for credit achievement calculations.

AND/OR

Option 2: Material Ingredient Optimization (1 point)

Use products from at least three different manufacturers that document their material ingredient optimization using the paths below for at least 10%, by cost, of the total value of permanently installed products in the project or use at least 10 permanently installed products from at least three different manufacturers.

Material Ingredient Screening and Optimization Action Plan (value at 50% by cost or ½ product)

- The manufacturer has screened the product to at least 1,000 ppm and has provided a publicly available inventory meeting the requirements of Option 1 and completed a detailed action plan to mitigate or reduce known hazards using the principles of green chemistry. The action plan must be product-specific (not company, manufacturer or brand), and must include the following information:
 - Description of the screening or assessment platform used by manufacturer to complete the material ingredient screening and analysis.
 - Identification of the specific green chemistry principles targeted for implementation in the action plan.
 - Description of specific steps anticipated in implementation of the action plan. Include proposed changes in formulation or manufacturing processes that are planned as part of green chemistry optimization strategy.
 - Specific dates and a full timeline for completion of all the steps described in the action plan.

Advanced Inventory & Assessment (value at 100% by cost or 1 product):

- The end use product meets the requirements of any of the following:
 - Manufacturer Inventory or Health Product Declaration: The product has demonstrated a chemical inventory to at least 0.01% by weight (100 ppm) with no GreenScreen LT-1 hazards or GHS Category 1 hazards. The HPD or Manufacturer Inventory must be third party verified.
 - Manufacturer Inventory or HPD: The product has demonstrated a chemical inventory to at least 0.01% by weight (100ppm) AND at least 75% by weight of product is assessed using GreenScreen Benchmark assessment. The remaining 25% by weight of product has been inventoried. The GreenScreen assessment must be publicly available. The HPD or Manufacturer Inventory must be third-party verified.
 - Declare labels designated as Red List Free that are third-party verified.
 - Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Bronze level or higher.

Material Ingredient Optimization (value at 150% by cost or 1.5 products)

- The end use product has demonstrated a product inventory and assessment of ingredients using any of the following programs:
 - Manufacturer Inventory or HPD: The product has demonstrated a chemical inventory to at least 0.01% by weight (100ppm) AND at least 95% by weight of product is assessed using GreenScreen Benchmark assessment. No Benchmark 1 hazards (BM-1) are present in the end use product. The remaining 5% by weight of product not assessed has been inventoried and screened using GreenScreen List Translator and no GreenScreen LT-1 hazards are present in the end use product. The documents must be third party verified.
 - Cradle to Cradle. Product has Material Health Certificate or is Cradle to Cradle Certified™ under standard version 3 or later with a Material Health achievement level at the Silver level or higher. .

International Alternative Compliance Path – REACH Optimization (value at 100% of cost of 1 product)

- End use products and materials have fully inventoried chemical ingredients to 100 ppm and assess each substance against the Authorization List – Annex XIV, the Restriction list – Annex XVII and the SVHC candidate list, (the version in effect in June 2013), proving that no such substance is included in the product. If the product contains no ingredients listed on the REACH Authorization, Restriction, and Candidate list.

USGBC approved program.

- Products that comply with USGBC approved building product optimization criteria for material ingredient optimization and/or advanced inventory & assessment pathways.

For credit achievement calculation of options 2 and 3, products sourced (extracted, manufactured, and purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing cost (or number of products), up to a maximum of 200% of cost or 2 products.

For all options

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 from calculations. Include materials destined for alternative daily cover (ADC) in the calculations as waste (not diversion). 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 international projects 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 1a. Divert 50% and 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 1b. Divert 50% using Certified Commingled Recycling Facility and One More Material Stream (1 Point)

Divert at least 50% of the total construction and demolition material; diverted materials must include at least two material streams. All commingled recycling is required to be one of the streams and must be sent to offsite sorting facility(ies) certified by the Recycling Certification Institute or approved equivalent.

OR

Path 2a. Divert 75% and 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

Path 2b. Divert 75% using Certified Commingled Recycling Facility and Two More Material Streams (2 points)

Divert at least 75% of the total construction and demolition material; diverted materials must include at least three material streams. All commingled recycling is required to be one of the streams and must be sent to offsite sorting facility(ies) certified by the Recycling Certification Institute or approved equivalent.

OR

Option 2. Reduction of Total (Construction and Demolition) Waste Material (2 points)

Salvage or recycle at least 75% of all demolition and renovation debris (not including ADC) and utilize onsite waste minimizing design strategies for new construction activities. Create a narrative describing how the project is addressing waste prevention and/or achieving waste generation thresholds via design strategies.

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 for all CI projects.

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

Mechanically Ventilated Spaces

For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), meet the requirements for both ventilation (Case 1 Option 1 or Option 2 or Case 2) and monitoring.

Mechanical Ventilation

Case 1. Systems Able to Meet Required Outdoor Airflow Rates

Option 1. ASHRAE Standard 62.1–2016

Meet the minimum requirements of ASHRAE Standard 62.1–2016, Sections 4, 5, 6.2, 6.5, and 7 or a local equivalent, whichever is more stringent.

OR

Option 2. ISO 17772-1:2017 and EN 16798-3: 2017

Projects outside the U.S. may instead meet the requirements of using Method 1—Perceived air quality with Category I or II and local standard for ventilation system design such as EN Standard 16798-3: 2017, Sections 7-10.

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.

Monitoring for mechanical ventilation systems

Provide outdoor air monitors for all mechanical ventilation systems in the project scope of work with outdoor air intake flow greater than 1000 cfm (472 L/s). The monitoring device must be capable of measuring the minimum outdoor air intake flow and be capable of measuring the design minimum outdoor air intake flow with an accuracy of $\pm 10\%$. An alarm must indicate when the outdoor airflow value varies by 15% or more from the outdoor airflow setpoint.

Alternatively, for constant-volume systems included in the project scope of work, that do not employ demand control ventilation, provide an indicator capable of confirming the intake damper is open to the position needed to maintain the design minimum outdoor airflow as determined during the system startup and balancing.

Naturally Ventilated Spaces

For naturally ventilated spaces (and for mixed-mode systems when the mechanical ventilation is inactivated), 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 for both ventilation (Option 1, Option 2, or Option 3) and monitoring.

Natural Ventilation

- **Option 1. ASHRAE Standard 62.1-2016**

Meet the requirements of ASHRAE 62.1-2016, Sections 4, 6.4, and 6.5.

OR

- **Option 2. Engineered natural ventilation system**

Meet the requirements of ASHRAE 62.1-2016, Sections 4 and 6.5, and have an engineered natural ventilation system approved by the authority having jurisdiction (per exception 1 of ASHRAE 62.2-2016 section 6.4).

OR

- **Option 3. Existing building**

This option is available to projects located in an existing building.

Meet the requirements of ASHRAE 62.1-2016, Sections 4, 6.4.1, 6.4.2, 6.4.3, and 6.5.

Monitoring for natural ventilation systems

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. *This strategy is not allowed for projects using Ventilation Option 3. Existing building.*
- 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 (CO₂) concentrations within each thermal zone. CO₂ monitors must be between 3 and 6 feet (900 and 1 800 millimeters) above the floor and within the thermal zone. CO₂ monitors must have an audible or visual indicator or alert the building automation system if the sensed CO₂ concentration exceeds the setpoint by more than 10%. Calculate appropriate CO₂ setpoints by using the methods in ASHRAE 62.1–2016, Appendix D.

All Spaces

The indoor air quality procedure defined in ASHRAE Standard 62.1–2016, Section 6.3 may not be used to comply with this prerequisite.

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

For this prerequisite smoking includes tobacco smoke, as well as smoke produced from the combustion of cannabis and controlled substances and the emissions produced by electronic smoking devices.

Option 1

Locate the project in a building that prohibits smoking inside the building.

Smoking must also be prohibited outside the building except in designated smoking areas located at least 25 feet (7.5 meters) (or the maximum extent allowable by local codes) from all entries, outdoor air intakes, and operable windows. This smoking requirement also applies to any spaces outside the property line that are used for business purposes.

Communicate the no-smoking policy to occupants. Have in place provisions for enforcement or no-smoking signage.

Option 2

Prohibit smoking in the project spaces.

Smoking must also be prohibited in all common areas used by the project occupants and any areas of the building served by the same HVAC system as the project.

If smoking is permitted in other areas of the building, ensure that ETS cannot migrate by either mechanical or natural ventilation into the project spaces.

Communicate the no-smoking policy to occupants of the project. Have in place provisions for enforcement or no-smoking signage.

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 all of 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 regularly used 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 (2.54 l/s per square meter), 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 52.2–2017; or
- Equivalent filtration media class of ePM₁ 50% or higher, as defined by ISO 16890-2016, 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 one the following requirements

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 (select one):

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

Mixed-mode systems (select one):

- A. exterior contamination prevention;
- B. increased ventilation;
- D. additional source control and monitoring; or
- 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 (or local equivalent for projects outside the U.S., 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 CO₂ concentrations within all densely occupied spaces. CO₂ monitors must be between 3 and 6 feet (900 and 1 800 millimeters) above the floor. CO₂ monitors must have an audible or visual indicator or alert the building automation system if the sensed CO₂ concentration exceeds the setpoint by more than 10%. Calculate appropriate CO₂ setpoints using methods in ASHRAE 62.1–2016, Appendix D.

D. Additional Source Control and Monitoring

For spaces where air contaminants are likely, evaluate potential sources of additional air contaminants besides CO₂. 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 MATERIALS

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

Use materials on the building interior (everything within the waterproofing membrane) that meet the low-emitting criteria below. Points are awarded according to Table 1:

2 product categories	1 point
3 product categories	2 points
4 product categories	3 points
5 product categories	3 points + exemplary performance
Reach 90% threshold in at least three product categories	Exemplary performance <i>or</i> 1 additional point if only 1 or 2 points achieved above.

Paints and Coatings

At least 75% of all paints and coatings, **by volume or surface area**, meet the *VOC emissions evaluation* AND 100% meet the *VOC content evaluation*.

The paints and coatings product category includes all interior paints and coatings applied on site.

Adhesives and Sealants

At least 75% of all adhesives and sealants, **by volume or surface area**, meet the *VOC emissions evaluation* AND 100% meet the *VOC content evaluation*.

The adhesives and sealants product category includes all interior adhesives and sealants applied on site.

Flooring

At least 90% of all flooring, **by cost or surface area**, meets the *VOC emissions evaluation* OR *inherently nonemitting sources criteria*, OR *salvaged and reused materials criteria*.

The flooring product category includes all types of hard and soft surface flooring (carpet, ceramic, vinyl, rubber, engineered, solid wood, laminates), wall base, underlayments, and other floor coverings.

Subflooring is excluded.

Wall panels

At least 75% of all wall panels, **by cost or surface area**, meet the *VOC emissions evaluation*, *OR inherently nonemitting sources criteria*, *OR salvaged and reused materials criteria*.

The wall panels product category includes all finish wall treatments (wall coverings, wall paneling, wall tile), surface wall structures such as gypsum or plaster, cubicle/curtain/partition walls, trim, doors, frames, windows, and window treatments.

Removable/interchangeable fabric panels, built-in cabinetry, and vertical structural elements are excluded.

Ceilings

At least 90% of all ceilings, **by cost or surface area**, meet the *VOC emissions evaluation*, *OR inherently nonemitting sources criteria*, *OR salvaged and reused materials criteria*.

The ceilings product category includes all ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems (including canopies and clouds), and glazed skylights.

Overhead structural elements (exposed, finished, and unfinished) are excluded.

Insulation

At least 75% of all insulation, meets the *VOC emissions evaluation*.

The insulation material category includes all thermal and acoustic boards, batts, rolls, blankets, sound attention fire blankets, foamed-in place, loose-fill, blown, and sprayed insulation.

Insulation for HVAC ducts and plumbing piping are excluded.

Furniture

At least 75% of all furniture in the project scope of work, **by cost**, meets the *VOC emissions evaluation*, *OR inherently nonemitting sources criteria*, *OR salvaged and reused materials criteria*.

The furniture product category includes all stand-alone furniture items purchased for the project.

Composite Wood

At least 75% of all composite wood, **by cost or surface area**, meets the *Formaldehyde emissions evaluation OR salvaged and reused materials criteria*.

The composite wood product category includes all particleboard, medium density fiberboard, hardwood veneer plywood, and structural composite wood not included in the flooring, ceiling, wall panels, or furniture material categories.

Low-emitting criteria

Inherently nonemitting sources

Product is an inherently nonemitting source of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood) and has no integral organic-based surface coatings, binders, or sealants.

Salvaged and reused materials

Product is more than one year old at the time of use. If finishes are applied to the product on-site, the finishes must meet the *VOC emissions evaluation AND VOC content evaluation* requirements.

VOC emissions evaluation.

Option 1. Product has been tested according to California Department of Public Health (CDPH) Standard Method v1.2–2017 and complies with the VOC limits in Table 4-1 of the method. Additionally, the range of total VOCs after 14 days (336 hours) was measured as specified in the CDPH Standard Method v1.2 and reported (TVOC ranges: 0.5 mg/m³ or less, between 0.5 and 5 mg/m³, or 5 mg/m³ or more). Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use. Products used in school classrooms must be evaluated using the classroom scenario, products used in other spaces must be evaluated using the default private office scenario.

The statement of product compliance must include the exposure scenario used, the amount of wet-applied product applied in mass per surface area (if applicable), the range of total VOCs, and follow guidelines in CDPH Standard Method v1.2-2017, Section 8. Organizations that certify manufacturers' claims must be accredited under ISO Guide 17065.

Option 2. Product has been tested according to CEN TS 16516 and complies with the LCI values from Table 1 of the German AgBB Testing and Evaluation Scheme (2015) and a formaldehyde limit of 10 micrograms per cubic meter.

Additionally, the range of total VOCs after 28 days was measured as specified in EN 16516 and reported (TVOC ranges: 0.5 mg/m³ or less, between 0.5 and 5 mg/m³, or 5 mg/m³ or more). Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use.

The statement of product compliance must include the amount of wet-applied product applied in mass per surface area (if applicable) and the range of total VOCs. Organizations that certify manufacturers' claims must be accredited under ISO Guide 17065.

VOC content evaluation

Product meets the VOC content limits outlined in one of the applicable standards and for projects in North America, methylene chloride and perchloroethylene may not be intentionally added.

Statement of product compliance must be made by the manufacturer. Any testing must follow the test method specified in the applicable 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.

- Paints and coatings:
 - California Air Resource Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings
 - South Coast Air Quality Management District (SCAQMD) Rule 1113, effective February 5, 2016
 - European Decopaint Directive (2004/42/EC)
 - Hong Kong Air pollution control (VOC) Regulation for regulated architectural paints (January 2010)
- Adhesives and sealants:
 - SCAQMD Rule 1168, October 6, 2017
 - Canadian VOC Concentration Limits for Architectural Coatings (SOR/2009-264)
 - Hong Kong Air Pollution Control (VOC) Regulation for regulated adhesives and regulated sealants (April 2012)
 - Free of solvents, as defined in TRGS 610 (January 2011)

Formaldehyde Emissions Evaluation

Product meets one of the following:

- EPA TSCA Title VI or California Air Resources Board (CARB) ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins
- EPA TSCA Title VI or CARB ATCM formaldehyde requirements for no added formaldehyde resins (NAF).
- Tested per EN 717-1:2014 for formaldehyde emissions and complies with emissions class E1. Structural composite wood product made with moisture resistant adhesives meeting ASTM 2559, no surface treatments with added urea-formaldehyde resins or coatings, and certified according to one of the following industry standards:
 - Plywood: compliant in accordance with *Voluntary Product Standard - Structural Plywood (PS 1-09)*, *Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10)*, or one of the standards considered by CARB to be equivalent to PS 1 or PS 2: (AS/NZS 2269, EN 636 3S (including CE label), Canadian Standards Association CSA O121 for Douglas fir plywood, CSA O151 for Canadian softwood plywood, for CSA O153 Poplar plywood, or CSAO325 for Construction sheathing)
 - Oriented strand board: specified with the Exposure 1 or Exterior bond classification in accordance with *Voluntary Product Standard – Performance Standard for Wood-Based Structural-Use Panels (PS 2-10)*
 - Structural composite lumber: compliant in accordance with *Standard Specification for Evaluation of Structural Composite Lumber Products (ASTM D 5456-13)*
 - Glued laminated timber: compliant in accordance with *Structural Glued Laminated Timber (ANSI A190.1-2012)*
 - I-joists compliant in accordance with *Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists (ASTM D 5055-13)*
 - Cross-laminated timber: compliant in accordance with *Standard for Performance-Rated Cross-Laminated Timber (PRG 320-15)*
 - Finger-jointed lumber labeled “Heat Resistant Adhesive (HRA)” in accordance with the *American Softwood Lumber Standard (DOC PS-20 2015)*

Furniture emissions evaluation

Product has been tested in accordance with ANSI/BIFMA Standard Method M7.1–2011 (R2016) and complies with ANSI/BIFMA e3-2014e Furniture Sustainability Standard, Sections 7.6.1 (for half credit, by cost) OR 7.6.2 (for full credit, by cost). If 75% of the furniture also complies with Section 7.6.3 in addition to 7.6.2, the category counts for exemplary level (90%).

Seating products must be evaluated using the seating scenario. Classroom furniture must be evaluated using the standard school classroom scenario. Other products should be evaluated using the open plan or private office scenario, as appropriate. The open plan scenario is more stringent.

Statements of product compliance must include the exposure scenario(s). Organizations that certify manufacturers' claims must be accredited under ISO Guide 17065.

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 media with ISO_{coarse} 90% or higher, as defined by ISO 16890-2016, 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 smoking inside the building and within 25 feet (7.5 meters) of the building openings during construction. Smoking includes tobacco smoke, as well as smoke produced from the combustion of cannabis and controlled substances and the emissions produced by electronic smoking devices.

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 (4 267 140 liters of outdoor air per square meter) of gross 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 (1 066 260 liters of outdoor air per square meter) of gross 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 per second per square meter of outside air) 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 (4 270 liters 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 in occupied spaces for the contaminants listed in Path 1. Particulate matter and inorganic gases (for 1 point) and/or Path 2. Volatile organic compounds (for 1 point). Retail projects may conduct the testing within 14 days of occupancy.

Path 1. Particulate Matter and Inorganic Gases (1 point)

Test for the particulate matter (PM) and inorganic gases listed in Table 1, using an allowed test method, and demonstrate the contaminants do not exceed the concentration limits listed in the table.

Table 1. Particulate Matter and inorganic gases

Contaminant (CAS#)	Concentration Limit ($\mu\text{g}/\text{m}^3$)	Allowed Test Methods
Carbon monoxide (CO)	9 ppm; no more than 2 ppm above outdoor levels	ISO 4224 EPA Compendium Method IP-3 GB/T 18883-2002 for projects in China Direct calibrated electrochemical instrument with accuracy of (+/- 2% ppm <50 ppm minimum accuracy).
PM 10	ISO 14644-1:2015, cleanroom class of 8 or lower 50 $\mu\text{g}/\text{m}^3$	Particulate monitoring device with accuracy greater of 5 micrograms/ m^3 or 20% of reading and resolution (5 min average data) +/- 5 $\mu\text{g}/\text{m}^3$
PM 2.5	12 $\mu\text{g}/\text{m}^3$ or 35 $\mu\text{g}/\text{m}^3$ **	
Ozone	0.07 ppm	Monitoring device with accuracy greater of 5 ppb or 20% of reading and resolution (5 min average data) +/- 5 ppb ISO 13964 ASTM D5149 -- 02 EPA designated methods for Ozone

**Projects in areas with high ambient levels of PM2.5 (known EPA nonattainment areas for PM2.5, or local equivalent) must meet the 35 $\mu\text{g}/\text{m}^3$ limit, all other projects should meet the 12 $\mu\text{g}/\text{m}^3$ limit.

AND/OR

Path 2. Volatile Organic Compounds (1 point)

Perform a screening test for Total Volatile Organic Compounds (TVOC). Use ISO 16000-6, EPA TO-17, or EPA TO-15 to collect and analyze the air sample. Calculate the TVOC value per EN 16516:2017, CDPH Standard Method v1.2 2017 section 3.9.4, or alternative calculation method as long as full method description is included in test report. If the TVOC levels exceed 500 $\mu\text{g}/\text{m}^3$, investigate for potential issues by comparing the individual VOC levels from the GC/MS results to associated cognizant authority health-based limits. Correct any identified issues and re-test if necessary.

Additionally, test for the individual volatile organic compounds listed in Table 2 using an allowed test method and demonstrate the contaminants do not exceed the concentration limits listed in the table. Laboratories that conduct the tests must be accredited under ISO/IEC 17025 for the test methods they use.

Exemplary performance is available for projects that test for the additional target volatile organic compounds specified in CDPH Standard Method v1.2-2017, Table 4-1 and do not exceed the full CREL levels for these compounds adopted by Cal/EPA OEHHA in effect on June 2016.

Table 2. Volatile organic compounds

Contaminant (CAS#)	Concentration Limit ($\mu\text{g}/\text{m}^3$)	Allowed Test Methods
Formaldehyde 50-00-0	20 $\mu\text{g}/\text{m}^3$ (16 ppb)	ISO 16000-3, 4; EPA TO-11a, EPA comp. IP-6 ASTM D5197-16
Acetaldehyde 75-07-0	140 $\mu\text{g}/\text{m}^3$	
Benzene 71-43-2	3 $\mu\text{g}/\text{m}^3$	ISO 16000-6 EPA IP-1, EPA TO-17, EPA TO-15 ISO 16017-1, 2; ASTM D6196-15
Hexane (n-) 110-54-3	7000 $\mu\text{g}/\text{m}^3$	
Naphthalene 91-20-3	9 $\mu\text{g}/\text{m}^3$	
Phenol	200 $\mu\text{g}/\text{m}^3$	
Styrene 100-42-5	900 $\mu\text{g}/\text{m}^3$	
Tetrachloroethylene 127-18-4	35 $\mu\text{g}/\text{m}^3$	
Toluene 108-88-3	300 $\mu\text{g}/\text{m}^3$	
Vinyl acetate 108-05-4	200 $\mu\text{g}/\text{m}^3$	
Dichlorobenzene (1,4-) 106-46-7	800 $\mu\text{g}/\text{m}^3$	
Xylenes-total 108-38-3, 95-47-6, and 106-42-3	700 $\mu\text{g}/\text{m}^3$	

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 55-2017

Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55–2017, Thermal Comfort Conditions for Human Occupancy with errata or a local equivalent.

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 Standards

Design HVAC systems and the building envelope to meet the requirements of the applicable standard:

- ISO 7730:2005, Ergonomics of the Thermal Environment, analytical determination and interpretation of thermal comfort, using calculation of the PMV and PPD indices and local thermal comfort criteria; and
- ISO 17772-2017 of Energy Performance of Buildings, Indoor environmental quality- Part 1. Indoor environmental input parameters for the design and assessment of energy performance of buildings Section A2.

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.

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 spaces 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 illumination level (not including daylight contributions).

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

- Have in place 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.
- Switches or manual controls must be located in the same space as 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 of the following strategies.

- A. For all regularly occupied spaces, use light fixtures with a luminance of less than 2,500 cd/m² between 45 and 90 degrees from nadir.
Exceptions include wallwash fixtures properly aimed at walls, as specified by manufacturer's data, indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above, and any other specific applications (i.e. adjustable fixtures).
- B. For the entire project, use light sources with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, or other special use.
- C. For at least 75% of the total connected lighting load, use light sources that have a rated life (or L70 for LED sources) of at least 24,000 hours (at 3-hour per start, if applicable).
- D. Use direct-only overhead lighting for 25% or less of the total connected lighting load for all regularly occupied spaces.
- E. For at least 90% of the regularly occupied floor area, meet or exceed the following thresholds for area-weighted average surface reflectance: 85% for ceilings, 60% for walls, and 25% for floors.

- F. If furniture is included in the scope of work, select furniture finishes to meet or exceed the following thresholds for area-weighted average surface reflectance: 45% for work surfaces, and 50% for movable partitions.
- G. For at least 75% of the regularly occupied floor area, meet a ratio of average wall surface illuminance (excluding fenestration) to average work plane (or surface, if defined) illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 60% for walls.
- H. For at least 75% of the regularly occupied floor area, meet a ratio of average ceiling illuminance (excluding fenestration) to work surface illuminance that does not exceed 1:10. Must also meet strategy E, strategy F, or demonstrate area-weighted surface reflectance of at least 85% for ceilings.

RETAIL CI

For at least 90% of the individual occupant spaces 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 the maximum illumination level not including daylight contributions).

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.

AND

Select one of the following three options.

Option 1. Simulation: Spatial Daylight Autonomy and Annual Sunlight Exposure (1–3 points, 1-2 points Healthcare)

Perform annual computer simulations for spatial daylight autonomy_{300/50%} (sDA_{300/50%}), and annual sunlight exposure_{1000,250} (ASE_{1000,250}) as defined in IES LM-83-12 for each regularly occupied space. Additionally, calculate the average sDA_{300/50%} value for the total regularly occupied floor area.

For any regularly occupied spaces with ASE_{1000,250} greater than 10%, identify how the space is designed to address glare.

Points are awarded according to Table 1.

Table 1. Points for Option 1

The average sDA _{300/50%} value for the regularly occupied floor area is at least 40%	1 point
The average sDA _{300/50%} value for the regularly occupied floor area is at least 55%	2 points
The average sDA _{300/50%} value for the regularly occupied floor area is at least 75%	3 points
Each regularly occupied space achieves sDA _{300/50%} value of at least 55%	<i>Exemplary performance or 1 additional point if only 1 or 2 points achieved above.</i>

The sDA and ASE calculation grids should be no more than 2 feet (600 millimeters) square and laid out across the regularly occupied area at a work plane height of 30 inches (760 millimeters) 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.

Include any permanent interior obstructions and moveable furniture and partitions.

OR

Option 2. Simulation: Illuminance Calculations (1–3 points, 1-2 points Healthcare)

Perform computer simulations for illuminance at 9 a.m. and 3 p.m. on a clear-sky day at the equinox for each regularly occupied space. Demonstrate illuminance levels are between 300 lux and 3,000 lux at both 9 a.m. and 3 p.m. Spaces with view-preserving automatic (with manual override) glare-control devices may demonstrate compliance for only the minimum 300 lux illuminance level.

Points are awarded according to Table 2.

Table 2. Points for Option 2

<i>Percentage of regularly occupied floor area</i>	<i>Points</i>
55%	1
75%	2
90%	3

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

- Use typical meteorological year data, or an equivalent, for the nearest available weather station.
- 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 or shades from the model.

Include any permanent interior obstructions and moveable furniture and partitions.

OR

Option 3. Measurement (1-3 points, 1-2 points Healthcare)

Measure illuminance in each regularly occupied space.

Achieve illuminance levels between 300 lux and 3,000 lux. Spaces with view-preserving automatic (with manual override) glare-control devices may demonstrate compliance for only the minimum 300 lux illuminance level.

Points are awarded according to Table 3.

Table 3. Points for Option 3

<i>Percentage of regularly occupied floor area</i>	<i>Points</i>
55% at one time in the year	1
75% at two times in the year	2
90% at two times in the year	3

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.
- If pursuing one point, take one measurement in any regularly occupied month. If pursuing two points, take two measurements: 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 (900 millimeters) 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 (7.5 meters) 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 in "Windows and Offices; A Study of Office Worker Performance and the Indoor Environment."

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

Include any permanent interior obstructions and moveable furniture and partitions.

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 two of the following: HVAC background noise, Sound Transmission, and/or reverberation time. Meet all three for an exemplary performance point.

Confirm compliance via calculations or measurements in representative rooms, and/or design documentation from a person experienced in the field of acoustics.

HVAC Background Noise

Achieve maximum background noise levels from heating, ventilating, and air conditioning (HVAC) systems per 2015 ASHRAE Handbook-- HVAC Applications, Chapter 48, Table 1; AHRI Standard 885-2008, Table 15; or a local equivalent. .

If confirming compliance via measurements, use a sound level meter that conforms to ANSI S1.4 for type 1 (precision) or type 2 (general purpose) sound measurement instrumentation, the International Electrotechnical Commission (2013) IEC 61672-1:2013 Electroacoustics – Sound Level Meters – Part 1: Specifications, or a local equivalent.

Comply with design criteria for HVAC noise levels resulting from the sound transmission paths listed in 2015 ASHRAE Handbook ---HVAC Applications, Chapter 48, Table 6; or a local equivalent.

Sound Transmission

Categorize all occupied spaces by use and desired level of acoustic privacy.

Meet the composite sound transmission class (STC_c) ratings or noise insulation class (NIC) listed in Table 1. For NIC measurements, use ASTM E336-17a or Annex A.3 of ANSI S12.60-2010.

Table 1. Minimum composite sound transmission class ratings for adjacent spaces

Adjacency combinations		STC _c **	NIC**
Retail	Retail	50	
Collaborative / multi-use	Hallway, stairway	25	20
Private	Hallway, stairway	35	30
Confidential	Hallway, stairway	40	35
Collaborative / multi-use	Collaborative / multi-use	35	30
Collaborative / multi-use	Private	45	40
Collaborative / multi-use	Confidential	50	45
Private	Private	45	40
Private	Confidential	50	45

Confidential	Confidential	50	45
Conference room	Conference room	50	45
Mechanical equipment room*	Hallway, stairway	50	45
Mechanical equipment room	Occupied area	60	55

*Minimum STCc or NIC has to be met unless proven that the equipment noise in conjunction with the sound isolation performance of the partitions and doors will not exceed the maximum background noise requirements of the adjacent space.

**If a sound masking system is implemented at a minimum level of 40 dBA, the STCc ratings or NIC values in Table 1 may be lowered by 5 points. This applies to all space types except mechanical equipment rooms. The sound masking system must be designed by an acoustical professional and meet the following criteria:

- The overall level for sound masking must be set by an acoustical professional and must not exceed 48 dBA in open offices, libraries, cafeterias, corridors/hallways, 45 dBA in enclosed offices, and 42 dBA in conference rooms, and wellness rooms. The combined level of masking and HVAC background noise must not exceed these limits.
- The system design and commissioning must provide overall level uniformity of +/-1 dBA and one-third octave band uniformity of +/-2 dB from at least 100 to 5,000 Hz when tested according to ASTM E1573-18
- The sound masking spectrum must conform to the National Research Council of Canada COPE Optimum Masking Spectrum or an alternate spectrum if specified by an acoustical engineer.

Reverberation Time

Meet the reverberation time requirements in Table 2 (adapted from Table 9.1 in the Performance Measurement Protocols for Commercial Buildings¹).

Table 2. Reverberation time requirements

Room type	Application	T60 (sec), at 500 Hz, 1000 Hz, and 2000 Hz
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

¹ 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

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance credits.

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.

Examples of innovation may be found in the LEED Innovation Catalog.

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 v4 prerequisite or credit that allows exemplary performance, as specified in the LEED Reference Guide, v4 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.

APPENDICES

APPENDIX 1. USE TYPES AND CATEGORIES

Table 1. Use Types and Categories

Category	Use type
Food retail	Supermarket
	Grocery with produce section
Community-serving retail	Convenience store
	Farmers market
	Hardware store
	Pharmacy
	Other retail
Services	Bank
	Family entertainment venue (e.g., theater, sports)
	Gym, health club, exercise studio
	Hair care
	Laundry, dry cleaner
	Restaurant, café, diner (excluding those with only drive-thru service)
Civic and community facilities	Adult or senior care (licensed)
	Child care (licensed)
	Community or recreation center
	Cultural arts facility (museum, performing arts)
	Education facility (e.g., K—12 school, university, adult education center, vocational school, community college)
	Government office that serves public on-site
	Medical clinic or office that treats patients
	Place of worship
	Police or fire station
	Post office
	Public library
	Public park
	Social services center
Community anchor uses (BD&C and ID&C only)	Commercial office (100 or more full-time equivalent jobs)
	Housing (100 or more dwelling units)

Adapted from Criterion Planners, INDEX neighborhood completeness indicator, 2005.

APPENDIX 2. DEFAULT OCCUPANCY COUNTS

Use Table 1 to calculate default occupancy counts. Only use the occupancy estimates if occupancy is unknown.

For the calculation, use gross floor area, not net or leasable floor area. Gross floor area is defined as the sum of all areas on all floors of a building included within the outside faces of the exterior wall, including common areas, mechanical spaces, circulation areas, and all floor penetrations that connect one floor to another. To determine gross floor area, multiply the building footprint (in square feet or square meters) by the number of floors in the building. Exclude underground or structured parking from the calculation.

Table 1. Default Occupancy Numbers

	Gross square feet per occupant		Gross square meters per occupant	
	Employees	Transients	Employees	Transients
General office	250	0	23	0
Retail, general	550	130	51	12
Retail or service (e.g., financial, auto)	600	130	56	12
Restaurant	435	95	40	9
Grocery store	550	115	51	11
Medical office	225	330	21	31
R&D or laboratory	400	0	37	0
Warehouse, distribution	2,500	0	232	0
Warehouse, storage	20,000	0	1860	0
Hotel	1,500	700	139	65
Educational, daycare	630	105	59	10
Educational, K-12	1,300	140	121	13
Educational, postsecondary	2,100	150	195	14

Sources:

ANSI/ASHRAE/IESNA Standard 90.1-2004 (Atlanta, GA, 2004).
 2001 Uniform Plumbing Code (Los Angeles, CA)
 California Public Utilities Commission, 2004-2005 Database for Energy Efficiency Resources (DEER) Update Study (2008).
 California State University, Capital Planning, Design and Construction Section VI, Standards for Campus Development Programs (Long Beach, CA, 2002).
 City of Boulder Planning Department, Projecting Future Employment—How Much Space per Person (Boulder, 2002).
 Metro, 1999 Employment Density Study (Portland, OR 1999).
 American Hotel and Lodging Association, Lodging Industry Profile Washington, DC, 2008.
 LEED for Core & Shell Core Committee, personal communication (2003 - 2006).
 LEED for Retail Core Committee, personal communication (2007)
 OWP/P, Medical Office Building Project Averages (Chicago, 2008).
 OWP/P, University Master Plan Projects (Chicago, 2008).
 U.S. General Services Administration, Childcare Center Design Guide (Washington, DC,2003).

APPENDIX 3. RETAIL PROCESS LOAD BASELINES

Table 1a. Commercial kitchen appliance prescriptive measures and baseline for energy cost budget (IP units)

Appliance type	Baseline energy usage for energy modeling path				Levels for prescriptive path	
	Fuel	Function	Baseline efficiency	Baseline idle rate	Prescriptive efficiency	Prescriptive idle rate
Broiler, underfired	Gas	Cooking	30%	16,000 Btu/h/ft ² peak input	35%	12,000 Btu/h/ft ² peak input
Combination ovens, steam mode (P = pan capacity)	Elec	Cooking	40% steam mode	0.37P+4.5 kW	50% steam mode	0.133P+0.6400 kW
Combination ovens, steam mode	Gas	Cooking	20% steam mode	1,210P+35,810 Btu/h	38% steam mode	200P+6,511 Btu/h
Combination ovens, convection mode	Elec	Cooking	65% convection mode	0.1P+1.5 kW	70% convection mode	0.080P+0.4989 kW
Combination ovens, convection mode	Gas	Cooking	35% convection mode	322P+13,563 Btu/h	44% convection mode	150P+5,425 Btu/h
Convection oven, full-size	Elec	Cooking	65%	2.0 kW	71%	1.6 kW
Convection oven, full-size	Gas	Cooking	30%	18,000 Btu/h	46%	12,000 Btu/h
Convection oven, half-size	Elec	Cooking	65%	1.5 kW	71%	1.0 kW
Conveyor oven, > 25-inch belt	Gas	Cooking	20%	70,000 Btu/h	42%	57,000 Btu/h
Conveyor oven, ≤ 25-inch belt	Gas	Cooking	20%	45,000 Btu/h	42%	29,000 Btu/h
Fryer	Elec	Cooking	75%	1.05 kW	80%	1.0 kW
Fryer	Gas	Cooking	35%	14,000 Btu/h	50%	9,000 Btu/h
Griddle (based on 3 ft model)	Elec	Cooking	60%	400 W/ft ²	70%	320 W/ft ²
Griddle (based on 3 ft model)	Gas	Cooking	30%	3,500 Btu/h/ft ²	38%	2,650 Btu/h/ft ²
Hot food holding cabinets	Elec	Cooking	na	40 W/ft ³	na	21.5V Watts

(excluding drawer warmers and heated display), $0 < V < 13 \text{ ft}^3$ ($V =$ volume)						
Hot food holding cabinets (excluding drawer warmers and heated display), $13 \leq V < 28 \text{ ft}^3$	Elec	Cooking	na	40 W/ft ³	na	2.0V + 254 Watts
Hot food holding cabinets (excluding drawer warmers and heated display), $28 \text{ ft}^3 \leq V$	Elec	Cooking	na	40 W/ft ³	na	3.8V + 203.5 Watts
Large vat fryer	Elec	Cooking	75%	1.35 kW	80%	1.1 kW
Large vat fryer	Gas	Cooking	35%	20,000 Btu/h	50%	12,000 Btu/h
Rack oven, double	Gas	Cooking	30%	65,000 Btu/h	50%	35,000 Btu/h
Rack oven, single	Gas	Cooking	30%	43,000 Btu/h	50%	29,000 Btu/h
Range	Elec	Cooking	70%		80%	
Range	Gas	Cooking	35%	na	40% and no standing pilots	na
Steam cooker, batch cooking	Elec	Cooking	26%	200 W/pan	50%	135 W/pan
Steam cooker, batch cooking	Gas	Cooking	15%	2,500 Btu/h/pan	38%	2,100 Btu/h/pan
Steam cooker, high production or cook to order	Elec	Cooking	26%	330 W/pan	50%	275 W/pan
Steam cooker, high production	Gas	Cooking	15%	5,000 Btu/h/pan	38%	4,300 Btu/h/pan

or cook to order						
Toaster	Elec	Cooking	—	1.8 kW average operating energy rate	na	1.2 kW average operating energy rate
Ice machine, IMH (ice-making head, H = ice harvest), H ≥ 450 lb/day	Elec	Ice	6.89 - 0.0011H kWh/100 lb ice	na	$37.72 * H^{-0.298}$ kWh/100 lb ice	na
Ice machine, IMH (ice-making head), H ≤ 450 lb/day	Elec	Ice	10.26 – 0.0086H kWh/100 lb ice	na	$37.72 * H^{-0.298}$ kWh/100 lb ice	na
Ice machine, RCU (remote condensing unit, w/o remote compressor, H < 1,000 lb/day)	Elec	Ice	8.85 - 0.0038H kWh/100lb ice	na	$22.95 * H^{-0.258} + 1.00$ kWh/100 lb ice	na
Ice machine, RCU (remote condensing unit), 1600 > H ≥ 1000 lb/day	Elec	Ice	5.10 kWh/100 lb ice	na	$22.95 * H^{-0.258} + 1.00$ kWh/100 lb ice	na
Ice machine, RCU (remote condensing unit), H ≥ 1600 lb/day	Elec	Ice	5.10 kWh/100lb ice	na	$-0.00011 * H + 4.60$ kWh/100 lb ice	na
Ice machine, SCU (self-contained unit), H < 175 lb/day	Elec	Ice	18.0 - 0.0469H kWh/100lb ice	na	$48.66 * H^{-0.326} + 0.08$ kWh/100 lb ice	na
Ice machine self-contained unit, H ≥ 175 lb/day	Elec	Ice	9.80 kWh/100 lb ice	na	$48.66 * H^{-0.326} + 0.08$ kWh/100 lb ice	na

Ice machine, water-cooled ice-making head, $H \geq 1436$ lb/day (must be on chilled loop)	Elec	Ice	4.0 kWh/100 lb ice	na	3.68 kWh/100 lb ice	na
Ice machine, water-cooled ice-making head, 500 lb/day < $H < 1436$ (must be on chilled loop)	Elec	Ice	5.58 – 0.0011H kWh/100 lb ice	na	5.13 - 0.001H kWh/100 lb ice	na
Ice machine, water-cooled ice-making head, $H < 500$ lb/day (must be on chilled loop)	Elec	Ice	7.80 – 0.0055H kWh/100 lb ice	na	7.02 - 0.0049H kWh/100 lb ice	na
Ice machine, water-cooled once-through (open loop)	Elec	Ice	Banned	Banned	Banned	Banned
Ice machine, water-cooled SCU (self-contained unit), $H < 200$ lb/day (must be on chilled loop)	Elec	Ice	11.4 – 0.0190H kWh/100 lb ice	na	10.6 - 0.177H kWh/100 lb ice	na
Ice machine, water-cooled self-contained unit, $H \geq 200$ lb/day (must be on chilled loop)	Elec	Ice	7.6 kWh/100 lb ice	na	7.07 kWh/100 lb ice	na

Chest freezer, solid or glass door	Elec	Refrig	0.45V + 0.943 kWh/day	na	$\leq 0.270V + 0.130$ kWh/day	na
Chest refrigerator, solid or glass door	Elec	Refrig	0.1V + 2.04 kWh/day	na	$\leq 0.125V + 0.475$ kWh/day	na
Glass-door reach-in freezer, $0 < V < 15$ ft ³	Elec	Refrig	0.75V + 4.10 kWh/day	na	$\leq 0.607V + 0.893$ kWh/day	na
Glass-door reach-in freezer, $15 \leq V < 30$ ft ³	Elec	Refrig	.75V + 4.10 kWh/day	na	$\leq 0.733V - 1.00$ kWh/day	na
Glass-door reach-in freezer, $30 \leq V < 50$ ft ³	Elec	Refrig	.75V + 4.10 kWh/day	na	$\leq 0.250V + 13.50$ kWh/day	na
Glass-door reach-in freezer, $50 \leq V$ ft ³	Elec	Refrig	0.75V + 4.10 kWh/day	na	$\leq 0.450V + 3.50$ kWh/day	na
Glass-door reach-in refrigerator, $0 < V < 15$ ft ³	Elec	Refrig	0.12V + 3.34 kWh/day	na	$\leq 0.118V + 1.382$ kWh/day	na
Glass-door reach-in refrigerator, $15 \leq V < 30$ ft ³	Elec	Refrig	0.12V + 3.34 kWh/day	na	$\leq 0.140V + 1.050$ kWh/day	na
Glass-door reach-in refrigerator, $30 \leq V < 50$ ft ³	Elec	Refrig	0.12V + 3.34 kWh/day	na	$\leq 0.088V + 2.625$ kWh/day	na
Glass-door reach-in refrigerator, $50 \leq V$ ft ³	Elec	Refrig	0.12V + 3.34 kWh/day	na	$\leq 0.110V + 1.500$ kWh/day	na
Solid-door reach-in freezer, $0 < V < 15$ ft ³	Elec	Refrig	0.4V + 1.38 kWh/day	na	$\leq 0.250V + 1.25$ kWh/day	na
Solid-door reach-in freezer, $15 \leq V < 30$ ft ³	Elec	Refrig	0.4V + 1.38 kWh/day	na	$\leq 0.400V - 1.000$ kWh/day	na

Solid-door reach-in freezer, $30 \leq V < 50$ ft ³	Elec	Refrig	$0.4V + 1.38$ kWh/day	na	$\leq 0.163V + 6.125$ kWh/day	na
Solid-door reach-in freezer, $50 \leq V$ ft ³	Elec	Refrig	$0.4V + 1.38$ kWh/day	na	$\leq 0.158V + 6.333$ kWh/day	na
Solid-door reach-in refrigerator, $0 < V < 15$ ft ³	Elec	Refrig	$0.1V + 2.04$ kWh/day	na	$\leq 0.089V + 1.411$ kWh/day	na
Solid-door reach-in refrigerator, $15 \leq V < 30$ ft ³	Elec	Refrig	$0.1V + 2.04$ kWh/day	na	$\leq 0.037V + 2.200$ kWh/day	na
Solid-door reach-in refrigerator, $30 \leq V < 50$ ft ³	Elec	Refrig	$0.1V + 2.04$ kWh/day	na	$\leq 0.056V + 1.635$ kWh/day	na
Solid-door reach-in refrigerator, $50 \leq V$ ft ³	Elec	Refrig	$0.1V + 2.04$ kWh/day	na	$\leq 0.060V + 1.416$ kWh/day	na
Clothes washer	Gas	Sanitation	1.72 MEF	na	2.00 MEF	na
Door-type dish machine, high temp	Elec	Sanitation	na	1.0 kW	na	0.70 kW
Door-type dish machine, low temp	Elec	Sanitation	na	0.6 kW	na	0.6 kW
Multitank rack conveyor dish machine, high temp	Elec	Sanitation	na	2.6 kW	na	2.25 kW
Multitank rack conveyor dish machine, low temp	Elec	Sanitation	na	2.0 kW	na	2.0 kW
Single-tank rack conveyor dish machine, high temp	Elec	Sanitation	na	2.0 kW	na	1.5 kW

Single-tank rack conveyor dish machine, low temp	Elec	Sanitation	na	1.6 kW	na	1.5 kW
Undercounter dish machine, high temp	Elec	Sanitation	na	0.9 kW	na	0.5 kW
Undercounter dish machine, low temp	Elec	Sanitation	Na	0.5 kW	na	0.5 kW

The energy efficiency, idle energy rates, and water use requirements, where applicable, are based on the following test methods:

- ASTM F1275 Standard Test Method for Performance of Griddles
- ASTM F1361 Standard Test Method for Performance of Open Deep Fat Fryers
- ASTM F1484 Standard Test Methods for Performance of Steam Cookers
- ASTM F1496 Standard Test Method for Performance of Convection Ovens
- ASTM F1521 Standard Test Methods for Performance of Range Tops
- ASTM F1605 Standard Test Method for Performance of Double-Sided Griddles
- ASTM F1639 Standard Test Method for Performance of Combination Ovens
- ASTM F1695 Standard Test Method for Performance of Underfired Broilers
- ASTM F1696 Standard Test Method for Energy Performance of Single-Rack Hot Water Sanitizing, ASTM Door-Type Commercial Dishwashing Machines
- ASTM F1704 Standard Test Method for Capture and Containment Performance of Commercial Kitchen Exhaust Ventilation Systems
- ASTM F1817 Standard Test Method for Performance of Conveyor Ovens
- ASTM F1920 Standard Test Method for Energy Performance of Rack Conveyor, Hot Water Sanitizing, Commercial Dishwashing Machines
- ASTM F2093 Standard Test Method for Performance of Rack Ovens
- ASTM F2140 Standard Test Method for Performance of Hot Food Holding Cabinets
- ASTM F2144 Standard Test Method for Performance of Large Open Vat Fryers
- ASTM F2324 Standard Test Method for Prerinse Spray Valves
- ASTM F2380 Standard Test Method for Performance of Conveyor Toasters
- ARI 810-2007: Performance Rating of Automatic Commercial Ice Makers
- ANSI/ASHRAE Standard 72-2005: Method of Testing Commercial Refrigerators and Freezers with temperature setpoints at 38°F for medium-temp refrigerators, 0°F for low-temp freezers, and -15°F for ice cream freezers

Table 1b. Commercial Kitchen Appliance Prescriptive Measures and Baseline for Energy Cost Budget (SI units)

Appliance type	Baseline energy usage for energy modeling path				Levels for prescriptive path	
	Fuel	Function	Baseline efficiency	Baseline idle rate	Prescriptive efficiency	Prescriptive idle rate
Broiler, underfired	Gas	Cooking	30%	50.5 kW/m ²	35%	37.9 kW/m ²
Combination oven, steam	Elec	Cooking	40% steam mode	0.37P+4.5 kW	50% steam mode	0.133P+0.6400 kW

mode (P = pan capacity)						
Combination oven, steam mode	Gas	Cooking	20% steam mode	(1 210P+ 35 810)/3 412 kW	38% steam mode	(200P+6 511)/ 3 412 kW
Combination oven, convection mode	Elec	Cooking	65% convection mode	0.1P+1.5 kW	70% convection mode	0.080P+0.4989 kW
Combination oven, convection mode	Gas	Cooking	35% convection mode	(322P+ 13 563)/ 3412 kW	44% convection mode	(150P+5 425)/ 3412 kW
Convection oven, full-size	Elec	Cooking	65%	2.0 kW	71%	1.6 kW
Convection oven, full-size	Gas	Cooking	30%	5.3 kW	46%	3.5 kW
Convection oven, half-size	Elec	Cooking	65%	1.5 kW	71%	1.0 kW
Conveyor oven, > 63.5 cm belt	Gas	Cooking	20%	20.5 kW	42%	16.7 kW
Conveyor oven, < 63.5 cm belt	Gas	Cooking	20%	13.2 kW	42%	8.5 kW
Fryer	Elec	Cooking	75%	1,05 kW	80%	1.0 kW
Fryer	Gas	Cooking	35%	4.1 kW	50%	2.64 kW
Griddle (based on 90-cm model)	Elec	Cooking	60%	4.3 kW/m ²	70%	3 .45 kW/m ²
Griddle (based on 90-cm model)	Gas	Cooking	30%	11 kW/m ²	33%	8.35 kW/m ²
Hot food holding cabinets (excluding drawer warmers and heated display) 0 < V < 0.368 m ³ (V = volume)	Elec	Cooking	Na	1.4 kW/m ³	na	(21.5*V)/0.0283 kW/m ³
Hot food holding cabinets (excluding drawer warmers and heated display),	Elec	Cooking	Na	1.4 kW/m ³	na	(2.0*V + 254)/0.0283 kW/m ³

$0.368 \leq V < 0.793 \text{ m}^3$						
Hot food holding cabinets (excluding drawer warmers and heated display), $0.793 \text{ m}^3 \leq V$	Elec	Cooking	Na	1.4 kW/m ³	na	$(3.8*V + 203.5)/0.0283 \text{ kW/m}^3$
Large vat fryer	Elec	Cooking	75%	1.35 kW	80%	1.1 kW
Large vat fryer	Gas	Cooking	35%	5.86 kW	50%	3.5 kW
Rack oven, double	Gas	Cooking	30%	19 kW	50%	10.25 kW
Rack oven, single	Gas	Cooking	30%	12.6 kW	50%	8.5 kW
Range	Elec	Cooking	70%	na	80%	na
Range	Gas	Cooking	35%	na	40% and no standing pilots	na
Steam cooker, batch cooking	Elec	Cooking	26%	200 W/pan	50%	135 W/pan
Steam cooker, batch cooking	Gas	Cooking	15%	733 W/pan	38%	615 W/pan
Steam cooker, high production or cook to order	Elec	Cooking	26%	330 W/pan	50%	275 W/pan
Steam cooker, high production or cook to order	Gas	Cooking	15%	1.47 kW/pan	38%	1.26 kW/pan
Toaster	Elec	Cooking	Na	1.8 kW average operating energy rate	na	1.2 kW average operating energy rate
Ice machine, IMH (ice making head, H = ice harvest) $H \geq 204 \text{ kg/day}$	Elec	Ice	$0.0015 - 5.3464E^{-07} \text{ kWh/kg ice}$	na	$\leq 13.52*H^{0.298} \text{ kWh/100 kg ice}$	na
Ice machine, IMH (ice making head), $H < 204 \text{ kg/day}$	Elec	Ice	$0.2262 - 4.18E^{-04} \text{ kWh/kg ice}$	na	$\leq 13.52*H^{0.298} \text{ kWh/100 kg ice}$	na
Ice machine, RCU (remote condensing)	Elec	Ice	$0.1951 - 1.85E^{-04} \text{ kWh/kg ice}$	na	$\leq 111.5835H^{0.258} + 2.205 \text{ kWh/100 kg ice}$	na

unit, w/o remote compressor) H < 454 kg/day						
Ice machine, RCU (remote condensing unit) 726 > H ≥ 454 kg/day	Elec	Ice	0.1124 kWh/kg ice	na	$\leq 111.5835H^{0.258} + 2.205$ kWh/100 kg ice	na
Ice machine, RCU (remote condensing unit), H ≥ 726kg/day	Elec	Ice	0.1124 kWh/kg ice	na	$\leq -0.00024H + 4.60$ kWh/100 kg ice	na
Ice machine, SCU (self contained unit), H < 79 kg/day	Elec	Ice	0.3968 - 2.28E ⁻⁰³ kWh/kg ice	na	236.59H ^{-0.326} + 0.176 kWh/100 kg ice	na
Ice machine, SCU (self contained unit), H ≥ 79 kg/day	Elec	Ice	0.2161 kWh/kg ice	na	236.59H ^{-0.326} + 0.176 kWh/100 kg ice	na
Ice machine, water-cooled ice-making head, H ≥ 651 kg/day(must be on a chilled loop)	Elec	Ice	0.0882 kWh/kg ice	na	≤ 8.11 kWh/100 kg ice	na
Ice machine, water-cooled ice-making head, 227 ≤ H < 651 kg/day (must be on a chilled loop)	Elec	Ice	0.1230 - 5.35E ⁻⁰⁵ kWh/kg ice	na	$\leq 11.31 - 0.065H$ kWh/100 kg ice	na
Ice machine, water-cooled ice-making head, H < 227 kg/day(must be on a chilled loop)	Elec	Ice	0.1720 - 2.67E ⁻⁰⁴ kWh/kg ice	na	$\leq 15.48 - 0.0238H$ kWh/100 kg ice	na
Ice machine, water-cooled once-through (open loop)	Elec	Ice	Banned	Banned	Banned	Banned
Ice machine, water cooled SCU (self-	Elec	Ice	0.2513 - 9.23E ⁻⁰⁴ kWh/kg ice	na	$\leq 23.37 - 0.086H$	na

contained unit) $H < 91$ kg/day (must be on a chilled loop)					kWh/100 kg ice	
Ice machine, water cooled SCU (self-contained unit) $H \geq 91$ kg/day (must be on a chilled loop)	Elec	Ice	0.1676 kWh/kg ice	na	15.57 kWh/100 kg ice	na
Chest freezer, solid or glass door	Elec	Refrig	15.90V + 0.943 kWh/day	na	9.541V + 0.130 kWh/day	na
Chest refrigerator, solid or glass door	Elec	Refrig	3.53V + 2.04 kWh/day	na	≤ 4.417 V + 0.475 kWh/day	na
Glass-door reach-in freezer, $0 < V < 0.42$ m ³	Elec	Refrig	26.50V + 4.1 kWh/day	na	≤ 21.449 V + 0.893 kWh/day	na
Glass-door reach-in freezer, $0.42 \leq V < 0.85$ m ³	Elec	Refrig	26.50V + 4.1 kWh/day	na	≤ 25.901 V – 1.00 kWh/day	na
Glass-door reach-in freezer, $0.85 \leq V < 1.42$ m ³	Elec	Refrig	26.50V + 4.1 kWh/day	na	≤ 8.834 V + 13.50 kWh/day	na
Glass-door reach-in freezer, $1.42 \leq V$ m ³	Elec	Refrig	26.50V + 4.1 kWh/day	na	≤ 15.90 V + 3.50 kWh/day	na
Glass-door reach-in refrigerator, $0 < V < 0.42$ m ³	Elec	Refrig	4.24V + 3.34 kWh/day	na	≤ 4.169 V + 1.382 kWh/day	na
Glass-door reach-in refrigerator, $0.42 \leq V < 0.85$ m ³	Elec	Refrig	4.24V + 3.34 kWh/day	na	≤ 4.947 V + 1.050 kWh/day	na
Glass-door reach-in refrigerator, $0.85 \leq V < 1.42$ m ³	Elec	Refrig	4.24V + 3.34 kWh/day	na	≤ 3.109 V + 2.625 kWh/day	na
Glass-door reach-in refrigerator, $1.42 \leq V$ m ³	Elec	Refrig	4.24V + 3.34 kWh/day	na	≤ 3.887 V + 1.500 kWh/day	na

Solid-door reach-in freezer, $0 < V < 0.42 \text{ m}^3$	Elec	Refrig	14.13V + 1.38 kWh/day	na	$\leq 8.834V + 1.25$ kWh/day	na
Solid-door reach-in freezer, $0.42 \leq V < 0.85 \text{ m}^3$	Elec	Refrig	14.13V + 1.38 kWh/day	na	$\leq 4.819V - 1.000$ kWh/day	na
Solid-door reach-in freezer, $0.85 \leq V < 1.42 \text{ m}^3$	Elec	Refrig	14.13V + 1.38 kWh/day	na	$\leq 5.760V + 6.125$ kWh/day	na
Solid-door reach-in freezer, $1.42 \leq V \text{ m}^3$	Elec	Refrig	14.13V + 1.38 kWh/day	na	$\leq 5.583V + 6.333$ kWh/day	na
Solid-door reach-in refrigerator, $0 < V < 0.42 \text{ m}^3$	Elec	Refrig	3.53V + 2.04 kWh/day	na	$\leq 3.145V + 1.411$ kWh/day	na
Solid-door reach-in refrigerator, $0.42 \leq V < 0.85 \text{ m}^3$	Elec	Refrig	3.53V + 2.04 kWh/day	na	$\leq 1.307V + 2.200$ kWh/day	na
Solid-door reach-in refrigerator, $0.85 \leq V < 1.42 \text{ m}^3$	Elec	Refrig	3.53V + 2.04 kWh/day	na	$\leq 1.979V + 1.635$ kWh/day	na
Solid-door reach-in refrigerator, $1.42 \leq V \text{ m}^3$	Elec	Refrig	3.53V + 2.04 kWh/day	na	$\leq 2.120V + 1.416$ kWh/day	na
Clothes washer	Gas	Sanitation	1.72 MEF		2.00 MEF	
Door-type dish machine, high temp	Elec	Sanitation	Na	1.0 kW	na	0.70 kW
Door-type dish machine, low temp	Elec	Sanitation	Na	0.6 kW	na	0.6 kW
Multitank rack conveyor dish machine, high temp	Elec	Sanitation	Na	2.6 kW	na	2.25 kW
Multitank rack conveyor dish	Elec	Sanitation	Na	2.0 kW	na	2.0 kW

machine, low temp						
Single-tank rack conveyor dish machine, high temp	Elec	Sanitation	na	2.0 kW	na	1.5 kW
Single-tank rack conveyor dish machine, low temp	Elec	Sanitation	Na	1.6 kW	na	1.5 kW
Undercounter dish machine, high temp	Elec	Sanitation	Na	0.9 kW	na	0.5 kW
Undercounter dish machine, low temp	Elec	Sanitation	Na	0.5 kW	na	0.5 kW

The energy efficiency, idle energy rates, and water use requirements, where applicable, are based on the following test methods:

ASTM F1275 Standard Test Method for Performance of Griddles

ASTM F1361 Standard Test Method for Performance of Open Deep Fat Fryers

ASTM F1484 Standard Test Methods for Performance of Steam Cookers

ASTM F1496 Standard Test Method for Performance of Convection Ovens

ASTM F1521 Standard Test Methods for Performance of Range Tops

ASTM F1605 Standard Test Method for Performance of Double-Sided Griddles

ASTM F1639 Standard Test Method for Performance of Combination Ovens

ASTM F1695 Standard Test Method for Performance of Underfired Broilers

ASTM F1696 Standard Test Method for Energy Performance of Single-Rack Hot Water Sanitizing,

ASTM Door-Type Commercial Dishwashing Machines

ASTM F1704 Standard Test Method for Capture and Containment Performance of Commercial Kitchen Exhaust Ventilation Systems

ASTM F1817 Standard Test Method for Performance of Conveyor Ovens

ASTM F1920 Standard Test Method for Energy Performance of Rack Conveyor, Hot Water Sanitizing, Commercial Dishwashing Machines

ASTM F2093 Standard Test Method for Performance of Rack Ovens

ASTM F2140 Standard Test Method for Performance of Hot Food Holding Cabinets

ASTM F2144 Standard Test Method for Performance of Large Open Vat Fryers

ASTM F2324 Standard Test Method for Prerinse Spray Valves

ASTM F2380 Standard Test Method for Performance of Conveyor Toasters

ARI 810-2007: Performance Rating of Automatic Commercial Ice Makers

ANSI/ASHRAE Standard 72–2005: Method of Testing Commercial Refrigerators and Freezers with temperature setpoints at 38°F (3°C) for mediumtemp refrigerators, -18°C for low-temp freezers, and -26°C for ice cream freezers.

Table 2. Supermarket refrigeration prescriptive measures and baseline for energy cost budget

Item	Attribute	Prescriptive measure	Baseline for energy modeling path
Commercial Refrigerator and Freezers	Energy Use Limits	ASHRAE 90.1-2010 Addendum g. Table 6.8.1L	ASHRAE 90.1-2010 Addendum g. Table 6.8.1L
Commercial Refrigeration Equipment	Energy Use Limits	ASHRAE 90.1-2010 Addendum g. Table 6.8.1M	ASHRAE 90.1-2010 Addendum g. Table 6.8.1M

Table 3. Walk-in coolers and freezers prescriptive measures and baseline for energy cost budget

Item	Attribute	Prescriptive measure	Baseline for energy modeling path
Envelope	Freezer insulation	R-46	R-36
	Cooler insulation	R-36	R-20
	Automatic closer doors	Yes	No
	High-efficiency low- or no-heat reach-in doors	40W/ft (130W/m) of door frame (low temperature), 17W/ft (55W/m) of door frame (medium temperature)	40W/ft (130W/m) of door frame (low temperature), 17W/ft (55W/m) of door frame (medium temperature)
Evaporator	Evaporator fan motor and control	Shaded pole and split phase motors prohibited; use PSC or EMC motors	Constant-speed fan
	Hot gas defrost	No electric defrosting.	Electric defrosting
Condenser	Air-cooled condenser fan motor and control	Shaded pole and split phase motors prohibited; use PSC or EMC motors; add condenser fan controllers	Cycling one-speed fan
	Air Cooled condenser design approach	Floating head pressure controls or ambient subcooling	10°F (-12°C) to 15°F (-9°C) dependent on suction temperature
Lighting	Lighting power density (W/sq.ft.)	0.6 W/sq.ft. (6.5 W/sq. meter)	0.6 W/sq.ft. (6.5 W/sq. meter)
Commercial Refrigerator and Freezers	Energy Use Limits	N/A	Use an Exceptional Calculation Method if attempting to take savings
Commercial Refrigerator and Freezers	Energy Use Limits	N/A	Use an Exceptional Calculation Method if attempting to take savings

Table 4. Commercial kitchen ventilation prescriptive measures and baseline for energy cost budget

Strategies	Prescriptive measure	Baseline
Kitchen hood control	ASHRAE 90.1-2010 Section 6.5.7.1, except that Section 6.5.7.1.3 and Section 6.5.7.1.4 shall apply if the total kitchen exhaust airflow rate exceeds 2,000 cfm (960 L/s) (as opposed to 5,000 cfm (2,400 L/s) noted in the ASHRAE 90.1-2010 requirements)	ASHRAE 90.1-2010 Section 6.5.7.1 and Section G3.1.1 Exception (d) where applicable

